

**Constructing China's National Food Security:  
Power, Grain Seed Markets, and the Global Political Economy**

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# Examining Committee Membership

The following served on the Examining Committee for this thesis. The decision of the Examining Committee is by majority vote.

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# **Author's Declaration**

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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# Abstract

What is China's place in the global food system? This thesis provides an analytical lens to explain the factors behind the structure of China's national seed industry and recent global agribusiness expansion. Scholars of Global Political Economy and critical food studies have begun to assess the (re)emergence of actors from China in global markets replete with powerful agribusiness from the global North. However, these scholars have thus far paid less attention to the domestic, normative origins and dynamics that explain China's place in the global food system. For example, though the global grain seed industry is highly concentrated, China's domestic grain seed market does not share the same characteristics. To explain this discrepancy and shed light on the place of China in the global food system, I develop the concept of securitized foodways.

Securitized foodways is built on a power framework that incorporates both positive and negative forms of power. Three dimensions of power (ideational, material, and autonomy) correspond to three factors that have shaped China's grain seed industry, its place in the global food system, and its broader economy. The first factor is the Party-state's ideational priority of self-reliance, particularly in the context of grain security. In contrast to other large Southern countries (e.g., India and the Philippines), the historical priority for China to be self-reliant has led to a distinct conception of national food security focused on national ownership over each segment of the grain supply chain and particularly seed resources. The second factor is the Party-state's control over its domestic agrifood system through law and regulation limiting the participation of foreign seed companies. More recently, the Party-state's power over its domestic grain seed markets has shifted into nascent material power in the global food system. This expansion of Chinese agribusiness in the name of national food security occurs through a combination of overseas seed extension projects as well as through the acquisition of foreign agribusinesses including Syngenta, Noble, and Nidera. The third factor is China's historical autonomy from the U.S. food regime (1950s to 1970s). China remained independent of the agrifood networks developed under the U.S.-led green revolution and food aid architecture, instead establishing its own domestic research networks and extension system. This autonomy provided the Party-state with the power necessary to retain domestic policy space, develop a home-grown seed industry, and challenge the dominance of Northern agribusiness firms in the global food system.

Combined, the three factors explain China's domestic grain seed market structure (ideational priority of self-reliant national food security, material power over the domestic food system, and historical autonomy from the U.S. food regime). Further, these factors serve to explain and interpret the recently expanded presence of actors from the PRC in global grain and grain seed markets. Despite pressure from MNCs and other states, national agribusinesses continue to hold market share in China's domestic grain seed market

demonstrating both the continued normative commitment of Party-state actors to support national industry and the material power to maintain control over national markets in the context of economic globalization. These national Chinese agribusinesses (with the help of financial actors) have also rapidly increased their presence abroad to compete in both domestic and global markets.

However, despite the exercise of material power in the global food system, actors from China have not yet displaced the incumbent agribusiness power of MNCs headquartered in the global North. Further, there are challenges and impacts related to the pursuit of national food security through domestically owned industrial agriculture. Given MNC ownership of patents, the potential introduction of genetically modified (GM) grain seeds to the domestic Chinese market presents a challenge to the Party-state's continued control over the PRC's seed industry. Further, the growing commercial seed system and discourse of national food security has placed pressure on, but also provided limited space for, alternative food movements within China. These food movements share similar ideational concerns to the Party-state vis-à-vis global agribusiness concentration, but promote a path to food security rooted in local food systems. As agribusinesses from China, with strong connections to the Party-state, expand their global grain and seed networks, both GM seeds and food alternatives are domestic sources of contention for the Party-state's emerging agrifood power.

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# List of Abbreviations

AFN	Alternative food network
BPI	Bureau of Plant Industry
CAAS	Chinese Academy of Agricultural Science
CIMMYT	International Maize and Wheat Improvement Center
CGIAR	Consultative Group for International Agricultural Research
CNSGC	China National Seed Group Corporation
CPC	Communist Party of China
CRRRI	Central Rice Research Institute
ESFAC	Esso Standard Fertilizer and Agricultural Chemical Company
FAO	Food and Agriculture Organization of the United Nations
GM	Genetically modified
GPE	Global Political Economy
HRRC	Hunan Hybrid Rice Research Center
HYV	High-yield variety
ICAR	Indian Council of Agricultural Research
IEB	International Education Board
IRC	International Rice Commission
IRRI	International Rice Research Institute
JCRR	Joint Commission on Rural Reconstruction
LPHT	Longping High-tech Agriculture
LSMRRC	Liang Shuming Rural Reconstruction Center
MNC	Multinational Corporation
NARB	National Agricultural Research Bureau
NDRC	National Development and Reform Commission
NSC	National Seed Corporation
PRC	People's Republic of China
SASAC	State-owned Assets Supervision and Administration Commission
SLAC	SL Agritech Corporation
SOE	State-owned enterprise
SSA	Sub-Saharan Africa
TWN	Third World Network
UPCA	University of Philippines College of Agriculture
USAID	United States Agency for International Development
WTO	World Trade Organization

# Chapter 1: Introduction

## 1.1. Research problem and context

Actors from the People's Republic of China (PRC) are becoming key players in global agrifood markets, an outcome motivated in large part by the Chinese Party-state's normative commitment to national food security. Over the last decade, scholars have become increasingly focused on the PRC's place in a shifting world order. To assess the parameters of these shifts as they pertain to China, most attention is given to traditionally powerful areas of the global economy, including international currencies, high finance, and heavy industry. However, the global food system is a significant part of the global political economy and is likewise experiencing shifting power dynamics in relation to China. This dissertation develops argumentation and theory to explain and interpret the changing place of the PRC in the global food system and broader global political economy.

For more than a century, states, institutes, and agribusinesses based in Europe and North America have had a dominant influence in global food and agricultural development. These actors play a central role in managing demand and supply, diffusing agricultural input technologies including genetically modified (GM) seeds, shipping commodities across the globe, and designing the rules under which food systems operate (Clapp & Fuchs, 2009; McMichael, 2009). However, the interaction between actors from the PRC with the global food economy of Western agribusiness has only expanded over the last several decades. The PRC now imports 63% of internationally traded soybean, while also importing several million tons of rice, wheat, and corn;

further, agribusinesses from the PRC are investing abroad in multiple sectors (USDA, 2018). Though much of the soybean that China imports is GM, no GM grain seeds have yet been approved for commercial planting in the country (Zhang, 2018). On one hand, China's domestic production, agricultural markets, environment, and alternative food movements are changing (Si, Schumilas, & Scott, 2015; Zhang & Donaldson, 2008). On the other hand, agribusiness investment from the PRC is expanding overseas (Schneider, 2017; Yan, Chen, & Bun, 2016). What do these trends mean for the power structures of the global food system and economy?

The place of actors from China within the contemporary global food system is complex and poorly understood. For example, scholars analysing the global land grab initially pointed to PRC agribusiness as a main contributor to global land dispossession, but have since been corrected (Brautigam, 2015; Lawther, 2017; Oliveira, 2017). Scholars of Global Political Economy (GPE) are increasingly pointing to the changing power-dynamics held by BRICS countries at the expense of actors traditionally prominent in food regimes (Hopewell, 2014).<sup>1</sup> Food regime theorists, who argue that the current food system has its roots in the post-WWII period of United States pre-eminence, are faced with difficulty interpreting potential new food regimes since the acceleration of economic globalization in the 1980s (Burch & Lawrence, 2009; Pritchard, 2009). The presence of state and commercial actors originating from China is clearly becoming more significant in the agrifood sector (Schneider, 2017). However, contemporary analysts often take an ahistorical approach to the PRC, using existing

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<sup>1</sup> I use the capitalized term Global Political Economy (GPE) to denote the diverse field of scholarship, whereas the non-capitalized term "global political economy" refers to the empirical context of global economics and politics.

frameworks that emerged from hegemony based in the United States and Europe (see McMichael, 2013).

Chinese state and agribusiness experience in the global food system prior to engaging with economic globalization in the 1980s is often overlooked and has bearing on the shape of the Party-state's current power in the global food system. Meanwhile, power dynamics in the global food system are intimately related to the broader place of the PRC in the global political economy. The term "Party-state" is used throughout this dissertation to refer to the Communist Party of China (CPC) (*Zhōngguó gòngchǎndǎng*, 中国共产党) and the collection of state and business actors within the PRC that enact CPC policy. The CPC is at the center of these actors through its integrated relationship to state organs, national regulations, and state-owned enterprises, and also is correspondingly central to shaping ideological frameworks for national priorities (Pearson, 2005, 2015). Despite the CPC's centrality to Chinese politics, its economic and political openness has varied over time and issue areas (Shambaugh, 2018). While some see the Party-state as increasingly fragmented in its mobilization of actors and institutions towards national objectives, this is less the case in the context of key strategic industries for national security and economic importance (Chin, 2010; Hsueh, 2011; Pearson, 2015). The grain seed and grain trade industries are key sectors from the Party-state's perspective of national food grain security, and public opinion is highly attuned to food security and safety as seen in the rise of alternative food movements in China (Dickson, 2016; Pei et al., 2011; Si, Schumilas, & Scott, 2015; Zhang, 2018).

This dissertation uses a contemporary puzzle, and an answer that reaches into history, to explain the reasons, mechanisms, and trajectory of China's changing position

in the global food system. The central puzzle that drives this dissertation relates to the comparative structure of the global grain seed industry vis-à-vis the particular context of the PRC. A high level of corporate concentration characterizes the global grain sector from seed to table. A handful of agribusiness multinationals account for the majority of the world's commercial grain and seed sales, including Monsanto, DuPont-Pioneer, Syngenta, ADM, Bunge, Cargill, and Louis Dreyfus (Murphy, Burch, & Clapp, 2012); these companies are usually headquartered in Northern countries, and particularly in the United States, western Europe, and Japan. A similar oligopolistic pattern is replicated throughout most industrialized countries and many large developing countries (Clapp & Fuchs, 2009). However, the PRC's domestic grain seed industry is highly fragmented, with these top multinational corporations (MNCs) typically accounting for less than 20% of market share combined (CCM 2015g; Hicks, 2014). In contrast, more than 50% of the PRC's vegetable seed market is occupied by MNCs (CCM, 2015c, 31). This begs the question: ***What explains the low concentration of the dominant agribusiness multinationals in the PRC's commercial grain seed market, and what is the relationship between the PRC's grain seed industry structure and the overall place of China in the global food system?*** In responding to this question, this dissertation establishes a concrete basis for understanding key motivations of the Chinese Party-state's engagement in the global food system, and global political economy, through the concept of *securitized foodways*.

## 1.2. Argument

The place of actors from China in the global food system is heavily contested. Scholars of global political economy and critical food studies have observed a broad consolidation of global capital that extends to China (ETC Group, 2013; Nolan, 2012); yet actors from the PRC are often presented as outsiders to, or challengers of this system (Belesky & Lawrence, 2018). The truth lies uncomfortably in the middle of these two extremes. In response to the research question posed above, my central argument is laid out in three steps:

- 1) *The Party-state, through networks of nationally-owned agribusiness and financial actors, seeks to retain and expand control over domestic and international grain and seed markets,*
- 2) *The pursuit of control over agricultural markets is driven by the Party-state's national food security objective, which relies on control over international flows of grain and grain seed in the context of economic globalization, and*
- 3) *The Party-state's ability to define and carry out its national food security objective was made possible by the PRC's historical experience with and autonomy from the U.S.-led food system of the mid-20<sup>th</sup> century.*

The central concept of this dissertation is securitized foodways, a form of national food security based on self-reliance attained through controlled engagement of global supply chains. I develop the concept of securitized foodways to explain China's state-agribusiness partnerships and controlled competition in global agribusiness. It is both an explanatory framework for China's contemporary place in the global food system and



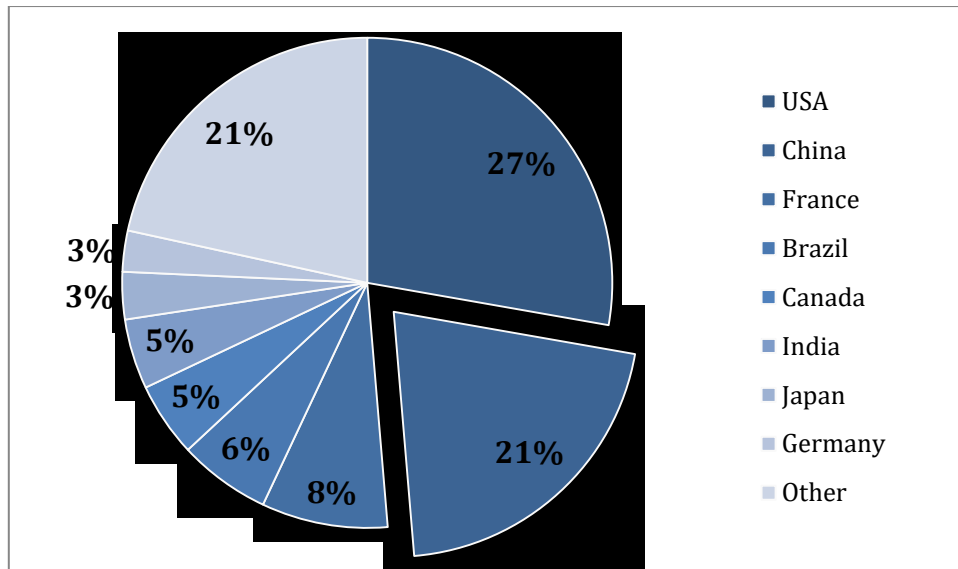
a heuristic to understand future motivations and actions of the Party-state within the global political economy of food. The concept is built on an adapted power framework using forms and dimensions of power developed in GPE and International Relations. I focus on two forms of power: positive and negative. Within these forms, I focus on three key dimensions of power identified in the literature: 1) ideational, 2) material, and 3) autonomy (Barnett & Duval, 2005; Clapp & Fuchs, 2009; Cohen & Chiu, 2014). Ideational and material dimensions are positive forms of power. Ideational power relates to national norms regarding food security and self-reliance and material power relates to influence over actors and the ability to shape the parameters under which other actors must operate. Conversely, the autonomy dimension is a negative form of power referring to the ability to withstand the influence of others. Positive and negative forms of power, their respective dimensions, and corresponding framework are elaborated in depth in Chapter 3.

Why is this line of argumentation important? As noted above, imports of grains to China have surged since the 1990s, including GM grains, drawing wide attention. Other scholars have covered these broad dynamics in detail (Cui & Shoemaker, 2018; Smil, 2004; Zhang, 2018). The PRC's urbanizing population continues to grow, reaching 1.37 billion in 2016, but is expected to stabilize at or decrease from 1.42 billion after 2025 (Cui & Shoemaker, 2018). However, meat consumption in the PRC accelerated since the 1980s, with annual per capita consumption of meat increasing significantly from 4kg in 1961 to 61kg in 2010 (Weis, 2013). This increase fuelled domestic consumption of grain for direct consumption, animal feed, and further processing (Cui & Shoemaker, 2018). At US\$9 billion in 2012, the PRC's commercial seed market was the second largest in the

world next to the U.S. and larger than France (McNabb, 2013). As shown in Figure 1.1, the PRC's domestic seed market is larger than the next 5 biggest commercial seed markets combined (Brazil, Canada, India, Japan, and Germany).

The future of grain demand in China remains unclear in terms of the production, consumption, and imports of both grain and meat, with estimates pointing in different directions (Cui & Shoemaker, 2018; Zhang, 2018). Nevertheless, significant attention is paid to these dynamics in the media. Journalistic pieces are trying to make sense of the recent presence of actors from the PRC in the global food system, with the Wall Street Journal publishing an article titled *China Seeks to Develop Global Seed Power* and CNN asking *Why is China Buying the World's Seeds* (Petroff, 2017; Tsang, 2017; Yap, 2015). The PRC is seen as an increasingly significant player in the global food system. Given China's sheer size, increased economic growth, and position in the broader global political economy, it is crucial to understand the underlying motivations and strategy of the Party-state in terms of grain security. The arguments above, and the concept of securitized foodways, seek to both explain and provide a sense of order to the barrage of information on the subject.

**Figure 1.1: Domestic seed market as a portion of the world seed market**



**Source:** McNabb, 2013

At this point, it is important to identify what this dissertation is and is not. This dissertation is not about the PRC's domestic resource requirements, nor is it about neo-Malthusian arguments of global resource scarcity (see Brown, 1995; Ma & Adams, 2013; Smil, 2016). The issues that concern neo-Malthusian perspectives are often lurking in the background and may at times even have an influence on the motivations of policymakers. They do not, however, explain why the PRC has been able to maintain control over its seed industry, nor why outward investment from the PRC (including land grabs) has not resulted in *increased* shipments of grain back to the PRC (Brautigam & Zhang, 2013; Lawther, 2017). Further, this dissertation does not account for the entire PRC agricultural economy. There are many sectors beyond grain and grain seed that are important and may have distinct dynamics in the context of the PRC and the global food system, for example aquaculture, livestock (meat and dairy), and processed foods (Schneider, 2017; Zhang, 2018). In addition, despite focusing on the PRC's engagement in the global food system through both trade and investment, this dissertation is not

about the PRC being integrated into a liberal international economic order or the corporate food regime (Ikenberry, 2008; McMichael, 2012). Liberal and food regime perspectives do not account for the normative priority for the Party-state to exert ownership and control in the global economy. Rather, liberals assume the pursuit of market benefits, and food regime scholars focus on corporate hegemony within a capitalist food system.

This dissertation is about the formation of ideas regarding national food security and the material structures required to act on these ideas. I draw on constructivist insights and an economic nationalist lens to illustrate how political priorities are established and change over time, and the ways in which these ideas interact with economic actors in domestic and international markets (Abdelal, 2001; Abdelal, Blyth, & Parsons, 2015). In doing so, I adapt a mix of theoretical backgrounds from critical GPE and food studies. I take a meso-level perspective of the PRC's grain and grain seed sectors, concentrating specifically on the identified key food grains in the PRC, in particular rice, corn, soybean, and wheat. Generally, I focus on theoretical traditions in GPE that, "turn liberalism on its head and mak[e] politics the premise of economics" (Paul & Amawi, 2013, 183). It is these political priorities formulated by the Party-state that shape a national security strategy to securitize foodways through the exercise of power in the global food economy. I do not, however, conceive of ideas as being the singular determinant of outcomes. Rather, I acknowledge that material and historical factors interact with and help to both shape ideas and make it possible to act on them.

## **1.3. Contributions and thesis structure**

In developing the arguments in this dissertation, I make three types of contributions: 1) empirical contributions to the existing literature on the historical and contemporary development of China's seed and agribusiness industries; 2) analytical contributions to food studies and GPE by interpreting the PRC's approach to power in the global political economy; and 3) theoretical contributions to situate the PRC relative to the global food regime heuristic and study of the global food system.

### ***1.3.1. Empirical contributions: the development of China's seed industry***

This dissertation contributes layers of empirical information that piece together the structure of China's seed industry and global agribusiness. It does so both over time and space, with a focus on global connections and disjunctures. This work provides historical detail, tracing the linkages between Republican China's (1920-1949) international agricultural partnerships and their relationship to the green revolution in India and the Philippines (1950s-1970s). The green revolution refers to the period, beginning in the 1950s, when U.S. actors promoted the diffusion of agricultural technologies throughout the global South, particularly grain seed and agrochemical inputs (Cullather, 2010). It compares these linkages with the PRC's separation from international agricultural actors that once spread throughout Mainland China. The historical treatment in this dissertation's early chapters brings together, compares, and contrasts events in a novel approach, emphasizing the shadow history of the green revolution in Asia. Most importantly, it makes the case that the PRC was purposefully disconnected in specific ways from the precursor to contemporary global agribusiness expansion, the green

revolution. In doing so, I contribute to literature on the politics of the green revolution, and specifically China's place in, and in contrast with, the green revolution (Cullather, 2010; Perkins, 1997; Schmalzer, 2016)

Building on the above historical contributions, I subsequently develop a contemporary account of the PRC's domestic seed industry, its connections to multinational agribusiness enterprises, and assess the place of alternative food movements in the PRC. I illustrate the structure of China's domestic grain seed industry and trace the development of seed enterprises, controlled inclusion of foreign germplasm and technological resources, and the entry of major foreign agribusiness into China's seed market. I also offer a detailed case example of the complexities surrounding GM rice seed (*Bt* rice), and the interconnection between domestic research institutes, Chinese seed companies, and the proprietary technologies of MNCs. To my knowledge, it is one of the first discussions of such dynamics in English-language academic literature (for an exception, see Zhang, 2018). Illustrating seed industry development and expansion in the PRC will contribute both to literature on China's domestic agricultural systems (Veeck & Shui, 2011; Zhang & Donaldson, 2008) and to GPE scholarship on corporate concentration and power (Clapp & Fuchs, 2009; Murphy, 2008).

I also present empirical detail on outward agribusiness acquisitions by Chinese firms, and interactions between the PRC and other states in the global food system. These details offer empirical investigation of the changing footprint of the PRC's global agricultural commodity infrastructure, and its relationship to dominant global agribusinesses. More specifically, I provide detailed examples of outward investment by Chinese grain and seed companies in South/Southeast Asia and sub-Saharan Africa

(SSA), as well as the acquisition of major global agribusinesses by state-owned enterprise (SOE) investors. The latter example brings forward the recent interactions between dominant global agribusiness and actors from the PRC: the PRC's rejection of Syngenta's GM corn in 2014/15, COFCO's (*Zhōngguó liángyóu shípǐn yǒuxiàn gōngsī*, 中国粮油食品有限公司) acquisition of Noble and Nidera in 2015/16, and the acquisition of Syngenta by ChemChina (*Zhōngguó huàgōng jítuán gōngsī*, 中国化工集团公司) in 2016/17. By bringing together the networks of international resources held by agribusiness from the PRC (much of which is technically owned by the Party-state), I bring new information to GPE scholarship, particularly in the context of the global food system and food regimes, as well as to the land grab literature (Belesky & Lawrence, 2018; Cotula, 2013; McMichael, 2013).

Finally, I examine the activities of alternative food movements in China, juxtaposing the discourse of the Party-state and agribusiness actors with that of nascent food sovereignty activists. This comparison reveals striking similarities regarding views and priorities between each, providing discursive openings for cooperation. Both state-corporate actors and food sovereignty activists point to global agribusiness concentration as an issue, however each offers a very different approach to defining desirable food systems. This distinction is important as the PRC's dominant industrial food system has led to increased pollution, whereas alternative food movements advocate more sustainable solutions (Si, Koberinski, & Scott, forthcoming). Further, I report on the undertakings of seed activists in China, and their efforts to shape state policy to retain space for farmer seed-saving practices. To my knowledge, much of this information has not been previously discussed in academic research, and contributes to

literature on alternative food movements and food sovereignty in the PRC (Schumilas, 2014; Si et al., 2015). However, I also question assertions that the PRC is a participant in the food sovereignty movement by pointing to the policy priorities within national food grain security that promote industrial forms of commercial agriculture (see Zhang, 2018).

### ***1.3.2. Analytical contributions: interpreting China's agribusiness power***

The above empirical contributions are intimately tied to the analytical objective of interpreting China's agribusiness power – particularly in the grain and seed industries. Current studies that address agribusiness power writ large typically focus on multinational agribusiness based in high-income countries (Lang & Heasman, 2015). The approach is most often used to assess the power of agribusiness to set private rules and influence states (Clapp & Fuchs, 2009). Given their global reach, these entities are often seen as existing separate from their home states. The analysis presented in this dissertation provides an alternative perspective, demonstrating the close (though not linear) relationship between the Party-State and agribusiness based in China. In this analysis, state power is intimately connected to corporate power, in terms of ownership over physical infrastructure and technology, the creation of parameters that shape behaviour, and through acting on national goals. Key to this perspective on power is the differentiation between power as an active form of influence versus a reactive assertion of autonomy from influence within the global political economy.

Building on these concepts, I offer an explanation for the patterns and motivations behind the engagement of the Party-state and agribusiness in the global



food system. The analysis reveals that China's agribusiness power is intricately tied to the Party-state's normative priority of ensuring national food security through controlling powerful global agribusiness actors in the domestic market and competing with these actors in international markets. In other words, to achieve normative goals in the context of global integration, the Party-state seeks to achieve self-reliance in food security through defining its own terms of global agribusiness engagement. This analysis offers a counterpoint to scholarship that privileges transnational capitalist classes over Party-state priorities (see Oliveira, 2017). Further, the analysis unmask the previously "hidden" state-corporate relationships in countries beyond China. The empirical treatment of two events related to Syngenta (Chapter 6) reveal the continued relationship between the American state, its domestic agribusiness, and dominant MNCs.

The normative priorities of state or corporate actors are seldom accounted for in studies of power as a driver of change in the global political economy. As such, the combination of ideational and material dimensions of power to explain the Party-state's emerging agribusiness networks contributes specifically to studies of power in the global food system (Clapp & Fuchs, 2009; Hopewell, 2014; McMichael, 2000), and more generally to conceptual literature on power in the GPE (Barnett & Duvall, 2005; Cohen & Chiu, 2013; Fuchs & Lederer, 2007). In turn, understanding the place of the PRC in the global food system sheds light on the broader power dynamics in a changing world order.

### ***1.3.3. Theoretical contributions: China and the food regime***

The empirical study, theoretical framework, and key concept of securitized foodways (see Chapter 3) each contribute to an alternative and historically grounded view of the PRC in relation to food regimes. This dissertation challenges researchers of food regimes and of power in the global political economy to take on a more dynamic approach by accounting for longer historical time-periods and broader geographic scope in their treatment of China. Though the conceptual grounding of food regimes is intended to be historical in nature, the attempt at creating continuity between the second food regime and any future regime is ill fated without accounting for the unique historical development of agribusiness in the PRC. China is conspicuously absent from food regime scholars' treatment of the second (United States) food regime, yet it is drawn into contemporary analysis of potential third food regimes. For example, Schneider (2017) argues that China's agribusiness enterprises are beginning to challenge the power of some MNCs, but it is not clear what conditions have led to power being taken from the powerful.

I provide the empirical and conceptual grounding to engage food regime scholarship regarding the absence of the PRC in the second food regime, and contemporary place in the global food system (Zhang, 2018). This alternative explanation of China's place in the global food system, based on the Party-state's economic nationalist orientation, expressed through the creation of securitized foodways, challenges the notion that the PRC acts simply to extend surplus agricultural capital abroad. The concept of securitized foodways also moves away from existing land-centric concepts in critical food studies such as control-grabbing (Borras, Franco,

Gómez, Kay, & Spoor, 2012) and security mercantilism (McMichael, 2013), to include a fuller picture of the technological and trade infrastructure at the centre of China's food self-reliance in the global political economy.

#### **1.4. Outline of the chapters to follow**

The following chapters elaborate and weave together the primary argument of this dissertation: that China's securitized foodways are an expression of grain self-reliance within the global economy and politics of agribusiness. Chapter 2 offers a literature review aimed at laying the contextual groundwork for the theoretical framework briefly introduced above. I review a broad range of literature in the fields of GPE and power, food studies, and Chinese political economy. The review is aimed at elaborating key debates in economic globalization, the global food system, and normative dimensions of food security. In addition, I provide a review of research related to China's grain sector, state priorities, and international interactions. In Chapter 3, I introduce conceptual literature on power in the global political economy. This literature is incorporated into the concept of securitized foodways and a related power framework that I utilize in this dissertation. Finally, I discuss my methodological approach, including the key explanatory variables in my arguments, and introduce the materials used to evaluate and support these arguments.

Chapter 4 reaches into history to define a key period of disjuncture between China and the global seed industry. I argue that China's absence from a key period of agricultural globalization, sometimes called the "second food regime", kept the country separate from the early development of global agribusiness. I show that prior to 1949,

Republican China was on the path to becoming a major player in the green revolution. However, from the 1950s to the 1970s, China diverged from the experiences of U.S.-led green revolution countries (particularly the Philippines and India). The divergence occurred in the circumstances under which high-yield varieties (HYVs) of seeds were developed and the use of the fertilizers required by HYVs increased. Though increased production and the attainment of self-sufficiency in production remained common objectives in both cases, the level of foreign engagement allowed by each path differs significantly. Looking forward, the domestic particularities of the seed breeding and extension system in the PRC during this period had devastating effects on farm-saved grain seed varieties, and set the stage for the PRC's future seed enterprises.

Chapters 5, 6, and 7 move forward to examine more contemporary global-national dynamics of the grain-seed system in the PRC. Chapter 5 demonstrates why and how the structure of China's grain seed industry does not conform to global trends of MNC consolidation. Building on the previous chapter, I show how the PRC's seed system transformed into thousands of seed enterprises in the 1980s and 1990s. This transformation happened on the back of Mao-era seed-stations as the Party-state implemented regulations limiting inward MNC agribusiness investment. This process shaped a diffuse industry structure that did not readily allow MNC entry or acquisition as occurred in other countries. The chapter presents a first pivot in the way that the PRC's concept of self-reliance interacts with economic globalization. No longer is self-reliance exclusively about using homegrown breeding technology or producing everything domestically and with domestic resources. Instead it is about ensuring

national ownership of enterprises and technology within the industry, a first step toward securitized foodways.

Chapter 6 shifts perspective to address outward connections of China's agribusiness enterprises over the last two decades. As the PRC joined the World Trade Organization (WTO) in 2001, state conceptions of self-reliance were challenged by increased interaction with the structural power of global agribusiness. I demonstrate that China sourced imported grains from the entrenched, foreign-owned, global agribusiness networks of the seed and grain trade industry. To act on securitized foodways, and ensure control over domestic networks and institutions, the Party-state has encouraged overseas investment and trade, expanding its global seed and grain trade network. This strategy led to recent acquisitions of foreign agribusiness such as Noble, Nidera, and Syngenta. Now, rather than referring solely to domestic production and national ownership of domestic resources, self-reliance extends beyond borders. The outward orientation of self-reliance serves to create secure supply chain networks in the input and grain trade sectors that compete internationally, owned by the PRC state or proxies of the state.

Chapter 7 expands on the initial puzzle to ask: does China's unique seed industry structure leave an opening for domestic seed alternatives? Alongside the rise of agribusiness globally and within China, worldwide food movements now advocate for sustainable alternatives to industrial agriculture. A growing body of research points to domestically led alternative food organizations, as well as transnational peasant movements like La Via Campesina, advocating and acting for change in Mainland China. I argue that there is a distinct overlap in agribusiness/alternative discourses within the

PRC. Arguments made by Chinese state/corporate actors and those of actors from alternative food movements focus on achieving autonomy and contesting foreign-owned agricultural capital. These commonalities reveal a discursive battleground in China that creates unique constraints (and opportunities) for food activists to shape Party-state priorities and retain their own space in the PRC. The comparison also helps to make explicit the shortcomings of securitized foodways as a practice in terms of sustainability.

Finally, Chapter 8 brings together the previous empirical chapters to offer a full-picture analysis of the PRC's emerging place in the global food system. I put forward and compare the findings of the previous chapters in the context of research on the global food systems (particularly food regimes), and GPE more broadly. In addition, the chapter establishes the broader importance of securitized foodways as a heuristic to understand the trajectory of the PRC within the global food system, at the level of states, enterprises, and alternative food organizations. The concept of negative power is identified as particularly useful in the context of transitional periods and in situations of confrontation with powerful actors in global the political economy.

# Chapter 2: Power, Food Security, and China in the Global Political Economy

## 2.1. Introduction

How can we characterize power in the global food system? This chapter reviews existing debates about the global political economy of food and the meaning of food security, with a particular focus on the PRC. Though the concept of power permeates discussion of the global food system, the concept remains relatively static in its application. As the broader global political economy undergoes change, particularly with the economic and political rise of BRICS countries, dynamic questions are increasingly central: how do states or businesses or other actors gain power? How do power dynamics shift over time? These questions of change or transition in power are crucial to understanding the contemporary global political economy and food system. Not only do they help understand the nature and implication of these changes, but they also help to anticipate future trajectories and intentions of key states and agribusiness actors.

This chapter is structured in several sections, designed to lay the scene for the myriad moving parts that make up the GPE of food and the evolving context of the PRC. First, I introduce broad discussions of power in the global political economy, and particularly in the global political economy of food and agriculture. In doing so, I draw on a variety of theoretical and ontological traditions, examining a spectrum of realist, liberal, constructivist, and Marxist approaches to food studies and introducing differing units of analysis from states, to corporations, to food activist networks. Second, I break down the concept of food security and related ideas. I treat food security as a normative

term rather than an objective measure of wellbeing, and likewise point to the ideational underpinnings of the term and its different interpretations. This section brings in key ideational elements of the global food system. Third, I focus on existing research related to the PRC's agriculture and agrifood system, domestic policies, and land tenure. These areas of literature will each contribute to developing the concept of securitized foodways and its underlying power framework.

## **2.2. Power, food security norms, and China's food system**

### ***2.2.1. Power, the Party-state, and the global political economy of food***

The (re)emergence of China as a powerful state is a central point of interest regarding the future of global state-market relationships and the potential implications for food systems at large. There is disagreement among scholars, both within and between different schools of thought, regarding the extent to which China is integrating into the broader global economy, and on what terms. Some argue that China's power in the global political economy has increased (Arrighi, 2007; Layne, 2012), and has even helped to shape the outcome of trade negotiations (Hopewell, 2014). Others point to the continued importance of the United States in creating the rules and norms that govern markets (Ikenberry, 2008; Saull, 2012), in its comparative economic and military resources (Beckley, 2018), and the dominance of Western businesses in global production chains (Nolan, 2012). Since the rise of Chinese president Xi Jinping (*Xí jìnpíng*, 习近平), scholars of Chinese politics continue to be divided about the sustainability of China's political system with some predicting probable decline of the CPC due to internal division and an alienated bureaucracy (Pei, 2016) and others



arguing that the public support necessary for the CPC to maintain power exists (Dickson, 2016).

Within the broader GPE literature, there are multiple areas of interest concerning the extent of China's changing place within global political economy. A primary aspect of U.S. power is the adoption of its currency for commerce, investment, and global reserves (Chey, 2012). As such, the *renminbi* (*Renminbi*, 人民币) now receives much attention to gauge the position of the PRC compared to the U.S. and Europe, though the U.S. dollar is typically considered the primary global currency with a place for the *renminbi* in regional markets (Chey, 2012; Eichengreen, 2013). Similarly, the relationship between the PRC and the U.S. is tied up in financial transactions where the U.S. national debt is in part held by China, which in turn recycles trade surpluses into foreign investment in the U.S. (Drezner, 2009). While some scholars argue that this dynamic means that China is dependent on the U.S. in regards to PRC holdings of U.S. treasury bills (Panitch & Gindin, 2012, 300), others argue that the PRC is in fact slowly diverting its trade surplus into other currencies and assets (Beeson, 2009). Still others argue that the U.S.'s expansive military, domestic economic wealth, and global production networks owned by U.S. corporations are now key indicators reflecting power relationships in the global political economy (Nolan, 2012; Starrs, 2013; Beckley, 2018). The vast majority of scholarship pertaining to the GPE of China focuses on these types of areas without much consideration of their links to food and agriculture.

Another area of differentiation between the PRC and most other key actors in the global political economy is the relationship between the CPC, the state, and business in China. It is clear that the relationship between the CPC, the state, and business in China,

whether state-owned enterprise or private, is distinct in the context of increased interdependence. For most of the latter half of the 20<sup>th</sup> century, the CPC was viewed as the primary actor in Chinese politics; however, since the 1970s, the control of the CPC over the national economy was reduced with the dismantling of many small and medium state-owned enterprise, decentralization of authority, and the rise the of home grown private business and foreign investment (Brødsgaard, 2016; Lieberthal & Oksenberg, 1990). In many sectors, the Party-state is seen as increasingly fragmented due to the multiplicity of actors and institutions that impact decision-making and outcomes (Brødsgaard, 2016; Hameiri & Jones 2018). In the realm of domestic environmental governance, conflict exists between SOEs and state regulators given that SOEs are significant polluters in defiance of Party policy and state regulation (Eaton & Kostka, 2017). The diversity of actors and interests within the Party-state exist in other spheres as well. For example, Chinese sovereign wealth funds are, by definition, owned by the state but nevertheless engage in controlled competition in the pursuit of international investments (Eaton & Ming, 2010). Also in the financial sector, factions of the Party-state have called for controlled opening of the PRC's capital account, and have been met with vigorous debate from both state and private financial actors in the process (Lombardi & Malkin, 2017). There are therefore competing interests between the actors and organizations that make up the Party-state.

In the context of international development finance (IDF) several ministries (with competing interests) are involved in deploying development projects, along with numerous state-owned and private enterprises in the infrastructure and construction sectors (Hameiri & Jones 2018, 580). In the development sphere, Party-state policy is

seen as lacking coherence, resulting in “ample opportunities for Chinese companies to manoeuvre IDF to suit their commercial interests” (Hameiri & Jones, 2018, 582).

Similarly, Oliveira (2017) finds that Chinese agribusiness investments in Brazil are more influenced by and advantageous to agribusiness executives than either the Brazilian or Chinese state. In a study of Chinese state-business relationship in Mozambique and Zimbabwe, Gu et al. (2016) show that there is a diversity of state-business relationships, with both commercial and state-political interests involved in outcomes. These studies however, typically focus on a broad range development projects from agricultural to industrial, and not specifically on grain seeds from the PRC.

An underlying question in the above studies is the level of control and coordination exhibited by the CPC over the state and business (and vice-versa). While the multiplicity of Party-state actors is recognized, the centrality of the CPC in the PRC is particularly applicable in the context of strategic industries (Chin 2010; Pearson, 2015). For example, in the development of the auto sector, the Party-state has played an active role in courting international investment from the largest carmakers while simultaneously requiring ownership and local content thresholds (Chin, 2010). Some call this process the “liberalization two-step” where the economy is opened to investment but strategic industries are controlled through regulatory restrictions, enabling the simultaneous retention of control and transfer of technology (Hsueh, 2011).

More centrally, these dynamics require a level of cooperation between business, the state, and the CPC in China, though the relationship is not homogenous among all business actors or sectors (Ngo, 2018). Pearson (2015, 33-34) argues that in sectors

important to national security the Party-state retains control over large SOEs, encourages consolidation, and continues to appoint executives to these companies' boards. While the survival of these SOEs is not guaranteed, the Party-state also has regulatory controls to assist enterprise development in key sectors and oversight functions through the state bodies including the National Development and Reform Commission (NDRC) (*Guójiā fāzhǎn hé gǎigé wěiyuánhùi*, 国家发展和改革委员会) and State-owned Assets Supervision and Administration Commission (SASAC) (*Guóyǒu zīchǎn jiāndū guǎnlǐ wěiyuánhùi*, 国有资产监督管理委员会) (Pearson, 2015). In the agrifood sector, recent studies point to a strong level of coordination between agribusiness actors (both state-owned and private) and the state (Belesky & Lawrence, 2018; Schneider, 2017; Zhan, 2017). An infrastructure therefore exists for the Party-state to devise policy and coordinate its execution, though not always successfully.

In this dissertation, I argue that grain and grain seed, ultimately used to feed the population, are in fact strategic industries for the Party-state and are intimately linked to national food security (see Hsueh, 2011; Pearson, 2015; Zhang, 2018). In this context, the Party-state devises policy priorities and SOEs have a key role in developing and maintaining control over key markets. Importantly, the view of a strong CPC does not discount fragmentation or diversity of opinions within the CPC that go into policymaking. Further, there is not always a direct, instrumental, link between the construction of a policy, the issuance a policy directive, and a specific outcome. Rather, the diffusion of power away from single actors exercising top-down influence to influence through a plurality of actors can be understood through different conceptions of power, as discussed in Chapter 3. In this dissertation, I do not assume that the Party-

state is a singular monolithic actor. I use CPC and state policy documents to infer policy positions adopted by the Party-state and their change over time, rather than focusing on the bureaucratic politics of policy development in given moments.

These macro-level debates take a wide view of various arenas in which changes in power can be seen. However, a fruitful study of power dynamics must temper broad structural arguments by studying specific empirical subjects (Falkner, 2008, 24-25). The specific empirical subject of this dissertation is the global food system (and particularly grains) as it pertains to the PRC. This critical sector, in relation to the PRC, has not received significant attention from scholarship in GPE. However, in the broader global political economy of food and agriculture, the landscape of power has changed dramatically over the last 30 years. One recognized feature of the contemporary global food system is corporate concentration along the entire supply chain. Multiple scholars have analysed the level of concentration within the seed/input, trade/processing and food/drink industries (Howard, 2016; Lang & Heasman, 2004; Murphy et al., 2012).

Concentration in these links in the food supply chain include:

- **Seed industry:** in 2014, over 57% of global seed industry sales was made up of four companies: Monsanto, DuPont Pioneer, Syngenta, and Vilmorin (Limagrain) (IPES-Food, 2017, 22),
- **Agrochemical industry:** in 2014, over 60% of global agrochemical sales were made up of four companies: Syngenta, Bayer, BASF, Dow AgroSciences (IPES-Food, 2017, 23),

- **Grain trade:** In 2012, four grain trade companies handled up to 90% of the global grain trade: Archer Daniels Midland (ADM), Bunge, Cargill, and Louis Dreyfus (Murphy et al., 2012),
- **Food and beverage processing:** in 2017, ten companies made up approximately 37.5% of the market share of top 100 food companies, including Anheuser-Busch InBev, Nestlé, PepsiCo, JBS, and Coca-Cola (Mooney & ETC Group, 2018).

In recent years, many of these sectors have further consolidated, increasing the level of market concentration, while others have faced competition from other emerging companies (IPES-Food, 2017). The companies listed in these categories, among many others, have global research facilities and infrastructure, and have developed markets across countries and continents. The control they possess is argued to impact the decisions of farmers and consumers, the environment, and human health (Clapp, 2015a; Howard, 2016; Lang, 2003).

It is important to note that at the national scale, the mix of actors and levels of concentration varies compared to the lists of largest global companies. The national distribution of global agribusiness takes shape for a variety of reasons, some of which are discussed in this dissertation. The largest companies in most of these sectors are headquartered in the United States and Western Europe, with some exceptions. Given the significant private business interests in the global food system, it is not surprising that the power of corporations is a focal point of both scholarship and activism. For example, as the point of contact for consumers, food retailers have the power to create private international standards that can influence farmer livelihoods, the environment, and consumer choices (Fuchs & Kalfagianni, 2010). Seed and input companies also

influence state priorities and influence international rules on issues like intellectual property rights over seed varieties (Sell, 2009). For grain traders, on the other hand, influence can mean the ability to acquire land in the face of state regulations preventing such an action (Salerno, 2018), or acquire capital assets across the globe to expand access to crops largely without touching land itself (Hall, forthcoming). Still others focus on alternatives to the dominant global food system. Most prominently, a broad coalition of peasants, small farmers, activists, and scholars have created a *food sovereignty* movement opposing global agribusiness and industrial farming (Wittman, Desmarais, & Wiebe, 2010). Studies of food sovereignty, and other forms of alternative food systems (Schumilas, 2014), often focus on non-state actors beyond agribusiness in their efforts at shaping global, national, and local food systems (Boyer, 2010; Clark, 2015; McKeon, 2015).

These studies directly or indirectly engage debates about the role and power of the state in relation to the proliferation of large-scale, internationally connected agribusiness. In these debates, the role of the state is seen as changing in a period of global economic integration, facilitated by international trade agreements and extensive global production networks (Clapp, 2006; Gereffi, 2014; Strange, 1996). As the establishment of trade agreements and the physical trade of goods accelerates, one effect is the declining ability of states to choose policies, or the “shrinking of development space” (Wade, 2003). Greater economic integration demands standardization of rules, which creates room to subsume national regulatory frameworks to the global, including rules governing agricultural materials (Falkner & Gupta, 2009). In turn, MNCs acquire new forms of power as their reach and integration

expand across national boundaries. Scholarship sways between reconsidering the relationship between businesses and the state (Strange, 1996), and assigning a continued pre-eminence to state power (Krasner, 2001).

In the context of China, the relationship between state and corporate actors in food and agriculture is distinct. Schneider (2017) argues that China's domestic firms and processors in the pork (and feed) market are a locus for the "domestic-global, state-private trajectory" where Chinese state enterprises are "beginning to challenge the power of leading North Atlantic agrifood TNCs [transnational corporations]." Relatedly, the Party-state has various mechanisms to exert strong control over the economy, including SOEs, private companies with ties to the state, control over financial institutions, and industrial policy (Belesky & Lawrence, 2018, 8). Further, Chinese state-led capitalism is linked with economic nationalism, and specifically protecting domestic markets while expanding trade and investment internationally (Belesky & Lawrence, 2018; McMichael, 2013). Others argue that international agribusinesses actors from the PRC have mixed results in their pursuit of Brazilian markets, and that a specific class of agribusiness professionals in China and Brazil have relatively independent interests from the Party-state (Oliveira, 2017). Overall, these scholars correctly argue that the PRC is different from, yet integrated in some way with, dominant actors in the global food system. A key distinction is in the relationship between state and private actors. Many studies focused outside the PRC (including some cited above) point to either an adversarial relationship between business and the state or a situation where regulatory/interest groups have captured the state (Falkner, 2008; Hopewell, 2013;



Tourangeau, 2017). As discussed in the sections below, the state-corporate dynamic is different in the PRC, particularly in the food and agricultural sector.

### ***2.2.2. China and the food regime***

Unfortunately, few studies situate the perceived new power of actors from China within a historical context. Oliveira (2017) provides an exception in his treatment of China-Brazil relations since the 19<sup>th</sup> century up to recent agribusiness and farmland investments (for another exception see Arrighi, 2007). Arguably, one of the reasons that China garners so much recent interest is its relative absence from the global food system described above until the turn of the 21<sup>st</sup> century. The food regime heuristic was born from a tradition of examining time-horizons that spanned decades and is a central analytical tool used in critical food studies. This makes the absence of analysis regarding China's historical trajectory somewhat surprising.

The first food regime, based in British trade with settler nation-states beginning in the late 1800s, served to expand agricultural markets, to underwrite urban British wage labour through cheap food imports, and to develop national economic territories (Friedmann & McMichael, 1989). Though Imperial China was also a source of many agricultural products supporting British trade, it is not formally discussed in the foundational food regime publication beyond occasional reference (see Friedmann & McMichael, 1989). However, during this period, the urban residents of Imperial China were interacting with the first food regime in seldom-reported and intriguing ways. In the years prior to the rise of the first food regime in the late 19<sup>th</sup> century, the Qing Dynasty (*Qīngcháo*, 清朝) fought two pivotal colonial wars with Britain centred on

opening China's markets to international trade of opium in exchange for silver and agricultural products like silk, cotton and tea (Arrighi, 2007, 340). The Opium Wars forced open the ports of Hong Kong and other coastal trading cities. Imperial China subsequently saw an influx of foreign grains during the first food regime as businesses from the U.S. west coast began shipping flour and other products to Chinese urban centres (Meissner, 1997). The surge in wheat imports spurred Chinese national resistance, as seen in the success of domestic Chinese flour mills in overcoming U.S. import competition after the turn of the 20<sup>th</sup> century (Meissner, 2005). There is a case to be made that the first food regime had unique contemporaneous interactions with Imperial China, including successful opposition to foreign control of markets. While I do not have sufficient space to fully assess the place of the Qing Dynasty in the first food regime, it is sufficient to say that China's relationship to this period of international food trade has gone under the radar despite relevant and contentious dynamics.

Of more central importance to this dissertation is the period during which the United States rose to power in the mid-20<sup>th</sup> century. For food regime scholars, this period is characterized as the second food regime, and saw an extension of U.S. influence during state formation of post-colonial countries and the transnational consolidation of agricultural capital, focused particularly on soy, corn, and meat (Friedmann & McMichael, 1989). The ways in which the U.S. extended (or attempted to extend) influence through food and agriculture are well documented. Beginning in the 1950s, the United States instituted food aid programs that saw the international shipment of surplus U.S. grains, via U.S. flagged ships, across the world (Barrett, 2006). Friedmann (1982, 251) points explicitly to the domestic need for the U.S. to find markets for its

farmers in order to “dispose” of surplus production through international aid, and allow transnational businesses to establish themselves in developing countries. Possessing cheap grain as a resource allowed the U.S. to use food aid as “a carrot and a stick” when trying to influence the domestic policies of recipient countries on a wide range of Cold War issue areas (Clapp, 2015b, 3 and 19). Significantly, the U.S. accounted for the vast majority of global food aid during this period, and U.S. grain trading companies benefited from government policy. For example, in the context of famine in India in the mid-1960s, an industry insider stated that “[t]he unusual demand for food grains militated by the Indian famine afforded great opportunity for the grain trading companies. The effects of this exciting new business milieu were pronounced at Cargill” (Broehl, 1998, 99).

International food aid was not the only defining pattern of the post-war global food system. A critical, and contradictory, source of American power during the Cold War came through networks of American plant breeders that extended technology through state-supported grain breeding programs (Perkins, 1997). More specifically, Perkins argues that the green revolution’s attempt to increase Southern grain production reflected U.S. efforts to protect its national security from the perceived threat of overpopulation in developing countries (Perkins, 1997, 260). Cullather (2010) similarly points to U.S. involvement in the green revolution as being guided by strategic political considerations, often at the expense of those targeted for relief. Though promoting seeds and other input technologies were at the heart of attempts to exert power through agriculture, they were not always successful or fully controlled. For example, a U.S.-promoted hybrid rice variety introduced to South Vietnam ended up

making its way into the communist North (Cullather, 2010). Like food aid, the push to extend high-yield seeds and agrochemical inputs across the globe also served as a source of power for states and seed companies from North America and Europe (Kloppenborg, 2005, 170). Though these dynamics were primarily in place from the 1950s to the 1970s, the uneven outcomes of the U.S.-led green revolution on environment and biodiversity, farmer health and welfare, are still debated today (Harwood, 2013; Pingali, 2012). Likewise, the shipment of food aid is also criticized for undercutting local markets and simultaneously subsidizing U.S. agriculture (Clapp, 2015b; Lentz, Passarelli, & Barrett, 2013). This period laid the groundwork for the expansion of global agrifood businesses (Kloppenborg, 2005).

West-centred political-economic drivers are the focus of the many political analyses of the post-war food system, whereas the PRC is often only mentioned in its position as a foil to U.S. efforts in other developing countries (Cullather, 2010; Perkins, 1997). As with the first food regime, the PRC is not mentioned in the foundational texts for the second food regime (see Friedmann, 1982; Friedmann and McMichael, 1989). While it is possible that the absence of China is because the country was not seen as central to either the British or U.S. capital accumulation strategies, the PRC's position in these dynamics still helped to shape the norms of prominent political actors over time. In current food regime literature, China still remains largely absent from discussion of the second, U.S.-centred, food regime. However, it is precisely the absence of the PRC that make this period significant. Agricultural development in the PRC during the Mao period actually took the form of its own green revolution, with some transnational influences but notably different domestic dynamics (Schmalzer, 2016). The PRC's

experience during this time serves as a critical juncture, a break from key aspects of the path taken by its peers. The historical trajectory that the PRC followed, particularly from the mid-1950s until the mid-1970s, caused China to develop a domestic grain economy largely divorced from active international engagement and transnational capital. This disjuncture is the focus of Chapter 4.

The post-war period is an important precursor to the contemporary global food system, further highlighting the importance of the absence of the PRC from previous food regime heuristics. As mentioned above, the largest global agribusinesses are typically headquartered in North America and Europe. Many of these companies (or their predecessors of mergers past) owe their global presence in part to production methods and networks laid out by the green revolution (Kloppenborg, 2005, 15). However, understanding today's global food system from a food regime perspective is elusive. It is clear that agribusiness has grown in size and reach, creating powerful new actors within the food system. Food regime scholars currently focus on the role of agribusiness, pointing to a potential new corporate food regime (McMichael, 2005). For McMichael (2005, 298), the integration of corporate entities (including with global finance), the capture of the state by private interests, and the exploitation of farm labour characterize the corporate food regime. However, discord continues in the study of food regimes. Others argue that a neoliberal free market in agriculture via the WTO Agreement on Agriculture does not currently exist, and as a result there is no current defined food regime (Pritchard, 2009). Still others refer to a transition or restructuring from one regime to another, though the form that this takes is not well defined (Dixon, 2009; Dixon, 2014; Otero, 2012). In each of these views the essence is the extension of a

capitalist-led industrial food system led by key state and private actors. Still others point to undercurrents in the global food system, including alternative food movements such as the food sovereignty movement, certification and organic schemes, and other forms of food advocacy (Akram-Lodhi, 2015; Wittman et al., 2010). Many of these alternative movements run in opposition to the dominant global food system, and focus their critiques on corporate concentration and industrial agriculture, while promoting alternative ways to structure agricultural systems. Aspects of their relationship to China will be discussed in Chapter 7. However, the PRC remains substantively absent from the focus of contemporary food regime scholarship.<sup>2</sup>

An additional challenge for food regime scholarship is that it tends to focus on relatively stable and defined periods. McMichael conceives of food regimes as a lens through which to see “geo-political ordering, forms of accumulation, and...vectors of power” (McMichael, 2005, 276). Importantly, such a regime is defined as:

stable periods of capital accumulation associated with particular configurations of geopolitical power, conditioned by forms of agricultural production and consumption relations within and across national spaces. Contradictory relations within food regimes produce crisis, transformation, and transition to successor regimes.

This conceptualization makes it difficult to determine when one regime ends and another begins. More specifically, it assumes that geopolitical power is determined by the way in which agricultural products are produced and consumed across the world.

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<sup>2</sup> The work of both Belesky & Lawrence (2018), Schneider (2017), and Zhang (2018) are important exceptions.

The concept of the corporate food regime itself “carries the legacies of the first two regimes” (McMichael, 2005), and in doing so, tends to see the crystallization of the food regime’s geopolitical power within the capitalist economic systems most familiar to its history (U.S., Europe, and their businesses). However, it is impossible to ignore China. As a result, some new voices are arguing that the PRC’s state-led capitalism is “...reshaping relations of power in the global political economy of food” (Belesky & Lawrence, 2018). They, and others, refer to a more diffuse power structure within the global food system, with an increased role for the state, but maintain a materialist explanation for the emergence of a more polycentric global food system, with corporate power still at the centre (Belesky & Lawrence, 2018; Borras, McMichael, & Scoones, 2010; Pritchard, Dixon, Hull, & Choithani, 2016). Importantly, these explanations also continue to focus on a relatively static, contemporary context to explain the place of the PRC in the global food system.

These strictly materialist interpretations do not leave much room for normative or historical-structural factors in explaining change in the global food system, particularly in the context of an emerging power like the PRC. Though these studies usually acknowledge the concept of food security in the context of the PRC, it is often treated as either disingenuous or simply employed as a corollary to the underlying dynamics of capital accumulation (Belesky & Lawrence, 2018; McMichael, 2013; Schneider, 2014a). Further, there is little acknowledgement of the historical legacy of such concepts within Chinese history and potential interactions with previous food regime dynamics.

### ***2.2.3. Food security and national norms***

Much of the above discussion focuses on the material dimension of power in the global food system. However, key normative dimensions of power are at play when it comes to food and agriculture, economic globalization, and nation states. Indeed, national norms have been shown to be important for influencing security outcomes (Berger, 1996; Johnston, 1998; Katzenstein, 1996) and broader economic policy (Abdelal, 2001; D’Costa, 2009; Hall, 2004; Wegren, 2011). The topics discussed above, including corporate concentration in the global food system and U.S. primacy during the second food regime, act as important patterns that contribute to the Party-state’s development of the normative goals that underpin securitized foodways. Normative drivers can be influential by virtue of being defined against an “other” (Abdelal, 2001). Abdelal (2001, 27) argues that nationalism, for example, is “inherently relational” in that it requires interaction with and/or opposition to other phenomena in the international system. For the PRC, this “other” is the historically foreign-controlled global food system, particularly since the 20<sup>th</sup> century.

This dissertation highlights normative terms including food security, self-sufficiency, and self-reliance, each of which contributes to defining the contours of the Party-state’s policy goals. In academic and policy literature, each term has several attached meanings. Further, as will become evident in chapters 4-7, meanings can have subtle changes over time. Food security is most often expressed through the Food and Agriculture Organization (FAO) definition. In this formulation, food security exists “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active



and healthy life” (FAO, 2015b). This iteration of the term is descriptive (Clapp, 2014), and is often used as a basis for the measurement of the supply, distribution, and access to food in a specific context (Pinstrup-Andersen, 2009). However, this definition does little to prescribe how the stated goals are to be achieved. Critics point to the term food sovereignty as a challenge to the FAO-derived concept of food security (McMichael, 2005; Fairbairn, 2012). For them, the term food security implicitly adopts the industrial agriculture and trade-based solutions of the dominant global food system, with negative environmental and social impacts (Schanbacher, 2010). In contrast to food security, they argue that food sovereignty provides normative direction focused on peasant and small-farmer rights in a local and environmentally sustainable food system (Akram-Lodhi, 2015). In turn, food sovereignty has been criticized for idealizing a notion of strict self-sufficiency that is not practical in many circumstances where trade is required (Burnett & Murphy, 2014).

The divide between food security vs. food sovereignty itself has been critiqued as a false binary, given FAO-defined food security’s descriptive and food sovereignty’s normative positions (Clapp, 2014). Maxwell (1996) pointed out that there were over 200 definitions of food security, reflecting diversity of interpretation but also causing policy confusion due to their contradictions. Lang & Barling (2012) further categorize the various meanings of “food security”, where different meanings draw on a range of ideas to inform their content. Among these ideas are food nationalism, autarky, food sovereignty, and food sustainability (Lang & Barling, 2012). Similarly, Pinstrup-Andersen (2009) points out that food security has had different meanings over time, including two different variations: national food security and national food sovereignty,

where national food security implies self-sufficiency and national food sovereignty implies availability regardless of origin. Both Lang and Barling and Pinstrup-Andersen's term food sovereignty is not to be confused with the food sovereignty movement. Rather, the term "sovereignty" is employed to mean national sovereignty. Food self-sufficiency is often conceived of as a desire to produce all of the food a country eats. However, like food security, there exist alternative interpretations of self-sufficiency. Clapp (2017) argues that self-sufficiency is not a binary between autarky and complete trade dependence, rather it should be seen as a relative concept aimed at national objectives to "carve out policy space" in the global food-trade system. In this sense, self-sufficiency becomes more of a goal related to policy autonomy than a goal related to production targets.

In this dissertation, these two important points (national food security and the definition of self-sufficiency) converge. Food security is not used in terms of measuring and addressing the issue of global hunger. Rather, state and corporate actors also invoke food security as a motivation or justification for actions in the context of national (food) security. Food and agriculture can be *securitized* in the sense that they become the object of security concerns and gain political priority due to being framed as an existential threat (Buzan, Wæver, Wæver, & De Wilde, 1998, 26). Food security therefore comes to be imbued with specific values and imperatives to mitigate real or perceived negative consequences for the nation-state. What does this have to do with power? Some scholars define power in a narrow sense as influence through interest group politics, to be differentiated from "soft cultural influence" (see Paarlberg, 2013, 7). However, when it comes to national norms related to food security, cultural influences and normative

priorities are indeed factors to be accounted for. I argue that these concepts provide the normative underpinnings for how (and why) China engages with the global food system, both with dominant forces and alternative food movements.

In China, norms regarding the meaning of national food security are being redefined, serving as a driver of economic policy and reshaping the structure of the global food system (Zhang, 2018). In Chinese language, food security is known as grain security (*Liángshí ānquán*, 粮食安全) and term differs from the FAO term food security, which is not often used in the PRC's domestic policy discourse and has little historical context within the country (Schneider, 2014a). However, food grain security in China is associated with strong norms related to self-sufficiency, legitimacy of rulers, and protection of the national economy, particularly in relation to grain (McBeath & McBeath, 2010; Wong & Huang, 2012; Zhang, 2018). These associations have been present over centuries, from late imperial dynasties (Li, 2007; Will et al. 1991), to the early 20<sup>th</sup> century Republican period (Lee, 2011) to present day (Wong & Huang, 2012). More recently, Schneider (2014a) questioned the PRC's national policy of grain "self-sufficiency" through domestic production given the country's increased reliance on global grain/oilseed imports for animal feed. Economic growth and local preferences in China since the early 1980s led to widespread increases in meat consumption, which in turn resulted in significant increases in demand for feed crops such as soy and corn. Soy imports to China increased in the late 1990s, which now represent more than 50% of globally traded soy (Sharma, 2014). Simultaneously, the Party-state continues to articulate formulations of national grain self-sufficiency targets, aiming to produce 95%

of cereals domestically though not achieving these targets (McBeath & McBeath, 2010; Zhang, 2018).

However, the reality of this situation is far more complex. As Schneider (2014a) argues, the terms used by Chinese media and state planning agencies often obfuscate how the strict interpretation of self-sufficiency is measured; the actual content of the term “self-sufficiency” can be redefined. For example, whereas self-sufficiency in grain production used to be measured in terms of rice, wheat, and corn, priority grains making up the 95% self-sufficiency target have recently been reduced to only rice and wheat. Further, the interaction between national food security and power-holders in global markets is central to the Party-state’s national policy priorities. Indeed, the arrival of agribusiness from countries in the global South is often precipitated by national food security concerns, blurring the lines between state and corporate interests (Margulis, 2014). Zhang (2018, 35-36) makes an important contribution by pointing to the role of state food security norms and the role of the global food system dynamics in the recent shift away from strict self-sufficiency in production. He particularly notes the contemporary Party-state’s distrust of international grain markets due to their concentration, comparatively small size relative to Chinese consumption, and the internationalization pressure placed on the state by state-owned agribusiness (Zhang, 2018, 43). Zhang (2018, 56) correctly argues that,

The country’s sensitivity associated with food self-sufficiency is both a domestic construct, which is deeply rooted in its unique cultural, political, and economic structures, and shaped by Chinese leaders’ interpretation of the global food market and its external environment in general.

Zhang takes a broad perspective including many food types and recognizes a “paradigm shift” in national food security policy beginning in 2013, based on the official acceptance of “moderate imports” (Zhang, 2018, 48). However, this perspective is less focused on the specific mechanics of controlling the global pathways of grain and grain seed at different segments of the supply chain both within China and abroad. Further, Zhang’s (2018, 288) conclusion is that China is reforming the corporate food regime “to achieve the fundamental goals championed by food sovereignty.” This argument is problematic in terms of the substantially different priorities of the Party-state and the food sovereignty movement, as will be discussed in Chapter 7. In contrast, though Belesky and Lawrence (2018, 4) downplay the normative drivers of the PRC in the global food system, they accurately argue that,

[i]n securing global agrifood supply and value chains, the Chinese government is reconfiguring relations of power in the global food system, and pragmatically reducing its reliance on thinly traded global agri-food markets and large transnational companies (TNCs) in the Global North that have historically held dominant trading positions in these markets.

Finally, Zhang does not explain how and why the PRC is *able* to act on these priorities when peer countries like India, the Philippines, and Brazil, have not had the same priorities and/or room to manoeuvre. Like other scholars, he invokes food regimes but does not place significant emphasis on China’s interaction with previous food regimes as a key historical variable in his explanation.

I characterise the normative priority attached to food and agriculture by the Chinese Party-state through the concept of self-reliance (*Zìlìgēngshēng*, 自力更生). Self-reliance literally translates to “regeneration by one’s own efforts”, and has had importance as a normative framework for state policy in China (Kerr, 2007). Since the PRC’s reform and opening in the late 1970s, scholars from outside China have debated whether the country will retain “self-reliance or interdependence” (Terrill, 1977). Some scholars continue to explore the concept of self-reliance and its contemporary applicability. Kerr (2007, 100) argues that the PRC’s global integration “has not entailed an abandoning of the principles of [self-reliance] but represents a conditional accommodation that allows China to gain the things it needs to build its own national strength.” However, global intellectual property rights over industrial products and processes (including seeds) mean that, in high-technology sectors, self-reliance can be difficult to maintain without significant national investment or illegally borrowing (Kerr, 2007, 93). As such, self-reliance, like self-sufficiency, is not to be understood as a “policy of autarky” or strict self-sufficiency, rather it can accommodate controlled international exchange (Kerr, 2007). However self-reliance in this context does not go as far as the FAO’s usage of the term, which equates the term to reliance on international markets through comparative advantage (FAO, 2003, section 1.5). Rather, for the Party-state, the focus is on building a national economy under various international economic conditions and through various mechanisms designed to retain national control. Studies of economic nationalism have grappled with similar debates, where economic nationalism is often conceived of as a focus on the domestic economy, but the actual economic policies derived from economic nationalism are highly varied (Helleiner,

2002). However, by including a plurality of economic policies to achieve national economic goals, it is important to be wary of “redefining almost all behaviour as nationalist” or self-reliant (Hall, 2004, 82). In the following chapters, I will explore the content of self-reliant national food grain security priorities in the PRC as well as the circumstances that have shaped its ability to act on these objectives.

#### ***2.2.4. China’s agrifood system***

As seen above, the place of actors from China in the global food system is often difficult to grasp due to the focus of both food studies and GPE on state and corporate actors from the United States and Europe. Recently, the most often cited dynamics related to China are as an importer of soy and corn (Huang & Rozelle, 2004; Oliveira & Schneider, 2016) and China as a land grabber (Ayers, 2013; Muldavin, 2012). Both subjects focus on the PRC’s outward trajectory in the global food system from the perspective of acquiring land and agricultural goods from abroad in order to serve domestic markets. Scholars in China point to import dependence on agricultural products as “weak points” that must be protected from international volatility, a reflection of national security concerns (Zha & Zhang, 2013).

Caveats have been added to these trends, adding nuance to the analysis of the bulk flows of grain and capital crossing borders. The role of private and state-owned agribusiness from the PRC is increasingly recognized in carrying out these transactions. In the corn and soybean trade, control of the grain trade is shifting, with state-owned Chinese companies acquiring foreign businesses and infrastructure (Oliveira & Schneider, 2016; Yan et al., 2016). The Japanese *sogo shosha* grain traders have also

revised their business strategy by orienting their businesses to serve Chinese markets as a method of sustaining the volumes required to serve smaller Japanese markets (Hall, forthcoming). Restructuring is taking place in the seed and input sectors as companies tied to the Party-state look to acquire foreign agribusiness like Syngenta (Belesky & Lawrence, 2018). In the case of land grabs, the role of actors from the PRC relative to other countries was initially overstated, though the overall land grab phenomenon has received much (negative) attention (Ayers, 2013; Oliveira, 2017). In fact, actors from the PRC have engaged in foreign agricultural aid and investment since the 1950s, and there is a long-standing norm of South-South interactions (Brautigam & Zhang, 2013). Schneider (2014a) situates China's role in the global land grab as based on meat consumption, both through imports of meats but also through livestock feed which is used as a method to accumulate capital in Chinese agribusiness. However, van der Ploeg and Ye (2016b, 6) caution that the PRC's participation in land grabs typically result in commodities sold in host countries and should not be taken as a sign that the PRC's domestic agriculture is failing. These dynamics will be explored in greater detail in Chapters 5 and 6.

While the trend of the PRC's increased presence in global agricultural markets is clear, there is a key discrepancy between political perspectives and neoclassical economic perspectives. Agricultural economists call for the removal of restrictions on foreign investment in agriculture and see efficiencies to be gained by relying on cheap food imports (Fan et al. 2006, 59). In other words, "China has not revised its food security policy to take into consideration agricultural comparative advantages in the international economy", and should begin importing land- and water-intensive crops in



which it is less competitive (McBeath & McBeath, 2010, 277). This strictly economic analysis discounts normative policy objectives while political analysis often overlooks the costs of pursuing political priorities and broader power dynamics of the global political economy. Further, it does not explain why the Party-state has not fully adopted a liberalized trade environment in key grain products. Though food security is a “legitimate goal for China”, the Party-state expends significant resources to build agribusinesses, sometimes at the expense of farmers (Zhan, 2017, 160).

Contemporary agribusiness development in China has a wide scholarship, usually focused on domestic events and broad government agricultural support. Contemporary agriculture in the PRC is partly dependent on a web of policies tailored to increasing the production of specific food-types. Veeck and Shui (2011) provide an overview of the policy basket employed by central and provincial governments in the PRC, including input subsidies, tax relief, machinery promotion, and the creation of farm associations. An important recent shift in policy practice is the reduction of agricultural taxes beginning at the turn of the 21<sup>st</sup> century after acceding to the WTO. Whereas taxes on agricultural producers had been used to subsidize urban development since the early 1980s (and indeed earlier during Mao’s industrial drives) the state has shifted towards not only removing taxes but providing subsidies to farmers (Augustin-Jean & Wang, 2015). Most subsidies apply specifically to grain farmers, and include a key subsidy to reduce the costs of inputs and encourage the use of high-yield seed varieties provided by specific companies (Gale, 2013). The connections between these policies are sometimes conflicting. These inconsistencies have been referred to as a “policy trilemma”, where grain self-sufficiency, promotion of farm incomes, and adhering to international trade

reforms cannot be simultaneously achieved (Veeck & Shui, 2011, 244-245). Du and King (2018) further point out the fiscal cost of staple grain purchases and sales at the interface between state monopoly purchase price from farmers and sale price to food processors and retailers. The tension between the priority of promoting the domestic agricultural economy and pursuing greater international engagement will reoccur throughout the following chapters.

One of the ways in which we can better understand this domestic-global interaction is by focusing on the structure of markets. In other words, rather than focusing on state policy to promote production or on bulk flows of commodities, it is beneficial to examine policy, regulations, and activities related to industry organization. Augustin-Jean and Alpermann (2014, 8) draw on economic sociology to conceive of the market as “social and political, while the development of rules and regulations and their stabilization...reflect the power relationships among actors in that market.” Their framework for analysis provides agency to both states and businesses, both domestic and international. For example, in the 1990s the central government placed responsibility for grain supply (including seed and fertilizer availability) and demand in the hands of provinces (“governors grain bag system”) (*Mǐ dàizi shěngzhǎng fùzé zhì*, 米袋子省长负责制) with a mix of both state and private internal grain trading companies (Zhou, 2010). As will be discussed in Chapter 5, the Chinese state also used biotechnology and foreign investment regulation to ensure that domestic state-owned enterprises could compete against Monsanto in the domestic cotton industry (Alpermann, 2014, 204). Importantly, these types of studies typically focus solely on

materially derived sources of interests, whereas I argue that there are deep-seated normative priorities that serve as impetus to shape markets to certain ends.

Today, agribusiness markets in China remain largely diffuse in terms of corporate concentration, but vary by product type and sector. The domestic seed industry has less than 5000 companies following recent consolidation from over 10,000 registered companies a decade ago, with several dozen emerging at the head of the industry (USDA, 2017, 2). The most important of domestic seed businesses will be discussed in Chapter 5. Grain and oilseed processing companies are more concentrated, however they are still relatively fractured given that there were 110,000 “dragonhead enterprise” (*Lóngtóu qǐyè*, 龙头企业) agribusinesses in China (Schneider & Sharma, 2014). In China, the term “dragonhead enterprise” is applied to leading companies in many different industries, and also refers to formal local, provincial, and national government lists of companies eligible for tax relief and other incentives. In the grain seed sector, designated dragonhead enterprises are typically state-owned. This usage differs from Oliveira (2017) who labels dragonhead enterprises as successful outward agribusiness ventures and paper tigers as unsuccessful investments focus on land.

As Schneider and Sharma (2014, 27) demonstrate, processing sectors by product are almost entirely made up of national firms except for soybean oil processing and soybean meal exporting (see also Yan et al., 2016). However, even the structure of the soybean sector is volatile. Fifteen years ago, global agribusiness giants including Wilmar, Cargill, Bunge, and Louis Dreyfus controlled over 70% of the Chinese domestic processing market, but this number has dropped lower than 40% since foreign investment restrictions came into effect in 2007 (Sharma, 2014, 9). The data is not clear, however,

and others argue that foreign grain trade and processing presence remains significant within the PRC (Yan et al., 2016). In the retail sector, concentration remains below the global average, but is relatively more consolidated than other links in the supply chain. By 2012, four companies shared over 35% of Chinese retail sales: Walmart, Carrefour, RT-Mart, and China Resource Enterprises (Michelson et al., 2013).

Land in the PRC is farmed at a relatively small scale. The average farm size in China remains very small, at around half a hectare per farm, though figures vary (see van der Ploeg & Ye, 2016). There is regional variation in farm size, with the north east of the country tending towards larger scale industrial farms with much of the rest of the country tending towards smaller farms. Rural land is owned by collectives rather than by individuals, and individual households have the right to use a portion of land owned by their collective. In an effort to increase the scale of farming beyond individual households, various tiers of the Party-state in China have attempted to consolidate land size while avoiding land reform (Zhang & Donaldson, 2013). The primary technique to create larger-scale commodity farming is through contract farming between groups of farmers and agribusinesses (Zhang, 2012). To a lesser extent, cooperatives have also been developed by grouping farmers as a bargaining unit to connect to agrifood supply chains (Chen & Scott, 2014). Beyond mainstream food production, alternative food movements are gaining traction throughout the country. These nascent movements have grown quickly over the last decade and often focus on organic and local food, including the use of traditional seed varieties (where possible), ecological production, and local production/distribution (Scott, Si, Schumilas, & Chen, 2014). In addition, these

movements often employ the terms food security and food sovereignty to their advantage, as will be discussed in Chapter 7.

As seen in the paragraphs above, there are an increasing number of inward and outward connections between China and the global food system. Belesky and Lawrence (2018, 16) argue that the rise of Chinese SOEs focused on outward investment of food and agriculture is “challenging the historical dominance of TNCs from the global North, as they gain increasingly powerful positions in global value chains for agri-food, feed and biofuel.” But how is the PRC able to exercise power in a realm dominated by already powerful actors? And why does the Party-state choose food and agriculture as a sector of focus in terms of both foreign and domestic investment? International relations scholars argue that the PRC’s normative priority of food security is based in both historical memory of famine and the Party-state’s understanding of the international food system (Zha & Zhang, 2013). However, historical memory in and of itself does not explain the PRC’s ability to exercise agrifood power, nor does it conceptualize food security priorities as leading to specific economic policies. In other words, more attention must be paid to the “normative dimension of China’s integration” with the global political economy (Shambaugh, 2013, 315). Further, attention must be paid to these normative dimensions over time to understand how power has developed along with the normative framework through which power is applied in terms of policy. For now, the concept of power is not well defined in the context of the PRC’s place in the global food system. Further, the normative dimension of the PRC’s engagement with the global food system is seldom invoked in the context of changing power relationships (see Zhang, 2018 as an exception). To draw the two together, I introduce the term

“securitized foodways” as an analytical lens for application to the Party-state’s changing place in the global food system.

# **Chapter 3: Securitized Foodways: Theoretical and Methodological Approach**

This chapter develops China's "securitized foodways" and introduces the materials and methods used to assess the concept. Securitized foodways provides a conceptual framework that explains power dynamics in relation to China's place in the global food system. To advance this framework I draw on conceptual literature primarily from international relations, GPE, and food studies, focusing on the concept of power (Barnett & Duvall, 2005; Clapp & Fuchs, 2009; Cohen & Chiu, 2013). This framework is important given the absence of an existing explanation of how and why actors from the PRC are able to gain power in the global food system despite the existence of incumbent powerful states and global agribusiness. This chapter subsequently discusses the qualitative research methods used to evaluate the arguments underlying securitized foodways and the material I draw upon to support my conceptual framework. I take three steps to advance my conceptual framework and methodological approach. First, I review existing power frameworks to identify the ways in which the concept has been employed, including its various dimensions. In particular, I differentiate between positive and negative forms of power, a distinction that helps to understand changes in power dynamics over time. Second, I introduce the concept of securitized foodways, drawing on concepts of power and on the literature identified in Chapter 2. Finally, I elaborate my methodological approach and the research materials used to evaluate and support the central arguments presented in Chapter 1.

## **3.1. Power and securitized foodways**

### ***3.1.1. The Concept of Power***

Power is a concept that is difficult to conceptualize. In the discussions laid out in Chapter 2, power is central and mentioned frequently in analyses of the global political economy and of global food systems. Before getting into more detail about forms and dimensions of power relevant to this study, it is useful to ask a fundamental question: who can hold power? In the studies discussed in Chapter 2, a wide variety of actors are identified as holding power or having power exercised upon them.

Dahl (1957, 203) cast a broad net when he identified “individuals, groups, roles, offices, governments, nation-states, or other human aggregates” as potential holders of power. Other “human aggregates” have also been identified as potential power holders, including businesses, non-profit NGOs, and international organizations. If such a broad range of actors can hold power, then what is power? In much realist international relations, power is tied to economic and military might in the realm of states. Many arguments related to China’s rising power in the world continue to refer specifically to these factors, invoking military size and expenditure, along with macroeconomic indicators such as GDP size and growth rate as proxies (see Beckley, 2018; Layne, 2012; Wohlforth, 2012). Though these and other studies frequently use the term power, the concept is often not explicitly defined (see Belesky & Lawrence, 2018; Hopewell, 2016; Schneider, 2017). Instead, authors who invoke the word “power” acknowledge a difference between its economic and political usages, but do not delve more deeply into its manifestation and operationalization. A recent exception is Beckley (2018), who,



while focused only on material sources of power, creates an accounting framework for economic and material power that goes beyond the simple size of U.S.-China militaries and economies. This simple distinction between economic and political power is often critiqued as is the implicit assumption that there is a one-for-one relationship between economic/military size and power, particularly in the case of China (Hopewell, 2014; Strange, 1998, 25-27).

Where power is treated more formally, it is variously defined and applied in multiple different social science sub-disciplines and subject areas. Dahl (1957) defined power as relations between actors (i.e., people, businesses, states etc.), and specifically the power of one actor over another actor. For Dahl (1957, 203), the power of *A* over *B* is a starting point to understand the resources behind power, including the source, means to exercise, amount, and scope of power. As such, his full definition includes the exertion of direct influence through relations between actors via the use of defined resources. Though the inquiry into sources, means, and scope of power is important, this definition remains limited due to its focus on the exercise of direct influence between specific actors (Barnett & Duvall, 2005; Clapp & Fuchs, 2009). A less direct formulation of power is introduced by Bachrach and Baratz (1970) who argue that it is also exhibited when a person or group can *constrain the participation* of another person or group in a given activity. Again, power is conceived of as a social relationship; however the relationship may not be through direct interaction, but rather through the institutionalization of values and rules that affect specific actors (Barnett & Duvall, 2005). Finally, definitions of power have also been expanded to include constitutive elements where “social relations define who the actors are and what capacities and practices they are socially

empowered to undertake” (Barnett & Duvall, 2005, 46). Said differently, constitutive forms of power can contribute to the creation of “legitimate social purpose...to project political authority into the international system” (Ruggie, 1998, 65).

As seen in these varying definitions, contemporary scholarship has established multiple dimensions to the study of power. To accommodate these dimensions, Barnett and Duval (2005, 42) provide an encompassing definition, where power is “the production, in and through social relations, of effects that shape the capacities of actors to determine their circumstances and fate.” This formulation allows for their taxonomy of four types of power focused on differences in how power works (material/constitution) and the specificity of power’s effects (direct/diffuse). The first type of power is “compulsory power” and mirrors the definition offered by Dahl. The second type of power is “institutional power” and mirrors the definition offered by Bachrach and Baratz. The third type of power is a specific form of “structural power”, based in social relations of constitution where one actor’s position in a structure will “shape self-understanding and subject self-interests” (Barnett and Duval, 2005, 53). Barnett and Duval’s fourth type of power, “productive power”, works through social relations of constitution and is diffuse in nature; however, it is not discussed here. These dimensions of power are not mutually exclusive; each type of power has the potential to exist simultaneously or to interact.

Drawing in part on Barnett and Duval, Clapp and Fuchs developed a power framework for application in the context of agribusiness power. This framework identifies three similar dimensions: instrumental, structural, and discursive, drawing on both material and ideational sources of power (Clapp & Fuchs, 2009). Instrumental

power refers to the influence of A over B. Structural power refers both to the indirect “agenda setting power” as well as the “positions in material structures and organizational networks [which may] endow actors with direct rule-setting power” (Fuchs & Lederer, 2007). Finally, discursive power shapes interests through the ability to frame broader norms, underpinned by political legitimacy and trust (Clapp & Fuchs, 2009). Like Barnett and Duvall’s formulation, these three forms of power are not mutually exclusive, and often reinforce one another.

Structural power is a particularly important concept. For Clapp and Fuchs (2009, 9), structural power exists as the nexus of “economic and institutional structures, processes, and interdependencies” Structural power allows corporate and state actors to shape the rules of the game through state laws and regulations, corporate resource networks, private rules such as certification schemes, and other mechanisms to constrain behaviour such as production and investment decisions (Clapp & Fuchs, 2009, 9). Strange (1988) argues that there are four broad and interacting power structures employed by power-holders: security (military), production, finance (credit), and knowledge (beliefs and ideas). Like Clapp and Fuchs, the structures introduced by Strange’s framework allow an actor to influence, more or less directly, the options available to others (Strange, 1998, 31). Strange emphasises a key geographic angle implicit in the concept of networks where, “territorial boundaries of states no longer coincide with the extent or the limits of political authority over economy and society” (Strange, 1996b, ix). Thus military, production, finance, and knowledge structures are seen to not only spill across national boundaries, but also implicate non-state actors.

Other perspectives have attempted to grapple with power in the context of economic globalization and the spread of actors across borders. Kahler (2009) and his colleagues have begun to take a network-centric view of power. For Kahler, network power is broken into structures and actors “ties or links among actors (nodes) create a structure (a persistent pattern of relations) that in turn serves to constrain actors or provide opportunities for action” (Kahler, 2009, 5). However, in Kahler’s formulation, individual actors do not purposefully create networks, rather networks are taken as given. This need not be so. The active creation of networks, within social and geographic space, is central to the development of powerful structures.

While frameworks in the GPE of food are largely interested in “the powerful” and how they exercise influence, power can also be understood as autonomy. In this formulation, “power does not mean influencing others; rather, it means not allowing others to influence you -- others letting you have your way” (Cohen, 2008). This less-discussed dimension of power can also be conceived of as “autonomy” or the ability to create “policy space” or “policy independence” (Cohen & Chiu, 2013, 3). A similar conception of “negative power” or the ability to say “no” has been used in the study of American politics and the institutionalized veto power of the president (Cameron, 2000, 3). In the context of studies on the global food system the negative conception of power, in contrast to the positive forms of power discussed previously, has not been formally applied, to my knowledge. This absence is intriguing given the focus on both the idea of policy space in developing countries and also the spread of alternative food systems. GPE scholars regularly discuss the development of policy space in the context of restrictive international agreements through the WTO (Clapp, 2017; Wade, 2003).

Similarly, food sovereignty scholars examine resistance to powerful agribusiness and trade rules, including the development of community practices and state policies that insulate peasants and small farms from powerful market actors. This includes calls for policy space beyond the current norm (Akram-Lodhi, 2015) and protections from trade (Burnett & Murphy, 2014). Despite the striking parallels, the view of autonomy as a formal dimension of power is not typically elaborated.

The inclusion of autonomy as power is a crucial component of power models as it creates room for change. The idea that power can be developed despite the presence of existing power holders makes changing power dynamics possible. It acknowledges not just that there are areas that the powerful do not reach, but also that the less powerful can avoid influence. Further, in terms of the ideational dimension of power, the ability to resist influence has implications for the way that subjective self-interests may form in opposition to the actor attempting to exert power. For example, Chapter 4 and 5 will discuss U.S. power in the mid-20<sup>th</sup> century and its contribution to the PRC government's social purpose in the context of national food security.

Given the multiple, and sometimes conflicting, definitions of the various forms, dimensions, and types of power it is useful to briefly highlight the definitions that I will use in developing securitized foodways as a conceptual framework. Table 3.1 lists the forms, dimensions, and types of power used to build securitized foodways while specifying their usage and lineage within the existing literature on power. The forms, dimensions, and types of power summarized in Table 3.1 are discussed further in the context of their application in securitized foodways. Importantly, there are both positive and negative forms of power, with ideational and material dimensions. Further, like

other dimensions of power the additional dimension of autonomy is inherently relational in the sense that an actor can only be deemed autonomous relative to their interaction with other actors. These concepts are developed below.

**Table 3.1: Definitions of power**

<b>Form</b>	<b>Dimension</b>	<b>Type</b>	<b>Definition</b>
<b>Positive</b>	<i>Ideational</i>	Normative	The ability to shape norms, but taken a step further to understand the social construction of these ideas and norms as they underpin national priorities (Barnett & Duvall, 2005; Clapp & Fuchs, 2009).
	<i>Material</i>	Instrumental	The power of A to directly influence B (Dahl, 1957).
		Structural	Constraint over options, both formally through state and non-state institutions and/or informally through corporate resource networks (Clapp & Fuchs 2009; Strange, 1998).
<b>Negative</b>	<i>Autonomy</i>	The power to “go it alone” when faced with outside influence. The autonomy dimension of power is relational in the sense that the ability of an actor to go it alone is conditioned by the dimensions of positive power being exerted on it (Cohen & Chiu, 2013, 3).	

### ***3.1.2. Securitized foodways: a framework for power***

Drawing on the above literature and theory, I develop the concept of *securitized foodways* to explain and interpret the place of the PRC within the global food system.

The concept of securitized foodways brings together the above dynamics to conceptualize how Party-state actors exercise positive and negative forms of power over time with the effect of exercising control over China’s food system. In terms of negative power, the Party-state historically retained autonomy from power-holders in the global food system. In terms of positive power, the Party-state has constructed a normative purpose regarding national food security and increasingly has established and exercised

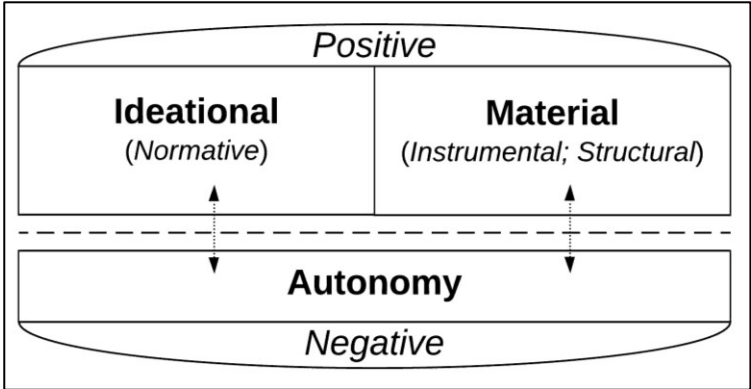
material power in the global food system. I begin by breaking the term down securitized foodways.

The term “securitized foodways” marries two words with somewhat separate traditions. The word foodways refers to a research approach that deals with analysing “the material and social factors [a]ffecting the production, distribution, and consumption of foods” (Edwards, 2011). Studies that employ a foodways approach are often concerned with the cultural significance of history and customs surrounding food, including the relationship between food, politics, and economics. I appropriate this term and employ it in the context of securitization. As stated above, to securitize is to make something the object of security concerns. In this sense, securitized foodways refers to the manner in which the production and distribution of food, in particular grain and grain seed, becomes the object of security concerns that pose a perceived existential threat to the nation, or a national security concern. In other words, the concept provides the principle behind which the Party-state (and other actors) approach self-reliance in grain and grain seed technology and production in interaction with the global political economy. The concept is also embedded in the context of the PRC’s historical interaction with the global food system and the accompanying power dynamics within food regimes as they pertain to national food security.

Despite the significant presence of the U.S. state and agribusiness in the global political economy since the mid-20<sup>th</sup> century, major U.S. and European-based agribusiness actors in the grain seed and trade sectors have not gained control over PRC’s agriculture. In order to operationalize the concept of securitized foodways, I adopt a framework that combines positive and negative forms of power to provide an

interrelated explanation of: 1) the construction of the Party-state’s social purpose/self-interest in terms of national food (grain) security, 2) the Party-state’s historical ability to retain autonomy in the domestic grain seed industry, and 3) its capacity to build positive power within the global food system. As seen in Figure 3.1, I use a three-dimensional approach to power: ideational, material, and autonomy.<sup>3</sup> These dimensions of power represent an ideal-type and in practice there is interaction between them; they also correspond to the set of explanatory variables introduced below in the discussion of methodology. The first two dimensions provide analytical tools capable of identifying both ideational and material dimensions of power, which I identify as positive forms of power. The additional third dimension of autonomy runs parallel as a negative form of power: the ability to withstand or avoid the positive power of other actors.

**Figure 3.1: Framework of power**



These dimensions not only correspond to the explanatory variables in this dissertation, they also serve as tools to identify dimensions of power within my analytical framework

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<sup>3</sup> This power framework draws on different dimensions of power, but does not serve as an exhaustive framework for all possible types of power. Rather, it serves as a lens to illustrate and explain the particular dimensions at play to understand China’s recent historical and contemporary activities in the global food system.



presented below. As an analytical tool, this power framework helps to interpret how the Party-state's interests and national priorities are shaped as well as the ways in which actors act on these priorities over time. The PRC's early negative power to "go it alone" in the face of a global political economy with incumbent powerful actors provided the needed autonomy to later act on national food security priorities and develop structural power both nationally and in the global food system. Each dimension of power is based on a reconfiguration of existing power concepts, drawing mainly from existing frameworks of power, particularly Barnett and Duvall (2005), Clapp and Fuchs (2009), and Cohen and Chiu (2013).

### **Positive power**

Modifying the language of Barnett and Duval (2005, 42) I define positive power as an active form of power in that it reflects efforts of an actor or set of actors to "shape the capacities" of others "to determine their circumstances and fate" (Barnett and Duval, 2005, 42). In this sense, positive power represents the concept of "power over", while negative power discussed below is the "power to" – both of which are necessary for a complete concept of power (Pansardi, 2012; Cohen & Chiu, 2013). I group the positive form of power into two dimensions, ideational and material.

#### *Ideational dimension of power*

My use of ideational power draws on constructivist insights and existing normative types of power (Barnett & Duvall, 2005; Clapp & Fuchs, 2009). In this formulation, the self-interest of actors is formed through the construction of subjective self-interest and national goals. Ideational power takes a soft constructivist stance in that national

identities and social purposes have primarily social roots (i.e., culture, values, relationships) but are also influenced by material factors. In this sense, ideational power works to shape the norms and values of actors, and correspondingly provide the legitimacy and social purpose necessary to carry out activities (Clapp & Fuchs, 2009). It also refers to normative interaction in the vein of Abdelal's (2001) view of the dynamics of nationalism where norms are defined in relation or opposition to those of another actor (or set of actors). Ultimately, ideational power serves to legitimate the actions and priorities of an actor in contrast to others and create acceptance of these priorities. Measuring ideational power involves first determining the qualitative content of the normative drivers of the actor in question, and subsequently following the successful reception of these priorities to others (Clapp & Fuchs, 2009, 11). In the context of securitized foodways, this implies: 1) understanding the meaning of food security through the policies and statements of CPC and Chinese state actors; and 2) subsequently following these policy frames through to their broad adoption (or rejection) by state organizations, SOEs, NGOs, and private actors. This dimension of power will serve as the cornerstone for the Party-state's national food security priority over time.

*Material dimension of power (instrumental and structural)*

I employ a material dimension of power that has two types: instrumental and structural. Instrumental power follows the above definitions where actor A has power over actor B. While much of the analysis to follow deals mostly with structural power, there are moments in which instrumental power is invoked. Instrumental power appears in the lobby activities undertaken by government, corporate, and NGO actors where an actor is

attempting to achieve a specific outcome over another. The relationship between the Party-state and the PRC's agribusiness involves some application of instrumental power to the extent that the Party-state is able to exercise influence over individuals and organizations. However, as noted in chapter 2, the Party-state's authority has dispersed since the 1980s and more akin to a structural form of power.

Where instrumental power is typically seen in a one-on-one relationship, structural power is more diffuse in nature (Barnett & Duval, 2005). I employ structural power to focus jointly on the place of an actor within networks that span geographic space and the ability of an actor to constrain the options available to others (Clapp & Fuchs, 2009). This use of structural power recognizes the range of domains in which structural power can exist: including financial, production, and security networks (Strange, 1998). For example, the Party-state now exercises influence over the domestic market through laws, regulations, oversight bodies, and Party representation in companies through their executive boards and within their organizational structures (Hsieh, 2011; Pearson, 2015). The approach taken here is specifically interested in networks of material resources controlled by states, corporations, and NGOs. This builds on Clapp and Fuchs' (2009, 9) observation that "corporate actors have control over pivotal networks and resources." By virtue of controlling networks even beyond borders, actors can influence physical and social infrastructure along with the corresponding flows of objects and information. In doing so, actors gain power over the allocation of resources and can influence both formal and informal rules in the global food system. For example, Murphy (2008) argues that the vertical integration of agribusiness across the globe facilitates the ability to set prices and control products

that reach market. My use of networks in structural power differs from Kahler (2009) and his colleagues in the important respect that networks are not taken as given, but can be consciously created by actors over time.

The networks inherent in structural power are linked to the concept of agenda-setting power or “the imposition of limits on the range of choices given to actors” (Clapp and Fuchs, 2009, 8). Actors, or a network of actors, can influence formal or informal rules that constrain others’ ability to act (Barnett and Duvall’s, 2005). To date, structural power is most often employed by states and corporations to influence formal institutions, for example state regulations, international standards, or creating private governance standards (Falkner, 2008; Fuchs & Kalfagianni, 2010). However, structural power can also be found in less formalized forms based in the networks of material resources controlled by state and corporate actors. As used in this dissertation, both formal and informal structural power will come into play; to achieve normative priorities Party-state actors can influence the choices available to other actors through control over domestic regulations, and through influence over the flow of resources created by the distribution of corporate networks. This type of power can be observed by identifying institutional configurations (i.e., laws and regulations) established by Party-state actors and by corporate networks and ownership in the agribusiness sector that respond (at least in part) to Party-state actors. An assumption is that the spread of networks will proportionally affect the scope of influence over rules and resources.

As mentioned above, positive dimensions of power are not mutually exclusive, rather they are mutually reinforcing. For example, the construction and articulation of normative priorities using ideational power can impact the exercise of material power

by guiding the application of instrumental power or building institutions/network structures required of structural power. The collection of laws, regulations, directives, policy measures, and ownership over SOEs provide Party-state actors with significant resources upon which to draw in order to exercise various dimensions of power both at home and abroad. Of course not all attempts to exert power are successful, and are in part dependent on the interests and power of other actors. The PRC's historical disconnect from the interests and power of other powerful state and agribusiness actors over its domestic economy is equally significant to the development of positive forms of power.

### **Negative power**

Again modifying the language of Barnett and Duval (2005, 42) I define negative power as a reactive form of power in that it reflects efforts of an actor or set of actors to avoid having their own capacity to “determine their circumstances and fate” to be shaped by others. Negative power is defined in terms of an actor's ability to pursue their own self-determination despite the efforts of others to exert power over them (Cohen & Chiu, 2013). In the context of securitized foodways, I identify negative power as autonomy.

### *Autonomy as power*

The power of autonomy provides a gateway into understanding changes in power structures over time. This parallel, negative form of power does not include the ability to influence; rather, it does include the ability to avoid the influence of powerful actors. In essence, where actors attempt to produce effects to shape the capacities of others, whether through ideational or material means, the power of autonomy is exercised by

resisting these efforts or conditions. Such resistance can manifest in taking the opposite action or position than what is desired, not complying with the requested action or norm, or taking an alternative path. The fact of being able to go a different way points to the limits of powerful actors vis-à-vis those who can exercise autonomy. These limits provide the opportunity for autonomous actors to develop power opposite the powerful and potentially contribute to changing power structures over time.

In this way, the power of autonomy exists as a mirror to the positive dimensions of power. For example, ideational power holds that a powerful actor can shape the self-understanding of another to meet its own form. However the power to be autonomous allows for the construction of independent self-interest in reaction to the social relationship at hand, outside of the form intended by the powerful actor. Structural power involves an actor's geographic expansion and corresponding control of resources and shaping the options available to other actors; however, the power of autonomy implies withstanding the extension of networks and the rules laid out within a power structure (or at least not following them exactly).

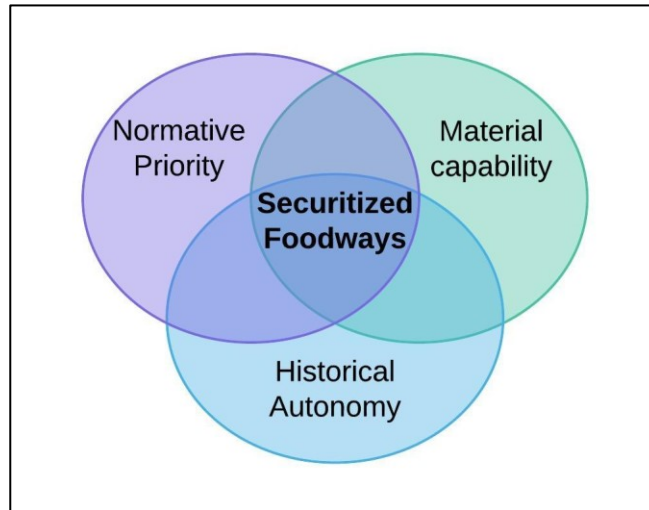
A key assumption in this framework is that there is interaction between these different forms of power (Barnett & Duvall, 2005). For example, ideational power can promote the exercise of negative power or the pursuit of structural power. Further, the various actors involved in power dynamics each have the potential to draw on different types of power as a result of their relationships and interactions. The inclusion of autonomy provides an opportunity for change from established power relationships.

## 3.2. Methodology and research materials

### 3.2.1. *Securitized foodways and explanation*

To develop the concept of securitized foodways and build understanding of the PRC's place in the global food system, I use a largely interpretive approach that borrows from a range of qualitative research methods in the social sciences. As described by the puzzle statement in Chapter 1, I am interested in a particular outcome: the relative absence of foreign actors with the PRC's commercial grain seed sector and the increased power of the PRC within the global food system. To explain this current context, I examine the causes that lead to this outcome (Mahoney, Kimball, & Koivu, 2009). As described in the argument above, three major variables make the Party-state's pursuit of securitized foodways possible: 1) a normative priority to control the national grain supply; 2) control over the material structure of agricultural technology and production; and 3) historical autonomy from the incumbent powerful global agrifood actors. These three variables form a set of factors that are individually insufficient, but when brought together are sufficient to bring about the PRC's place in the global food system (Mahoney, 2008). As shown in Figure 3.2, the explanatory concept of *securitized foodways* is depicted as existing in the PRC at the convergence of these three factors, which corresponds to three dimensions of power.

**Figure 3.2: Securitized foodways and explanation**



Within this set are both ideational and material variables. By drawing on ideational dimensions of power and corresponding explanation, I engage with constructivist traditions (Abdelal, Blyth & Parsons, 2015). These traditions offer an interpretive understanding of the world, and acknowledge that “there is radical diversity across cultures concerning the way in which social life is conceptualized” (Little, 1991, 74-75). However, my analytical and explanatory framework also draws on the material elements such as infrastructure, state regulation, and commercial networks that make social practices possible (i.e., pursuit of a national food security priority). The use of interpretive methods helps to illustrate the relationship between ideational and material sources of power, where each is not complete without the other. Put differently, positive qualitative research methodologists often invoke the metaphor of the detective seeking to explain a murder, where the detective knows the outcome they seek to explain and go about uncovering and weighing evidence to solve the crime (Mahoney, 2010; Mahoney & Goertz, 2006). However, these scholars are often in the business of



pointing to material evidence to explain their outcomes in question. By dealing with both material and ideational factors, I seek to provide causes that include not only physical evidence but also the motives behind the PRC's newfound place in the global food system. This effort builds an alternative heuristic to understand current food system dynamics.

The normative priority of national food security is long-held by the Party-state in regards to control over the production chain related to grain and grain seed (Wong & Huang, 2012). This constructed self-interest has specific parameters that define how the CPC and agribusiness in China perceive the grain seed industry as a strategic national security sector. Material capability refers to the networks of resources and rules of the game within which agribusiness actors must operate both within the PRC and abroad. Control over these structures translates, at least in part, to the capacity to control flows of agricultural products, technologies, and governing rules in the service of national food security. Finally, autonomy is the variable that allows the PRC a historical separation from dominant agribusiness actors from the U.S. and Europe, lending to the existence of domestic policy space. These variables work together over time to produce the current place of China in the global food system.

To evaluate these variables' contribution to the PRC's control over its domestic grain seed industry and increasing presence in the global grain and grain seed sectors, I predominantly use within-case analysis in addition to loose cross-case comparisons (George & Bennett, 2005). Beginning in Chapter 4, I use a loose comparative approach to trace the development of the three variables of concern during the mid-20<sup>th</sup> century. The chapter traces the roots of food nationalism in both Republican and Communist China,

the creation of grain seed breeding programs in the PRC, and the separation of the PRC from U.S.-led green revolution activities. To gain analytical leverage, I draw comparison to countries impacted by the U.S.-led green revolution, particularly India and the Philippines. The comparative approach reveals key differences between the PRC and green revolution countries, from differing content of normative priorities, to differing material networks, and crucially to different levels of autonomy from the positive power of the U.S.-led global food system.

In Chapters 5 and 6, I turn to within-case analysis to trace the development of the three variables that make up securitized foodways, and examine the key components of this explanatory framework. Chapter 5 lays out the structure of the PRC's domestic seed market from the 1980s to present. Building on the analysis of Chapter 4, I use contemporaneous statements by Party-state and corporate actors as well as PRC laws and regulations to show that national food security remained a normative priority but with a shifted meaning away from strict self-sufficiency in the context of economic globalization. Further, I draw on those laws and regulations in contrast with the situation in other Southern countries at the time to show that the Party-state retained the policy space necessary to develop market controls vis-à-vis global agribusiness. Finally, various market reports provide evidence that the domestic PRC seed industry expanded via a regulatory regime that privileges domestically controlled research and agribusiness facilities. These market controls under a re-defined vision of national food security allows for global agribusiness investment in seed technology, but draws boundaries to limit global seed company expansion in the domestic market. Chapter 6 focuses on the Party-state's more recent exertion of positive power through the global

expansion of PRC-owned grain and seed companies. Again, I collect statements from central Party-state actors as well as from foreign corporations and governments to demonstrate that the normative priority to achieve national food security remains paramount in the PRC while self-reliance is pursued through control over material resources beyond the territorial borders of the nation-state. Further, I draw on extensive market research to map a broad corporate network of businesses from the PRC in countries across the world. The combination of policy statements, regulations, and physical infrastructure maps demonstrate continued market presence in terms of grain imports, which allows me to draw inferences regarding the Party-state increasing structural power over the global food system.

Finally, Chapter 7 returns to a domestic focus to provide a within-case analysis of alternative food movements in the PRC. In this chapter, I again draw on the statements of Party-state and corporate actors and contrast this Party-state driven national food security discourse with statements and interviews with alternative food movements. Whereas the Party-state and industrial agribusiness in the PRC benefit by acting on securitized foodways, local food movements in the PRC are more circumscribed. By comparing the discourses of each group, I demonstrate that alternative food movements in the PRC share common food nationalism with the Party-state, but lack material networks and resources (now devoted to industrial agriculture). However, their ability to exert negative power vis-à-vis the Party-state's promotion of industrial agriculture continues to allow space for seed alternatives in China, as shown through interviews and media reporting on changes to the new Seed Law (*Zhǒngzǐ fǎ*, 种子法). This mix of comparative and within case studies allows me to establish and assess the factors of

concern to explain the place of China in the global political economy of food. The concept of securitized foodways can also be used as a heuristic to understand the future motivations and actions of the Party-state in terms of its position in global grain and grain seed markets.

### ***3.2.1. Research materials and their application***

In this sub-section, I will first review the types of materials I have collected and then explain how I employ this evidence to support and evaluate my argument. I have drawn on a wide variety of sources to assist in piecing together the ideational, material, and autonomous forms of power that shape securitized foodways as they travel across the three major periods covered by this dissertation: 1) 1930s-1970s; 2) 1980s-1990s; and 3) 2000s onward. In 2015, I conducted fieldwork at various institutions across China, first in June, and then from September to December. I spent the majority of my time at Nanjing University (*Nánjīng dàxué*, 南京大学), as well as Yunnan Agricultural University (*Yúnnán nóngyè dàxué*, 云南农业大学) and China Agricultural University (*Zhōngguó nóngyè dàxué*, 中国农业大学). During this time I collected 430 academic publications from Chinese language academic journals and professional magazines including over 100 historical Chinese journal articles from the 1920s to the 1970s. These publications focus on 1) historical seed breeding and extension, 2) seed industry development and national policy, 3) seed company research and policy prescription, and 4) international extension activities and policy. In addition, I collected corporate reports and Chinese securities filings, as well as speeches and policy documents from government ministers, members of the CPC, business representatives, and activists. The vast majority of these

works have not been cited in English language scholarship, to my knowledge. These documents were complemented by grey literature from various food and agriculture focused NGOs in the country. Many of these documents are not readily available online, and required library, database, and/or institutional access.

In addition, I conducted a dozen interviews with seed industry representatives, activists, and policy makers, along with many more informal conversations. These interviews were arranged both through direct outreach and through introductions from university colleagues in China and Canada. Interview materials provided supporting context regarding agricultural policy in China, seed industry structure and seed research, and alternative food movement activities. My intention was to conduct a greater number of interviews with representatives from seed companies; however, responses to my inquiries were not typically forthcoming despite introductions from intermediaries. It is possible that given government focus on the industry as well as recent atmosphere in the PRC, such connections were more difficult to establish. However, the primary material in the form of articles (academic or magazine) written in Chinese publications by company or government authors provided more than enough information. In fact, there is significant benefit in sourcing information from Chinese-language publications intended for a domestic audience in the PRC, rather than to an international readership. My position at the universities above also allowed me to discuss these issues with students and faculty familiar with food system issues.

I also draw on archival resources and historical reports from a number of institutions. I have consulted documents from numerous digital archives to help frame the role of green revolution actors in China, including the Rockefeller Archives (digital),

the Henry Wallace Collection (digital), US Congress (digital), and Chinese reports published by the Nationalist Government (Guelph University archives, Nanjing University). In terms of historical reports, I have particularly drawn on pre-2001 publications from the International Rice Research Institute (IRRI), the FAO, the World Bank, and the Maize and Wheat Improvement Center (CIMMYT). Included in World Bank reports are oral histories of senior country-officials in China, India, and South/Southeast Asia. Finally, I draw on English language market publications such as corporate reports, market intelligence publications, and financial press. These publications provide additional detail on merger and acquisitions, company profiles, and infrastructure networks. As shown in Table 3.2, I assemble these materials at different moments in this dissertation as they apply to each chapter in this dissertation.

**Table 3.2: Research materials**

	<b>Primary</b>	<b>Secondary</b>
<b>Chapter 4</b>	<ul style="list-style-type: none"> <li>• Archival documents (government, philanthropic)</li> <li>• Historical reports (IRRI, CIMMYT)</li> <li>• Contemporaneous academic publications (1920-70)</li> </ul>	
<b>Chapter 5</b>	<ul style="list-style-type: none"> <li>• Historical reports (IRRI, CIMMYT, World Bank, FAO)</li> <li>• English and Chinese industry/market intelligence</li> <li>• Corporate reports</li> <li>• Interviews (seed industry, NGOs)</li> </ul>	<ul style="list-style-type: none"> <li>• Academic literature</li> </ul>
<b>Chapter 6</b>	<ul style="list-style-type: none"> <li>• English and Chinese language market intelligence</li> <li>• Chinese research studies</li> <li>• Chinese language press</li> <li>• Corporate reports</li> </ul>	<ul style="list-style-type: none"> <li>• NGO reports</li> <li>• News reports</li> </ul>
<b>Chapter 7</b>	<ul style="list-style-type: none"> <li>• English and Chinese language market intelligence</li> <li>• Chinese language press</li> <li>• Chinese government reports and policies</li> <li>• Interviews (NGOs, international public policy)</li> </ul>	<ul style="list-style-type: none"> <li>• Financial Press</li> </ul>

I use the materials listed above to illustrate and evaluate the three key dimensions of power (ideational, material, and autonomy) within my analytical framework. To uncover ideational power at different points in time I introduce statements by key state and CPC actors as found in legal and policy documents, academic publications, news reports, and grey literature to determine the qualitative nature normative priorities and perceived national self-interest regarding the concept of food security. The normative priorities within Party-state policy as inferred from these texts are subsequently triangulated through comparison with the approach of foreign government and corporate actors, as determined through counterstatements and differential policy approaches.

For example, in Chapter 4, I use archival documents, historical reports, and contemporaneous academic publications to compare grain seed development between the PRC and green revolution countries. Archival documents from the Chinese Republican government, U.S. foreign policy sphere, and PRC university publications are contrasted to interpret the ways in which national self-interest in relation to food grain security is constructed within the Nationalist and Mao governments. Statements and policies revealed by the documents serve to contrast approaches to national food security and provide evidence of differing ideational lineages within successive Mainland Chinese governments. In later chapters I use this initial ideational differentiation to trace the evolution of Party-state policy over time by drawing on subsequent statements by key officials, scientists, agribusinesses, and policy documents to demonstrate continuity and change with the normative underpinnings of national food security as found in the early history of the PRC. Again, these normative underpinnings are triangulated and contrasted using institutional reports (i.e., IRRI,

CIMMYT, World Bank), interviews with policy advocates and alternative food movements, and public statements by foreign governments and global agribusiness. Overall, I use written, first hand statements focused on key words and themes to draw out normative commitments, and triangulate these statements based on repetition from various corners and places in time.

Material power forms the second dimension of power and is a causal variable at play in the central argument of this dissertation. Material power includes both instrumental and structural components, which demand different forms of evidence to substantiate their presence. Instrumental power is more often employed in Chapter 4 under the Mao period, given the significant political influence of Mao's CPC at the time. For example, I draw on policy directives from Mao regarding seed policy in the mid-20<sup>th</sup> century, which are often assumed to be directly influence those carrying out the directives in the regions (though on the ground implementation may vary). In addition, later chapters refer to lobby activities of actors from the U.S., agribusinesses, and alternative food movements as found in material gathered through interviews, government publications, and seed industry publications. These activities draw out instrumental power dynamics between actors, though the degree of influence varies by case.

Within material power, the focus of this dissertation is on structural power in order to highlight the diffuse but systemic relationships between state and corporate actors and the resource networks of global agribusiness. To illustrate the structural power of Party-state actors I draw on a combination of government documents (laws, policy statements), industry and market analysis, corporate reports and websites,



financial press, and stock exchange filings. These documents reveal legal/regulatory frameworks institutionalized by the Party-state, derived from the ideological underpinnings of national food security policy, which set the rules for both domestic and foreign participants in the PRC's grain and seed industry. Further, I use corporate reports, the financial press, and Chinese-language scholarship to uncover the ownership and industry structure within the grain and grain seed industries. Ownership and industry structure illustrate the relationship between laws and regulations and their effect on the power of other actors that must operate within the frameworks set by Party-state policy. For example, in Chapter 5, I use information collected through these financial press and corporate reports to illustrate the effect of investment limits (and other factors) on the ownership structure of seed companies within Mainland China. In Chapter 6, I draw on trade data from the Food and Agriculture Organization (FAO) to illustrate changing flows of agricultural commodities that shape the material relationships between the PRC and other countries in terms of grain trade. I also use financial press and corporate reports to map a broad network of nationally owned businesses in the PRC and throughout the world, demonstrating the material resources in the hands of actors that ultimately report to central state organs.

Given that autonomy is a negative form of power, related to both ideational and material dimensions, I use much of the same materials or types of materials and case comparisons described above. Ideational forms of power, and particularly the normative priorities of the Party-state regarding national food security, are central to providing a reason for the Party-state undertaking certain actions over time. To demonstrate autonomy as power in Chapter 4, I draw on the materials described above and in Table

3.2 to present the very different ideational and material trajectories of the seed breeding activities in the PRC and in green revolution countries. I use the statements and activities of Republican actors, Mao-era political actors, and institutional actors of the green revolution to demonstrate that though Mainland China was targeted to be included in the green revolution the Party-state created largely independent notions of national food security and domestic agribusiness networks in comparison with the U.S.-led global food regime. Similarly, in Chapter 7, I draw on corporate statements, key informant interviews, and institutional publications to draw out differences between the priorities within Party-state policy and the activities of alternative food movements. The areas of normative overlap and differentiation highlight the limits food movement autonomy within the PRC's industrial food system.

Within each of these variables, I also employ a vast amount of secondary academic literature that addresses broader issues of agricultural development both in China and globally. I have reviewed many academic studies, each of which contributes pieces of the overall puzzle in terms of self-sufficiency discourse, food-system change, and seed industries. My extensive use of secondary literature is a contribution in itself, as I bring together material from numerous existing academic studies in order to tell a new story. This previously disparate literature is drawn together into a comprehensive analysis, adding value to its content.

### **3.3. Operationalizing securitized foodways**

The central argument of this dissertation employs and builds on the above power framework. The dimensions of power within China's securitized foodways operate

together over time in the following way: the Party-state uses ideational power, gained through social experiences related to food, famine, and international interaction to shape and legitimate the concept of national food security. To attain national food security, the Party-state deploys network power through national control over domestic and international networks of grain seed (and grain trade) companies and their infrastructure. National control over agrifood networks then feeds the Party-state's structural power to constrain the participation of other state and market actors as the PRC further engages the global agrifood system. The consequences of the power held by state and corporate actors in the PRC is the beginning of a reconfiguration of power dynamics within the global food system, from the United States and Europe to the emergence of the Party-state's networks of securitized foodways.

Importantly, the Party-state has the ability to exercise agrifood power (within limits) as a result of a historical disjuncture from the dominant global food system; the PRC did not participate in the U.S.-led food regime of the mid-20<sup>th</sup> century and kept distance from the major emerging global agrifood businesses for most of the latter half of the 20<sup>th</sup> century. This disjuncture meant that the PRC's food system was less influenced by the power of the United States and multinational agribusiness actors at key moments in the development of the dominant global food system. As a result, the Party-state gained a degree of autonomy from the ideational, network, and structural power of key actors in the global food system. In this sense, negative and positive powers have a dynamic relationship, where negative power is itself conditioned by the attempted exercise of positive power. An actor with the capacity for negative power

through autonomy can build power internally, leading in turn to positive power. These dynamics are laid out in the upcoming four chapters.

In the next chapter, I begin by explaining the historical disjuncture in the global political economy and global food system that enabled the PRC to develop autonomy from the emerging global food system. The focus on mid-20<sup>th</sup> century China traces the path of the country's domestic agricultural pursuits in comparison with the development of the U.S.-led food system, particularly the green revolution. This juxtaposition both highlights the nascent positive power held by the American state, both ideational and structural, as well as the elaboration of the PRC's own concept of national food security in opposition to this power. Though the dynamics began almost a century ago, they retain significance for more recent events covered in subsequent chapters.

Chapter 5 builds on the foundation for power as autonomy laid out in chapter 4. Here, the PRC's relative divorce from the structural power and networks in the global food system of the 1980s allowed the Party-state to reshape and expand its own domestic agribusiness networks and legal structures in the grain seed industry. However, the chapter also introduces a key paradox in terms of national food security and the shifting concept of self-reliance in the context of economic globalization. Whereas the ideational imperative during the Mao period was to focus on domestic grain production, increased interaction with the global economy allowed for a reframing of the concept to comply with greater economic exchange and integration. The central concept of control over networks remains, but engagement with the global food system accelerates. Chapter 6 also focuses on structural power, but with an outward orientation

beyond the territorial boundaries of the PRC. With the reframed concept of self-reliance in the context of economic globalization, the PRC now pursues securitized foodways globally by establishing positive power abroad via the international extension of grain seed, acquisition of global grain seed and agrochemical companies, and acquisition of global grain trade companies. The expansion of positive power serves to increase the PRC's structural power through greater influence on the application of rules related to the trade of GM grain.

Finally, Chapter 7 examines the national and sub-national scale to examine the effects of securitized foodways on alternative food systems in the PRC. With the expansion of domestically controlled agribusiness networks throughout the country, and the national security priority to compete with global agribusiness, the room for local food movements appears to be constrained. This chapter pushes the concept of autonomy as power further to examine the role of autonomy from state and agribusiness networks in the context of alternative food movement in China. With an eye to the future, the chapter focuses on discursive battles between the language of securitized foodways and alternative food movements, and the material implications of this contest on the development of national legal frameworks within the PRC.

# Chapter 4: Self Reliant Food Security in China and Green Revolution in Asia

## 4.1. Introduction

The PRC is largely absent from literature on the U.S.-led food regime in the early post-WWII period. However, this absence is itself significant. This chapter situates the place of grain seeds in China within the historical context of the second food regime (Friedmann & McMichael, 1989). Using the analytical framework laid out in Chapter 3, this chapter focuses on the construction of the Party-state's early national food security priority and the development of national autonomy from the U.S.-led food regime. Further, it establishes the context for the development of nationally owned, though highly fragmented, seed businesses within the PRC. Together these variables lay the foundation for the securitization of China's foodways through the development of a distinct conception of national food security through self-reliance and the exertion of national control over domestic grain seed networks.

More specifically, it focuses on a major transformation in global agricultural development: the green revolution of the 1950s to 1970s. Though China's communist revolution is often treated as a catalyst motivating the U.S.-led green revolution, the relationship between the two has not been explored in detail. This chapter proceeds in three principal parts: 1) understanding the place of U.S. agricultural influence under China's Nationalist government (1920s to 1940s), 2) exploring the comparison cases of green revolution in India and the Philippines (1950s to 1970s), and 3) presenting the experience of Mao-era grain seed research and extension during the green revolution

period. The three sections of this chapter come together to argue that the PRC's own agricultural experimentation was largely independent of the U.S.-led food regime's structural power to shape national agricultural development through exporting grain, green revolution technologies, development finance, and agribusiness enterprises. This independence led to a distinct domestic seed research and extension system unlike many other developing countries at the time: a path important for the development of securitized foodways and corresponding power dynamics at the heart of this dissertation.

As discussed in Chapter 2, the lasting impacts of the green revolution's agricultural transformations have been hotly contested in terms of changes in yields and production, environment and health, as well as income and land redistribution. The place of the green revolution within U.S. foreign policy during the Cold War is an equally contentious issue (Perkins, 1997). In effect, U.S. state and private foundation support for the activities of the International Maize and Wheat Research Institute (CIMMYT) and International Rice Research Institute (IRRI) was heavily embedded in modernist notions of development aimed at containing a communist revolution – to varying degrees of “success” (Cullather, 2010). Some authors point to agrarian revolution in China as being the impetus for United States food and agricultural assistance programs (Cullather, 2010; Perkins, 1997); others mention Maoist China's agricultural development as a “counterpoint” to India's green revolution experience in this same context (Schmalzer, 2016). U.S. scholars of the period also framed China's domestic experiences through the lens of the green revolution (Stavis, 1974). However, contemporary studies and reports often gloss over the divide between the international efforts of the U.S. and the PRC's

own domestic seed breeding program, making no mention of the historical context in which China's own seed system emerged (see Hargrove & Coffman, 2006; Tang, Li, & Bonjean, 2010).<sup>4</sup>

The difference between these paths is crucial to understanding more recent power dynamics in the global food system and the development of the transnational seed and input industries. This chapter uncovers historical antecedents to the green revolution in China, and contrasts concepts of self-sufficiency and seed market development between the PRC and green revolution countries. The comparative paths contribute to very different networks of seed research and extension creating a necessary base upon which later seed industry developments depended. The first section of this chapter places grain seed research during the Nationalist Government period (1920s-1940s) firmly on the path of internationalization through partnership with actors from the United States including universities, private foundations, and the U.S. government. The section concludes by presenting a counterfactual - had the international cooperation established in Nationalist China continued after 1949, would the PRC have become the model for the U.S.-led green revolution of the post-war period? The second section briefly introduces the research and extension systems of key green revolution countries (India and the Philippines) and their partnership with global agricultural and financial actors during the second food regime including IRRI, CIMMYT, and the World Bank. It contrasts the normative content of national self-sufficiency priorities promoted by leaders and economic planners in each country with the means

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<sup>4</sup> It is often difficult to trace the specific geography and movement over time associated with plant cultivars. However, in many publications care is taken to ascribe a nationality to specific cultivars, and this nationality changes over time in correlation with international political economy. What was once a Taiwanese variety is now a Chinese variety, blurring the important geopolitical distinction.



taken to achieve these stated objectives, offering a basis for comparison with the case of the PRC. The third section highlights the construction of the Party-state's national self-interest in terms of Mao-era notions of national food security. It illustrates the development of the PRC's system of grain seed research and extension autonomous from global agricultural capital leading up to the late 1970s.

In summary, this chapter tells the story of differing interpretations and constraints pertaining to how grain self-sufficiency was to be achieved in China. As we will see, the key divergence between India and the Philippines vs. China is a focus on national ownership over germplasm resources and restrictions on the use of foreign capital. Though the issue of domestic *production* of staple grains was declared paramount to achieving self-sufficiency in both cases, the PRC relied on domestically developed varieties while green revolution countries were integrated into a global agricultural system. The sections below will develop this comparison further.

## **4.2. The United States in Nationalist China's seed research**

### ***4.2.1. U.S. seed-aid partnerships in Nationalist China***

In the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, China was viewed internationally as the "land of famine", struggling to meet the needs of the population (Lee, 2011; Li, 2007; Mallory, 1926). With the end of the Qing Dynasty in 1911, there was an opening for increased international interactions. The handful of missionary universities in the country expanded with agriculture emerging as a key field of study (Stross, 1986). Between 1909 and 1949, over 500 students from Mainland China went abroad to study agronomy,

mainly to the United States (Zhao & Zhou, 2013).<sup>5</sup> Many of these students returned to China and occupied prominent positions in the newly developing university and political system bringing with them agronomic practices, including modern seed breeding, as well as networks with prominent foreign academics (Schmalzer, 2016; Zhao & Zhou, 2013). Though this period predates communist China and the U.S. food regime, it provides crucial context to understand the important role of actors from the United States at the time, and future diverging paths.

Successive United States governments had attempted to become involved in China's agricultural sectors in order to expand markets and address humanitarian issues including famine and hunger; however, few lasting engagements had been made.<sup>6</sup> By 1920, crop failure in northeast China again led to extreme hunger and the death of hundreds of thousands of people drawing worldwide response. The Red Cross undertook international humanitarian assistance, collecting donations and conducting on-the-ground relief efforts including the distribution of grain. U.S. President Woodrow Wilson himself put together a famine relief fund collecting over US\$17 million (Li, 2007). The first major state-level inroads in seed breeding between the United States and China began out of the remainder of these funds. The American Famine Fund Committee, which included Cornell University President Livingston Farrand among its membership, was left with nearly one million dollars after the famine abated. By early 1923, both

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<sup>5</sup> Funding opportunities existed to study in the United States resulting from an indemnity fund paid by the Chinese Government for damages to foreigners during the Boxer Rebellion. Japan was also a frequent destination for overseas students of agronomy. Zhao and Zhou (2013) found records of 518 overseas students, of which 263 studied in the United States (primarily Cornell and University of Minnesota) and 173 students in Japan, mostly at Tokyo Imperial University.

<sup>6</sup> See letter from US diplomat Paul Reinsch (Sun, 1922, 253-255). Also, Stross (1986, chapter 1) for a review of early USDA efforts to expand exports to China, and Meissner (1997) for a review of flour exports from California to China's coastal cities in the later half of the 1800s.

Cornell University and the American Red Cross had determined that the best way forward was to,

establish[] in China a work of University extension of ultimately nation-wide scope, located at Nanking and affiliated with Nanking University...We recommend that it begin with agricultural extension and that as soon as possible thereafter, it add engineering extension, in order through both of these departments to contribute to the solution of the problems of food production and famine prevention. (The Cornell Daily Sun, 1923)

In this early initiative, state, university, and philanthropic actors from the United States sought to share public seeds along with cultivation methods while building institutions within the PRC, in the name of global hunger. As the project moved forward into 1924, it was recognized that more funding would be needed to accommodate the scope of the program. Cornell turned to John D. Rockefeller's International Education Board (IEB), a philanthropic organization created in 1923 that would later become the Rockefeller Foundation. Albert Mann, the Dean of Agriculture at Cornell was serving as the Director of Agriculture for the IEB, and was able to secure up to a decade's worth of funding (Love & Reisner, 2012). Shen Zonghan (*Shěn zōnghàn*, 沈宗瀚), a Cornell doctoral graduate, led the program at Nanjing, having previously lobbied the government for a national agricultural program (Geng, 2015). Shen would play a major role in designing the agricultural college's, "ubiquitous concern with 'plant improvement'" (Schneider, 2005). Faculty from Cornell went to work at Nanjing University in the fields of agricultural economics and agronomy, encouraging the exchange of graduate students, and developing a small network of experimentation stations. Though the Cornell-

Nanjing program represented a large seed breeding and extension program in Republican China, it totalled only 13 stations, mostly in the east of the country throughout Anhui, Henan, and Jiangsu provinces. Wheat was its primary focus, with experiments also including barley, corn, sorghum, cotton, rice, soybean and millet (Love & Reisner, 2012).

Nearing the end of the project, Shen Zonghan and advisors from the United States lobbied the *Guomindang* (*Guómíndǎng*, 国民党), the Nationalist Party government, to scale up efforts at Nanjing University and develop a national-scale extension system to improve seed breeding and overall agronomy.<sup>7</sup> The Nationalist Government's National Agricultural Research Bureau (NARB) (*Zhōngyāng nóngyè shíyàn suǒ*, 中央农业实验所) began its work in 1931, drawing on the experience of Nanjing University and other agricultural colleges throughout the country. Collections of grains from Europe and North America were made available to researchers. Raymond Moyer, a Cornell Graduate and professor at Oberlin College, worked in Shanxi province beginning in the 1920s and brought thousands of species for testing to central China (Shen, 2004). Roy Wiggans, a member of the Cornell-Nanjing project, also visited Yanjing University (*Yānjīng Dàxué*, 燕京大学) in Beijing with samples for experimentation stations in the area. An additional collection of wheat breeds was obtained from Reading University, adding to the other foreign varieties (He, Xia, & Bonjean, 2011). Given the importation of these many thousands of seed varieties from the U.S., United Kingdom, Japan, and other

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<sup>7</sup> The *Guomindang* is the often-used Mandarin spelling for the Nationalist Party of Chiang Kai-shek, which held the seat of government in the Republic of China. The *Guomindang* was also known as Kuomintang or KMT using Wade-Giles Romanization. I use *Guomindang*, Nationalist Party, and Republican Government interchangeably.

countries, the Nationalist Government had no qualms about using foreign technologies in the service of national food security.

The concept of the NARB was to extend new varieties and techniques to farmers, with a view to increasing production.<sup>8</sup> The Ministry of Industries (1934, 12) described the process as such,

This extension work will consist of demonstration and instruction. The demonstrations will show the farmers the advantage of the new ideas, and the instruction will teach the farmers how to make use of them...In this way, the results of research will be of practical benefit to the agriculture and rural life of the Nation.  
(Ministry of Industries, National Government of the Republic of China, 1934)

The Nationalist Government perceived foreign seed and production technologies as being for the national good, integrating foreign partnerships into their agricultural planning. There was also wide support within the Nationalist government to promote self-sufficiency. Lee (2011) provides excellent examples of both *Guomindang* officials and popular opinions from the period arguing that national food security ought to be a priority given insufficiency at home, increased imports, and the hostility of Japan. One official, Chen Bozhuang (*Chén bózhūāng*, 陈伯莊), with the support of the Republican government and financed partly by Great Britain, unsuccessfully attempted to abate Guangdong's rice imports by creating a new domestic railway to ship surplus Hunan rice through mountainous terrain to get to Guangzhou (Lee, 2011, 185-187). In the North,

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<sup>8</sup> Despite Shen's focus on plant breeding and extensive foreign partnerships, he was unable to move his experiments from the laboratory into the countryside (Stross, 1986, 189).

too, government ministers saw grain imports as a crisis of self-sufficiency (Li, 2007), and set about designing policy to increase production (Chang, 1931).

The concern was addressed in part by expanding plant breeding programs. Shen Zonghan, now working as a key official in the Republican Ministry of Agriculture and Forestry, spearheaded several initiatives. Achieving self-sufficiency by creating crops with increased yield and pest resistance was a key component of these programs. Shen (1936, 17) indicated that, “[a]s the Government has recently established the National Rice and Wheat Improvement Institute for China’s self-sufficiency of these two crops, the fund for wheat breeding has been greatly increased, and a co-ordinated plan of wheat breeding on a national basis is needed.” To this end, he employed germplasm resources left by the legacy of the Cornell-Nanjing program, and expanded extension stations. Breeding programs were developed in the South of the country as well. In Guangdong province, Ding Ying (*Dīng yǐng*, 丁颖), Dean of Sun Yat Sen University (Zhongshan College) (*Zhōngshān dàxué*, 中山大学) had returned from study at Tokyo Imperial University to restructure the institution’s approach to agronomy. To combat foreign rice imports he trumpeted scientific breeding over “peasant experience” as he sought to develop new varieties of rice as a means to achieve self-sufficiency (Lee, 2011, 132). Later joining the Communist Party, his 1933 work on wild rice germplasm in Guangdong province would prove important to breeding programs during the Mao period (Sun, 1987; World Scientific, 1981).

### ***4.2.2. The U.S. state and food security assistance in the Nationalist period***

By the early 1930s, the Cornell-Nanjing program had dissipated in formal terms. However, Rockefeller Foundation officials saw Nanjing University as the preeminent agricultural research institution in China and maintained a continued presence through funding other rural development initiatives. They were particularly encouraged by the relationship between the Rural Reconstruction Movement of James Yen (*Yàn yángchū*, 晏阳初) and their previous investment in Nanjing University's agriculture program (Gunn, 1934). The foundation provided some support to Yen in 1928, and, by the 1930s, began to support Yen's Rural Reconstruction movement in its combined activities in rural education, public health, and agriculture. Yen was educated in the United States (Yale and Princeton) and looked to Western institutions for funding toward his goals in rural improvement. He saw a need to modernize rural China believing that, "the fundamental problem of the Chinese nation, which caused her lagging behind in the modern world, was fourfold. This fourfold problem is 'ignorance, poverty, disease and selfishness'" (Hsieh, 1944). Yen tried to use foreign funding in order to move towards local self-sufficiency, creating an integrated rural economy by increasing agricultural productivity, education, healthcare, and local industry. The focus complemented central government priorities by working at the local level in China's predominantly rural areas (including introducing new grain and cotton seeds) and maintaining an internationalist outlook.

There were, however, multiple Rural Reconstruction experiments at the time (Day, 2008; Yan & Chen, 2013). James Yen's rural reconstruction work in Hebei province is often juxtaposed with that of Liang Shuming (*Liáng shùmíng*, 梁漱溟), a domestically educated scholar with an experimental site in neighbouring Shandong province. Liang focused on a "third way" between the Nationalists and Communists, focusing on Chinese culture and renewed Confucianism to rebuild the countryside. In 1936, a prominent left-wing intellectual, Li Zixiang (*Lǐ zǐxiáng*, 李紫翔), argued that, "the main difference [between the old school of Liang Shuming and new school supported by James Yen] is that the new school relies on 'international' material and human aid, while the old school is comparatively conservative and, up to now at least, has not welcomed foreign influence or foreign participation in its rural reconstruction movement" (Alitto, 1976). There were, in other words, multiple approaches being employed during this time in terms of achieving self-sufficiency in production and improving agricultural livelihoods, with some (including the Republican government) drawing on foreign partnership and others largely relying on local resources and ideational lineages. However, in terms of strategy to increase domestic production, those most closely connected to the *Guomindang* government favoured an internationalist approach.<sup>9</sup>

Though the Rockefeller, Cornell, and Nationalist projects were put on hold at the time of Japanese occupation in the late 1930s,<sup>10</sup> it was clear towards the war's end that the *Guomindang* and its supporters were keen to continue agricultural cooperation with the United States. In June 1944, Henry Wallace, Vice President and co-founder of the Hi-

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<sup>9</sup> The views of the Communist Party will be introduced in section 4.4, below.

<sup>10</sup> The work of the NARB and Nanjing University continued in Chongqing and Sichuan Province after the Nationalist Government relocated in 1937, but with minimal resources given the outbreak of war.



Bred Corn Company (later, Pioneer Hi-Bred), visited China's displaced Nationalist government in Chongqing. Before leaving for China, he made arrangements to lunch with several Chinese dignitaries, including James Yen. When word got out that he was visiting, Wallace's office received multiple requests for meetings with various agricultural societies. Wallace himself put in a request to Chinese Ambassador Wei Taoming (*Wèi dàomíng*, 魏道明) to acquire samples of corn grown in the mountainous regions of southern China (Wallace, 1944). One letter received by Wallace was signed by hundreds of faculty and students from the encampment of National Yunnan University in Kunming, where many of China's top universities had relocated after the fall of the eastern coast. The letter stated,

Mr. Wallace...What you can bring to China is not only compassionate understanding, not only the seeds of valuable plants, but also the necessary recognition of facts and something which will encourage the growth of those seeds of democracy which will bear the fruit of "government of the people, by the people, and for the people." These seeds were sown by our Dr. Sun Yat-Sen with his own hands and later watered with the sweat, tears, and blood of the Chinese people, especially of the young. (Students of NSW University, 1944)

For the students and faculty members at this leading institute in refuge from war, Wallace represented both the promise of U.S.-supported democracy and the potential for agricultural improvement. A year after Wallace left China, and the war with Japan began to ebb, discussion regarding technical cooperation resumed between the United States and China's Ministry of Agriculture and Forestry. In June of 1946, President Harry Truman wrote to Chiang Kai-shek (*Jiǎng jièshí*, 蒋介石) regarding an agreement

between the two countries to investigate further agricultural partnerships. Truman stated that development cooperation ought to involve agriculture, as it was an important component of security, industry, and prosperity to the mutual benefit of both China and the United States (Acheson, 1946). In response, Chiang Kai-shek agreed to receive a team of US experts, stating that,

We have been for centuries primarily an agricultural nation. The farmer is traditionally regarded with affection and respect. During recent times, unfortunately, our agricultural technique has fallen behind due to delay in the adoption and application of new scientific methods. I am keenly conscious of the fact that unless and until Chinese agriculture is modernized, Chinese industry cannot develop, as long as industry remains undeveloped, the general economy of the country cannot greatly improve. For this reason, I heartily agree with you that any plan for cooperation in economic development between our two countries should include agriculture. (Stuart, 1946)

Again, the Nationalist government reiterated its support for international agricultural cooperation and the adoption of foreign agricultural technologies to the ends of increased food production. The agreement led to a last attempt at agricultural modernization under the Nationalist government under the support of the United States. A group of technical experts arrived in China for a period of 6 months to make recommendations on how the country could increase production and adopt new technologies. The Dean of University of California Berkeley's School of Agriculture, who had previously worked with Albert Mann at the Rockefeller's IEB led the group along with Raymond Moyer of Oberlin College. Shen Zonghan, now the Director of the Ministry of Agriculture and Forestry, guided the delegation on their tour. In addition to making

recommendations regarding the development of farm credit and stemming population growth, the commission focused once more on building a national agricultural extension system along with introducing improved crop varieties and chemical fertilizer capacity (US Agricultural Mission, 1946), this occurring the decade before the green revolution would begin.

By 1948, little progress had been accomplished regarding the commission's recommendations. The end of Japanese occupation brought civil war across China between the Nationalist and Communist parties, diverting the financial commitments of the Nationalist government. In this context, a plan was designed for a "big push" of U.S. assistance for the Chinese economy, including agriculture. On April 3<sup>rd</sup>, 1948, the same day on which the Marshall Plan was approved by US congress, the United States made available US\$338 million under the auspices of the China Aid Act of 1948. Of this total amount, 10% was earmarked for expenditure in agriculture, and a renewed support of the Rural Reconstruction Movement. In the congressional testimony that led up to the Act, the rationale for undertaking such an aid project was discussed at length. Concern over the Chinese civil war was palpable not only for the possible outcomes but also for the potential for the United States to be drawn into prolonged expenditure. George Marshall argued that growing support for the Communist Party at the expense of the Nationalists meant that,

a great deal must be done by the Chinese authorities themselves—and that nobody else can do it for them—if that Government is to maintain itself against the Communist forces and agrarian policies. It also means that our Government must be exceedingly careful that it does not become committed to a policy involving the

absorption of its resources to an unpredictable extent (Committee on Foreign Affairs, 1948).

The use of U.S. funds for agricultural development in opposition to communism was already taking shape, as seen in this late effort to boost the Nationalist government's status and the U.S.-China relationship. The record of U.S.-led partnerships in the previous decades also became pertinent to the rural component of U.S. assistance. Representative Helen Gahagan Douglas argued, "why can't we give aid to Dr. James Yen's mass education movement...From all reports, Dr. Yen has done a perfectly magnificent job in every way. The Generalissimo has now given him a whole province to work in. It seems money spent there would be in support of a positive program which could counteract Communist propaganda" (Committee on Foreign Affairs, 1948). In the end, the rural component of the China Aid Act focused on supporting a new, broader vision of Rural Reconstruction drawing on the recommendations of the 1946 mission. The Joint Commission on Rural Reconstruction (JCRR) would focus on agricultural extension activities, including improved seed varieties and irrigation, but also include issues of land survey and registration.

When the JCRR agreement was finalized it brought together a familiar group of alumni from the pre-war agricultural development partnerships. Raymond Moyer was named as an American representative, while the Chinese contingent of the JCRR team included both Shen Zonghan and James Yen, now with long-term experience both in rural China and in partnerships with U.S. organizations. The JCRR began its work in Nanjing on October 1<sup>st</sup> 1948, but was moved to Guangzhou before the year's end due to the Communist Party's advancement into Southeastern China (Lapham, 1949). By 1949,

the Nationalist government and the JCRR had moved again, this time to the new headquarters in Taiwan. The Cornell trained agronomists and rural developers of the Nationalist government continued their work in Taiwan, and were instrumental in carrying out both land reform and plant breeding on the island. Shen would lead the organization, bringing with him several students and colleagues, including T. T. Chang (*Zhāng décí*, 张德慈). Chang had studied for his undergraduate degree at Nanjing University, and was recommended for an MSc at Cornell University by Shen after working with him in Guangzhou and then at the JCRR in Taiwan. For his part, James Yen went on to open a sister organization in the Philippines in 1952, which kept connections to Taiwan's JCRR. The effort by U.S. actors to forge ties to China's agricultural development did not succeed in establishing lasting institutional linkages in Mainland China, however it did create a network agronomists that would go on to shape the green revolution in Asia.

In the post-war period, the path set forth by the U.S.-trained plant breeders continued outside of Mainland China. In 1960, IRRI was established in Los Baños, Philippines, with the goal of developing HYVs of rice in the same manner done at CIMMYT for wheat and corn. While establishing IRRI, officials looked to take on agronomists to conduct the breeding work being undertaken by the organization. Back from the United States after receiving his PhD from the University of Minnesota, T. T. Chang was now a senior agronomist at the JCRR in Taiwan. While visiting James Yen's Rural Reconstruction initiative in the Philippines, he met with IRRI officials in September of 1960 (Chandler, 1992). By 1961 he was employed at IRRI, and brought with him rice varieties being bred by the JCRR in Taiwan, including the Dee-geo-woo-

gen dwarf variety, which proved crucial to the creation of several IRRI rice strains key to green revolution activities in Asia (Chandler, 1992, 53-54). In effect, the legacy of U.S.-sponsored agronomic activities in pre-1949 China (and post-1949 Taiwan) was essential for the development of the rice varieties IRRI spread throughout Asia. It is to these activities that we now turn, before examining the distinct path taken by the PRC in Mainland China after 1949.

### **4.3. The U.S.-led green revolution in India and the Philippines**

National governments in South and Southeast Asia that embraced green revolution technologies in the post-war period have a distinct formulation of the meaning of self-sufficiency, particularly in India and the Philippines. The formulation is similar to that of the *Guomindang* in that self-sufficiency is to be attained by increasing domestic production through the significant use of technologies and capital from abroad. In South and Southeast Asia, the research and extension of HYVs of wheat, rice, and corn were propelled by the activities of CIMMYT, IRRI, host governments, and the support of both public and private actors from the United States. In part, as described above, the work of Nationalist China seed breeders now operating in Taiwan would have a direct relationship with the work of IRRI in the development of HYV rice seed. In contrast to Mainland China, the lineage between Nationalist China and Taiwanese seed breeding mirrors the idea of self-sufficiency through foreign partnership that would develop under the green revolution. In order to see this lineage we now turn to the experiences of India and the Philippines, which illustrate the differences in approaches to self-sufficiency between the PRC and green revolution countries.

The activities of both CIMMYT and IRRI in the post-War period were not immediately embraced by either India or the Philippines. Both countries had only recently become independent with long colonial histories. American advisors themselves had also been wary of the manner in which overseas agricultural and seed breeding initiatives would take place. American geographer Carl Sauer cautioned that, “[t]he possibilities of improvement by selection are enormous, but such selection should proceed from the local materials. A good aggressive bunch of American agronomists and plant breeders could ruin the native resources for good and all by pushing their American commercial stocks” (Sauer, 1941). Nevertheless, agricultural assistance was carried forward in the hopes of yield increases with the paramount objective of achieving self-sufficiency in production for both countries. In a similar fashion to that of Nationalist China, seed breeding activities were a focus in India and the Philippines, with the same institutions providing funding and expertise.

#### ***4.3.1. Green revolution and India’s self-sufficiency partnerships***

In India, seeds were recognized as a critical part of achieving self-sufficiency driven both by national government priority and the activities of the newfound post-war international institutions. While grain seeds are implicated in the normative objective of pursuing India national food security, little distinction was made in terms of their source; based on the normative priority of self-sufficiency in production, successive Indian governments established international agricultural projects including the use of outside germplasm resources and funding. In the mid-20<sup>th</sup> century two institutions served as primary interfaces between the Indian government and international

organizations: the Indian Council of Agricultural Research (ICAR) (established prior to independence in 1929) and the Central Rice Research Institute (CRRI) of India (established in the late 1940s). Both organizations undertook internationally oriented projects from an early stage. During the 1950s, the Rockefeller Foundation was invited by the ICAR to coordinate India's corn breeding initiatives bringing in commercial varieties from North America (Kumar et al., 2012). In terms of rice, the Food and Agriculture Organization's (FAO) International Rice Commission (IRC) sponsored the major CRRI project of the 1950s.<sup>11</sup> The FAO financed research focused on crossing rice varieties at the CRRI, eventually producing varieties such as ADT 27 which was circulated only in parts of the country (Barker, Herdt, & Rose, 1985). However, given limited success, the IRC called for a broader international breeding and training program leading to the creation of IRRI in 1960.

Though India undertook multiple international collaborations in the post-war period, self-sufficiency discourse also received a renewed focus. In the early 1960s, Agricultural Minister C. Subramaniam was attempting to redefine self-sufficiency in production by reducing reliance on the U.S. supply of food aid coming through the U.S. food aid bill PL 480, passed a decade before (Singh, 2008). However, the mid-1960s saw a major drought, making self-sufficiency in production difficult to reach and resulting in frequent high-level discussions between the U.S. and Indian governments regarding requests for food aid (Kux, 1992). Though the normative priority for Indian policymakers was shifting toward increased domestic production, the way to achieve

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<sup>11</sup> The IRC came into existence in 1948 under the FAO, with Nationalist China included among its initial members. The People's Republic of China was excluded from representation.



self-sufficiency was very specific. Government policy focused on production but did not require domestically controlled inputs. Looking back, M. S. Randhawa, a senior official from the Punjab argued that,

An outstanding achievement is attainment of self-sufficiency in food by the country...These [production] increases are largely due to the introduction of high-yielding varieties of wheat, rice, pearl millet (bajra) and maize and their adaption to Indian conditions. Our scientists were not the mere recipients of this material but they improved it significantly. (Randhawa, 1979)

Randhawa's use of the term self-sufficiency required domestic production increases in order to meet domestic consumption, and allows for the introduction of foreign seed technologies for use by agronomists to meet this priority. By the early 1960s, there was a nationally based drive to produce domestically bred crop seeds, and multiple domestic seed and agrochemical companies were promoted. In 1963, a state seed research strategy was developed through the creation of the National Seed Corporation (NSC) under the Ministry of Agriculture. In subsequent years, provincial seed companies were also created with the aim of producing seed and extending regionally. By the mid-1960s, thousands of seed distribution and experimentation stations existed throughout the country, to varying degrees of capacity (Bell, 1965). Not only were national seed companies developed, but accompanying input industries supporting commercial growth were also put in place. This included PI Industries and Rallis, which started focusing on pesticide in the 1960s alongside green revolution technologies. In addition, private domestic seed firms began operations, including Mahyco, which began its seed

business in the 1960s, “start[ing] with a founding vision of changing the agricultural face of India and making the country self-sufficient in food production” (Mahyco, 2016).

Though the ICAR, NSC, and private Indian actors were involved in a mission to increase national grain production, they quickly became involved in the transnational seed breeding initiatives of the U.S.-led green revolution. In 1964, the NSC’s Chairman, Dr. G. V. Chalam, visited IRRI, bringing back 2kg of a semi-dwarf rice variety in his suitcase (Rockefeller Foundation, 2016). After IRRI released its IR8 rice variety in the mid-1960s, the Rockefeller and Ford Foundations imported 20 tons of IR8 from the institute by 1966. CIMMYT had also begun its formal work in India during the 1950s and 1960s, bringing in Mexican wheat and corn varieties to be bred and planted in the Punjab region. Given limited foreign exchange available to import new seeds, the Rockefeller Foundation again financed the shipment of CIMMYT wheat (Varshney, 1998). Rice, wheat, and corn varieties supported by transnational research and germplasm exchange were extended by the network of the NSC, state seed companies, and the State Farm Corporation of India (Singh, Pal, & Morris, 1995, 9). By the early 1970s, the Government of India, through ICAR, had signed formal memorandums with both CIMMYT and IRRI focused specifically on germplasm exchange and breeding cooperation with a view to providing seed/inputs to increase production (CIMMYT and ICAR, 1972). In other words, to achieve national self-sufficiency in production, the Indian government did not conceive of self-sufficiency as relying solely on domestic resources. Rather, the primary actors of the U.S.-led food regime expanded germplasm and breeding technology networks within India, provided development financing, and attempted to shape the structure of domestic agricultural systems.

A crucial component of the transformation of India's seed production and distribution system during the green revolution was the role of the World Bank in providing international finance. In 1964 the World Bank's Bell Mission, led by Bernard Bell and including World Bank staff advisors along with a member of the Ford Foundation, undertook an evaluation of India's agricultural development policies. The report criticized the NSC for a slow start, argued the need for greater investment in agricultural technologies, and advised that foreign multinationals were looking to partner in the country (Bell, 1965). India was considered the centre of operations for the World Bank in the 1960s and 1970s. The relationship between the green revolution and the World Bank was in lockstep, with the World Bank headquarters located inside the Ford Foundation building. World Bank staff from the time recall that they were keenly aware of domestic press concern about the entry of foreign ownership (World Bank, 2006). In fact, the initial offer of the Rockefeller Foundation to bring in new seed technologies through CIMMYT (and later IRRI) had been met with hesitation from the Government of India for similar reasons (Perkins, 1990). Despite these concerns, the work of these organizations continued.

World Bank lending in India focused significantly on the agricultural input sector. The HYV seeds of the green revolution required intensive use of chemical fertilizers and pesticides, which were unavailable at the scale needed to match the proliferation of the new seeds. This new demand created a surge in imports subsidized by aid, equating to \$280 million in 1968 (Lipton & Toye, 2010). However calls for national production of agrochemical inputs increased, leading to the opening of further domestic chemical fertilizer plants, financed through foreign loans. Between 1969 and 1986, the World

Bank lent Southern governments US\$3.4 billion to construct fertilizer plants in support of the new seed types, with India receiving approximately US\$1.5 billion (Tomich, Kilby, & Johnston, 1995, World Bank, 2019). Fertilizer consumption was less than 1 million tons before the mid-1960s, and with the increase in HYV seeds this figure reached 12.73 million tons by 1991 (FAO, 2005). Tomich et al. (1995, 244) argue that, “The [World] Bank's 1970 decision to support fertilizer investment [in the South] on a major scale was not related to price volatility or comparative advantage. Rather, it seems to have implicitly accepted the notion of self-sufficiency.” The irony of this statement is in its limited view of self-sufficiency as focusing solely on end production, and disregarding technology import and foreign debt. Loans were made more appealing by restrictions on foreign investment introduced in 1974, which maximized foreign ownership at 40% equity helping to spur further dependence on World Bank loans. India's engagement with the U.S.-led food regime contributed to indebtedness to international financial actors and increased reliance on imported green revolution technologies (both seeds and agrochemicals). This stands in contrast to the case of the PRC, as we will see below.

Emphasizing these linkages is not intended to remove agency from the Indian state. Indian scientists did adapt many varieties before extending them locally, and World Bank employees themselves recall that the government of India was able to influence the World Bank as well given that it was the biggest client of the time (World Bank, 2006). However, it does serve to demonstrate that the manner in which the goal of self-sufficiency under the green revolution was pursued had specific parameters. For the Indian state, the idea of self-sufficiency included a centralized seed research system with significant international partnerships in the development of state infrastructure, and

included drawing on international finance to underwrite the needed inputs. These developments likely resulted from long colonial relationship and historical involvement by foreign actors in India's domestic governance. As a result, by the 1970s, CIMMYT wheat varieties, sometimes cross-bred with local landraces, were present in the vast majority of varietal releases (Byerlee & Moya, 1993). Though IRRI rice took longer to diffuse, by the 1980s, the combination of directly adopted IRRI varieties and varieties with IRRI ancestry accounted for over 50% of rice seed used in India (Fan, Chan-Kang, Qian, & Krishnaiah, 2005). Agrochemical companies financed by global capital supported these seeds with the inputs required in an attempt to meet the yields needed to achieve self-sufficiency in production.

#### ***4.3.2. Importing green revolution in the Philippines' self-sufficiency***

The place of rice in the Philippines was central to the national development project and the normative priorities of state actors. Like India, the Philippines' approach to self-sufficiency did not prioritize the use of domestic resources to increase production; rather it engaged the U.S.-led food regime to use foreign germplasm, foreign agrochemical inputs, development finance, and international partnerships. During the 1940s and 1950s, attempts to increase rice production in the Philippines were focused on reconstruction and irrigation but not on domestic seed breeding (Hayami & Kikuchi, 1999; USAID, 1969b). The key institutions undertaking breeding research were the Bureau of Plant Industry (BPI) and the University of Philippines College of Agriculture (UPCA), with the UPCA holding partnerships with both Cornell University and the Rockefeller Foundation (Rockefeller Foundation, 1955). In 1957, the BPI developed one

key indica rice variety, BPI-76, which was extended in 1960. For its part, the UPCA had also bred an indica variety, C4-63, in 1962, and released it shortly thereafter. However, uptake of these new releases was relatively slow. In the lead up to their introduction, Philippines President Carlos Garcia's 1958 inaugural address laid clear the ideational drivers regarding food production in the country in the wake of shortages faced during the Second World War,

It is a strange paradox that while the basic articles in our fundamental economy are rice and fish, we are not self-sufficient in both from time immemorial. We have gone into extensive plans and schemes in industrialization, foreign exchange and similar matters, but we have not given sufficient thought or incentives, nor have we done enough to provide for the fundamental need of national life — foodstuff. In the midst of abundant natural resources for rice culture and fish production, we still have to import from abroad a substantial part of the supply to meet these absolute and irreducible necessities of life...never again [should we] neglect this essential side of our economy. (Garcia, 1958)

In his address, Garcia's self-sufficiency priority calls for an increase in national rice production in order to feed the Philippines' population without the use of imports. Despite this stated national objective, the United States Agency for International Development (USAID) (1969, 1) would characterize the Philippines' early post-war agricultural development programs as insufficient, stating that, "over time, the government's extension services became relatively emasculated." This "emasculatation" would serve as impetus to increase foreign collaboration in Philippine agriculture and seed breeding. Most notably IRRI built its headquarters outside of Manila through Ford

and Rockefeller Foundation funding. The institute was established with the support of the Philippines government and the University of the Philippines, who provided land to IRRI for its headquarters and experimentation fields (Chandler, 1992). The two foundations and the Philippines' Secretary of Agriculture and Natural Resources signed the Memorandum of Understanding enabling IRRI's creation in 1959. The document opens with a declaration that places Philippine food security squarely in the context U.S.-led international research efforts to address concerns regarding population growth and international food production,

the annual supply of rice falls far short of needs in many rice-consuming countries and the situation is becoming increasingly serious with progressive population increases. In many areas rice varieties are unimproved and cultivators make little use of modern techniques of production with the result that yields are far below production potentials. In view of the importance of rice as a human food and the interest of the Ford and Rockefeller Foundations in contributing to increasing the quantity and quality of available food crops for the peoples of the world. These two foundations and the Government of the Philippines have...decided that there is great need for a research institution of this character that it should be located in Southeast Asia, and that the Philippine Islands could provide an ideal site for its establishment. (MOU 1959)

With the creation of IRRI, foreign researchers from the United States, Japan, as well as China (by way of Taiwan, as seen above) came to work in the Philippines. In addition, UPCA research was reoriented to serve the needs of this new institution aimed at jointly addressing production issues domestically and throughout Asia. However, like in India,

domestic production increases in the name of self-sufficiency were to be achieved using imported seed technologies and inputs.

Less than a decade after Carlos Garcia's declarations and shortly after IRRI began producing "miracle rice" varieties, newly elected President Ferdinand Marcos cemented the goal of achieving self-sufficiency in rice production, adopting and supporting the work of the institute. In his first "state of the nation" speech, Marcos specifically addressed the need for self-sufficiency in rice in view of both feeding the population and gaining foreign exchange through rice exports. This goal was situated within the "sacred and noble mission" of building the Philippine nation (Marcos, 1966). Ideological reliance on food production was reiterated in 1968, when food self-sufficiency was announced as having been achieved, "fulfill[ing] a historic dream of several generations of Filipinos who equated the solution of the rice problem with the nation's self-esteem." Other domestic and international observers credited the distribution of IRRI's IR8 seeds as an important part of achieving self-sufficiency (Marcos, 1968).

Whether the Philippines was ever actually able to reach self-sufficiency in the production of rice (and corn) is subject to debate (Cullather, 2010). Nevertheless, the concern for the argument at hand is the means taken in the attempt to reach this goal. Self-sufficiency was to be achieved through an umbrella program called the National Rice Program. This, and related platforms, highlight a Philippine government view of self-sufficiency focused on the final rice product as opposed to including the inputs to produce the rice itself. Marcos' drive toward self-sufficiency was undertaken in close collaboration with the United States. After IR8 rice was created, using key genetic components imported from Taiwanese researchers involved in the JCRR, Philippines



national agricultural development planning focused on extending these varieties widely throughout the country. In particular, USAID worked with IRRI and organizations in the Philippines including the National Economic Commission and provincial governments to distribute so-called “do-it-yourself” kits to farmers. These packages contained IR8 rice, fertilizer, pesticide, and instructions (Moseman, 1969). Over the next years, though peasant-saved seeds continued to be planted, the majority of rice produced from the late 1960s to the 1980s originated from varieties developed by IRRI.

As in India, the Philippines’ engagement with the U.S.-led food regime resulted in greater U.S. structural power over the framework for agricultural development in the country. A study on the evolution of a village in Laguna province, where USAID’s SPREAD program was piloted, showed that, in 1966, wet season rice was planted solely to traditional varieties (with almost no dry season planting); by 1979 almost 98% of rice was planted to IR varieties in the wet season and all the newly irrigated dry season rice was planted to these breeds (Hayami & Kikuchi, 1999). In a speech to IRRI in 1972, Marcos himself noted that he was, “proud to say that no nation in the world has embraced the high yielding varieties developed by IRRI more enthusiastically than the Philippines. Fully sixty per cent of our rice paddies are now planted to high yielding varieties...As far as you can see, there is nothing but short, stiff-strawed, and non-lodging varieties” (Marcos, 1972). Indeed, the Philippines came to heavily rely on elements of the U.S.-led food regime, including the seeds developed by IRRI and the import of agrochemicals. Extension of IRRI rice was accelerated with the Masagana 99 campaign beginning in 1973, which was labelled a “program of national survival”, relying also on agrochemical inputs and rural credit (USAID, 1979). The rapid extension

of new IRRI rice resulted in IR36 being, “grown almost in monoculture” (IRRI, 1981). In this context, domestic investments in rice research capacity significantly decreased from the early 1960s until the mid-1980s (Revilla-Molina, 2012).

Importantly, in addition to the internationalized germplasm and research activities, the agrochemicals needed to support these HYVs of rice depended heavily on foreign content. The agrochemicals contained in the “do-it-yourself” packets initially distributed by USAID were produced by a combination of multinational agribusinesses and the Philippine agrochemical industry. Esso Standard Fertilizer and Agricultural Chemical Company (ESFAC), of the Rockefeller-owned Standard Oil Company, played a particularly important role in producing the fertilizers and cooperating with both USAID and UPCA (Davide, 1969). Though efforts were made to promote national agrochemical production to meet fertilizer and pesticide demand, between the 1960s and 1980s, 60% of Philippines market share in pesticides was occupied by Shell, Bayer, and Planters Products (which purchased ESFAC in 1970) (Boyce, 1993). In addition, the Philippines began borrowing significant sums of money from the World Bank for various “development projects”. Bernard Bell, who had led the World Bank agricultural mission to India in 1964, was World Bank Director for East Asia and the Pacific by the mid-1970s when loans to the Philippines increased. Under Marcos, the World Bank and international creditors would lend significant sums of money adding to an external debt that roughly equalled the size of the Philippine economy by the mid-1980s, with a portion focused on agricultural credit and irrigation (Dohner & Intal, 1989).

Both India and the Philippines were at the forefront of the U.S.-led green revolution and intimately tied to the U.S. food regime. In each instance, the content of the

term self-sufficiency was largely focused on attaining a level of domestic production that would supply domestic demand or even produce for export. In each country, self-sufficiency goals during the green revolution did not focus on national ownership over or development of germplasm resources, nor did self-sufficiency goals succeed in using domestic capital to either finance or produce the majority of inputs required of HYVs. Rather, engagement with the U.S.-led food regime in the name of self-sufficiency led to greater structural power of the U.S. state via its influence on international organizations, agrochemical companies, and research institutions. This is seen in the adoption of green revolution technologies funded by U.S. state and private actors. The experiences of these countries, though similar to China in some respects, would differ drastically in their approach to seed breeding and agricultural inputs. I argue that this difference in experience has lasting effects on the way that national food security is conceived of and pursued by Party-state actors in the PRC. It is to the case of China that we now turn.

## **4.4. China's self-reliant green revolution**

### ***4.4.1. The Communist Party's self-reliance in Yan'an***

Prior to 1949, the combination of actors, financiers, and international orientation placed China on track to undergo a similar experience to that of green revolution countries. However, the rupture created by the CPC's ascent to power in China's civil war set the country on a very different course with a lasting effect on the Party-state's views of food security and interaction with the global food system. The pre-1949 influence of nascent green revolution programs supported by various actors from the United States was greatly reduced as post-1949 China saw a significant change in the country's political

economic relationships. Despite some initial discussion on cooperation, in 1950 the U.S. placed an embargo on the PRC in reaction to the Korean war and the onset of the Cold War (Chen, 2006). With the Nationalist Party relocated to Taiwan, receiving full U.S. support and retaining its seat at the United Nations, the PRC became relatively isolated from the previous activities of U.S. state, business, and philanthropic actors. In this context, the PRC underwent massive reorientation and maintained distance from the expanding networks and structural power of the dominant global food system during the U.S. food regime.

Prior to 1949, self-sufficiency in grain production was a frequently cited goal of the CPC. In the mid-1940s, Mao reported from his base in Yan'an (*Yán'ān*, 延安) that it was "unnecessary to buy grain from outside [provinces]...there is no longer any doubt that the border region can be self-supporting in grain" (Schram, Cheek, & MacFarquhar, 2015).<sup>12</sup> Regardless of whether Mao's claims were true, the idea he articulated points to a parallel system of self-sufficiency goals existing alongside those of the Nationalist ambitions to increase grain production. Among the means to achieve Mao's early goal of increased grain production in mountainous central China was a focus on processes such as improving irrigation and to "popularize the use of superior quality seeds" (Schram et al., 2015, 218). In terms of seeds, Mao wrote that improved varieties could increase production without increasing the use of limited inputs such as farm labour and fertilizers. The model he discussed included taking seed varieties deemed to be improved, and encouraging peasants to plant them in different districts to test for local

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<sup>12</sup> The Yan'an era reports discussed in this paragraph are contained in the anthology of Yan'an era writings by Mao and senior Communist Party official compiled by Schram, Cheek, and MacFarquhar (2015).

suitability. Along with testing for improved seed, partnerships were initiated with newcomers, allowing the development of a system in which the Communist Party distributed “seed, plow oxen, and agricultural implements...” while promoting pig rearing to ensure efficient use of waste and fertilizer production (Schram et al., 2015, 304, 307). The CPC was already beginning to develop an agricultural extension system under resource constraints, which included mandating the local improvement of seed varieties.

This focus on self-sufficiency in agricultural production was part of a larger principle of “self-reliance”. Mao’s principle of self-reliance was ideological but also based in the material circumstances of the party at the time: economic blockade, Japanese invasion, conflict with Nationalists, and geographic isolation. In advocating self-reliance, he frequently spoke of avoiding dependence on foreign aid, particularly from the United States but also more generally. Of course, like self-sufficiency, claims of self-reliance did not necessarily translate to the full embodiment of complete isolation, as the CPC did continue to purchase goods from the outside and receive Soviet assistance (Kerr, 2007). Nevertheless, self-reliance was certainly a goal that directed various configurations of agricultural production during this period. Schmalzer (2016) gives one example by pointing to competing models of agricultural research experimented within the Communist Party’s base in Yan’an during the 1930s and 40s, particularly to the division between two academics, Xu Teli (*Xú tèlì*, 徐特立) and Le Tianyu (*Lè tiānyǔ*, 乐天宇).<sup>13</sup> Where Xu promoted “basic science” in agronomy, which included the use of foreign

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<sup>13</sup> Schmalzer notes that Le Tianyu has been incorrectly Romanized as Luo Tianyu in the past (Schmalzer 2016, 237n27). Le Tianyu will be mentioned again below, and I have retained the correct spelling.

textbooks, Le focused on local production methods and peasant engagement; the latter of which won out due to its compatibility with “self-reliance”. The concept of self-reliance and the importance of grain seeds continued after the CPC moved from its base in Yan’an to establish the PRC. Under Mao, the concepts of self-sufficiency and self-reliance take on the meaning of a relatively strict isolation. However, the implementation of these ideas in Mainland China’s grain seed research differed significantly in practical terms from the ideas of self-sufficiency in India and the Philippines, where international engagement was a central component.

#### ***4.4.2. Soviet influence and U.S. distance in 1950s agriculture***

Three months prior to establishing the PRC, Mao emphasized that China must “lean to one side” and ally with the Soviet Union in order to learn from their experiences. As a corollary, Britain and the United States, classified as “imperialists”, were not legitimate partners in China’s development plans. Capital injection from the United States once destined for Mainland China under the Nationalists was met with suspicion,

supposing they might be willing to lend us money on terms of mutual benefit in the future, why would they do so? Because their capitalists want to make money and their bankers want to earn interest to extricate themselves from their own crisis - it is not a matter of helping the Chinese people. (Mao, 1961)

The formal relationship to the West as it existed under the Nationalist government was no longer practicable, and the CPC began to define the PRC’s national self-interest, including its views of food security, in opposition to that of the United States.

The implications of this initial severance were significant in terms of research and extension on crop seeds, including grains. The previous work of United States agronomists was challenged in official publications. Technicians from the newly reformed North China Institute of Agricultural Science (formerly the Beijing Agricultural Experimentation Farm) took issue with the international extension activities of the past,

[b]efore this Institute took the form of a revolutionary barracks, the previous direction of the area's extension of American corn seed to peasants did not bear fruit. American radish seeds merely produced cherry-sized roots. These seeds by no means went through any rigorous adaptation to local conditions; so much so that they were given in envelopes marked with English writing and went straight into farmer's fields. Agricultural science and technology staff merely kept busy with calculating statistics, writing articles to send to American newspapers with grand statements of America's seed productivity. This is the epitome of China's old agricultural science and technology work. (Ma & Zhu, 1953)

The station in question, in the Beijing area, was one visited by Roy Wiggans of the Cornell-Nanjing project on his tour of northern experimental stations prior to the area's occupation by Japan (Shen, 2004). This statement of rejection, tainted with government directives of the time, critiqued U.S.-style agricultural assistance as being removed from the reality of farmers and an imposition of outside seeds. The direct planting of foreign varieties and U.S. assistance was framed as running counter to the goals of the newly formed PRC.

During the 1950s, the idea of self-reliance became entangled with the economic and ideological relationships to the Soviet Union. This entanglement is observed in China's

agricultural research of the time, particularly in the influence of the Soviet scientist Trofim Lysenko, who promoted a version of the peasant-led research of Ivan Michurin (Schneider, 2005; Schmalzer, 2016). After shunning U.S.-sponsored research activities, agronomic teaching was quickly replaced by the favoured biologist of the Soviet Union. Trofim Lysenko was president of the Lenin Academy of Agricultural Science, and held a prominent position in Soviet biology. Contrary to Mendelian genetics emphasizing heritable traits, Lysenko's view was that plants change through generations based solely on their environment and that humans could control this environment (Schneider, 2005). This viewpoint was brought to China and implicated in the ideals and practices regarding the development of improved agricultural systems, indicating that self-reliance at the time did not discount the possibility of foreign interaction.

At the top level of the Communist Party, Le Tianyu brought in Lysenkoism as the preferred philosophy of science after he gained prominence due to his self-reliant approach to production in Yan'an.<sup>14</sup> In terms of applied research in plant breeding, influences can be seen in publications as early as 1953, when the Guangdong Agriculture Experiment Station began its work (Huang, 1953). By 1954, popular publications introduced Michurin as a model for plant breeding and promoting Lysenko's interpretation of his work (Jing, 1954). Michurin, in particular, as opposed to Lysenko, had been embraced for his advocacy of engaging peasants in the work of seed research (Schmalzer, 2016). For example, in the mid-1950s, a young peasant researcher, Yang Minghan (*Yáng mínghàn*, 杨明汉), was widely praised in Chinese propaganda for his

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<sup>14</sup> Laurence Schneider (2005) indicates that it is difficult to tell whether Le advocated for Lysenkoism based on an actual appreciation for it, or whether it was simply an opportunity for him to gain power within China's major institutions. For an in depth discussion of these events, see Schneider (2005).



practices of seed selection and for assisting the goal of increased production through domestic research (Biological Study Bulletin, 1955). Prior to joining Ding Ying to study at Huanan Agricultural University (or South China Agricultural University) (*Huánán nóngyè dàxué*, 华南农业大学), Yang wrote of reading Michurin in middle-school and using his works as inspiration to conduct seed breeding in his hometown (Yang, 1955). Schmalzer (2016) notes that many of the top scientists of the time selected peasant partners to work with.

Though Lysenkoism began to be discredited in the Soviet Union after Stalin's death in 1953, its stronghold in China's academic institutions continued until the Qingdao conference of 1956 in which scientists expressed alternative opinions on genetics (Schneider, 2005). Nevertheless, the Lysenkoist practices had been mobilized through Mao's influence down to the level of the commune and formed part of the backing for agricultural "productivity increases" in the Great Leap Forward (*Dàyuèjìn*, 大跃进). The "Eight Character Charter" for agriculture (*Nóngyè bāzì xiànfǎ*, 农业八字宪法) was promoted by Mao in the mid-1950s, and emphasized eight components of increasing agricultural production: land, fertilizer, water, seeds, close planting, crop protection, tools, and management. Within the Charter, the main contribution of Lysenkoist thought came in the form of close planting and deep tilling, emphasizing the environmental factors perceived to influence yields. Despite being adopted in official policy of the 1950s, the extremes of Lysenkoist ideas did not always go unchallenged, with prominent agronomists noting issues with close planting and other practices (Ding, 1958; Li, 2012). However, such criticism was not enough, and during the Great Leap Forward, peasant farmers operating under collectives were instructed by CPC cadres to

follow lingering Lysenkoist methods. In 1958, experimental plots around the country were initiated, called “satellite fields” (*Wèixīng tián*, 卫星田), an allusion to the Soviet Sputnik satellite that launched in late 1957 (Chang & Halliday, 2005, 419-420). Reports were released that these plots of wheat, rice, and other crops were producing extraordinary yields, achieved through high yield seeds, deep tilling, close planting, and the application of manure, in line with the Eight Character Charter slogan of the time (Shangai Academy of Social Sciences, 1959; Wuhan University, 1959). Of course these reports are now known to have been mostly false or greatly exaggerated (Li, 2012; Lu, 2014). Though there were many contributors to the famines that killed millions during the Great Leap Forward, such as diversion of capital to industry, the commune system, bad weather, exports of grain, etc. (Manning & Wemheuer, 2011), the pinnacle of Soviet influence also contributed to the devastation (Schneider, 2005).

Despite Mao’s initial emphasis on the need to introduce Soviet technology and know-how, the relationship was not one-directional. As early as 1950, leaders of the Communist Party questioned the balance of power in their relationship with the Soviet Union. In order to bring in Soviet industrial technology, Stalin required joint ventures within China to hold 50 percent ownership and for Soviet control of management (Zhang, 1998). As a result, the Chinese leadership “suspected that the Soviets were trying to take advantage of China's difficult situation...Beijing saw the Soviet leaders continuing to practice the old czarist ‘imperialism’ toward China” (Zhang, 1998). In addition, Mao’s attempt to rapidly collectivize agriculture was carried out despite disapproval from the Soviet Union (Hou, 2010). By 1960, the relationship between China and the Soviet Union had become hostile, and Soviet technical advisors left Chinese soil.

After 1961, translations and joint publications between Chinese and Soviet agricultural researchers no longer appeared in the pages of the Ministry of Agriculture sponsored journal, *Scientia Agricultura Sinica*. With the decline in soviet influence, the CPC's concept of self-reliance took a further inward turn to further rely on domestic resources and avoid direct cooperation with the two world powers.

#### ***4.4.3. Self-reliance in the PRC's grain seed system***

Peasant-led seed selection was a key component of the establishment of China's national seed breeding program. The national program prioritized the development of seeds with increased yields, particularly through the use of existing domestic germplasm resources and previously imported varieties. The research and extension infrastructure promoted in "New" China began by adapting and expanding the infrastructure left behind by the Nationalist government. Shen Zonghan's vision of a national extension system had never been realized, but the CPC began working on this directly. The immediate goal of the Mao-era extension system was the collection and inventory of domestic germplasm resources, for which it relied on the mass-mobilization of peasants and researchers throughout the country.

To carry out the national priority for self-sufficiency in food production, domestic institutions were devised to promote agricultural research throughout the country along with a system of seed proliferation. In the early 1950s, 14,000 varieties of corn were collected with the goal of selecting improved varieties for eventual hybridization (Sun 1987, 174). In addition, corn and wheat varieties previously brought in through US partnerships, including the Cornell-Nanjing program, were used along with newly

catalogued domestic landraces and wild varieties. One foreign corn selection, Golden Queen (*Jīn huánghòu*, 金皇后), was planted widely in central China, reaching 55% of the corn area of Shanxi province (Stone, 1988). This variety was initially extended by Raymond Moyer and his colleagues in the 1930s as part of an American collection provided by Oberlin College (Shen, 2004). Though the extension system disseminated previously imported corn varieties in the 1950s, domestic varieties were also planted and extended, and the PRC launched a national corn research program mid-decade (Zhang & Bonjean, 2011).

In terms of rice, there was also a renewed focus on breeding and extension. Ding Ying, who had promoted self-sufficiency through local rice breeding during the 1920s and 1930s, became the president of Huanan Agricultural Institute (*Huánán nóngyè kēxuéyuàn*, 华南农业科学院) in the early 1950s after the restructuring of Sun Yat-sen University. By 1956 he had officially joined the CPC, and was named president of the Chinese Academy of Agricultural Science (CAAS) (*Zhōngguó nóngyè kēxuéyuàn*, 中国农业科学院) upon its creation in 1957 (World Scientific, 1981). His research team, beginning prior to 1949, had collected over 7,000 species of wild and landrace rice in Southern China (Li & Zhang, 2012). Ding Ying's works on the archaeology and genetics of rice were also increasingly used to make nationalist claims about the origins of the rice planted in the country; the rice of China was seen as having deep roots that could not be unearthed from the country and was differentiated from the rice of India or Thailand (see Sun, 1987; World Scientific, 1981). However, as with corn, not all rice varieties planted in China during the 1950s were sourced from the Mainland. For example, one variety that was used in domestic breeding programs, Nongken58 (*Nóngkěn 58*, 农垦

58), was acquired on a trade mission to Japan in 1957 when Chinese scientists in the delegation visited a Japanese agricultural demonstration centre (Jiangsu Province, 1997). Nongken58 and rice with its lineage would be extended widely in southern China. Nevertheless, while foreign seeds were used, the actual breeding was undertaken domestically and extended using domestic resources. Agricultural universities were created from existing institutions, newly developed ones, or a recombination of the two. Overall, the CPC's normative priority to ensure self-sufficiency required that significant material resources be devoted to collect and inventory germplasm in order to develop domestically controlled seeds.

The collection of domestic germplasm resources both from landraces and wild varieties led to the discovery of dwarf varieties of rice resistant to lodging due to their short height and thicker stem. The emphasis on dwarf rice breeding in Mainland China had solidified by the early 1950s, with varieties being introduced as early as 1956, before IRRI came into existence (Sun, 1987, 146). These varieties included *aijiaonante* (*Āijiǎo nántè*, 矮脚南特), selected in 1956 and subsequently released for cultivation experiments. By 1965, it was being planted on 733,000ha. Other varieties include *guangchangai* (*Guǎngchǎng ǎi*, 广场矮) (1959) and *zhenzhuai* (*Zhēnzhū ǎi*, 珍珠矮) (1961). By the time IRRI had released IR8 in 1966, based in part on a dwarf variety of rice found in Taiwan, there were over 10 similar rice varieties bred and released on the Mainland (Sun, 1987, 147). The late 1950s also saw the beginning of China's corn hybridization program. Corn hybridization was illegal under Lysenkoist policies of the Soviet Union until 1952. This was also the case in China until 1956, when domestic hybrid corn research began (Schneider, 2005, 157). Li Jingxiong (*Lǐ jìngxióng*, 李竞雄), a

graduate of Cornell's plant breeding program who remained in the PRC after 1949, headed the research unit calling for accelerated research and extension of hybrid corn including the use of domestic germplasm resources (Li, 1960). In order to produce seed in adequate quantities, beginning in 1954, the PRC established a nation-wide development program for local seed fields (*Zhǒngzǐ tián*, 种子田) to select and multiply HYV seed for dissemination (Hunan, 1958; Shi & Rong, 1955; Xu, 1955). By the late 1950s, "an extensive network of 13,669 agricultural technical stations, 1,390 seed stations and 1,899 demonstration and breeding stations for seed strain improvement had been established" (Stone, 1988). The seed breeding and distribution system in the PRC was becoming formalized in a way it had never been previously. The system promoted domestic varieties that started to take the place of farmers' saved seed, all before IRRI was established.

In the wake of the famine following the Great Leap Forward, domestic seed research and extension systems were revised. In the absence of Soviet partnership, views of self-reliance took a stronger position against the direct use of imported germplasm. Paramount to views of self-sufficiency through self-reliance was the Dazhai (*Dàzhài*, 大寨) model. Dazhai was a town in Shanxi province with limited resources that (at least in slogan) achieved local self-sufficiency and was promoted in CPC campaigns ("Learn from Dazhai") (*nóngyè xué Dàzhài*, 农业学大寨) as the idea to be strived for (Schmalzer, 2016). During this time, national self-sufficiency was to be achieved at the sub-national level. In other words, regions and even counties were encouraged to become self-sufficient within their own unit. The promotion of this model was motivated, at least in part, by the external threat of the United States and Soviet Union

from which China was now isolated (Zweig 1989, 6). For example, a village in southern China began receiving new rice seed varieties as a late adopter in the mid-1960s. Requiring heavy fertilizer application and reliable irrigation, the village had to use a combination of manufactured fertilizer received from the government, while also using local sources of nitrogen like alfalfa cover crop, co-planting water plants alongside rice, and using all available compost (Chan, Madsen, & Unger, 1984). Though the extension of seed became increasingly widespread as a mechanism to achieve local self-sufficiency, peasants were often reluctant to begin planting these new varieties given the proclivity to sudden crop failures, as described in the case of Golden Queen corn (perhaps strategically, given the U.S. origin of the variety) (People's Daily, 1958).

During the late 1960s to the late 1970s, though much of the formal education system and bureaucracy was disrupted due to the upheavals of the Cultural Revolution, research and extension of new grain seed varieties often continued throughout the country. The “four-level agricultural scientific experiment network” (*Sì jí nóngyè kēxué shíyàn wǎng*, 四级农业科学实验网) originating in Hunan province proliferated throughout the country given its local (county) level focus (Gao & Zhang, 2008; Schmalzer, 2016, 44). Yuan Longping's (*Yuán lóngpíng*, 袁隆平) two-line hybrid rice varieties are perhaps the most famous examples of seed-variety diffusion as a result of this extension system. These high yield rice varieties would result in Yuan becoming a household name as China's “father of hybrid rice” (*Zájiāo shuǐdào zhī fù*, 杂交水稻之父). In 1970, the discovery of a male-sterile variety enabled the development of this new breeding method. The team of researchers shared their findings and the genetic materials to research institutions in 13 rice producing provinces (Li, Xin, & Yuan, 2009,

5). Over the next several years nation-wide breeding activities took place (though particularly in Hunan), with experimental extension activities in place by 1974. Tens of thousands of research stations now existed at the local level, including seed stations (*Zhǒngzǐ zhàn*, 种子站) and units within Mao-era production brigades (*Shēngchǎn dàduì*, 生产大队). To be sure, the extension system's characteristics varied over time during the Mao period, nevertheless, by 1974, over thirteen million people were participating in extension activities or an average of almost 400,000 per administrative division (Schmalzer, 2016).

As seen above, seed production, not solely in relation to rice, was considered a crucial component of achieving self-sufficiency. On this point, the Provincial Agricultural Bureau of Liaoning Province issued a statement that “seed work is the foundation of agricultural production, both for current production, but also to be prepared with extendable improved varieties for the future” (Liaoning Agricultural Bureau, 1974). By 1978, with the country on the cusp of reform and opening (*Gǎigé kāifàng*, 改革开放); domestically bred “improved” strains of semi-dwarf rice were being planted on 80% of total rice area, while newly introduced hybrid rice was already being planted on 12.6%. Meanwhile HYVs of corn were being planted on 60% of the total area dedicated to the crop. For both rice and corn, the variety-types in question were being planted on less than 1% of the total devoted areas prior to 1949 (Stone, 1988). Traditional, farmer saved, varieties now occupied a minority position in terms of overall planting of grain seed. Though some germplasm had originated from imports, the original foreign varieties had been bred out domestically and were no longer being planted directly. The national objective of reaching self-sufficiency in production was targeted not just by



increasing production but also by doing so using domestic germplasm resources and breeding technologies.

#### ***4.4.4. PRC interaction with the U.S.-led green revolution***

IRRI and CIMMYT varieties did arrive in China, however not through direct contact with the organizations. Though the work of the CGIAR institutions was initially meant to prevent Chinese-style revolutions in Asia, it is clear that controlling the spread of these technologies was not easy; for example, IRRI rice varieties became popular in North Vietnam (Cullather, 2010). When IRRI rice varieties made their way to Mainland China, it was through economic back channels. An investigative report by Australian journalist Richard Hughes indicated that researchers in China had received samples of the CGIAR varieties (particularly IR8 and Mexican wheat) through Nepal and Pakistan in 1970, previously having obtained samples in the late 1960s (Dalrymple, 1986, 97n37; Hesser, 2006, 150). It was only in 1972, with the China-Philippines rapprochement, that Chinese officials officially acknowledged receiving samples of IRRI rice varieties from a trade mission to the Philippines. In this instance Ferdinand Marcos, courting closer diplomatic ties, provided samples of IR varieties (Karplus & Deng, 2007). China was formally provided with IRRI rice and CIMMYT wheat only after the development of formal partnerships with the organizations in 1974. Even with this limited interaction, there was almost no direct adoption of either institution's grain seeds in China, either in the 1960s/70s or beyond (as will be discussed in Chapter 5).

Though IRRI/CIMMYT's HYVs were not extended during this period, varieties developed in Mainland China also required greater water and fertilizer inputs. Most of

the fertilizer needed to sustain the new seeds was initially supplied through organic methods (manure, compost), which had been promoted by Mao since the Yan'an period and could be sourced locally. In the 1960s, chemical fertilizer was introduced in greater measure, produced on a small-scale in brigades around the country. By the 1970s, small-scale production totalled some 2 million tons per year. Nevertheless, China was still reliant on fertilizer imports (mostly from Japan) to the level of 1 million tons per year. Examples of Japanese fertilizer use abound (Chan et al., 1984; Zweig, 1989). Beginning in 1972, large scale factories were constructed with external engineering assistance, and added 4 million extra tons of production by 1980 (Barker et al., 1985).

At the centre of the major fertilizer infrastructure purchases was the M. W. Kellogg Company, which had previously worked in various green revolution countries constructing fertilizer operations for major global chemical and agrochemical firms including Shell, Standard Oil, and DuPont (For Your Information, 1975). Three sets of contracts were devised with the M. W. Kellogg Company constructing 8 ammonia plants; its Dutch subsidiary (Kellogg Continental) was contracted to open an additional 8 urea plants. Finally, Kellogg received joint contracts in partnership with a Japanese firm, Toyo Engineering Corporation, for an additional two ammonia plants (Wilcke, 1973). Significantly, in order to settle the several hundred million dollars in costs, the transactions were undertaken without the use of credit. Neither commercial banks nor the World Bank were implicated in financing the transaction (Torbert, 1977). In the twilight of the Mao period, the fix of agrochemicals needed to support the newly disseminated seed varieties began to draw on foreign support, though still outside of the global credit and development finance systems.

Nevertheless, the PRC was largely shut out from flows of capital and technology emanating from both the United States and the Soviet Union, and also from the international financial institutions of which it was not a member. The majority of seed varieties, and particularly seed breeding, was derived nationally. Between 1950 and 1960, ten rice varieties were introduced from abroad, while the period 1960-1970 saw only one extra foreign variety extended into farm fields (Shen, 1980). Similarly, the development of domestic hybrid corn varieties meant that very few foreign varieties were planted directly after 1960. By the late 1970s, as domestic political transition was occurring in the wake of Mao's death and Deng Xiaoping's (*Dèngxiǎopíng*, 邓小平) rise to leadership the PRC's seed system was already unrecognizable compared to the pre-war Nationalist period. Mao and the CPC had constructed a national concept of food self-sufficiency that prioritized the development of a seed system that no longer relied on foreign germplasm, breeding technology, finance, or institutional partnerships. In turn, significant material resources were dedicated to the objective, including the development of seed breeding and research networks within the PRC.

## **4.5. Comparing green revolutions**

### ***4.5.1 Defining self-sufficiency: the PRC vs. India and the Philippines***

In the decades leading up to the establishment of the PRC, multiple actors from China and the United States were in partnership with the goal of increasing grain production (and other crops) in China. This goal was to be achieved in large part by improving agricultural inputs, using new seeds, techniques, and/or capital imported from abroad – particularly from the United States. The Republican government's focus on self-

sufficiency included regaining control of trade and developing domestic markets without a strong focus on or ability to control investment and technological exchange. With the fall of the *Guomindang*, many of the key individuals involved in U.S. agricultural partnerships moved to Taiwan, and later contributed to the development of IRRI rice. As the green revolution got underway, first in Mexico, and then in India and the Philippines, these countries focused on self-sufficiency in production as opposed to technology and capital transfer. In contrast, the CPC undertook a “self-reliant” approach, in part shaped by the Cold War context.

There is an important element of continuity between the U.S.-sponsored activities in Chinese agriculture in the pre-1949 period, and the post-war green revolution activities in Asia. Likewise, there are important discontinuities between the experiences of green revolution countries and that of China under Mao. The meaning of self-sufficiency differed between these two versions of agricultural transformation. The definitions, in combination with the geopolitical and economic structure of the time under the U.S. food regime, produced important differences related to sources of germplasm and sources of finance for inputs. Table 4.1 illustrates each country’s differences in the international dimensions of the concept of food self-sufficiency, where the checkmarks are based on the analysis above. Where each country established goals of self-sufficiency, India and the Philippines relied significantly on international partnerships in their approaches to meet production targets, from germplasm to finance. In comparison the PRC focused not only on the goal of adequate production, but also on the (largely) domestic sourcing of germplasm, breeding ability, and inputs.

In terms of germplasm and breeding, the key difference is in the level of reliance on external support and the development of norms related to the adoption of seed varieties from abroad. In India and the Philippines, though local varieties and national breeding institutions existed, there was significant cooperation with CIMMYT and IRRI in addition to the FAO and U.S. development institutions. In each country, key grain varieties and chemical inputs came from abroad for use in domestic breeding programs. Though many domestic institutions and agronomists were involved, U.S. and international partnerships played a key role in directing research and extension. Private and public actors from the U.S. offered advice on breeding techniques, encouraged land reform, and emphasized the selection of specific grains suitable to these breeding techniques. In addition, they made parallel recommendations to introduce industrial agrochemicals alongside the introduction of HYVs.

**Table 4.1: Food Self-sufficiency and International Dimensions**

	Food Self-sufficiency discourse	Foreign germplasm	International seed research	Foreign agro-inputs	Grain imports	Global finance (agric.)
PRC	✓	✓		✓	✓	
India	✓	✓	✓	✓	✓	✓
Philippines	✓	✓	✓	✓	✓	✓

**Legend:** ✓ = significant presence; ✓ = moderate presence; ✓ = some presence

Although the PRC initially drew directly on the grain seeds left from international partnerships under the Nationalist government, the tendency was to move in a different direction. Local breeders and work units collected germplasm resources from across the country for exploitation, the state restricted outside varieties from coming into the country, and previously imported varieties ceased being directly adopted and were rather used for breeding after 1960 (Fan et al., 2003; Stone, 1988). Though the state did promote agrochemicals, the priority was on local production, relatively independent of outside resources. However, the PRC was not immune to the importation of fertilizer for use in its new input-intensive agricultural model. Among low income countries in Asia, China and India each accounted for the largest total amount of fertilizer imports. However, in a relative sense, imports were much lower for China. Between 1975 and 1979, imports to China accounted for 18.4% of the total fertilizer used in the country whereas in India they represented 34.3% (Barker, Herdt, & Rose, 1985, 89). This figure must also be understood in the context of India's domestic production being largely underwritten by World Bank loans. In the Philippines, though the total volume of fertilizers used was much lower, imports from foreign agrochemical firms made up a much larger percentage of the total, reaching 73% in the same period (Barker, Herdt, & Rose, 1985, 89). Further, domestic fertilizer production in China during this time was focused on a combination of organic sources (such as animal and green manure) in addition to local-scale chemical fertilizer production. This dynamic is in direct contrast to the sourcing of agrochemical inputs in green revolution countries, which relied upon a combination of foreign loans, foreign investment, and foreign imports to achieve desired yields.

I argue that these key differences mark an important divergence for the PRC in terms of the meaning of grain self-reliance and distance from the global food system. Food production, particularly in the context of rice, was put forward in each country as an important component of national identity and national economic development. While “food nationalism” was present in China, India, and the Philippines, the parameters of national production varied in the context of agricultural development. Each state made national self-sufficiency in grain production a priority as a means to feed their population and conserve foreign exchange. For the PRC, this developed in a broader period of economic isolation. As a result, discourse and action surrounding food grain self-sufficiency took on a unique flavour as compared to green revolution countries. Self-reliance under strict sufficiency in agricultural production required a focus on ownership of and national control over each segment of the production chain, from the sourcing of germplasm, to the breeding and extension of new varieties, to the inputs used and necessity to produce enough for national consumption. As such, the grain varieties developed and extended during this period were considered an instrumental component of achieving self-sufficiency. Rice, in particular, was given the characteristic of being an integral part of the Chinese nation with deep historical meaning.

The model of agricultural development undertaken by the PRC, a function of both ideology and material limits, was essentially autonomous from the dominant global political economy of the time. The PRC’s relatively strict self-sufficiency during this time meant that it was not a participant in the U.S. food regime. The positive power of the U.S. food aid system and green revolution was not successfully exerted on the PRC in the way it was in green revolution countries. In essence, this period marked a point at which

global agribusiness and financial actors made inroads in green revolution countries but were unable to extend networks into the PRC. The various U.S. and European companies and institutes involved in selling and/or extending seed and chemical inputs, along with commodity trading, did not regularly operate in the PRC during this period. Even when it did occur, agribusiness interaction of the period was conducted “cash on the barrelhead and [the PRC government] expressed no interest in long-term credits, even for large purchases such as M.W. Kellogg's ammonia plants” (Torbert, 1977, 1120).

This self-reliant model, however, held with it an important contradiction. Though seeds were promoted by the state as being crucial to the development of food self-sufficiency in a modern national economy, the large-scale extension of HYVs brought the beginning of a widespread displacement of local seed varieties and the dis-embedding of local agricultural systems. In a similar fashion to the green revolution countries, China's HYVs began to take over traditional seed varieties and imposed the de facto requirement of farmers to source new seed to plant each year in order to achieve the promised yields. The key difference is that in China, the annual requirements of rice and corn seed were nationally developed, using domestically controlled research and extension networks. While this was in part made possible by the PRC's large size and population, market size was of secondary importance to the priority of self-reliance, as seen in the comparison to other large economies like India and the Philippines. As the following chapters highlight, this distinction becomes important with the further commercialization of seed industries in the 1980s and 1990s. The gradual integration of private businesses in China's domestic public seed research and extension system comes both in stark



contrast and striking familiarity to the privatization of the seed systems supported by, in large part, the CGIAR institutions.

#### ***4.5.2 Conclusion***

Though the PRC and green revolution countries pursued similar kinds of agricultural development, focused on increased production, they did so with different normative approaches and different breeding and research networks. In the PRC, these norms and networks were embedded in the domestic economy rather than the global political economy. These factors are important for securitized foodways as they demonstrate a distinct historical path followed by the PRC during a key period of global food system expansion under the U.S. food regime. The dynamics of the Cold War and normative priorities of the CPC allowed the PRC domestic autonomy during a time when the U.S. exerted positive power on the agricultural systems of many Southern countries. This autonomy allowed the Party-state domestic policy space to expand independent seed breeding networks and state-controlled agricultural research infrastructure, at times with significant human costs.

The objective of making this comparison is not to evaluate whether one approach or the other was better. In fact, the key similarity among each country was the use of HYVs and fostering dependence on the agrochemicals needed to reach promised yields. In addition, the spread of HYVs came at the expense of biodiversity in each country, and the planting of monoculture in various areas. Rather, the comparisons above establish the key areas of difference in the Party-state's conceptualization of self-sufficiency in the context of grain seed research and extension. While some historical research situates

China simply as the foil for the U.S.-led green revolution, the dynamics within the PRC were unique and differentiated in important ways both from the path that might have been taken under the Nationalist government and the path that was taken in comparison to India and the Philippines.

Surely the agricultural transformation in the PRC was influenced in part by foreign practices; however, there were also substantial barriers to the expansion of networks by agribusiness, international organizations, and U.S. philanthropic organizations. This distinction is important as it points to a shortcoming in scholarship of the U.S. food regime. During the post-war period, the key food regime dynamics were the expansion of US food aid, agricultural capital, and technology transfer (Friedmann, 1982). As shown above, this set parameters on the exercise of national self-sufficiency in developing countries. However, the case of China operates largely in parallel to the second food regime without becoming a part of it.<sup>15</sup> Food regime scholarship has always claimed not to encompass all aspects of the global food system (Friedmann & McMichael, 1989; McMichael, 2009); however, the absence of discussion pertaining to China during the second food regime is conspicuous given the context of the contemporary global political economy and the historical leaning of food regime analysis.

The importance of the concept of self-sufficiency was not unique to the CPC, as the Nationalist Party had also attributed importance to domestic grain production. However, the CPC leveraged the Republican Party's international collaborations by framing self-reliance in opposition to unbridled cooperation and expanded the

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<sup>15</sup> The PRC did import wheat on several occasions, equaling only a small percentage of overall production, while continuing to export rice. Equaling a relatively small amount of 4-5 million tons per year, these imports came, "mostly from Canada, Australia, Argentina and France" (Mah, 1971).

parameters of the concept to ownership over research and extension. For the Party-state, this period reinforced a foundational national priority regarding control over grain production, from research and extension, to seed inputs, to imports, to agricultural capital. As a result of this priority, national agricultural activities received frequent rhetorical focus, and significant national resources were devoted to pursuing self-reliance at each step of production. Further, the PRC separated itself from the structural power of the U.S. food regime, allowing the PRC to develop autonomy from the contemporaneous power dynamics of the global food system. The Party-state began to establish its own domestically controlled networks of research facilities, including the extension of domestically developed grain seed varieties by provincial and local research units. This level of autonomy and the creation of national networks serve as a key point of departure for explaining the trajectory of the PRC within the contemporary global food system. The next chapter delves into a period of enormous change in the global political economy; however, the experiences explored in this chapter continue to affect how these changes relate to the structure of the seed industry in China.

# Chapter 5: China's Domestic Seed Industry and Global Agribusiness

## 5.1. Introduction

Since the late 1970s, China's grain seed system has not escaped the economy-wide re-orientation toward interaction with the global economy. In an environment of renewed international engagement, the concepts of grain self-sufficiency and self-reliance were faced with new challenges. No longer was Party-state control over the grain seed industry guaranteed through state ownership, (mostly) closed borders, and small volumes of state-mediated trade. Instead, new states, enterprises, foreign agribusiness actors, and technologies interacted with the PRC. These dynamics set the domestic seed system on course to develop into a commercially oriented seed industry, eventually on a global scale. I argue that the concept of self-reliance was adapted to the context of greater interaction, leading to a policy focus on national control over the domestic seed industry and global competitiveness of national agribusiness firms. In acting on this priority, the Party-state exercises ideational and structural power over the domestic market by influencing agribusiness priorities and the structure of industry.

The domestic component of securitized foodways explains the contemporary Party-state's policy approach to national food security through pursuing self-reliance in the global economy. Self-reliance is maintained by carving out domestic policy space that allows state and private actors from the PRC to retain ownership of, and technology used by, grain seed enterprises. In the seed system created during the Mao period, thousands of work units (along with research institutions) across the country carried

out seed research and extension as opposed to centralized state or private enterprises. The sections below will examine the networks of these thousands of work units that were transformed into thousands of small seed enterprises. Further, the policy priorities of the Party-state act to maintain and create space for the national seed industry to exist and form, making it difficult for MNCs to establish joint ventures with immediately wide-reach. These policy priorities, supported by the normative objective of the Party-state, reveal both the change and continuity in the practice of national food security and concept of grain self-reliance in the global economy.

More generally, this chapter demonstrates why and how the structure of the contemporary grain seed industry in the PRC currently diverges from the trend of MNC consolidation since the 1970s. Building on its autonomy from the structural power of the U.S.-led food regime, the PRC began to refashion its domestic institutions in the late 1970s to interface with global agribusiness. Not only were domestic institutions modified, but also the meaning of the Party-state's national priority of self-sufficiency through self-reliance was reconstructed. Rather than pursuing self-sufficiency through enforcing hermetically sealed technological development, self-reliance was reoriented to accommodate increased international trade and investment in the agricultural sector. The key continuity for the CPC was the imperative of national control over seed enterprises through domestic ownership, despite increased global economic engagement.

Building on this strong ideational orientation, Party-state control over the grain seed industry is made possible by the additional power dimensions at play in securitized foodways. The negative power of the PRC in the post-war period led to the absence of

international organizations and foreign investment during the green revolution, which disconnected China from the global food system emerging in the 1980s. This early autonomy allowed for the development of policy space focused on financially, technologically, and geographically limiting inward MNC agribusiness investment. Further, the networks of decentralized seed research and extension organizations of the Mao period provided a base upon which seed enterprises could develop and expand within the PRC. Together, these dynamics contribute to China's securitized foodways in the global political economy.

To develop these points, this chapter contains four sections. I first provide a brief overview of the initial steps that the PRC took towards re-engaging the United States in terms of agricultural cooperation, and re-conceptualizing grain self-reliance through self-sufficiency. I subsequently investigate the linkages between the PRC's current domestic seed industry and global agribusiness, including the types of domestic seed firms in the PRC, existing joint ventures with major global seed companies, and the policies that govern seed industry change. Finally, I turn to an empirical example of domestically engineered, GM rice and its path to domestic commercialization. This example will illustrate the factors at play in this chapter, and point to a critical area of difficulty faced by contemporary economic nationalist policies; the use of foreign patents to develop "national" agricultural technology create potential limits on control through ownership.

## **5.2. Developing a seed industry in the PRC**

### ***5.2.1. Self-reliance and re-engagement with U.S-led green revolution actors***

During the 1970s, the world's largest agrochemical, pharmaceutical, and seed companies underwent a series of mergers and acquisitions (Fernandez-Cornejo, 2004). This transformation began during the green revolution, and the U.S.-centred food regime (Friedmann, 1982). During the same period there was increased discussion of "food as a weapon" in American policy circles (Zhang, 2018). Prior to the World Food Conference, and in the wake of the global food crisis, the U.S. Central Intelligence Agency produced a report stating that, "Without indulging in blackmail in any sense, the United States would gain extraordinary political and economic influence [through control of food supply]. For not only the poor LDC's [lesser-developed countries] but also the major powers would be at least partially dependent on food imports from the United States" (Weinstein, 1975). While President Gerald Ford declared that the U.S. would not use food as a weapon against the Soviet Union, Secretary of Agriculture Earl Butz continued to refer to the use of "agripower" and the advantage of dependence on US grain exports as a mechanism to increase compliance:

Other nations, too, are getting their lifelines extended right into our markets, in that they must have U.S. food on a continuing basis. That means they don't want even a one years' interruption of supply. It is one thing to depend on the U.S. market for steel products or airplanes. You can postpone purchases for a year if you need to. But if you're building up your livestock population - as they are in

Yugoslavia or Poland or Iran - based on a continuing flow of feed grains and protein supplement from the United States, you simply want to maintain reasonably amicable relationships to keep that lifeline open. (U.S. News & World Report, 1976)

This statement points directly to the type of structural power held by the United States in the global food system and the use of food for national security via the extension of lifelines into other countries. As discussed in Chapter 4, China was largely independent of the international grain seed research of the green revolution until the mid-1970s, and was also independent of the flow of US grain exports to the global South. However, the PRC was by no means agnostic to the concept of U.S. agri-power. In 1974, only three years after the PRC was recognized at the United Nations, future president Deng Xiaoping addressed the U.N. General Assembly. There, he gave a definition of self-reliance, which consciously opposed the structural power of the United States in global agricultural markets:

By self-reliance we mean that a country should mainly rely on the strength and wisdom of its own people, control its own economic lifelines, make full use of its own resources, strive hard to increase food production and develop its national economy step by step and in a planned way...each country should work out its own way of practising self-reliance in the light of its specific conditions...Self-reliance in no way means “self-seclusion” and rejection of foreign aid. We have always considered it beneficial and necessary for the development of the national economy that countries should carry on economic and technical exchanges on the



basis of respect for state sovereignty, equality and mutual benefit, and the exchange of needed goods to make up for each other's deficiencies. (Deng, 1974)

This statement rebukes the idea of control over the flow of food as a tool of power over national economies, while emphasizing the need to secure the PRC's own economic lifelines at a time when greater economic exchange was beginning. During the same period, researchers from around the world began receiving access to study China's agricultural system through invited/guided visits to the country. Several months after Deng's speech at the United Nations, a U.S. Plant Studies Delegation visited several Chinese cities. The delegation included green revolution leader Norman Borlaug, Rockefeller Foundation Vice President Sterling Wortman, as well as the Director General of IRRI, and involved seed exchange with representatives of China's national academies, including IRRI rice (Wortman, 1975). Additional missions from the FAO, IRRI, and CIMMYT, gained in frequency during the late 1970s (FAO, 1980, 49-50).

The PRC's domestic seed industry began to further exchange with the global seed research system of the green revolution. A critical example of this new context is the International Rice Research Workshop. October 1979 saw the first concrete interactions with the green revolution actors that had left China thirty years before. CAAS and IRRI jointly hosted this workshop in the southern city of Guangzhou. Almost four decades after supporting James Yen's Rural Reconstruction movement, the Rockefeller Foundation made a small return to agriculture in China by financing the event, with additional funds from the United Nations Development Program. Though IRRI seeds had previously entered China on several occasions, it marked the organization's first official activity in the country. The event was hosted at the Guangdong Academy of Agricultural

Sciences (*Guǎngdōng nóngyè kēxuéyuàn*, 广东农业科学院), the alma mater of former CAAS president Ding Ying. Familiar characters were in attendance including T. T. Chang, who had studied at Nanjing University with Shen Zonghan and later worked at IRRI, and the PRC's lead hybrid rice researcher, Yuan Longping. This event marked the beginning of new international networks being created in the PRC's grain seed industry, and renewed exchange of germplasm resources and breeding technologies.

The October 1979 workshop took place as Deng Xiaoping promoted the “four modernizations” (*Sì gè xiàndàihuà*, 四个现代化) slogan in national policy discourse and direction. Agriculture was Deng's primary focus for modernization, in addition to prioritizing industry, national defence, and science and technology. Top scientists from the PRC speaking at the workshop dutifully referenced Deng's slogans, and encouraged specific priorities for seed breeding. In a speech that marked a turning point in the way that agricultural self-reliance would be perceived in the PRC, CAAS vice president He Guangwen (*Hé guāngwén*, 何光文) told the room of foreign participants that, “to realize agricultural modernization, [China] must not only work hard, we must also seriously study and learn from the advances and experiences of other countries” (He, 1980, 3). The PRC's agricultural pursuits were being aligned with those of industrialized countries with a willingness to bring in foreign technology.

As argued in Chapter 4, under Mao, the grain seed system was built principally using the genetic resources available within the country including those legacy collections of foreign specimens from Nationalist China. In the 1980s, self-reliance would continue rhetorical prominence, though with a more distinct focus on

international engagement. As Shen Jinhua (*Shěn jǐnhuá*, 沈锦骅), a plant breeder from CAAS, stated in a prepared speech,

we must further collect genetic resources, both indigenous and foreign cultivars and wild species, and strengthen our genetic evaluation and utilization program...we must further strengthen cooperation with international agencies such as the International Rice Research Institute, with Japan, and with Southeast Asian countries to expand the scope of scientific discussions, technical cooperation, and exchange of genetic material and experiences. Such cooperation will enhance the development of rice breeding and rice production, both in China and the rest of the world. (Shen, 1980, 30)

This statement has several important points regarding the concept of self-reliance in food security: the PRC's seed research system was to 1) re-engage in international technical cooperation; 2) promote exchange and develop germplasm resources; and 3) maintain China's distinct place in comparison to the "rest of the world".

### ***5.2.2. Seed businesses, outside examples, and domestic regulation***

In assessing China's agricultural transformation during the 1980s, much focus has been placed on the important changes that took place in terms of agricultural land and production rights during this time. The household responsibility system was introduced in the late 1970s, and farmland was decollectivized in the early 1980s, with agricultural production increasing significantly (Nolan, 1988; Lin, 1991). What most explorations of this time have not dealt with is the place of seeds within these reforms and subsequent increase in grain production (for an exception, see Lin, 1991). The statements made at

the CAAS-IRRI conference above hint at the form of these changes. In November of 1977, just as Deng was assuming *de facto* leadership of the CPC, the State Planning Committee (*Guójiā jìhuà wěiyuánhùi*, 国家计划委员会) issued a policy statement that affirmed the role of seeds in the changes to come,

Agricultural policy...must strengthen seed research. Seeds degrade easily, so we must have a resource base. Capitalist countries have seed companies that sell to farmers. Seeds need constant research and continuous renewal, requiring strong measures [to achieve this]. (Zhang, 1984, 2)

This statement made an unlikely comparison. It looked toward the method of seed research and distribution in “capitalist countries” (*Zìběn zhǔyì guójiā*, 资本主义国家) as a potential pathway toward strengthening China’s agricultural base. Deng linked this more explicitly to the United States in 1978 during a visit to Sichuan province, when he stated that, “Seeds are very important. We must establish a seed-breeding base of operations... America has seed companies, and every year they produce seeds for sale” (Guo, 2014, 123). Deng was introducing an industrial and commercial perspective of agricultural production, one based on a specialized supply chain. For Party-state policy, the concept of agricultural self-reliance would now also differentiate between specialized components that make up the national food supply, with the seed industry at its core. The decentralized landscape of seed research and extension in the previous period gradually moved towards a loosely coordinated network of seed enterprises and research institutions, conscious of the global agribusiness landscape.

This nationally focused system did not abandon the normative priority of self-reliance by opening to unchecked foreign investment in the seed industry as occurred elsewhere in the world. Rather, the Party-state exercised structural power over its domestic economy by refashioning domestic institutions to interface with global agribusiness without rapidly liberalizing as occurred elsewhere at the time (Nolan, 2012). In 1978, the Party-state established its first national state-owned seed enterprise, China National Seed Group Corporation (CNSGC) (*Zhōngguó zhǒngzǐ jítuán gōngsī*, 中国种子集团公司). The domestically focused company was created under the Ministry of Agriculture, and overseen by the Deputy Minister of Agriculture. It was charged with carrying out modernization policy, to increase seed production specialization, mechanization, standardization, and varietal regionalization. The central government also built on the existing seed extension system in communes put in place during the Mao period, providing provinces with additional funding to establish or expand seed stations that extended new varieties and carried out new agricultural directives (Jiangsu Province, n.d.).

Reference to outside seed research and production systems resulted in greater activity comparing China's seed system to those in other countries. Throughout the 1980s, the extension system began reaching out to international models for formal comparison. Fan (1982) gave an early overview of the U.S. extension system, placing emphasis on the country's ability to produce its own seed varieties both through state and business institutions, and on the role of agriculture in the U.S.'s early state formation. While Fan (1982) didn't acknowledge a specific comparison or takeaway to be gleaned from reviewing the American system (though this was implied), further steps

were taken for more direct comparisons in subsequent years (Liu, 1987). These studies bore a remarkable resemblance to the papers published by Shen Zonghan forty years prior in Republican China given their broad examination of U.S. models. Now, the Party-state's shifting orientation regarding interaction with the global economy opened up possible new ways of organizing the national seed industry.

The new official focus on outside technologies also spurred research into the major agribusiness changes occurring outside China, as global seed and chemical companies began a rapid series of mergers and acquisitions in the early 1980s. Researchers in the PRC began examining the changing structure of the global seed industry, taking stock of the rise of companies like Dupont Pioneer, their commercial practices, and the technologies they employed (Gao, 1983; Wu, 1980; Zhang & Gao, 1982). These observations were disseminated to a specialized readership that had been less familiar with the operations of foreign agribusiness. As such, Party-state actors were increasingly informed about the developing reach and consolidation of foreign agribusiness at the time. In the late 1970s, state delegates were visiting agribusiness and chemical operations abroad. On a first visit to the United States, Deputy Minister Liu of the CNSGC led a delegation of grain seed experts to explore American practices, including to the labs of DeKalb (Salina Journal, 1979). As CNSGC transformed into China's largest seed enterprise, it embarked on some 170 "business contacts/professional networks" (*Yèwù liánxi*, 业务联系) in over 50 countries (Ye, 1983). In 1981, a further Chinese petrochemical delegation visited Monsanto, which had not yet acquired DeKalb (Song & Zong, 1982). The pattern of foreign engagement marked a significant reorientation from the relative isolation of the seed industry and

keen interest by actors from the PRC in the operations of foreign agribusiness and chemicals. With these actions in mind, the statements made by PRC representatives at the 1979 CAAS-IRRI workshop mentioned above were followed up in relatively short order.

Despite international engagement, the PRC's grain seed industry remained almost completely domestically owned and controlled. In the 1980s and 1990s, other Southern countries underwent structural adjustment at the behest of the World Bank and International Monetary Fund, often resulting in greater investment liberalization of the seed and agrochemical sectors in the 1980s and 1990s (ESCAP, 2007). However, the PRC's interactions with the international financial institutions were much different (Jacobson & Oksenberg, 1990).<sup>16</sup> Having been excluded from the U.N. system until 1971, China did not become a member of the World Bank and International Monetary Fund until 1980. A Senior Officer of the World Bank in China during the 1980s, Paul Cadario, indicated, "conditionality was not something you did in China" (Cadario, 2013, 50). In other words, at least in part because China did not have significant debt to the international financial institutions, no macroeconomic policies could be imposed on the PRC. Though the government did take on agricultural development loans in the 1980s (Brautigam, 2015, 42), the purpose for engaging with the international financial institutions was to access international technology and learn competitive bidding

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<sup>16</sup> In 1988, India's seed law began a series of reforms at the same time as its structural adjustment program. Though it was understood that the Indian state continued to place rhetorical priority on self-sufficiency, and claimed self-sufficiency was achieved through the CIMMYT and IRRI varieties of wheat and rice, reforming the seed law would open the door to multinational control of the commercial seed industry (Bhattacharjee, 1988; Pray, 1990). The Philippines similarly expanded access to its seed industry in a 1992 reform to its seed law, a foreign company could now invest at 100% ownership, however within 30 years, 60% of the ownership stake must be transferred to "Philippines citizens" (Marcos, 1973; Sudan Tribune, 2016).

processes (Cadario, 2013, 51-52). As a result, the pressures faced by green revolution countries to open for foreign investment in the 1980s and 1990s did not come to bear in the same way on the PRC's seed market as the Party-state largely retained control over its ability to set policy. This dynamic was made possible by the PRC's historical autonomy from global capital and agribusiness.

In practise, the structure of a newfound grain seed industry began to take shape within the PRC. During the 1980s, township and village enterprises were created from former communes and work brigades. As seen in Chapter 4, a substantial number of communes and brigades throughout the country had units focused on seed research, extension, and production. The commercialization of these units saw the gradual proliferation of state-owned seed enterprises and the creation of research institutes conducting seed breeding activities across the country (see Fan, Qian, & Zhang, 2006, 35-36). By 1982, over 2285 state seed companies already existed in the PRC at the local, provincial, and national levels and would later expand in number (Ye, 1983). These companies had been selected by sub-national governments as the first to operate outside of the planned economy as the central government gradually allowed the introduction of for-profit local enterprises. Some of these enterprises represented seed organizations that had been in development since the 1950s, while others were newly created entities (Zhang, 1984). As seed work (*Zhǒngzǐ gōngzuò*, 种子工作) continued, and both state-owned and private enterprises proliferated, the number of companies expanded during the 1980s and 1990s to reach over 10,000. By comparison, in the 1990s less than ten seed companies controlled over two thirds of the U.S. field crop seed market (Fernandez-Cornejo, 2004, 27).



Ownership of these companies was in the hands of various levels of government, and the seed varieties that these institutes and state companies worked with were largely based in domestically collected germplasm. However, in the wake of the 1979 IRRI conference, collaboration with IRRI and CIMMYT accelerated. These partnerships represented a new way of approaching seed research, and food security by formally including foreign ideas and resources. Both IRRI and CIMMYT germplasm were used in China's wheat, corn, and rice breeding. Despite frequent collaboration and resource exchange, direct adoption of international public germplasm resources was strictly avoided. Table 5.1 compares the degree of adoption of IRRI rice varieties in China and India during the 1980s and 1990s (Fan, Chan-Kang, Qian, & Krishnaiah, 2005, 374). In India, an early adopter of the CGIAR institutions' germplasm, most IRRI rice planted was either directly adopted or introduced into breeding research. In China, on the other hand, IRRI varieties have very seldom been used through direct adoption, and were rather incorporated into domestic breeding programs. As Table 5.1 demonstrates, rather than adopting seed directly, IRRI samples were used as restorer lines, bred into domestically developed varieties. The discouragement of directly adopting outside rice varieties favoured the use of domestic breeding programs, encouraging researchers to both use foreign germplasm and undertake further research.

Wheat seeds from CIMMYT had a similar trend, with very little direct adoption, though much greater cross-breeding with local varieties (He & Rajaram, 1997). This example illustrates the limits put on external technological engagement within the PRC's domestic seed industry. Though government policy emphasized the need to access

foreign germplasm and technologies, this was to be done without directly relying on seed sourced from abroad.

**Table 5.1 Percentage rice area planted with IRRI ancestors in China and India**

Year	China			India		
	Direct adoption	IRRI ancestry	Total IRRI	Direct adoption	IRRI ancestry	Total IRRI
1981	0	23.0	23.0	-	-	-
1982	0.2	23.9	24.1	-	-	-
1983	0.1	29.3	29.4	-	-	-
1984	0.1	36.0	36.1	-	-	-
1985	0.0	38.7	38.7	-	-	-
1986	0.2	45.3	45.5	-	-	-
1987	0	49.6	49.6	-	-	-
1988	0	58.8	58.8	-	-	-
1989	0	56.2	56.2	-	-	-
1990	0	62.6	62.6	-	-	-
1991	0	64.9	64.9	23.2	38.8	62.0
1992	0	58.9	58.9	34.7	34.0	68.7
1993	0	54.7	54.7	21.0	41.6	62.6
1994	0	53.0	53.0	25.0	30.3	55.3
1995	0	53.6	53.6	20.8	37.3	58.1
1996	0	41.1	41.1	24.4	35.3	59.8
1997	0	36.8	36.8	21.9	41.7	63.5
1998	0	30.5	30.5	18.7	44.5	63.3
1999	0	27.2	27.2	15.3	44.8	60.1
2000	0	18.7	18.7	14.5	43.9	58.3

**Source:** from Fan et al. (2005, 374)

Rather, externally sourced seed was used to expand on domestic breeding programs focused on continued research and extension of hybrid seed that began development under Mao. In the 1980s and 1990s, the HYVs of corn and rice discussed in Chapter 4 were extended even more widely. Hybrid corn seed now accounts for almost all of the planted corn in the PRC (i.e., over 99%), with the exception of areas in the mountainous Southwest where hybrid adoption is lower but remains over 50% (Meng, Hu, Shi, & Zhang, 2006, 38). Hybrid rice has expanded to reach approximately 50% of all rice area in the PRC, while “improved” varieties make up most of the remainder (Peng, Tang, & Zou, 2009). This pattern bears a striking resemblance to green revolution countries, as

HYVs have taken over, requiring continuous sourcing of seeds and chemical inputs from outside the farm. The vast majority of grain seeds were delivered to farmers through domestically owned seed companies and associated research institutions (Chen, Shelton, & Ye, 2011, 86).

However, as Fan et al. (2006) note, initial attempts to re-design the extension system to create commercially oriented state-owned enterprises in the 1980s had varied impacts. Though seed enterprises expanded into the thousands, this period is noted for its corruption. Within state seed companies of the time, friends and kinship networks generally profited from newly commercialized seed enterprises.<sup>17</sup> The commercialization of seeds also impacted the goal of extension work. Some extension workers active at the time now question the motivations and techniques that arose from this period. Rather than working with farmers to focus on traditional cultivation techniques the new extension system became focused on selling chemical products.<sup>18</sup> While seed enterprises have continued to evolve over time, the “reformed” extension system continues to be known for its focus on agrochemical sales to make up for budget shortfalls due to reductions in state funding (Peng et al., 2009, 6). In fact, in an attempt to generate profits, research institutes also began purchasing real estate and opening a variety of non-agriculture enterprises since the 1980s (Pray, 2001). Though the CPC has tremendous influence, it does not always have instrumental power over all actors within China. As such, though priorities and policies exist to shape the seed industry and national food security, in practice results have varied over time. Nevertheless, the Party-

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<sup>17</sup> Interview, Beijing, November 2015.

<sup>18</sup> Interview, Hong Kong, October 2015.

state holds structural power over the laws and regulations within China, shaping the framework for the seed industry in conformance with the normative priority to both engage international agro-industry while maintaining domestic control over the seed industry.

In the 1990s, the legal infrastructure for enterprises became more defined, and newfound domestic agribusinesses began focusing on specialty seed sales (Fan et al., 2006). At the same time, the PRC was faced with changing diets and increased imports (as will be further discussed in Chapter 6). Given the sudden increase of imports, principally soybean, the State Council issued a white paper in 1996 defining national grain self-sufficiency as producing 95% of food grains, though in practice the target has shifted (Schneider, 2014a; State Council of the PRC, 1996). This policy guideline included clauses on the advancement of the national “seed project” to introduce new high-yielding varieties with greater yield and environmental resistance (State Council of the PRC, 1996). In 1997, the central government allowed state-owned companies to be listed on domestic stock exchanges, resulting in multiple large seed enterprises going public, while continuing to be majority-owned by the State. During this period, grain seeds developed and sold in China remained mostly state-owned, in contrast to other countries in Asia. For example, corn seed sold in China in the late 1990s was 100% from state organizations, whereas in Asia more broadly during this time, 89% of corn seed was sold by private enterprises, including 66% by multinationals (Gerpacio, 2001, 33). In terms of overall agricultural research, private research in China accounted for only 3% of total agricultural research spending and typically came from a small number of foreign joint ventures, a figure much smaller than Asian counterparts (Pray & Fuglie,

2001). The seed system, now with thousands of domestic enterprises, remained nationally controlled with very little foreign presence.

The major change in the rules governing the domestic seed industry arrived in the year leading up to the PRC joining the WTO. In 2000, the Seed Law was put in place, laying the contemporary framework for the way seeds in China would be produced and sold. The Seed Law reaffirmed the Central Government's role in the seed system, declaring that "the State has sovereignty over germplasm resources", including the right to approve or deny outgoing and incoming germplasm (National People's Congress, 2000, Article 10). Importantly, it also allowed for private grain seed companies to be established, beyond the profit-oriented activities of state-owned seed companies at the national, provincial, and local levels (Karplus & Deng, 2007, 81). Previously, such private operations had been restricted to vegetable seeds (Koo, Pardey, Qian, & Zhang, 2003, 10). From the point of view of major global agribusiness, the USDA argued that this law better suited US interests than previous draft versions of the law, stating that multinational agribusiness lobbying resulted in broader scope of access to China's seed market (Kameny, 2000). However, despite the greater foreign access to PRC markets, the Seed Law maintained certain elements of control.

Further examples of state control over the domestic seed market include provisions that seeds produced in foreign countries cannot be sold in the PRC, foreign test crops cannot be sold commercially in China, and the State Council (*Guówùyuàn*, 国务院) retains prerogative in assessing foreign imported seeds, including GM seeds (Kameny, 2000; National People's Congress, 2000). The Party-state took this approach to allow for continued structural power over key dimensions of the interface between the domestic

and global grain seed market by limiting direct access to the market and through establishing regulatory organs of the State Council, including the State Administration of Quality Supervision, Inspection and Quarantine (*Guójiā zhìliàng jiāndū jiǎnyàn jiǎnyì zǒngjú*, 国家质量监督检验检疫总局) which enforces phytosanitary measures at the border (Augustin-Jean & Alpermann, 2013). Further, the declaration of state sovereignty over germplasm resources conceptually ties seeds directly to the notion of sovereignty, indicating their priority status for the Party-state.

The legacy of the Mao period was a highly decentralized seed system independent of global agricultural capital with already expanding circulation of domestically developed HYVs. While the PRC began to engage with major global research and agribusiness actors, Party-state policy began to reflect a modified concept of self-reliance focused on control over the domestic seed industry. To maintain control, the Party-state employed structural power over the domestic economy by imposing limits on the level and content of foreign engagement in the seed industry and by keeping seed industry enterprises under the purview of the state. By the early 2000s, the contemporary seed industry of the PRC began to take shape. The relationship between public/private and domestic/foreign seed enterprises became more complex, though still beginning from a highly fractured starting point. The following section will examine the parameters put in place to maintain ownership control over the PRC's domestic grain seed market, and the subsequent pattern of investment from agribusiness MNCs.

## 5.3. China's national seed industry

### *5.3.1. Developing a seed industry through Party-state priority and policy*

Though the PRC's seed industry is now commercially oriented and globally connected, the underlying objective of maintaining national food security remains. However, rather than pursuing national food security through strict self-sufficiency, the concept now takes on a paradoxically global dimension. No longer is the objective to pursue a base of seed operations largely removed from the global economy. Rather, it is to maintain national ownership over the companies that produce and sell seeds along with the intellectual property that underpins these activities, while also ensuring that global agribusinesses are limited in the domestic market. In pursuing national food security in a global context, Party-state policy seeks not only to maintain national control of the domestic seed industry but also to develop globally competitive agribusiness enterprises that control supply chains abroad.<sup>19</sup>

These objectives are found embedded in Party-state policy aimed at developing seed companies that can compete with global agribusiness actors. In 2011, the State Council published a directive on building a national seed industry, pushing a new central government priority of seed industry consolidation. The directive begins by declaring that:

China is an agricultural and seed-using power. The crop seed industry is a national strategic and core industry, and is fundamental to promoting stable, long-term,

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<sup>19</sup> For a broader discussion and critique of China's "National Champions", see Nolan, 2012.

agricultural development and ensuring national food security. (State Council of the PRC, 2011)

The directive establishes goals for the seed industry to promote competitiveness in commercial seed breeding and sales. While international cooperation is referenced, the objective is to arrive at independent innovation (*Zìzhǔ chuàngxīn*, 自主创新) for Chinese companies and to establish independent intellectual property rights (*Zìzhǔ zhīshì chǎnquán*, 自主知识产权) (State Council of the PRC, 2011). The policy document highlights how the concept of self-reliance has shifted over the last decades, clearly toward commercial orientation, but retaining national control in this new global context. The way in which commercial seed varieties are sourced for sale offers an entry point into the structure of China's contemporary seed industry.

Seed companies in China currently source their seed varieties through several development channels. These channels shape the current trend of industry consolidation being undertaken as a result of the Party-state's policy to build an internationally competitive domestic seed industry. These channels form a typology of mechanisms used by seed companies to acquire new varieties (see also Tong (2015) and Karplus & Deng (2007) for other categorizations). This typology is not a mutually exclusive system, and many of the largest seed companies acquire their seed varieties through multiple mechanisms. Scholars have identified many paths through which commercial seeds end up in farmers' fields (Karplus & Deng, 2007, 82). The development channels presented here are key links in the network through which seeds travel in China between development, retail/distribution, and end user. The vast majority of seed companies do not develop grain seed varieties internally. Rather they



are licensed companies that sell seed varieties they have purchased from public research institutions (Zhang, Li, Wang, & Zhu, 2014). Some companies are directly owned by, or affiliated with, a specific research institute. For example, CAAS has over 73 related seed companies (Fan et al. 2006, 37). Table 5.2 offers a typology of four main avenues for grain seed to be introduced to China’s expansive *commercial* seed markets: 1) licensed seed, where varieties are purchased from research institutes, 2) private/independent research, where seeds are bred by a company, 3) foreign partnership, using foreign-developed seed varieties, and 4) informal seed, where the varieties of type 1-3 are sold without a license. It is possible for a seed company to have more than one arrangement.

**Table 5.2: Development Channels for Commercial Grain Seed Varieties**

<b>Type</b>	<b>Description of Seed Company Sources</b>	<b>Frequency</b>
Licensed seed	Purchases the (exclusive) rights to seeds developed by institutes	Many
Private research	Conducts research to develop varieties for sale	Few
Foreign Partnership	Markets and develops varieties from foreign agribusiness	Few
Informal seed	Reproduces/sources and sells seeds initially developed by others, without license	Many

The majority of seed companies in the PRC source varieties from public research institutes, many of which have origins in the 1950s or in the expanded research system of the 1980s (Karplus & Deng, 2007). Varieties developed by research institutes are either sold by companies that are the commercial arm of the public research institute or by independent companies that purchase a license to sell a specific varietal. Many companies formally partner with research institutes for a first option to test and purchase the institute’s seed varieties; companies can pay between 1-2 million RMB

(US\$150,000-\$250,000) for such rights (CCM, 2015b, 10). In general, licensing contracts for specific seed varieties are conducted on a flat fee or royalty basis. While some seed varieties produced by research institutes such as universities or scientific academies are sold exclusively to a single company, other varieties are sold to more than one enterprise. One example is the most-planted corn variety in China over the last decade, Zhengdan958 (*Zhèng dān*, 郑单 958). The Henan Academy of Agricultural Sciences (*Hénán shěng nóngyè kēxuéyuàn*, 河南省农业科学院) bred this early maturing variety of hybrid corn that entered the market at the turn of the 21<sup>st</sup> century (Zhang & Bonjean, 2011, 43). In total, five companies purchased licenses to sell this hybrid seed, including Wanxiang Doneed (*Dénóng zhōngyè gǔfèn gōngsī*, 德农种业股份公司) and CNSGC (see Appendix I), in addition to several smaller regional seed companies. Both Wanxiang Doneed and CNSGC spent approximately 35 million RMB for the right to market the hybrid corn seed from 2011 to 2016 (CCM, 2015, 24). This type of relationship, though usually on a much smaller scale, is typical for most of the thousands of seed companies in the PRC.

Two other channels of commercial seed development originate outside of state research institutes. Both private research and foreign partnerships are not as widespread as licensing varieties from research institutes; however, these types of arrangements have increased significantly over the last 15 years (CCM, 2015b; Karplus & Deng, 2007, 77). Out of the thousands of seed companies in the PRC, comparatively few perform internal seed breeding research or source seed through foreign-partnerships. Foreign partnerships remain highly controlled, and are typically focused on hybrid corn seed. The influx of foreign developed seeds by joint venture companies in

various regions of China has led to several domestic appeals to “maintain corn seed autonomy” (Xiong, 2013). The dynamics of foreign partnerships will be further explored below.

The final channel for commercial seed varieties is the informal sector. The category serves as a catchall, but generally includes seeds sold from unlicensed entities. The Central Government has, for years, been critical of “pirated” or “fake” seeds sold under the name of approved seed varieties that either contain independently reproduced versions of these seeds or an entirely different variety. There are likely thousands of seed companies that sell these varieties of grain seed, many of which advertise themselves to be most-used seed varieties including those sold by MNCs such as Pioneer (Zhong, 2014). Separately from the commercial development channels discussed above, alternative seed networks are an additional mechanism through which independent producers can source seeds, including seed banks and farmer exchanges. Seed alternatives will be addressed more fully in Chapter 7.

Though there are now over 5000 seed companies in the PRC, down from over 8000 in 2010, there are several dozen companies that are frequently referred to as “dragonhead enterprises”, or top companies within the seed industry. Appendix I records the largest commercial seed companies in the PRC.<sup>20</sup> The types of channels for commercial grain seed presented above in Table 5.2 are applied to the companies in Appendix I. The predecessors to China’s dragonhead seed companies often have their roots in the reforms of the 1980s, beginning as local or provincial seed companies. Since

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<sup>20</sup> This non-exhaustive list is derived from a combination of listed companies on the Chinese stock market, regionally representative companies, and the largest companies both nationally and regionally as of 2017.

the 1980s, some of these companies have been listed on domestic stock exchanges, and therefore are publicly traded, with significant interests maintained by state actors. Unlike smaller seed companies in the PRC, most major seed companies acquire seeds through more than one channel, relying on a combination of licensed seed, foreign partnership, and private research (CCM, 2016b). While a minority has foreign joint ventures, the majority conducts a mixture of private research and purchasing seed licenses from research institutes. Further, the ownership of these companies is a mixture between private individuals from the PRC and state entities (either a larger SOE, state banks, research institutes, and/or local/state government) (CCM, 2015h, 2015i, 2015b).

Though there are thousands of seed companies across the country, no handful of companies dominate the market in any given grain variety.<sup>21</sup> As recently as 2011, the top 10 grain seed companies in the country had approximately 13% of the domestic market share (Zhang et al., 2014). Though they represent significant volumes of revenue and market capitalization these companies account for a minority of new rice and corn seed varieties approved for commercialization by national or provincial authorities (CCM, 2016a, 20). The exception to the low level of concentration is on a regional basis. For example, in Heilongjiang province Beidahuang Kenfeng (*Běidà huāng kěn fēng zhǒng yè gǔfèn yǒuxiàn gōngsī*, 北大荒垦丰种业股份有限公司) Seed holds approximately 25% market share in corn (part of which is from KWS-partnered seed) and 33% of rice seed

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<sup>21</sup> The case of vegetable seed, however, is rather different. It is reported that over 50% of the vegetable seed market, which is not subject to national food security policy, is occupied by MNCs (CCM, 2015c, 31).

(CCM, 2015a). The vast majority of new grain seeds continue to be registered by research institutes and companies that have local and/or provincial reach.

To pursue consolidation, many of the seed enterprises identified in Appendix I began to purchase smaller entities both in their home region and across the country. This new wave of domestic consolidation is driven by further policies with the objective of streamlining operations and expanding commercial networks on the domestic market, ensuring that national agribusinesses are in a position to compete with large global agribusinesses. Since 2011, in order to apply for a hybrid seed production license, seed companies must have 30 million RMB in registered capital (5 million RMB for conventional seed) (CCM, 2015b, 8). These capital requirements were implemented to encourage mergers in the seed industry in order to meet the capital thresholds, making it difficult for small-scale seed companies to be viable. Additional minimum capital thresholds exist for public listing on stock exchanges. Further, a company that wishes to operate along the entire crop seed value chain (i.e., in the breeding, production, and sale of crop seeds) must obtain an operating license from the Ministry of Agriculture, and have registered capital of 100 million RMB and fixed assets of at least 50 million RMB (CCM, 2015h). Such constraints on seed enterprises have in fact forced mergers and acquisitions, compelling larger domestic firms to gradually build an “aircraft carrier” sized enterprise to compete with global agribusiness (see Yang et al., 2010). An aircraft carrier enterprise is anticipated to contribute to national food security by allowing the state to retain national control over key inputs in the production process and by extending control over a segment of global supply chains (see Chapter 6).

For example, as mentioned above in section 5.2, CNSGC was created in 1978. Since that time, the SOE has expanded its reach significantly. In 2007, the company was acquired by one of China's largest SOEs, Sinochem (*Zhōngguó zhōng huà jítuán yǒuxiàn gōngsī*, 中国中化集团有限公司), and began acquiring smaller regional companies in the following years. Sinochem, which reports to SASAC, recently purchased controlling shares in Guangdong Golden Rice (*Guǎngdōng shěng jīn dào zhōng yè yǒuxiàn gōngsī*, 广东省金稻种业有限公司) and Hunan Dongting (*Húnán dòngtíng gāokē zhōng yè gǔfèn yǒuxiàn gōngsī* 湖南洞庭高科种业股份有限公司) while also acquiring a minority stake in Sichuan Chuanzhong (*Sìchuān chuān zhōngzhōng yè yǒuxiàn zérèn gōngsī*, 四川川种种业有限责任公司) (CCM, 2016a). These companies each have significant presence in their respective regions in Southern China, and relationships to provincial research institutes. Guangdong Golden Rice, for example, receives seed varieties from the Guangdong Academy of Agricultural Sciences, the former institute helmed by Ding Ying. CNSGC further established the China Seed Life Science Technology Center (*Zhōngguó zhǒngzǐ shēngmìng kēxué jìshù zhōngxīn*, 中国种子生命科学技术中心) in Wuhan (*Wǔhàn*, 武汉), aimed at creating new seed varieties for commercialization and engaging in biotechnology research (CCM, 2016a). In doing so, a leading SOE has established a research and sales network among its subsidiaries and partners in the domestic market.

In terms of private research, Beijing Origin (*Běijīng ào ruìjīn zhōng yè gǔfèn yǒuxiàn gōngsī*, 北京奥瑞金种业股份有限公司) is a unique entity in China's seed industry, as it was the first privately owned seed company in the PRC. Han Gengchen (*Hán gēngchén*, 韩庚辰), the founding CEO, worked at both Pioneer and CIMMYT in the

1990s. He began Origin in 1997, the year after his departure from Pioneer. Since that time, Beijing Origin has purchased multiple domestic biotechnology companies, and established a nationwide distribution network (CCM, 2015h). The company is known for its development of GM corn products, which are awaiting approval for commercial cultivation in China. Beijing Origin, with its U.S. listed counterpart Origin Agritech, has applied for foreign patents (Origin Agritech, 2013). Similar to CNSGC, Beijing Origin and Origin Agritech now hold a network of biotechnology research facilities and test sites in Mainland China and overseas.

For several years, Longping High-tech (LPHT) (*Yuánlóngpíng nóngyè gāo kējì gǔfèn yǒuxiàn gōngsī*, 袁隆平农业高科技股份有限公司) was also a privately owned seed company after being purchased by a private capital group Hunan Xindaxin (*Húnán xīn dà xīn gǔfèn yǒuxiàn gōngsī*, 湖南新大新股份有限公司). The company, named after hybrid rice breeder Yuan Longping, specializes in both hybrid rice and corn seed, and has a relationship with the Hunan Academy of Agricultural Sciences (*Húnán nóngyè kēxuéyuàn*, 湖南农业科学院). Hunan Xindaxin attempted to purchase Beijing Origin in 2014, but was unsuccessful (Origin Agritech, 2015, 134). In the same year, LPHT returned to state ownership when it was bought out by CITIC Group (*Zhōngxìn jítuán*, 中信集团), the investment arm of the major state-owned bank. Since then, LPHT has acquired stakes in multiple seed and agricultural technology companies (SinoCast, 2013). A similar pattern exists across the thousands of seed firms and agro-technology companies in the PRC. Rhetoric among executives of the largest companies has also ramped up. The Chairperson of Liaoning Dongya (*Liáoníng dōngyà zhōngyè yǒuxiàn gōngsī*, 辽宁东亚种业有限公司), for example, is “determined [for the company] to build

itself as China's Monsanto" (Shi, 2014). Each of these examples serves to demonstrate the current trend of consolidation, spearheaded by dragonhead enterprises and financial actors in the seed industry, in line with the Party-state's policy to build a domestic seed industry competitive with global MNCs. In a more interconnected global economy, the Party-state sees a competitive, nationally owned, seed industry as a key component of a self-reliant national food security, ensuring access to supply of grain. Using the Party-state's normative framing, state entities have developed policy incentives and statements to encourage consolidation, which has in turn been articulated and practiced by leading domestic SOEs and private seed businesses.

### ***5.3.2. National seed companies and controlled interaction with global agribusiness***

As indicated above, though the Party-state's normative commitment to self-reliance aims to compete with MNCs, it also allows foreign interaction with the domestic seed industry. The first major entry of a global agribusiness actor in the PRC occurred in the 1990s, and subsequent investments accelerated after the turn of the 20<sup>th</sup> century. In practice, the degree to which global agribusiness can operate in the national markets of the PRC is much more restricted. Control over MNC entry is exercised through the use of joint venture restrictions, regional segregation of MNC operations, and flexible enforcement of intellectual property rights. The development of these control mechanisms can be first illustrated in the case of Monsanto's entry into China's cottonseed market (Karplus & Deng, 2007). Below, I will introduce the path that major



global seed companies have followed to operate within the PRC's domestic grain seed industry and the mechanisms initiated by the Party-state to control this presence.

Monsanto entered the cottonseed market in China as global agribusinesses increased their reach into national markets worldwide in the 1980s and 1990s. In 1993, Monsanto first attempted to make inroads into China's seed market after initiating sales of agrochemicals. As Paarlberg (2001, 124) notes, this initial attempt failed, given that "China's national cotton research institute did not want foreign competition for China's own state-owned seed companies." In the same year, the company hired a Chinese national, Liu (David) Shi (*Liú shí*, 刘石), who had family connections in the Ministry of Agriculture, to assist its Mainland China entry (Yu, 2011). Liu helped Monsanto make connections with domestic Chinese seed companies, expanding on its existing chemical business. In 1996, Monsanto established a joint venture company with the Hebei Provincial Seed Group (*Héběishěng zhǒngyè jítuán*, 河北省种业集团) and Singapore Economic Development Board to sell Bt cotton in China (Hennessey, Gupta, & Kowalski, 2014). In this arrangement, before the passage of China's Seed Law, Monsanto gained 2/3 ownership of the company. However, the GM cotton was only approved for planting in Hebei Province, which surrounds Beijing, and was rejected in other provinces (Smith, 2000). A similar dynamic occurred in Anhui province, where a second joint venture was created. Given that China did not recognize intellectual property rights over the Bt cotton variety, Monsanto's Bt cotton was "pirated" and adopted widely outside of Hebei through domestic seed company sales without being controlled by Monsanto (Hennessey et al., 2014). Respect for intellectual property rights is a point of contention

between China and the United States and other OECD countries (Mertha, 2005; Zhang, 2019).

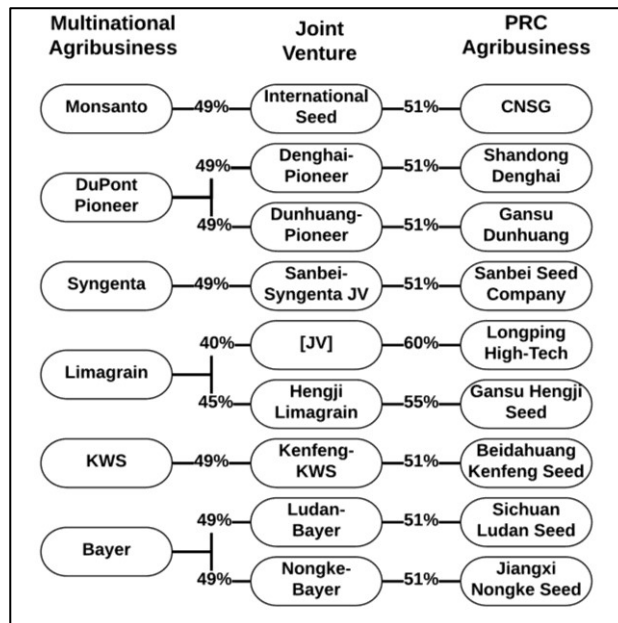
Subsequently, domestically developed GM cottonseed varieties bred and sold by CNSGC were planted throughout cotton-growing provinces, without the provincial restrictions faced by Monsanto. GM cottonseed is now planted extensively throughout the country, with domestically engineered varieties occupying the majority of the market (Huang, Hu, Rozelle, & Pray, 2007). The experience in China's cottonseed market during the 1990s was a critical test of Party-state protection measures prior to the introduction of the Seed Law and strict investment restrictions in the seed industry. The experience affirmed the Party-state's need to exercise control over the national grain seed market in the context of increased interconnection with global agribusiness. The joint venture structure obtained by Monsanto where Monsanto and its partner Delta and Pineland controlled 66% of the company would not be replicated in the future. From 1997 onward, joint venture restrictions were imposed, limiting foreign control in grain seed and agricultural biotechnology firms to 49% (Keeley, 2003). The use of regional segregation would continue as a tool to further limit the expansion of global agribusiness in Mainland China. Finally, the issue of intellectual property rights continues to be a double-edged sword at the nexus of domestic-international interaction in China's securitized foodways.

All major multinational seed companies have operations in Mainland China. These operations are bound by investment restrictions, limiting MNCs to minority share joint venture agreements with domestically owned firms. Figure 5.1 maps this global-national

network in China.<sup>22</sup> In each case, the foreign ownership of the joint venture is limited to a maximum 49%, with the Chinese partner retaining the controlling share, a minimum of 51%. The joint ventures are not always static, and have proven to be both controversial, subject to government intervention, and vary in the degree to which they result in the introduction of outside seed varieties.

The entry of Pioneer into China's domestic market is controversial from the Party-state's traditional view of food security as a relatively autarkic system. The State-driven narrative surrounding this investment and the role of joint venture partner Shandong Denghai (*Shāndōng dēng hǎi*, 山东登海) attempts to mediate this change (see Figure 5.1 and Appendix I).

**Figure 5.1: Joint venture map: grain seed companies in the PRC**



**Sources:** AgroNews, 2015; CCM, 2015b, 2015a; CPM, 2007; LFSW, 2008; SeedQuest, 2011; Syngenta, 2007.<sup>23</sup>

<sup>22</sup> Chapter 6 will address the recent (2017) acquisition of Syngenta by the SOE ChemChina.

<sup>23</sup> As of January 1, 2016. Percentages represent share of ownership over joint venture entity.

An article in the People's Daily from 2015 put the spotlight on Li Denghai (*Lǐ dēnghǎi*, 李登海), the largest shareholder of Shandong Denghai and Denghai-Pioneer, and also a billionaire and former representative in China's National People's Congress. The article faithfully states that,

America's Pioneer Hi-Bred Company has always dominated the global seed market. When they turned to the Chinese market, Denghai Seed Company was the preferred partner. However, Pioneer held to the condition that it must own 60% of the company. After being rejected by Li Denghai, the company offered 50%. 'Seeds are related to national food security, I must hold strong!' [said Li] In 7 years of marathon negotiations, Li Denghai held firm. In November 2002, China's first Sino-foreign joint venture company - Shandong Denghai Pioneer Seed Industry Co., Ltd. was established, the Chinese side accounted for 51% of the shares. (Xu & Bian, 2015)

The above quote portrays Li Denghai as a defender of China's national food security with the power to prevent agribusiness multinationals from gaining control of the domestic seed industry. In reality, it was State investment regulations that prevented Shandong Denghai from taking a majority share in the joint venture. In any case, the priority of national control over ownership stakes is clearly defined. The negotiation of the Shandong Denghai-Pioneer joint venture occurred during the tenure of Liu Shi, the former point of contact for Monsanto in China, who had moved to set up Pioneer Hi-Bred's office. Liu Shi presided over multiple MNC joint ventures in the seed industry, including Monsanto's first cottonseed venture, Denghai-Pioneer, Longping Hi-Tech-

Limagrain, and Hengji-Limagrain. In contrast to Li Denghai's positive portrayal, Mr. Liu's role in setting up joint ventures within the confines of the Party-state's limit is at times controversial, and he has been publicly accused of facilitating foreign entry in the seed market. As one commenter said, "You are a guilty person in China's history because you promoted Pioneer's seeds" (Zhou, 2011). Nevertheless, the Party-state has encouraged this form of controlled engagement with a view to importing foreign germplasm and technologies, for example Pioneer's Xianyu335 (*Xiānyù*, 先玉 335) hybrid corn. The engagement allows national firms to access foreign technologies and research networks while maintaining ownership over the seed varieties that are released within Mainland China. Further, as shown in Chapter 6, controlled engagement with global agribusiness allows for outward expansion in global agricultural markets upon which the PRC is increasingly relying.

The promotion of partnership itself has limits. In 2007, Limagrain attempted to increase its presence in the PRC grain seed market by acquiring a portion of the private holding company that owned LPHT, Hunan Xindaxin. The strategy worked, allowing Limagrain to, at the time, directly own 10% of China's largest hybrid rice company. However, with the implementation of the 2011 directive on building a national seed industry, Limagrain was forced to cede its direct stake in LPHT given the conflict with national ownership (Girard, 2016). In the wake of this deal, Hunan Xindaxin itself relinquished its controlling share to the state-owned CITIC Group, returning LPHT to effective state control. Since this time, Limagrain and LPHT have established a separate joint venture that respects the mandated ownership structure (Lan, 2011).

Multinational presence in the hybrid corn market is also divided between regions. In the PRC, seeds can be registered either nationally or provincially, with the vast majority of grain seeds being registered provincially (GAIN, 2015, 4). This registration system is a legacy of China's historical seed industry based in local and provincial seed breeding activities, but the effect has been to create a barrier to national-scale entry of MNCs. Further, the historical structure of the industry is such that there are many provincial and regional firms, which lends itself to regionalization of MNC presence. Major grain crops themselves have differentiated planting patterns through the country (see Appendix II). As such, when joint ventures with global agribusiness firms began, MNCs could not immediately sell their seeds nationally, due to having their varieties registered only at the provincial level and/or due to their domestic partner organization having limited national reach. The Chinese companies in Appendix I are mostly based in a specific province of China, though their commercial seed varieties have extended regionally in recent years. For example, Gansu Dunhuang (*Gānsù dūnhuáng*, 甘肃敦煌) is based in Gansu Province, Beidahuang Kenfeng Seed is based in Heilongjiang, Jiangxi Nongke (*Jiāngxī nóng kē*, 江西农科) is based in Jiangxi, etc. As such, upon initial creation of joint ventures, MNC seed varieties are limited to the province(s) in which their seeds have been approved and to the distribution network of their partner. Over time, varieties are approved beyond the initial province (or nationally), but typically expand outward within the climatic region as opposed to entering new geographic areas. Another example is the geographic division of MNC-sourced hybrid corn seed, which is divided between Pioneer's Xianyu335 in North and Northeastern provinces, Monsanto in the Southwest of the country, and KWS principally in the far

Northeast (CCM, 2015a, 220). Even though Pioneer and Monsanto together make up the greatest component of market share by foreign-partnered companies, this market share itself is, to an extent, constrained geographically.

Despite segmented regional markets, Pioneer's Xianyu335 expansion across the Northern provinces made waves over the last decade. Introduced in 2004, by 2012 the hybrid corn variety increased its presence to 9% of the corn-planted area in China (Wu & Han, 2012). In 2010, an article published in the agricultural web-magazine *Nongbo Online* rumoured that foreign companies control 70% of the overall seed market in China, and that the entry of MNCs in the seed market is a threat to national food security (Nongbo Seed, 2010). In making its case, the article focuses on the threat of external control over the seed market, referring directly to Henry Kissinger's quote that if one controls food, one controls the people. The article was widely circulated, and Sichuan Ludan (*Sìchuān lǜdān zhǒngyè yǒuxiàn gōngsī*, 四川绿丹种业有限公司), who later formed a joint venture with Bayer, even reposted it on their webpage (Sichuan Ludan, 2010). Shortly thereafter, rumours began to spread that Xianyu335 was a GM corn variety, and was perceived by some farmers to be responsible for a variety of animal deaths and deformities (Ho, 2013). In 2011, the Ministry of Agriculture removed Xianyu335 from its annual list of recommended crop seed varieties (CCM, 2015a, 9). Though the content of these rumours is questionable, it is telling that the target is a foreign-origin corn variety, and that the stories gained such traction.

The experience with Xianyu335 also relates to intellectual property rights and GM technologies. The key policy document that regulates foreign investment is the annual Catalogue for the Guidance of Foreign Investment Industries, published by the

NDRC in collaboration with the Ministry of Commerce. The Catalogue has reiterated foreign investment restrictions on the breeding of new crops and seed production, which must be majority owned by a Chinese party. It has also indicated that foreign investment in the “production and development of genetically modified plants' seeds” is prohibited (CCM, 2016, 10). The USDA reports that,

China has not approved any GE food or feed crops developed by foreign biotechnology firms for domestic commercial production. When foreign companies have asked to submit an application for domestic cultivation, MOA [Ministry of Agriculture] informed them that China’s foreign direct investment restrictions prohibit them from doing so. (USDA, 2016, 2)

Despite the attempts of MNCs to increase their presence in the PRC’s domestic market, they face an abundance of institutional limits and restrictions resulting from the Party-state’s structural power over the domestic market. However, while the Party-state is able to frame food security norms in the context of national ownership and apply regulations to realize related objectives, the PRC is not immune from global economic pressures. In the next section, I turn to a case example to highlight the complexity of intellectual property rights in the context of China’s securitized foodways.

### ***5.3.3. Securitized foodways and the issue of genetically modified rice in China***

The example of GM rice in Mainland China serves to demonstrate the current form of interaction between the PRC and the global seed industry. The ability of Chinese firms to compete with MNCs using domestically developed GM seeds is a key objective of the



Party-state. However, in order to protect a degree of autonomy from the networks of global agribusiness, firms from within the PRC must own the inputs required to produce internationally competitive grain seed. The example provided here demonstrates the Party-state's attempt to use positive, structural, power within the PRC's territorial limits, and the difficulties it faces relative to the broader power structures in the global food system.

In 2014, biosafety certificates expired for two GM rice varieties awaiting commercialization in the PRC. Observers often explain the delay in re-approving the biosafety certificates (and continued absence of commercial certificates) by pointing to public concern over GM products in China. This concern is particularly in the case of GM rice, given the staple status of rice and its previous illegal appearance on store shelves (Wen, 2017, 218). However, there is an additional dynamic that provides an alternative explanation, identified through the concept of securitized foodways and the creation of a competitive domestic seed industry. The GM seed issue relates to the foreign-domestic ownership of intellectual property rights, and the ability for the PRC's domestic seed industry to retain control over intellectual property and to compete domestically against global agribusiness.

Though GM cotton is widely planted in Mainland China, GM grain crops are not currently approved for commercial cultivation. Despite GM grain seeds not being approved for commercial planting, the central government has invested billions of dollars in biotechnology research since the 1980s (Huang et al., 2007). In 2008, the State Council approved a long term investment plan worth RMB 24 billion (~US\$3.8 billion) to develop new agricultural biotechnologies, with half of the funds coming from domestic

agribusinesses (USDA, 2016). The program includes both crop and animal biotechnology, with crop varieties focusing on rice, wheat, corn, and cotton research. The current government “roadmap” for commercializing the cultivation of GM crops begins with those not used in food, followed by those for animal feed, and lastly for staple foods – however, no timeline exists for the implementation of this plan (USDA, 2016). Further funding has come through the NDRC in 2012, aimed at improving hi-technology crop breeding, totalling RMB 400 million (~US\$63 million) to 41 seed companies (CCM Huazhong Agricultural University). The central government has continuously funded research and commercial application of GM crops, with a focus on key grains and cotton, though the rate of public investment has recently plateaued (Zhang, 2018, 101).

The focus on GM crop research in the PRC is in part aimed at reducing the potential for reliance on foreign seed companies and the patents they hold. In 2001, Pang Liping (*Páng lìpíng*, 庞莉萍), the former chairperson of Hefei Fengle (*Héféi fēnglè zhǒngyè gǔfèn yǒuxiàn gōngsī*, 合肥丰乐种业股份有限公司) (see Appendix I), placed GM seeds within the context of powerful agribusiness MNCs. For Hefei Fengle, the potential for a domestically developed GM rice variety, "may provide us with an edge in competing with those foreign giants...The control of new seed breeding technology using genetic engineering is crucial for the survival of China's seed companies and even the whole industry" (He, 2001). This concern is reflected in the 12<sup>th</sup> Five-year plan, devised in 2010 and published in early 2011. The central planning document states that the PRC will “speed up the innovation and application of biotechnology breeding in agriculture” in order to “develop new biological varieties with important application value and

independent intellectual property rights,” and “foster a large and strong modern seed industry” (National People’s Congress, 2011, Section 3).

Currently, there are several domestic GM crops engaged in field trials or awaiting approval for commercial cultivation. Those that are closest to commercialization are two rice strains along with a GM corn variety, each holding biosafety certificates to continue research and development of the seeds. Of particular interest are the two *Bt* rice lines (cry1Ab/Ac Huahui No. 1 and cry1Ab/Ac *Bt* Shanyou 63), which received biosafety certificates in 2009 (Chen et al., 2011). Geographic restrictions were placed on these varieties with approval only in one region: Hubei province in central China. The approval came shortly after widely reported incidents where, in 2005, the *Bt* rice varieties were found being sold in grocery stores in Wuhan, the capital of Hubei, due to illegal planting and harvesting in the province (Greenpeace, 2005). Both *Huahui No.1* (*Huá huī*, 华恢) and *Bt Shanyou 63* (*Shàn yōu*, 汕优) were developed domestically, through research at Huazhong Agricultural University, also located in Wuhan. After issuing the initial biosafety certificates in 2009, the certificates lapsed in August of 2014, awaiting renewal. The biosafety certificates for both rice varieties were later renewed on December 11, 2014, for a period of 5 years. However, Huazhong Agricultural University has never received the separate certification required for commercialization of these rice seeds. The Seed Law requires that several approvals and licenses be granted prior to commercial cultivation, and no GM grain crops currently possess all the required certification (CCM Nanjing University 2017). As a result, the two rice varieties remain restricted in their application, and are not currently commercially viable to sell to a domestic seed enterprise for licensing agreements and public sale.

In terms of securitized foodways and the national ownership priority, a crucial issue related to China's GM crop research is that both the germplasm and laboratory techniques used to create GM seeds often rely on a global patchwork of intellectual property rights. The use of foreign-patented technologies to develop "domestic" crop seed varieties challenges the PRC's continued negative power vis-à-vis MNC access to the domestic seed market. In terms of Party-state policy, the challenge is to navigate the status of intellectual property rights, the potential effect on exports, and MNC access to domestic markets for GM grain seed (Keeley, 2003). The impetus for recent concern over intellectual property came from a report published by Greenpeace and the Third World Network (TWN) in 2008 (TWN & Greenpeace, 2008). In this report, the organizations claimed that *Bt Shanyou 63* and *Huahui No. 1* used up to 12 different foreign-patented technologies to create the GM rice seed. The use of foreign technologies could fall into a patent trap whereby MNCs could legally challenge the ownership of the seeds, lock-in Chinese farmers to the technology, and possibly claim royalties (TWN & Greenpeace, 2008; Greenpeace & TWN, 2009). Importantly, as we will see in Chapter 7, the organizations place the issue of foreign ownership over GM patents on seed technology squarely in the context of food grain security and sovereignty, farmer income, and the potential increase of foreign influence on China's seed market (Greenpeace & TWN, 2009, 17-18).

The Greenpeace/TWN study was critiqued by academics due to its speculative nature; however, academic studies themselves partially support the findings (Liu & Cao, 2014; Liu & Li, 2011). Available information showed it was possible that five U.S.-held patents were used in producing *Bt Shanyou 63*, though not all information was available

to these researchers. The study stated that these patents include, “the CAMV35S promoter and gene gun-mediated methods...owned by Monsanto, the Selectable Marker hph by Syngenta, the P-ract1 promoter by Cornell University, and the RC7 gene by two Japanese public research institutes” (Liu & Cao, 2014, 188). However, none of these listed patents are held in China, which indicates there is no potential for legal challenge within China. Two important caveats were elaborated by Liu and Cao, who argued that there could be impacts for exports outside of China in jurisdictions in which the patents are enforced, and also within China in the case where private agreements such as material transfer agreements are signed but not known publicly (Liu & Cao, 2014).

From the perspective of securitized foodways, domestically produced GM rice seed is complicated in practice given the overseas origin of technologies used to create the seed. If the PRC commercializes GM grain crops, it will likely have to accept foreign GM grain crops for planting. Further, in that case, it will need to protect intellectual property rights of its own technologies, requiring it to also protect the intellectual property of others. Zhang and his colleagues from Shofine Seed Company (*Shāndōng shèngfēng zhǒngyè kējì yǒuxiàn gōngsī*, 山东圣丰种业科技有限公司) and Shandong province’s Ministry of Agriculture acknowledged this issue, including for the presence of non-GM grain seeds being planted in the PRC, and point to the inherent power dynamics in this relationship,

Transnational corporations principally use technological lock-in to reinforce the technical dependence of the host country, reducing technological spillovers and maintaining the advantage of monopoly. With the continuous expansion of

transnational seed companies' R&D activities in China, our country has lost its 'technological sovereignty' in seed science and technology. (Zhang et al. 2014, 13)

The patent question demonstrates that the Party-state's objective of retaining control over the domestic grain seed industry is made more complicated by privately owned biotechnology. The concern is often replicated in market analyses that mention foreign intellectual property ownership issues in the context of the Chinese seed industry as a political risk to investors (see CCM, 2015f). Huazhong Agricultural University is not the only domestic company attempting to commercialize GM seeds in China. A separate rice variety developed by CAAS may involve 5 foreign patents (CCM, 2015i). In addition, the country's only holder of a foreign patent on a GM grain, Origin Agritech, has actively lobbied the Ministry of Agriculture and Central Government to allow domestic planting of its GM corn products. Domestic seed companies in the PRC are moving forward on the government research agenda. However, despite government priority to control the seed market, containing the GM seed market is not guaranteed.

Major global agribusinesses are aware of the concern. At the turn of the 21<sup>st</sup> century, the former president of Monsanto's PRC office argued that China's regulatory framework governing production, research, and importation of GM crops "is specifically designed to shut foreign companies out of the world's largest government-funded biotechnology-development programmes. They have one foot on the accelerator, which is funding biotech research and development, and they have the other foot on the regulatory brake" (Zhao, Ho, Xue, & Swart, 2015, 120). From a different perspective, Pioneer's head in China more flatly acknowledges Party-state objectives, stating that, "[the PRC government] definitely want[s] to see locally developed biotechnology

innovations brought to market” (Hicks, 2014). These statements confirm the policy priorities of the Party-state vis-à-vis agricultural biotechnology in the seed industry, which are received differently, at least rhetorically, by competing global agribusiness.

The patent issues discussed above add difficulty for the Party-state to simply fund biotech research as a means to commercialize “locally developed” GM seed. Whereas ownership over grain seed companies can be maintained, ownership over the web of intellectual property that goes in to GM seeds may not be as feasible. This points to a key interplay between the structural power of the Party-state over the nationally controlled domestic seed industry and the structural power of global agribusiness firms in terms of their control over grain seed technologies in global markets. This dynamic illustrates a point of tension in the Party-state’s pursuit of securitized foodways in that it may or may not be possible to pursue GM grain seeds for the domestic market while simultaneously keeping agribusiness MNCs at bay.

Additional domestic dynamics also affect the adoption of GM seeds. On the ground in the PRC, views differ on the future of GM crops. In Southwest China, a GM rice researcher indicated that biotechnology will be the future of China’s seed industry, and will be crucial to address issues of stress tolerance, pest resistance, and salination.<sup>24</sup> Meanwhile, hybrid rice and corn researchers indicated that China’s current advantage is in HYVs, making GM grains a less attractive avenue for the government to pursue.<sup>25</sup> From the official viewpoint, Chinese President Xi Jinping was quoted as stating that GM research must continue, but extension should proceed with caution. He also reiterated

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<sup>24</sup> Author Interview, Anonymous, Southwest China, October 2015.

<sup>25</sup> Author Interview, Anonymous, Southwest China, September 2015.

the need for independent innovation and that the PRC “cannot allow large foreign companies to occupy the market for GM agricultural products” (Farmer’s Daily, 2014). Liu Shi, who presided over Monsanto, Pioneer, and Limagrain’s entry into China, expects GM grain crops to be commercialized in the near future (Hicks, 2014). Based on the model of global agribusinesses from the West, CNSGC sees biotechnology and China’s domestic germplasm resources as the key factor in “catching up and surpassing transnational seed corporations, and the basis for development and expansion of China’s seed industry” (Zhou, Qiu, Li, & Zhang, 2012, 2).

The ability for Chinese firms to compete with MNCs using domestically developed GM seeds with secure intellectual property is the Party-state’s ultimate objective (see also Zhang, 2018, 112-114 for similar perspectives). In doing so, the inputs required to produce internationally competitive grain seed must be owned by firms from within the PRC. However, countries outside the PRC hold control over techniques and specific genetic material, often major MNCs. In recent and upcoming years, some patents on GM technologies have, or will, expire, opening the possibility for generic varieties to be marketed without fear of infringement (Grushkin, 2013). When further patents expire in 2020, the PRC will have wider access to varieties accessible to domestic firms that can compete with foreign-owned varieties. Though Mainland China prohibits foreign investment in biotechnology, seed companies continue to seek out GM technology and research partnerships continue to exist. The simultaneous exclusion of foreign investment in agricultural biotechnology, promotion of within-country investment in the sector, usage of foreign technologies in the domestic development of seeds, and an



unclear intellectual property rights regime, create a complex environment for national seed security in the context of GM foods.

The momentum for GM seed commercialization is mounting; however, the issue finds itself potentially at odds with the concept of securitized foodways if GM commercialization would significantly reduce the Party-state's control of the domestic seed industry. As such, despite the rhetorical momentum, it is not likely that the PRC will commercialize GM grain crops (for food) until national seed companies can compete with MNCs on the domestic market, using seeds whose ownership is not foreign-controlled. For the Party-state, the issue of MNC control over GM technologies presents a significant challenge to the pursuit of national food security and to retaining structural power over the domestic economy. As such, the issue becomes integrated into the Party-state's pursuit of overseas acquisitions as discussed in Chapter 6.

#### **5.4. Discussion and conclusion**

The notion of "food as a weapon" has not been lost on the CPC in the decades since re-engagement with a global food system that features significant positive power held by multinational agribusiness firms. The sections above served to illustrate the key developments in the PRC's grain seed industry since the country's reform and opening, while retracing the manner in which national food security became redefined. In essence, food self-reliance under economic globalization requires a domestic grain seed industry that features home grown agribusiness firms and technologies that can compete with global agribusiness. In doing so, national food security is maintained through domestic control over the key input into grain production: seeds.

The first key point is that the conception of self-reliance adopted by the Party-state shifted to accommodate controlled international engagement in grain seed research and investment rather than continuing relative isolation. In terms of national food security this required a continued normative priority to maintain state control over the presence of powerful global agribusiness in the domestic market and target national seed industry development. The second key point is that the independent and decentralized seed research and extension system of the 1950s-1970s set the condition for the proliferation of smaller seed companies throughout the country. The historical absence of concentration or initial MNC presence in China's seed market reduced the ability of global agribusiness to extend within PRC, limiting the structural power of global agribusiness in China's domestic markets. The third key point is that the Party-state acted upon the priority of self-reliance in the context of international engagement by establishing state policies to build structural power over the domestic grain seed system, including: promoting national industry consolidation, limiting foreign ownership, geographic segmentation of investment, and restrictions on the type of seed technologies allowed to be planted.

The domestic component of securitized foodways is manifest through domestic policy space in the context of increased interaction with entrenched actors in the global food system. Though foreign-controlled technologies exist in the PRC, they are often limited in application or kept at arm's length due to government regulation. Despite establishing relationships with the CGIAR institutions, limits were imposed on the degree to which IRRI rice or CIMMYT wheat could be planted directly. More recently, MNC-owned GM grain seeds are restricted from planting in the PRC. Despite this

restriction, government investment and support for GM technologies remains high, indicating that the Party-state is building capacity in its domestic seed industry and corresponding market for GM seeds by promoting national technology and agribusiness firms. Restrictions on the type of seed technologies eligible to be planted limit the influence of international actors, and allow national agribusiness to produce seed varieties in which they already have an advantage.

The largest GM seed agribusinesses in the world do have a presence in the PRC selling hybrid grain varieties. However, along with being restricted in terms of the types of seed technologies they can market in the PRC, the restriction on ownership share also creates continued space for domestic seed companies. The requirement for MNCs to operate as a minority-share joint venture (and not as an individual entity) means that a select handful of domestic seed companies gain access to the new technologies desired by the central government, while the MNC partner gains access to a geographically fragmented distribution network. This strategy is similar to other important sectors of the PRC's domestic economy (Chin, 2010; Hsueh, 2011). Meanwhile, the Party-state is directing domestic agribusiness firms to increase in size through merger and acquisition, and to develop new "independent" seed varieties to compete on domestic and export markets. Securitized foodways act to partially protect the domestic seed industry while serving to reduce the influence of global agribusiness in terms of both market power and structural power that they have been known to hold in other areas of the world.

In the PRC, redefining national food security and self-reliance in global terms has occurred in parallel to reducing restrictions on foreign investment in the seed industry

over the last decades. The dynamic of promoting domestically owned seed companies and independent intellectual property is matched by simultaneously inviting and controlling MNCs and foreign developed seed varieties. As described above, a tension exists between these two logics. The example of GM rice helped to illustrate this complexity. On one hand, the pursuit of national control over the seed market as a key input in national food security through self-reliance can explain the absence of GM grains in China. Whereas in other countries, the absence of commercially available GM grain seed is often due to advocacy, in China the absence can be explained due to the difficulty of maintaining control of a specific market segment controlled by global agribusiness. Were China to commercialize the cultivation of GM rice or corn seed without nationally developed varieties to compete against foreign-owned varieties, the ability to retain control over the domestic market would be jeopardized, as would the pursuit of securitized foodways. On the other hand, the proliferation of illegal GM rice and concerns over the ownership over GM technologies indicate that maintaining control of China's domestic political economy under the flows of economic globalization is complicated.

Nevertheless, the grain seed market in the PRC remains significantly under the control of national agricultural capital, both through the state and private investors. Though some scholars and analysts argue that the PRC ought to lift restrictions on agricultural foreign investment in order to adopt the latest MNC varieties of seed and increase incentive for MNCs research and development in China (see Fan et al., 2006; Wang, 2013), these assessments neglect the normative goals of the CPC and power relationships that permeate global agri-politics. The PRC's mid-20<sup>th</sup> century disconnect

from the global food system meant that the corn and rice seed planted across the country was largely divorced from the resources owned by foreign organizations. It also meant that the structure of the grain seed market (multiple regional companies) did not lend itself to wholesale foreign takeover. The irony is that although China's leadership avoided direct cooperation with the U.S.-led green revolution and its political-economic ambitions, the increased reach of the PRC's national extension system actually led to a much higher adoption of hybrid seeds (corn, sorghum, and rice) than some green revolution countries and a much more commercially oriented grain seed market. It also led to the same environmental consequences as the U.S.-led green revolution, including excessive use and dependence on fertilizer and pesticides (Zhang, Jiang, & Ou, 2011). Reactions to these effects will be discussed in Chapter 7.

A globally oriented concept of national food security, achieved through historical autonomy and structural power over the domestic food system, does not end at the borders of the country. The next chapter will focus on the outwards orientation of securitized foodways: creating networks outside the territorial boundaries of the PRC to secure markets for domestic seed, securing foreign seed technology, and creating nationally owned infrastructure to serve both domestic and global grain markets.

# Chapter 6: Projecting National Food Security Abroad: Extension and Acquisition

## 6.1. Introduction

In May 2015, the Chinese pavilion opened at the Milan World Exposition. The theme of the exposition was food and sustainability and the PRC's pavilion, an expression of its national relationship to the theme, was shaped as a blade of wheat. Within the numerous exhibits, clear focus was given to the PRC's, "agricultural supply network, practical farming methods and technologies" including domestically developed hybrid rice varieties (China Daily, 2015; Rong, 2015). Some thirty years prior, Yuan Longping stated that, "hybrid rice is marching towards the world, to bring benefit to the people of the world" (Zhang & Xun, 2007, 30). Over the decades since the PRC initiated engagement with the global economy, not only has its domestic grain and seed industry expanded, the global presence of agribusiness actors from the PRC has increased substantially.

Previous chapters primarily examined the development and retention of the Party-state's negative power vis-à-vis the global food system, and positive power over its domestic economy. This chapter focuses on foreign expansion of grain and seed networks controlled by state and corporate actors from the PRC, the final component of securitized foodways. Importantly, the international landscape of global agribusiness is very much in contrast to that of the PRC. As argued in Chapter 5, the PRC is able to maintain domestic policy space while also retaining a degree of control over global agribusiness within the country. This domestic policy space allows the Party-state to expand its structural power at home by maintaining domestic rules and developing

networks of domestically owned agribusiness. However, outside of the PRC, the same levers are not available. Rather, global agribusiness markets are highly concentrated with networks of incumbent MNCs occupying significant presence in many countries (Howard, 2016). Further, the rules of agricultural trade have historically been heavily influenced by dominant states (Clapp, 2006; Hopewell, 2016). In this international context Party-state policy seeks to build positive power to assert national control over networks within the global grain and seed market.

Contrary to Yuan Longping's sentiment expressed above, the movement abroad of PRC-developed grain seed is not primarily motivated by addressing world food security. Rather, it forms a piece of the Party-state's contemporary national food security policy. In recent years, the Party-state is faced with challenges to maintaining control over China's domestic food supply. Imports of soy and corn have increased substantially, and competition with global agribusinesses is intensifying on domestic markets. Further, the imported soy and corn has often been grown using seed sold by MNCs, sourced from a geopolitical rival, and imported by ABCD firms. In order to maintain control over its domestic grain and seed industries, the Party-state's objective is to own competitive agribusiness in global markets. In this way, the Party-state can pursue self-reliance (distinct from strict self-sufficiency in production) by selling more grain seed outside of China, diversifying the sources of China's grain imports, and expanding state-owned grain trade infrastructure. In doing so, foreign imports will themselves be sourced in part from seed technology and trading infrastructure owned by actors from the PRC. Similarly, by expanding the global reach of grain seed companies from the PRC, these companies stake out greater international market share and

increase their position relative to foreign-owned MNCs with whom they may compete on the PRC's domestic market.

This effort takes the form of expanding resource networks around the world. There are two mechanisms used by actors from the PRC to build agribusiness networks in the grain and seed industries: 1) expanding domestically developed seed varieties to developing countries, and 2) taking possession of existing global agribusiness networks through merger and acquisition. Through these mechanisms, state-corporate and financial actors from the PRC are building markets for hybrid rice and corn seed owned by dragonhead enterprises. They are also controlling the portion of existing global agribusiness infrastructure required to primarily serve domestic markets either directly (sourcing grain) or indirectly (expanding markets for seed companies).

This chapter first examines the development of the Party-state's agricultural going-out policy, bringing context to the ideational shifts supporting the normative priority to expand national food security outwards. It then examines the first network-building mechanism, where national seed companies develop export markets for Chinese seed varieties, often in Southern countries. I then switch to examining the going-out activities as they relate to the dominant actors in the global food system. I begin by presenting a case example of a GM corn seed called Agrisure Viptera to highlight the dynamics at play in the grain trade and grain seed industries. I then map the pattern of overseas acquisitions and investment projects seen in the grain and seed industries. These maps demonstrate the rapidly accelerating infrastructure footprint of agribusiness from the PRC, which serve to build positive power in the global political economy in service of an outwardly oriented national food security.

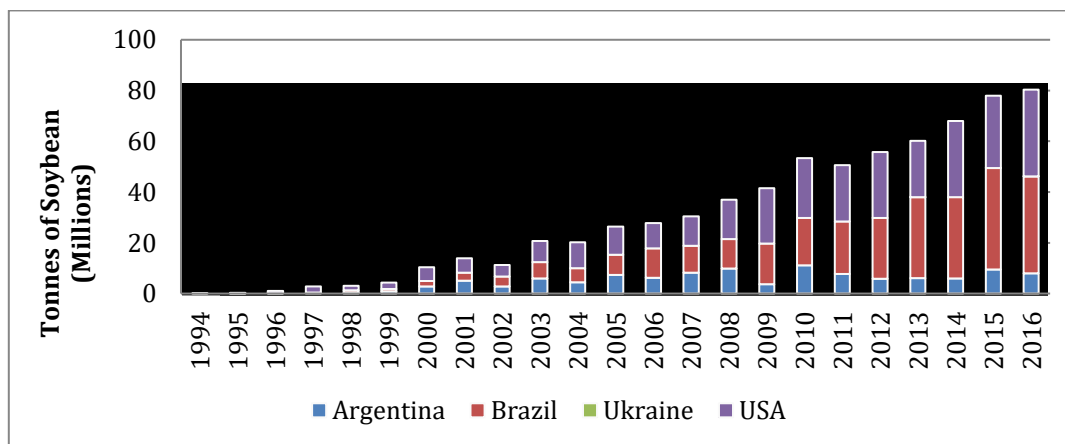


## 6.2. Grains flow inward, food security shifts outward

### 6.2.1. Grain import increases and the issue of self-reliance

At the time that the domestic seed industry was beginning to take shape, the PRC was also facing a climate of greater imports. Beginning in the mid-1990s, in anticipation of acceding to the WTO and to serve livestock feed markets, the PRC liberalized soybean imports. As seen in Figure 6.1, the vast majority of these imports typically came from the United States, and later from Argentina and Brazil. Further, the shipment and processing of these soybeans was principally controlled by the vast infrastructure networks of Cargill, ADM, Bunge, and Louis Dreyfus within the United States and Brazil (Brown-Lima, Cooney, & Cleary, 2010, 31).

**Figure 6.1: China's Soybean Imports (1994-2016)**



Source: FAOStat.org

Following WTO accession, the PRC was also required to further allocate 7.2 million tonnes of tariff-free corn imports (Reuters, 2013), though the volume of imports far exceeded this level prior to 2001. Overall, the quantity of imported grain by the PRC

increased substantially since the late 1990s primarily to serve animal feed markets (Schneider, 2014a; Sharma, 2014).

As foreign imports increased, China's emergence on international agricultural markets began making headlines again. In 1995, Lester Brown (1995) published his report "Who Will Feed China". This report echoed similar concerns raised in the 1920s and 1930s (see Chapter 4), claiming that population growth and production limits would lead to vastly increased food imports in the PRC, and raising an alarm regarding global food production levels and commodity prices (Brown, 1995). Notably, this publication stirred significant reaction within the CPC and among leading Chinese intellectuals. Boland (2000, 64-65) frames this reaction as a debate between state sovereignty and interdependence, where commentators in the PRC referred to the issue as a strategic concern, including debates as to the level of self-sufficiency in production that ought to be required in the interest of national security. These discussions focused on purchasing power in relation to food imports to the PRC, with the underlying assumption that the PRC would simply purchase grain on international markets, primarily from the United States (Brown, 1995; Paarlberg, 1996). These analyses did not typically elaborate on the ownership of infrastructure networks that go into making these markets possible, and the implications this may have had in relation to the Party-state's national food security priority in the context of increased interdependence.

Shortly after these discussions, in the late 1990s and early 2000s, the Party-state introduced a "going out" strategy (*Zǒu chūqù zhànlüè*, 走出去战略) aimed at broadly promoting overseas investment in multiple sectors. The going out strategy would frame the PRC's outward investment priorities including in food and agriculture. Announced in

1999 by the CPC Central Committee, the strategy has three principal objectives: 1) to supplement China's required resources; 2) to drive commodity and labour exports; and 3) to cultivate China's transnational corporations and brands (State Council of the PRC, 2006). By 2007, the going-out strategy had been integrated into the CPC's No. 1 Policy Document (CPC Central Committee, 2017). In terms of national food security, these priorities framed the Party-state's focus on securing imported grain, developing export markets for grain seeds, and promoting Chinese agribusiness abroad. Though the official strategy came into place in 1999, the going out policy had loosely been in place since the early 1980s, following the beginning of initial international investment and cooperation projects under Deng Xiaoping. Some analysts now refer to those early overseas investments retrospectively as part of the strategy (Zhai, 2006).

While the strategy is broad in scope, food and agricultural investments abroad have received significant and specific attention. The tie between self-sufficiency, national food security, and the going-out policy is clearly made and consistently invoked (Qiang, Mi, & Zhi, 2012; Yang, 2015). However, despite the will of the Party-state to increase investment and cooperation abroad, the policy was critiqued for its lack of coordination. Researchers from the Ministry of Agriculture stated that there were significant shortcomings in terms of making the agricultural going-out policy a systematic strategy (Yan & Han, 2006). While agreeing with the national goal of establishing international links, significant structural barriers were identified both overseas in terms of foreign regulations on investment and labour as well as domestic financial configurations, from investment capital to corporate insurance (Yan & Han, 2006). The authors suggested that in the future the agricultural going out policy should,

cooperate closely with the state's overall international political goals...[beyond] commercial and economic objectives...The most important thing is...to realize the effective allocation of domestic and foreign resources at a deep level, to make up for and alleviate the shortage of domestic resources...[and] requiring China's agriculture to gradually have a higher level and ability in international competition, including not only the government's service capabilities, but also for market entities to operate (agricultural companies, etc.). Through international agricultural cooperation and competition, learning and absorbing advanced management and technology, the international competitiveness of China's agriculture will be comprehensively improved. (Yan & Han, 2006, 15)

This statement outlines key elements of the mechanics that have developed over the last decade in the international context of securitized foodways. Importantly, the government authors tie together the pre-eminence of political priorities, the relationship between domestic and foreign resources, and the role of agricultural companies in carrying out political goals.

### ***6.2.2. The Party-state's going out strategy and the issue of agribusiness***

In the context of the seed industry, much of the initial focus on agricultural going out remained on the piecemeal export and testing of domestic products, including grain seeds. In this context, the notion of South-South cooperation re-emerged, putting forward the Chinese development model as an ideal-type for many developing countries (Oliveira, 2017; Tan & Ye, 2008, 58). For example, analysts focused on the advantages of creating agricultural links specifically with countries outside of North America and

Europe, particularly where development levels were similar or China had an advantage (Bai & Liang, 2007). Likewise, Wang et al. (2013) of China Agricultural University argue in the Ministry of Agriculture's *Scientia Agricultura Sinica* that key food security crops should be supported to expand internationally to build competitiveness, particularly in less-reached regions such as Africa and Latin America. More recently, the Ministry of Agriculture has referred to the need to increase strategic focus in the going out policy, and to play to advantages such as agricultural products including hybrid rice and corn seed (Yang, 2015, 30).

However, analysts in the PRC identify corporate concentration along international agricultural supply chains as a primary obstacle to agricultural going out and national food security. In addition to overcoming domestic resource constraints, analysts charge the PRC government with helping to,

get rid of international agribusiness corporation's monopoly, and furthermore play China's foreign exchange reserve to advantage in order to ensure the effective supply of our country's agricultural products...and build a giant multinational group in China's agricultural field, thus occupying a reasonable seat in the global agricultural product supply chain and establishing China's agricultural trade status. (Tan, 2011, 66)

The need to compete against global agribusinesses, and their networks of infrastructure and intellectual property, cause China's smaller agribusinesses to be seen as currently uncompetitive (Wang, Liu, & Song, 2013). In this context, Yang (2015) of the Ministry of Agriculture's Planning and Design Research Institute argues that "new circumstances require our country's agricultural science and technology development to have an

overall plan based in the combination of domestic and international conditions.”

Likewise, Yin Chengjie (*Yīn chéngjié*, 尹成杰), a party member, former Deputy Minister of Agriculture and representative on the National People’s Congress Standing Committee (*Quánguó réndà chángwěihui wěiyuán*, 全国人大常委会委员), stated that “our country [must] correctly grasp agricultural internationalization opportunities and strategies...establish a robust international cooperation control mechanism for the agricultural industry, and energetically promote agricultural enterprise competitiveness” (Yin, 2010). Further, Chen Xiwen (*Chén xīwén*, 陈锡文), former Director of the Central Leading Small Group for Rural Work (*Zhōngyāng nóngcūn gōngzuò xiǎozǔ*, 中央农村工作小组) reporting to the CPC Politburo (*Zhèngzhì jú*, 政治局), stated that the limited sources of international imports, and particularly the volume of corn and soybean coming from the United States, are “weak points” that must be protected from international volatility (Zha & Zhang, 2013). Together, these statements demonstrate significant Party-state concern over multinational control, import sources, and the effect each of these factors has on the survival of PRC agribusiness. These concerns are reflective of the securitization of foodways.

In terms of current policy, outward expansion and international competitiveness remain a key priority for the CPC. The 2016 No. 1 Policy Document states that in the development of the seed industry, both international and domestic market resources will be pursued (CPC Central Committee, 2016, I.8.). Importantly, the way that the statement is written conceptually separates domestic and international spheres. It divides domestic and international markets by stating that there are both domestic and international resources, a clear indication that global integration or interdependence is

controlled. Further, the 2017 No. 1 Policy Document seeks to “strengthen agricultural foreign cooperation and promote agricultural going-out” particularly in Asia (CPC Central Committee, 2016, I.8.). The document also declares that the Party-state “will support agricultural enterprises to conduct transnational operations, establish overseas production bases, processing and warehousing logistics facilities, and foster large-scale enterprises with international competitiveness” (CPC Central Committee, 2016, I.8.). There is a clear national priority in developing domestic agribusinesses that operate within the global food system. Though these concepts now appear in a central policy document, this does not imply that the Party-state’s strategy has become fully unified and coherent, nor will it necessarily be implementable. Xu and Zhang (2015, 133) point out that obstacles will exist in many agricultural markets given the complexity of regulations surrounding seeds and other agricultural inputs. Nevertheless, officials at the provincial and national level are making efforts to secure access to foreign markets through leading delegations focused on access for agricultural technologies (Qu et al., 2012). This process necessarily includes adapting to border measures and navigating commercial and phytosanitary regulations abroad (Tang & Tan, 2009, 34).

The Party-state’s going-out policy, in the context of food and agriculture, encompasses a key ideational shift regarding national goals related to national food security and self-reliance. In the context of economic globalization, where the PRC’s domestic grain market increasingly interacts with international grain supply, the concept of self-sufficiency as operating solely within the domestic economy no longer holds. Rather, support for changing diets through an increased reliance on imported feed grains, particularly soybean and corn, extends the concept of self-reliance outward.

From the perspective of securitized foodways, an increase in feed grain imports threatens the former autonomy of the PRC grain and grain seed market through increased exposure to global markets and the structural power of global agribusiness actors, including states and MNCs. The challenge presented to the Party-state is that global supply chains are dominated by relatively few foreign agribusinesses, and the source of grain imports to the PRC are largely derived from the United States, a historical geopolitical rival. In this sense, self-reliance is jeopardized given increased dependence on powerful outside actors to fulfil a core normative food security priority. To ensure unmediated access to international grain markets and to increase the competitiveness of national agribusiness, the Party-state's national food security policy emphasized self-reliance in international markets by promoting national seed varieties abroad and by the national acquisition of foreign multinationals.

The next sections examine the response of actors from the PRC to the national objectives outlined above. More specifically, they present the gradual international extension of agribusiness power through the development of networks beyond national borders, and the creation of controlled market spaces at the international level. By building positive power through global infrastructure networks, the Party-state will increasingly secure control over grain trade networks, expand the area planted to nationally owned grain seed varieties, and build nationally owned agribusiness that can compete in both domestic and international markets.



## **6.3. State and private seed companies in Southern markets**

### ***6.3.1. Overseas seed cooperation in Asia and Africa***

The first mechanism to extend networks overseas is to create space in markets where global MNC networks are less prevalent, and particularly in crop varieties that are vital to the PRC's domestic seed industry. Seed markets in many Southern countries have less market concentration and smaller commercial seed markets. PRC actors are therefore extending domestically developed grain seed varieties in markets with relatively little MNC competition, focused on grain seeds in which they have a competitive advantage and are important for the PRC's domestic economy. This activity serves to create potential outlets for grain seed exports and potential breeding bases for PRC-based agribusiness. As discussed below, this international extension takes several forms, and has not always been successful. There are a combination successful ventures and unsuccessful "paper tigers" partaking in seed industry expansion (Oliveira, 2017).

Importantly, overseas development projects are not new to the PRC. Since the inception of PRC hybrid rice and corn breeding programs in the 1950s and 1960s (see Chapter 4), grain seed varieties from China have been involved in overseas development and extension projects. Early projects were firmly based in Cold War dynamics, accelerating after the PRC gained a seat at the United Nations and the subsequent handover of multiple international development projects spearheaded by Taiwan (Brautigam, 1998). Brautigam (1998, 18) highlighted that the PRC's early agricultural development package in SSA partly followed Soviet teachings of the 1950s and included not only irrigation, labour, and machinery, but also rice seed varieties developed in the

PRC. The rice seeds used during this period were often, though not always, the HYVs discussed in Chapter 4, particularly *zhenzhuai* (Brautigam, 1998, 122). Since these earlier projects, the PRC's overseas agricultural activities continue to include the export of seed technologies, as discussed below.

In recent years, the presence of agribusiness investors from the PRC across the globe began attracting significant attention. The increased scale of overseas agricultural investment and development projects, intimately tied to the going out strategy, has been subject to many debates. In particular, they have been implicated in “land grab” literature (Zoomers, 2010), the ethics of PRC foreign agricultural projects (Lawther, 2016, 2017), and the efficacy of said projects (Xu, Li, Qi, Tang, & Mukwereza, 2016). In particular, the land grab literature initially pointed to actors from China as a primary source of large-scale investments in agricultural land, leading to dispossession (GRAIN, 2008; Zoomers, 2010). However, the centrality of China's role in the global land grab has been questioned since these early reports (Brautigam & Zhang 2013; Brautigam, 2015; Oliveira, 2017). Rather than focusing on the acquisition of *land*, the presence of actors from the PRC in the global South (and some former Soviet states) is even more significant in terms of the expanding footprint of hybrid seed businesses.

Below, many overseas seed projects are introduced, including their links to the PRC's national seed industry actors discussed in Chapter 5. I focus on Chinese language scholarship that has reported on field trials in the two regions most implicated in the creation of markets for PRC-developed grain seed: South/Southeast Asia and SSA. Seeds comprise a key component of the Party-state's going-out policy, yet the vast majority of literature related to China in the land grab has not focused on the source of seeds being

used (Lawther, 2016). Hybrid rice and corn developed in the PRC are being used to plant in many of these cases, making land only one aspect of any given investment. The international extension of national PRC varieties of hybrid rice and corn, as well as soy, is now accelerating. Commercial enterprises and institutes from China have gone abroad throughout the world to promote, test, and sell their hybrid grain seeds (He, 2013; Li, Yang, & Qiu, 2014). Whether the grain seeds become more widely commercialized beyond test farms remains to be seen; however, these test sites are an example of the PRC establishing foreign seed breeding networks and creating space for intellectual property owned by PRC actors in Southern seed markets.

Many of the PRC's dragonhead enterprises, as identified in Chapter 5, have increasing presence in foreign markets. While some companies engage mainly in exports (e.g. Grand Agriseed Technology, Zhongnongfa Industry Seed Group), other companies have expanded their production networks either through test sites or full subsidiaries. Those companies with a more active international presence directly cite the going out policy as part of their corporate strategy (Chongqing Seed, 2018). For example, Winall Hi-Tech Agriculture frames its recent overseas expansion in the rice seed market as "firmly grasping the national 'one-belt one road' and the seed industry 'going out' opportunity, and vigorously promoting overseas business development to a new level" (Winall Hi-Tech, 2018, 18). In comparison, Hefei Fengle also indicates that it will "seize the opportunity to accelerate going out opportunities" by expanding exports and testing in East and Southeast Asia, as well as SSA (Hefei Fengle, 2018). While LPHT officials have used the "going out" terminology, they often choose to focus on a message of global food security and, "[s]preading technology to benefit the world's hybrid rice production..."

(LPHT, 2018, 57). The repetition of party slogans does not necessarily mean that the company has a normative commitment to national food security driving the company's investments. However, it does show that it is a desirable a practice for Chinese agribusiness to cite state policy. Building on the Party-state priority to expand domestic agricultural technologies abroad, hybrid rice and corn varieties are now being tested or commercialized in more than 23 countries across SSA and South/Southeast Asia.

### ***6.3.2. PRC seed companies in South and Southeast Asia***

Table 6.2 provides an overview of grain seed extension activities in South and Southeast Asia by actors from the PRC. Following the development channels for commercial grain seed varieties presented in Chapter 5, the grain seeds deployed abroad come from a mix of SOEs, private enterprises, and research institutes. The most significant actor in establishing overseas infrastructure for grain seed technologies is LPHT, while various research institutes have also developed partnerships for site tests.<sup>26</sup> As seen in Table 6.2, seven of the countries represented feature LPHT or Hunan Rice Research Center (HRRC) (*Húnán zájiāo shuǐdào yánjiū zhōngxīn*, 湖南雜交水稻研究中心) (LPHT's research partner) test sites for hybrid rice varieties.

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<sup>26</sup> LPHT's involvement in the acquisition of Dow's Brazilian subsidiary will be discussed in Section 6.4.3.

**Table 6.2: PRC seed cooperation in South and Southeast Asia**

<b>Country</b>	<b>Seed company activity</b>	<b>Reference</b>
Bangladesh	<ul style="list-style-type: none"> <li>• Hubei Provincial Seed Company exports corn and rice seed</li> <li>• Sichuan Nongda Hi-Tech Agriculture of the Sichuan Rice Research Institute partnership with Bangladesh Rice Research Institute</li> </ul>	Cao & Qiu (2016) Siddique (2014)
Brunei	<ul style="list-style-type: none"> <li>• LPHT partnership with the Department of Agriculture and Agrifood in Brunei</li> </ul>	Xinhuanet (2017)
Cambodia	<ul style="list-style-type: none"> <li>• Rice Research Institute of Guangxi Academy of Agricultural Sciences - test site in Battambang for <i>zaoyou362</i> (早优 362), <i>teyou362</i> (特优 362) and <i>guiyuanyou362</i> (桂源优 362)</li> </ul>	Srean et al. (2012)
India	<ul style="list-style-type: none"> <li>• LPHT subsidiary opened in 2017, and a hybrid rice variety was approved for cultivation</li> </ul>	Zhang (2007, 29) LPHT (2018)
Indonesia	<ul style="list-style-type: none"> <li>• LPHT tested GNY50 and GNY53 hybrid rice and opened a subsidiary in 2015</li> </ul>	Zhang (2007, 30) Wang (2015)
Laos	<ul style="list-style-type: none"> <li>• National Hybrid Rice Research Center of the Hunan Academy of Agricultural Sciences hybrid rice varieties DH2525 and DH163 near Vientiane Laos.</li> <li>• Chongqing Seed Company testing <i>Qyou1</i> hybrid rice</li> <li>• Guangxi Wanchuan tested and exports hybrid rice seed.</li> </ul>	Xiong et al. (2010) Li et al. (2010) Wang (2005)
Myanmar	<ul style="list-style-type: none"> <li>• Chongqing Seed Company tests hybrid rice and corn</li> </ul>	Wang (2005)
Pakistan	<ul style="list-style-type: none"> <li>• LPHT tested hybrid rice varieties and has partnered with Guard Agricultural Research and Services</li> </ul>	Yang et al. (2002) Baig (2018)
Philippines	<ul style="list-style-type: none"> <li>• LPHT partnership with SL Agritech Corporation (SLAC). Testing SL-8H rice using LPHT parental lines.</li> </ul>	Zhang & Xun (2007)
Vietnam	<ul style="list-style-type: none"> <li>• LPHT has established test stations and exports both hybrid corn and rice seed</li> <li>• Guangxi Wanchuan Seed Company tested <i>teyou136</i> (特优 136)</li> <li>• Chongqing Seed Company tests <i>Qyou1</i> hybrid rice</li> </ul>	Zhang & Xun (2007) Zhou et al. (2014) Lei, Huan, & Fan (2012)

For example, LPHT developed a strategic partnership with the privately owned Filipino company SL Agritech Corporation (SLAC). Initial cooperation between Philippines national rice institute and Chinese academies began in the 1980s, including more than 10 different provincial academies of agricultural science (Shandong Zhang & Xun, 2007). In 1999, a cooperation agreement was signed between SLAC and LPHT's part-owner, the HRRRC (Peng, Zhang, & Yuan, 2007). Since then, senior researchers from the HRRRC joined SLAC, and tested LPHT parent lines. The joint venture eventually developed seed types including SL H8 hybrid rice, based on LPHT varieties (Zhang & Xun, 2007). By 2014, six varieties of hybrid rice had received certification for planting in the Philippines, primarily through SLAC; HRRRC/LPHT-based varieties now account for half of the overall area planted to hybrid rice seed (Li, Yang, & Qiu, 2014, 194-195).<sup>27</sup> These hybrid rice seeds compete directly against Syngenta, Pioneer, and Bayer, and are now being exported to other countries in tropical Asia (Pe & Tan, 2016). While the collaboration and flow of technology is clear, the profit-sharing agreement between SLAC and LPHT has not been made public, to my knowledge.

In Pakistan, LPHT has engaged in testing for hybrid rice varieties for decades (Yang, Fang, Yang, & Chen, 2002). In early hybrid rice trials, company authors specifically compared newly introduced LPHT varieties to IRRI varieties introduced to Pakistan in the 1970s (Yang et al., 2002, 377). These IRRI varieties (IR-6 and DR-92) remain the most widely planted in the country. More recently, LPHT's cooperation with the domestic Pakistani firm Guard Agricultural Research and Services have completed

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<sup>27</sup> In 2009, GRAIN reported that SL H8 seed had failed in some regions of Philippines, and was potentially mixed with hybrid rice seed imported directly from China (GRAIN, 2009).

testing and training, while initiating the development of “clear cut property rights” over parental rice lines (Ali & Yousef, 2017, 52). The partnership seeks to commercialize basmati rice hybrids in Pakistan’s Punjab province, creating a further mirror image to the green revolution (Pakistan Today, 2018). Guard Agricultural Research intends to export its rice seed to other countries, including the Philippines (Baig, 2018).

In India, LPHT has attempted to establish strategic cooperation with several seed companies. In the early 2000s, LPHT initiated strategic talks with Nuziveedu Seeds limited and Vihba Agrotech, each of which are private seed companies based in India (Zhang, 2007, 29). However, neither has resulted in significant activity. More recently, LPHT attempted to test its varieties through collaboration with another private seed company, J. K. Agri-Genetics Limited, bringing in 10kg each of *LP0882* and *LP0883* rice seed (Government of India, 2009). Further, in 2017 LPHT created a subsidiary in India called Longping Hi-Tech India Seed Company (*Lóngpíng gāokē yìndù zhǒngzǐ chǎnyè yǒuxiàn gōngsī*, 隆平高科印度种子产业有限公司). The subsidiary company is not yet operational, however LPHT obtained commercial planting approval for one variety of hybrid rice (LPHT, 2018, 17). In addition, LPHT’s international breeding centre on Hainan Island in China is targeting varieties that may be suitable to test in India.

Meanwhile, in Southeast Asia, numerous field trials and cooperation agreements took place over the last decades until present. Again, LPHT plays an important role along with several institutes and companies. Approximately 80% of Vietnam’s hybrid rice seeds are imported from Chinese companies (SLAC, 2017, 47). This level of concentration is advantageous to companies from the PRC, who see Vietnam’s lack of “hybrid rice self-sufficiency” as a competitive advantage (Zhou et al., 2014). Guangxi

Wanchuan Seed (*Guǎngxī wàn chuān zhǒng yè yǒuxiàn gōngsī*, 广西万川种业有限公司) has tested rice and corn seeds in Vietnam, including the *teyou136* hybrid rice variety (Zhou et al., 2014). The company, based in southern China bordering Vietnam, belongs to the Guangxi Academy of Agricultural Sciences, partnered with a domestic Vietnamese firm. Guangxi Wanchuan has also taken advantage of relative proximity to test and export seeds to Cambodia and Laos (Srean et al., 2012; Guangxi Wanchuan Seed Co., Ltd., n.d.). LPHT is also active in Vietnam, and has tested rice varieties in Indonesia and Laos. In Indonesia, LPHT focused on *GNY50* and *GNY53*, and has since received commercial planting and import approval from the Indonesian government. In 2015, LPHT opened a subsidiary company and its hybrid rice varieties are being planted in several provinces (Wang, 2015). In Laos, it is LPHT partner Hunan Academy of Agricultural Sciences that has tested several hybrid rice varieties (Xiong et al., 2010). Chongqing Seed Company has also tested its proprietary hybrid rice and corn varieties in Laos, developed in partnership with the Sichuan Academy of Agricultural Sciences (Wang, 2005). It has tested this variety and others in Cambodia, Laos, Myanmar, and Vietnam.

The projects and investments listed above place actors from the PRC in most of the world's top rice producing countries. The principal outlier is Thailand, where hybrid rice varieties are seldom grown due to government restrictions on imported germplasm for the purpose of commercialization (Napasintuwong, 2018). Despite the increased access of seed companies and institutes from the PRC, the adoption of hybrid rice in these countries typically remains comparatively low given their relatively small commercial seed markets. Nevertheless South and Southeast Asia are important destinations for China's foreign seed expansion, and this presence may increase if



commercial seed markets grow in the region. Creating inroads in the region's national rice seed markets serves to export the PRC's domestically developed rice seed technology, extending the international reach of otherwise domestically oriented agribusinesses and providing competitive international exposure vis-à-vis major MNCs.

### ***6.3.3. PRC seed companies in sub-Saharan Africa***

Building on the discussion above, we now turn to an overview of the PRC's grain seed extension activities in SSA. Though there are parallels with the examples above, in SSA Party-state actors from the Ministry of Commerce and Ministry of Agriculture are focused on coordinating with SOEs and universities to create demonstration centres in countries across the continent (Brautigam, 2015; Jiang, Harding, Anseeuw, & Alden, 2016). Though extension and demonstration projects have existed for decades, the renewed focus on these activities began after 2006 with the launch of the Forum on China-Africa Cooperation (*Zhōngfēi hézuò lùntán*, 中非合作论坛). The forum had been initiated in 2000, however the official launch in 2006 specifically prioritized agricultural demonstration centres. In 2016, there were 25 planned demonstration centres throughout the continent, many of which focus at least in part on grain seed (Li, 2016). These projects are largely funded by the Ministry of Commerce as well as financial institutions from the PRC (Brautigam, 2009). Similar to the dynamic in Asia, specific companies and research centres host or develop test sites for agricultural products and processes, bringing specific seed varieties to test for local adaptation and eventual adoption. Table 6.3 provides a list of the examples that include both demonstration sites and other private initiatives involved in rice and corn seed from the PRC.

**Table 6.3: PRC seed cooperation in sub-Saharan Africa**

<b>Country</b>	<b>Seed Company Activity</b>	<b>Reference</b>
Angola	<ul style="list-style-type: none"> <li>• Angola Longe Farm cooperates with LPHT and CITIC Group</li> </ul>	Hunan Daily (2016) CAAEPD (2018)
Ethiopia	<ul style="list-style-type: none"> <li>• Rice testing with the Ethiopian Institute of Agricultural Research</li> </ul>	Chen (2017) Alemu, Cook, & Qi (2015)
Kenya	<ul style="list-style-type: none"> <li>• China-Kenya Modern Agriculture Demonstration Center with support from Hubei Provincial Seed Company</li> </ul>	Chen (2017)
Liberia	<ul style="list-style-type: none"> <li>• China-FAO South-South Cooperation Programme including cooperation with LPHT</li> </ul>	FAO (2015, 6) Xinhuanet (2018)
Mali	<ul style="list-style-type: none"> <li>• China-FAO South-South Cooperation Programme</li> </ul>	FAO (2015, 11)
Mozambique	<ul style="list-style-type: none"> <li>• Huazhong Agricultural University and Wanbao Grain and Oilseed Company testing hybrid rice varieties</li> </ul>	CADF (2018) Wang (2012)
Nigeria	<ul style="list-style-type: none"> <li>• CGCOC and LPHT joint venture focused on hybrid rice and corn (Green Agriculture West Africa Co. Ltd.)</li> <li>• Chongqing Seed Company</li> <li>• China-FAO South-South Cooperation Programme</li> </ul>	Ye & Fan (2008, 35-36) CGCOC Agriculture (2018) FAO (2015, 16)
Rwanda	<ul style="list-style-type: none"> <li>• Tongliao Golden Mountain Seed Technology Company testing <i>Jinshan 1</i> and <i>Jinshan 28</i> hybrid rice</li> </ul>	Lawther (2016, 61-62)
Senegal	<ul style="list-style-type: none"> <li>• China-FAO South-South Cooperation Programme</li> </ul>	FAO (2015, 18)
Sierra Leone	<ul style="list-style-type: none"> <li>• China-FAO South-South Cooperation Programme</li> </ul>	FAO (2015, 20)
Tanzania	<ul style="list-style-type: none"> <li>• Chongqing Seed Company tests hybrid rice and corn at the China-Tanzania Agricultural Technology Demonstration Center</li> </ul>	Chen, Chen, Wen, Li, et al., (2012)
Uganda	<ul style="list-style-type: none"> <li>• China-FAO South-South Cooperation Programme</li> </ul>	Government of Uganda (2016)
Zambia	<ul style="list-style-type: none"> <li>• Zambia Agricultural Science and Technology Demonstration Park testing LPHT hybrid rice</li> </ul>	LPHT (2018)

Nigeria was identified by PRC analysts as a potential destination for both hybrid rice and corn seed projects (Tan & Ye, 2008, 60). In 2004, research and extension workers from Guizhou Institute of Agricultural Sciences and other partners tested over half a dozen Chinese hybrid rice varieties against conventional rice seeds sown in northern Nigeria (Ye & Fan, 2008, 35-36). Though the researchers showed that some were not suitable for the area, several varieties were to be followed up on for eventual commercialization. Following these initial tests, in 2005, a company named Green Agricultural Development Nigeria (*Lǜsè nóngyè fāzhǎn nírìliǎ yǒuxiàn gōngsī*, 绿色农业发展尼日利亚有限公司) was established, and primarily controlled by the state-owned CGCOC Group. In 2008, the company brought in LPHT to form a joint venture named Green Agriculture West Africa (*Lǜsè nóngyè xīfēi yǒuxiàn gōngsī*, 绿色农业西非有限公司) based on hybrid rice and corn seed expansion. Since then, the joint venture has collaborated with the Nigerian Ministry of Agriculture as well as some international organizations, and extended both hybrid and conventional seed varieties (CGCOC Agriculture, 2018).

In Tanzania, Chongqing Seed Company is involved in a technical demonstration project. The vice president of the Sichuan Academy of Agricultural Sciences places this demonstration project squarely in line with developing export markets for Chongqing's seed companies (Tang & Tan, 2009, 34). Test-publications argued that the hybrid rice and corn varieties brought by Chongqing Seed Company generated higher yields than the local varieties planted at the China-Tanzania Agricultural Technology Demonstration Center in Dakawa (*Zhōngguó yuán tǎnsāngníǎ nóngyè jìshù shìfàn zhōngxīn*, 中国援坦桑尼亚农业技术示范中心) (Chen, Chen, Wen, Li, et al., 2012; Chen, Chen, Wen, Yu, et al., 2012). Since then the company has retained links to Tanzania, with some adoption of the

hybrid rice technologies (Makundi, 2017). However, the adoption of foreign varieties has not gone without resistance. Jiang et al. (2016, 19) note that a disagreement arose in Tanzania based on the desire of Chinese experts to introduce Chinese hybrid varieties for testing, while the national government wished for more local content. Nevertheless, Chongqing Seed Company continues to test its imported varieties.

A similar test-site and demonstration centre was recently established in Kenya. The China-Kenya Modern Agriculture Demonstration Center (*Zhōngkěn xiàndài nóngyè shìfàn zhōngxīn*, 中肯现代农业示范中心) was installed at a local university and opened in 2017. The Center has focused on corn and rice, as well as sorghum, and an agreement was signed with Hubei Provincial Seed Group (owned by Zhongnongfa Seed Industry Group), among others, to source seeds (Chen, 2017). In Rwanda, Lawther (2016) found that *Jinshan 1* (*Jīnshān*, 金山) and *Jinshan 28* rice seeds were being tested for extension in the uplands, though wider uptake of the seeds had not yet occurred. The varieties were bred in Inner Mongolia by the state-owned Tongliao Golden Mountain Seed Technology Company (*Tōngliáo jīnshān zhōngyè kējì yǒuxiàn zérèn gōngsī*, 通辽金山种业科技有限责任公司), a state-sanctioned dragonhead enterprise owned by Sino Agriholdings (*Zhōngnóng jítuán zhōngyè kònggǔ yǒuxiàn gōngsī*, 中农集团种业控股有限公司).

The Chinese Ministry of Agriculture also indicated that several Chinese firms are operating in Zambia and Mozambique, some of them legacy businesses from cooperation projects of the 1970s. These operations include wheat, corn, and soy production, and new investments are being promoted through high-level delegations (Chen & Chen,

2007). Most recently, the China-Africa Development Fund (*Zhōngfēi fāzhǎn jījīn*, 中非发展基金), who reports to the State Council, supported an ongoing project to plant Chinese rice varieties in Mozambique through a partnership that includes Hubei Province's Wanbao Grain and Oilseed Company (*Wànbǎo liángyóu yǒuxiàn gōngsī*, 万宝粮油有限公司) and Huazhong Agricultural University (CADF, 2018; Wang, 2012). As of 2018, the project is currently planting 2200 hectares of rice received from Huazhong Agricultural University (the specific variety is unclear), though the project has faced significant local resistance in its plans to expand (Wise, 2018). In Zambia, LPHT is establishing the Zambia Agricultural Science and Technology Demonstration Park, which will include hybrid rice testing and demonstration (LPHT, 2018, 163).

Finally, beginning in 2004, the Chinese Government partnered with the FAO in a "South-South Cooperation Programme". The Programme has initiated various agricultural extension and technology transfer projects throughout the continent, including Chinese hybrid rice and corn, as well as other grains (FAO, 2015a). For example, hybrid rice extension projects with Chinese technicians and seeds imported from the PRC are in progress in Liberia, Mali, Nigeria, Senegal, Sierra Leone, and Uganda. The primary supplier of hybrid grains for this initiative is the HRRC of the Hunan Academy of Agricultural Sciences, drawing on its own resources and those of LPHT (FAO, n.d.). The wider uptake of the introduced varieties remains to be determined. However, speaking to the broader involvement of LPHT in extension activities throughout SSA, a LPHT official stated that, "Many of the trainees have become high-level officials and policymakers in their countries, and their vast understanding of China's agriculture can help promote further cooperation with China" (Xinhuanet,

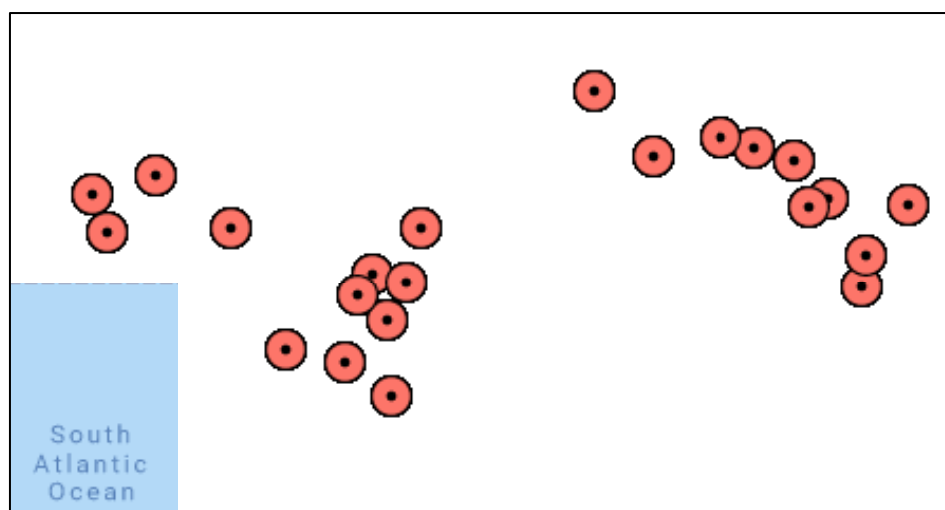
2018). As such, the operations of LPHT and other businesses are serving to expand networks and potentially markets and influence abroad.

The overseas extension of seed varieties developed in the PRC serves the Party-state's national food security objective by embedding networks of businesses and research institutes throughout Asia and SSA. These activities introduce many of the implicated companies or institutes to international competition, expand the market for Chinese-developed seed varieties, and secure intellectual property rights for seeds in these new markets. The above examples are not an exhaustive list of all projects and/or joint ventures to be found throughout these regions, however, they are the cases that are most verifiable based on Chinese language (and international) literature. Further, there are more projects to be found in Latin America and former Soviet states, among other places (Ho & Hofman, 2011; Myers & Guo, 2015).

The above cases, however, provide a broad picture of the connections between the PRC's domestic seed industry and the many international projects that often make headlines or appear in the Land Grab literature (Lawther, 2017). Connections to the PRC's domestic seed companies are often buried in favour of focusing on either broad trends or local political dynamics. However, the type of detail provided above is crucial to understanding the emerging networks of PRC agribusinesses across the global South, and in turn understanding the nascent agribusiness power of the PRC. Figure 6.2 maps the SSA and South/Southeast Asian countries in which PRC seed companies are engaging in grain seed research, extension, and/or commercialization, as outlined above. While most of the examples in this figure are either private business arrangements or bilateral state initiatives, several are multilateral in nature. As such, the networks of

foreign ventures are based on a mix of Chinese seed companies/organizations, both publicly and privately held, in addition to “traditional” development actors (Gaudreau, 2015).

**Figure 6.2: PRC rice and corn seed activities in SSA & South/Southeast Asia**



**Sources:** Alemu, Cook, & Qi (2015); Baig (2018); CAAEPD (2018); CADF (2018); Cao & Qiu (2016); CGCOC Agriculture (2018); Chen (2017); Chen, Chen, Wen, Li, et al., (2012); FAO (2015, 6); Government of Uganda (2016); Hunan Daily (2016); Lawther (2016, 61-62); Lei, Huan, & Fan (2012); Li et al. (2010); LPHT (2018); Siddique (2014); Srean et al. (2012); Wang (2005); Wang (2012); Wang (2015); Xinhuanet (2017); Xinhuanet (2018); Xiong et al. (2010); Yang et al. (2002); Ye & Fan (2008, 35-36); Zhang (2007, 29); Zhang & Xun (2007); Zhou et al. (2014)

Whether these ventures are able to establish themselves in local markets is subject to question. Though there are hundreds of test-sites and joint ventures throughout the world, there is no guarantee for the Party-state that the technology will be adopted. Nevertheless, such outward investments serve to extend the PRC’s domestic seed technologies outward and develop markets beyond its national borders. Importantly, most of the countries receiving these investments have less significant market presence of global seed businesses, particularly for rice seed, which offers PRC actors more space

to promote their technologies while employing discourse of South-South cooperation. In turn PRC agribusinesses are getting a competitive foothold in hopes of increasing their ability to compete against MNCs not just abroad but in their home market as well.

#### **6.4. Buying agribusiness networks for national food security**

The overseas testing and export of grain seed varieties developed in the PRC has been ongoing for decades. However, as seen above, commercialization through this channel is a long and complex process. Testing and adaptation of seed can take years, without guarantee of success. Further, the development of resource networks faces regulatory barriers, social resistance, and diplomatic efforts. In contrast, the second mechanism employed by actors from the PRC to acquire global agribusiness networks uses global financial channels to overtake and/or create existing resources and infrastructure. This pathway is a much more recent trend in the PRC's agribusiness sector than the previous focus on creating markets through test-sites and exports. It also parallels, and is precipitated by, the general trend of global agribusiness consolidation among the largest seed and agrochemical firms. As discussed in Chapter 2, each segment of the global agricultural value chain is highly concentrated with only several companies occupying the majority of market share. These companies have historically been based in the U.S., Europe, and to a lesser extent, Japan. I will explore the recent expansion of PRC networks through finance in three steps: first, to illustrate the power dynamics at hand, I introduce a case example of a trade disruption event related to a GM corn variety owned by Syngenta; second, I examine the PRC's network changes resulting from COFCO's acquisition of other grain trading companies; and third, I review the global financial



transactions of domestic PRC actors, including ChemChina's purchase of Syngenta, and their implications for the Party-state's control over a portion of global agricultural inputs.

#### ***6.4.1. Syngenta's GM corn, China's domestic regulations, and the global grain trade***

In late 2013, a watershed moment occurred, both revealing and anticipating changing power dynamics in the global food system. Shipments of corn began being turned away at the port of Shenzhen due to their contamination with a GM corn variety sold internationally by Syngenta but not approved in the PRC. The event lasted for one year, and embroiled global agribusiness giants, powerful states, international organizations, and American farmers. In the 14 months following the resolution to the rupture in trade, the PRC shifted the source of its corn imports away from the United States, COFCO purchased two commodity traders with substantial global assets, and ChemChina initiated the purchase of Syngenta.

Agrisure Viptera is a corn variety developed by Syngenta. This GM corn uses a Bt insecticidal protein coding sequence, which is introduced into a corn embryo using recombinant DNA techniques (Health Canada, 2015). This process creates the transgenic genotype titled Corn Event MIR162, which is a patented technology inserted into commercial corn varieties, namely Agrisure Viptera corn, as well as newer Syngenta corn varieties such as Agrisure Duracade. As a new GM crop, Agrisure Viptera was subject to regulatory approvals across the globe for the purposes of cultivation, human/animal consumption, and/or importation.

Syngenta filed for approval of MIR162 in the United States, receiving both food and feed authorization in 2008, though only receiving environmental approval for cultivation in 2010 (Syngenta, 2014). In November 2009, the trait was approved for food, feed and cultivation in Brazil. China's import certificate legislation requires that a new seed variety be approved for planting in another country before an application can be submitted. As a result, Syngenta submitted its application to China's Ministry of Agriculture for import approval in March 2010, based on Brazil's approval of the trait for cultivation. In the years that followed, several other key corn markets approved the trait in varying capacities, including the European Union, Argentina, Mexico, and Japan (Syngenta, 2014). However, in China, approval for the importation of corn containing the MIR162 trait remained pending.

By 2010, Agrisure Viptera was found in 1% of U.S. corn fields, representing approximately 1.5 million tons of U.S. corn, and reached approximately 3% by 2012 (Iowa Corn, 2014). Statistically, the variety was likely to be found in any batch of corn from the United States, due to mixed corn collection and processing methods. In 2011, Bunge, one of the four largest international grain traders, announced that it would not purchase grain produced from Agrisure Viptera seed due to the trait's pending approval in China. This announcement was followed by an initial lawsuit filed by Syngenta against Bunge, claiming that the processor has a responsibility, "to treat depositors of agricultural products fairly..." (US Court of Appeals, 2014). The lawsuit was eventually decided in Bunge's favour, and pointed to a clear tension between shifting import markets and the ability of the PRC to set informal standards on other countries.

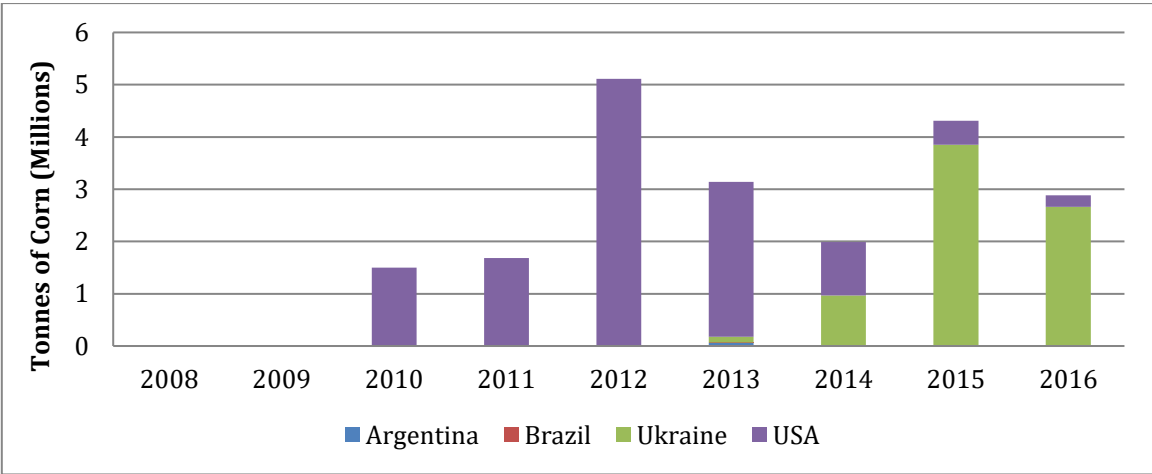
In August 2013, the PRC accepted a shipment of GM corn from Argentina, likely containing MIR162, brought in by China's state grain trader, COFCO (Bronstein, 2013). However, in November 2013, a shipment of corn from the United States was turned back at the port of Shenzhen because it contained MIR162. The AQSIQ in charge of border inspections in China released a statement indicating that MIR162 was pending approval in China, and shipments of corn or other grains containing MIR162 would not be accepted for import into the country (Xinhua, 2013b). Over the next year, multiple shipments containing MIR162 were refused at ports throughout China. Though numbers vary, it is estimated that several hundred thousand tons of corn and corn products were refused, and millions more tons worth of orders cancelled, with industry groups estimating losses between \$1-2.9 billion dollars in trade (Fisher, 2014).

In September 2014, Cargill Inc. sued Syngenta AG in U.S. state court over the premature release of MIR162 ahead of approval for import to China. The following week another U.S.-based grain exporter, Trans Coastal Supply Co, filed a separate lawsuit against Syngenta in US courts. Subsequently, Archer Daniels Midland as well as hundreds of US farmers also filed claims against Syngenta in U.S. courts that fall. Significant lobbying activity was also undertaken in an attempt to influence China's regulatory non-decision, including actions from industry organizations such as MAIZALL, BIO, and Corn Growers associations, as well as diplomatic activity from the United States, Argentina, and Brazil. In particular, MAIZALL, which represents agribusiness from Argentina, Brazil, and the U.S., met with the Permanent Chinese Mission to the WTO, to raise the issue of MIR162 and approval timelines (MAIZALL, 2014). In September 2014, a group of 19 US senators wrote to the United States Trade

Representative (USTR) Michael Froman formally requesting that the MIR162 issue be taken up directly with China. After more than a year of trade disruption, the approval of MIR162 corn was announced at a meeting of the US-China Joint Commission on Commerce and Trade, hosted by the USTR in December 2014. The announcement was made that following bilateral trade discussions placing agriculture market access as a priority, Agrisure Viptera had received approval from China (OUSTR, 2014).

This event demonstrated contemporary shifts in power dynamics in the global food system, and hints at the Party-state's developing national food security strategy. In the years following China's initial surge in corn imports, the PRC negotiated several new grain trade deals. These negotiations included phytosanitary agreements with Argentina, Ukraine, and Brazil, establishing bilateral rules for the import of corn. In both Ukraine and Argentina, COFCO signed additional agreements to source and ship corn to China (Bronstein, 2013; Zhou, 2012). As seen in Figure 6.3, in the wake of the MIR162 incident corn imports from the U.S. dropped precipitously in favour of imports from Ukraine, with increased shipments from COFCO. This outcome aligned with a strategic objective of the Party-state, to displace U.S.-sourced grain, thereby reducing reliance on the U.S. In addition, stocks of corn in the PRC were at record highs during this period. Chen Xiwen of the Agriculture and Rural Leading Small group had indicated that to reduce stocks, it was necessary to "obstruct the imports of corn alternatives" in addition to revising domestic corn pricing policy (Chen, 2016).

**Figure 6.3: China’s corn imports (2008-2016)**



Source: FAOStat.org

This event also demonstrates the changing structural power of the PRC in the global grain trade. Though the farmers harvesting MIR162 corn had followed the rules within their country, the position of the PRC as a major importer of corn effectively created new rules for major grain traders. Even though private governance initiatives existed to coordinate the international launch of agricultural biotechnology products, these mechanisms failed in the absence of formal global rules.<sup>28</sup> In essence, a regulatory non-decision by the Party-state was capable of disrupting global grain trade, affecting commodity prices, agribusiness incomes, and farmer incomes. Between November 2013 and October 2014 at the height of the MIR162 incident, Syngenta’s stock price decreased from \$70.78 to \$57.61. This incident presaged key international financial actions by state-owned agribusiness in the PRC, greatly increasing the reach of global networks under the influence of the Party-state. These actions are elaborated below.

<sup>28</sup> BIO, the Biotechnology Industry Organization, had introduced a Product Launch Stewardship policy to deal with situations of “Asynchronous authorizations combined with importing countries maintaining “zero tolerance””. Most major biotech seed companies are members.

#### ***6.4.2. Creating global food corridors through grain trade acquisitions***

As discussed above, China's long-term position of having very limited agricultural trade volumes changed in the mid-1990s with the liberalization of soybean trade and even more so after accession to the WTO in 2001 (Lardy, 2004; Schneider, 2014a; USDA, 2013). Prior to this period, China's ownership of foreign grain trading infrastructure was limited, with China's state commodity trading company, COFCO, being restructured between the late 1980s and mid-1990s into an internationally operating entity (McCorrison & MacLaren, 2010). Though COFCO expanded its trading desks abroad, its global infrastructure footprint remained limited relative to grain traders. In recent years, however, agribusinesses from China, including COFCO, have increasingly invested in such trading infrastructure.

There are multiple examples of investments connected to individual companies and countries. For example, in Australia, Beidahuang purchased not only agricultural land, but also ports in Albany through their company Vicstock (Thompson, 2015). In both Cambodia and Myanmar, Chinese firms are investing in rice processing projects (Far Eastern Agriculture, n.d.; Xinhua, 2013a). Over the last decade, China's largest privately-owned agribusiness, New Hope Group (*Xīn xīwàng jítuán*, 新希望集团), has opened three plants in the Philippines, three in Vietnam, two in Indonesia, as well as facilities in Sri Lanka, Cambodia, Egypt, and Bangladesh. However, the most important and expansive overseas investments were in 2014, with COFCO's purchase of two international grain traders, Nidera and Noble Agri (Meyer, 2014; Thukral & Flaherty, 2014; Oliveira, 2017).

As early as 2013, executives from Chinese SOEs were investigating foreign merger and acquisition possibilities in the grain sector, including conducting site visits abroad (Javier & Yun, 2013). Earlier, in 2012, Chen Xiwen stated that PRC agribusiness should expand by investing in grain trade in the name of supply stability (Javier & Yun, 2013). By early 2014, at the height of the MIR162 event, COFCO had announced two planned acquisitions. In February 2014, COFCO announced the purchase of 51% of Dutch grain trader, Nidera. The purchase was finalized in October 2015. By September 2017, COFCO had purchased the remaining share of Nidera, forming a wholly owned subsidiary. Subsequently, in April 2014, COFCO announced plans to purchase a 51% stake in Noble Agri, based in Singapore. The deal was closed in September 2015, and only months later COFCO announced plans to purchase the subsequent 49% stake to absorb 100% of Noble Agri. The total cost of these deals amounted to over \$3 billion, and were financed jointly by COFCO and a private equity consortium where COFCO provided two thirds of the capital (Sterling, 2018; Thukral & Flaherty, 2014). The private equity consortium included a Chinese private equity firm, Hopu Investment Management Corporation, as well as the Singaporean sovereign wealth fund Tamasek, the International Financial Corporation (part of the World Bank Group), and Standard Chartered Bank's private equity group. The debt taken on through these deals was financed "by a syndicate of banks with HSBC as coordinator and Bank of China as facility agent" (Clifford Chance, 2014).

Though COFCO cooperates with global agribusiness, it is also a key Chinese state-owned asset that is administered by SASAC. The company stated in a corporate report that,

[a]s a state-owned company that has developed alongside our country, COFCO always considers national food security, the stability of grain and oil market and the improvement of people's livelihood as our core responsibilities. Focusing on our core business is our strategic choice as the lifeblood industry of China.

(COFCO, 2017, 9)

Ning (Frank) Gaoning (*Níng gāoníng*, 宁高宁) was the company's CEO from 2004 to 2014. Ning, a high-ranking member of the CPC, oversaw the Noble and Nidera acquisitions. He also sat as one of nineteen members of the powerful central committee of the Central Commission for Discipline Inspection (*Jìlǜ jiǎnchá wěiyuánhui*, 纪律检查委员会), China's top anti-corruption body that answers directly to China's top political body, the Politburo Standing Committee (*Zhōngyāng zhèngzhì jú chángwù wěiyuánhui*, 中央政治局常务委员会) (Gong, 2008). In 2010, Ning invited delegates from the Agriculture and Rural Leading Small Group, including Chen Xiwen, to a Party conference with the company's Party Leadership Group to strategize on COFCO's execution of the Party's No. 1 Policy Document objectives (COFCO, 2010). The Noble and Nidera acquisitions can be seen as directly aligned with Party-state strategy and food security priority, even while being coordinated by and benefiting networks of agribusiness professionals (see Oliveira, 2017).

As noted above, COFCO previously only held subsidiaries coordinating grain trade logistics in various countries worldwide and held very little in the way of trade infrastructure such as storage, processing, transportation and port facilities. Instead, its orders for agricultural goods had been filled either through major grain traders, or



through China's state-owned shipping businesses. For example, COFCO and China Ocean Shipping Company (known as COSCO) agreed to a strategic partnership in 2007 given COFCO's position as a 'VIP customer' (COSCO, 2008). The new agribusiness formation between COFCO, Noble, and Nidera has been described as building on a special relationship (Oliveira & Schneider, 2016).

As seen in Figure 6.4, the acquisition of Noble Agri and Nidera has led to COFCO increasing (or initiating) its presence in 21 countries, across six continents. This expansion includes networks of processing, storage, and shipping infrastructure covering corn, soybean, rice and wheat among other commodities and fertilizer inputs. COFCO's corporate plan specifically highlights the network established through these acquisitions, framed in the context of the Party-state's going-out policy and national food security,

Utilizing on our mature global grain trade networks, we have established stable food corridors bridging the world's largest grain producing areas, such as South America and the Black Sea and the emerging markets in Asia, which have the largest grain demand in the world. By doing this, we have effectively executed the "Going Global" strategy for China's agriculture industry and laid a solid foundation for food security of China. (COFCO, 2017, 2)

The concept of "stable food corridors" is reflective of the concept of securitized foodways in that these corridors reflect global agriculture resource networks ultimately under control of the Party-state. Notably, the company acknowledges that the food security "of China" is directly linked establishing these "stable food corridors" throughout major grain producing regions.

**Figure 6.4: COFCO - Nidera and Noble Agri's global presence**



Source: Author's compilation based on Nidera (2015) and Noble Agri (2015)

Figure 6.4 highlights the new presence of COFCO in Argentina, Brazil, Ukraine, and the United States, which are China's most significant sources of soybean and corn imports (Oliveira & Schneider, 2016; USDA, 2013). Though there is very little in the way of direct land purchases/leases involved in these transactions of existing infrastructure, there is a significant increase in large and small farms becoming more closely connected to purchasing channels and infrastructure owned by the Chinese state. While the ABCD firms certainly retain the majority of global market share, there are already significant structural shifts at the country-level, with COFCO now controlling over 10% of Argentina's grain export market (Clarín, 2014). In Brazil, the ABCD firms' market share decreased from 57% in 2003 to 37% in 2015 due to increased purchases from Asian trading houses including COFCO (Bonato, 2016). In addition, COFCO's purchase of both Nidera and Noble Agri is accompanied by research and development infrastructure in

corn and soybean, including intellectual property over internationally planted seed varieties.

Given these major changes in global infrastructure networks, it is clear that actors from China are now increasingly involved in food supply chains before and after the growing of crops, both of which increase the international presence of Chinese actors in highly concentrated industries. Again, like the promotion of industrial seeds, China's No. 1 policy document has promoted the acquisition of processing and trade firms, a government stance that continues from an agricultural going-out policy (Chen, 2012; Zhai, 2006). The modified ownership of these marketing channels places farmers throughout the globe, working an immense area of land, in much more direct contact with Chinese actors than was previously the case. The result is that now a larger share of the grains being imported to China (and traded globally) passes through the hands of an enterprise ultimately owned by the Party-state. While the PRC no longer produces all the soy and corn necessary to satisfy its domestic animal feed demand, some of the grain it does bring in is sourced through domestically owned foreign infrastructure.

#### ***6.4.3. Securing technology and competitiveness through seed company acquisitions***

In the wake of the PRC blocking corn shipments from global grain traders, and a chorus of voices arguing that China will not commercialize GM grains, several major agribusiness acquisitions occurred. Grain seeds and agrochemical inputs have been the focus of international financial transactions over the last several years. In December 2015, Dupont and Dow announced their planned merger, while in May 2016 Bayer

began to the process of acquiring Monsanto. The examples provided below reflect the large-scale entry of actors from the PRC in the global seed, biotechnology, and agrochemical input sectors, resulting in a significant expansion of foreign seed industry resource networks.

The most significant case is ChemChina's acquisition of Syngenta. In February 2016, ChemChina, a Chinese state-owned agrochemical firm, announced its intention to purchase Syngenta in an acquisition deal. In the arrangement, ChemChina would purchase the vast majority of Syngenta's shares, and de-list the company in order to become a private (state-owned) enterprise. Costing \$44 billion, the acquisition amounts to the largest ever by an actor from the PRC. To finance this significant cost, the deal brought in support primarily from PRC-based financial actors, including Bank of China/China Reform Holdings/Industrial Bank (US\$18 billion), CITIC Bank consortium (US\$12.7 billion), HSBC (US\$6.81 billion), and Morgan Stanley (US\$2 billion). In addition, ChemChina itself provided US\$5 billion (Liu, 2017). The acquisition of Syngenta provides ChemChina with a significant global presence in the seed and agrochemical market as well as Syngenta's intellectual property rights in the biotechnology sector. Indeed, Syngenta owns the GM corn seeds at the heart of the MIR162 incident.

The purchase of Syngenta spurred criticism both within the PRC and from prominent U.S. politicians. Within the PRC, concerned citizens lobbied to halt the acquisition due to the threat of imported GM seeds (Collier, 2018). In a letter to the Ministry of Health that made its way to SASAC under the State Council, the 400 citizen signatories stated that, "[t]he acquisition of Syngenta and the promotion of its genetically-modified and agro-

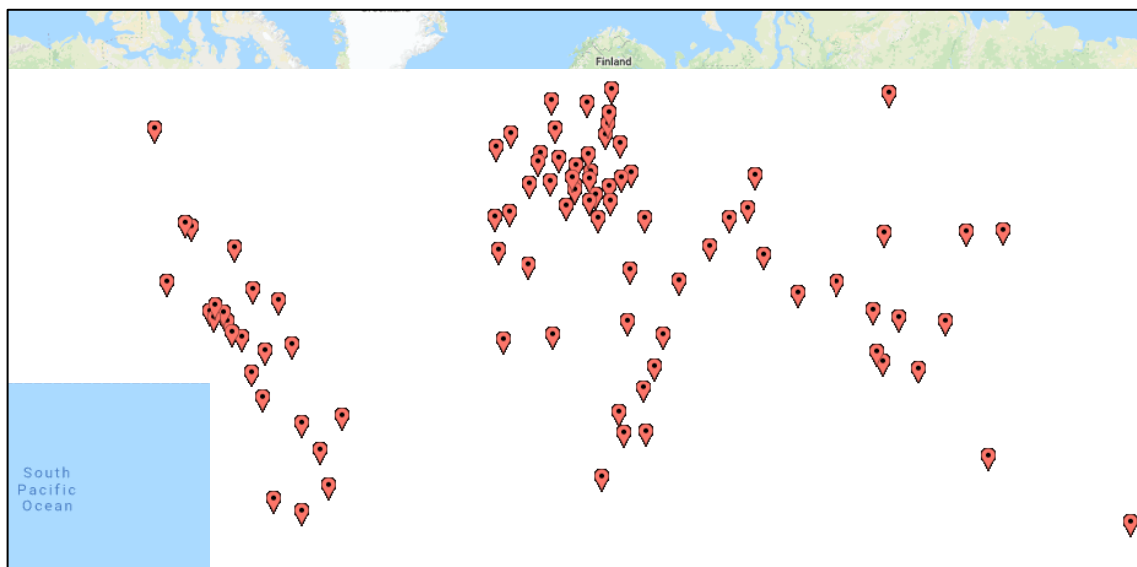
chemical agriculture in the country would destroy the country's own agriculture and food security..." (Collier, 2018, 14). This dynamic between the Party-state and domestic alternative food advocates will be further explored in Chapter 7. Within the U.S., Iowan Senator and chair of the Senate Judiciary Committee Chuck Grassley stated that his, "concerns of concentration and national security are compounded by the fact the Chinese government, if the ChemChina-Syngenta deal is approved, would be both a regulator in regard to biotech product approval and also at the same time owner of an entity that needs biotech approval" (Donnan, 2016). Despite the protestations on both sides, the deal was approved. Following the approval, Senator Grassley argued that,

[t]he ChemChina-Syngenta merger raises questions about national security because of the need to ensure a safe food supply in the United States. It's clear that China is looking at purchasing companies with food production expertise as part of a long-term strategic plan and a component of their national security. We need to be looking at these mergers in the same way, so it makes sense for [the Committee on Foreign Investment] to take that angle into consideration when reviewing these transactions. (Grassley, 2016)

He further advocated that the USDA be included in future national security reviews. Though his recommendation has not been implemented, it is clear that some corners of the U.S. government are beginning to rethink the relationship between agrifood power and national security. This dynamic provides a striking contrast to statements of previous U.S. administrations during the U.S. food regime, as discussed in Chapter 5, where it was U.S. agrifood power providing a "lifeline" to other countries.

On the part of Syngenta, former Chairman Michel Demaré noted that the acquisition makes Syngenta, “a partner of the Chinese government to basically drive the modernisation of Chinese agriculture — so we get the whole growth story” (Atkins, 2017). Upon closing the transaction, ChemChina’s then-CEO Ren Jianxin (*Rén Jiànxīn*, 任建新) stated his intentions to extend Syngenta’s seeds to Southern countries, “[d]eveloping countries around the world, including China, need Syngenta for its technology, for its products and for its services... India is another major growth market with a huge population...and I believe Africa will be the other major growth market for Syngenta” (Fukao, 2017). The purchase of Syngenta by ChemChina, much like the purchase of Noble and Nidera by COFCO, provides inroads to the global infrastructure necessary to establish securitized foodways. Figure 6.5 displays Syngenta’s global network, by country. Syngenta has a presence in 89 countries across the world.

**Figure 6.5: ChemChina’s acquired global network through Syngenta**



Source: Syngenta (2017); mapped using batchgeo.com

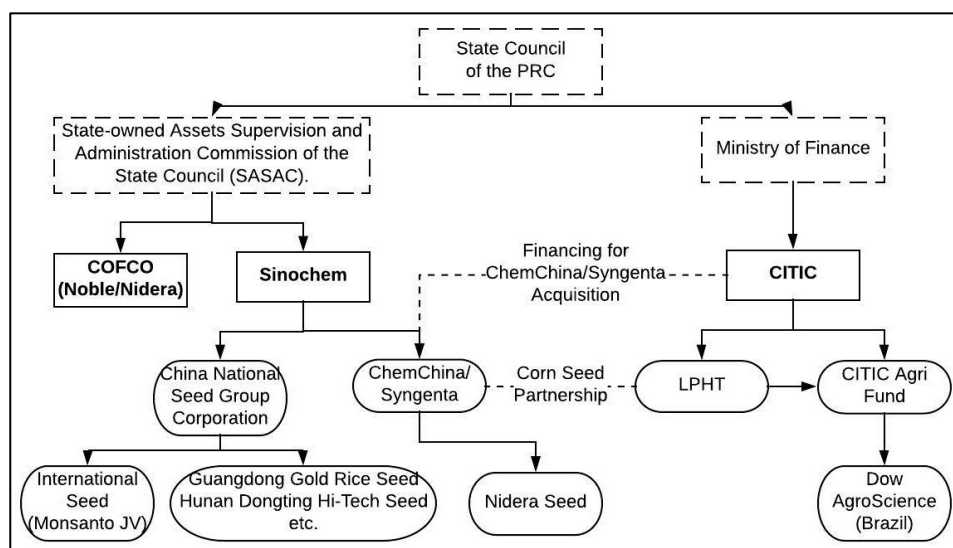
This network provides a Chinese SOE with the combination of intellectual property rights, germplasm resources, agrochemical inputs, production bases, and a global distribution network. Since ChemChina's purchase of Syngenta, the GM corn seed at the heart of the import embargo has been approved in China along with other Syngenta GM seeds that were awaiting approval (Unglesbee, 2017). Syngenta also owns golden rice technology (Parayil, 2003). The company's long-term focus on GM technologies within rice, as well as presence in Southeast Asian rice research addresses a central market concern in terms of outward expansion. These networks in SSA and Southeast Asia run parallel to the projects discussed in section 6.3.

Since the initial acquisition of Syngenta by ChemChina, further consolidation and strategic partnership have occurred vis-à-vis state-owned seed businesses. In February 2018, Syngenta/ChemChina acquired Nidera's seed division from COFCO, seeking efficiencies between these two newly formed global agribusinesses (Syngenta, 2018b). ChemChina has also created partnerships with other seed firms in the PRC. For example it partnered with LPHT on corn seed biotechnology (Patton, 2018).

In a significant development for the PRC's overall seed industry, ChemChina is preparing to merge with Sinochem, though the tie-up was not complete at time of writing. Nevertheless, significant steps have already been taken. In July 2018, Frank Ning, who oversaw COFCO's acquisition of Noble and Nidera, was appointed as Chairman and Secretary of the Party Committee (*Dǎngzǔ shūjì*, 党组书记) for ChemChina while concurrently serving as Chair and Secretary for Sinochem (Sinochem, 2018). After being appointed to these positions in ChemChina, Ning was promoted to Chair of Syngenta's board of directors (Syngenta, 2018a). As discussed in Chapter 5, Sinochem

also purchased CNSGC, which has in turn gained control of many smaller seed companies over the last decade. Further, CNSGC oversees Monsanto’s key grain seed joint venture, International Seed. Overseeing Sinochem itself is SASAC, a supervision unit under the State Council – the top government body in the PRC. This supervision, partnership, and ownership structure is outlined in Figure 6.6.

**Figure 6.6: State Council supervision of the PRC’s global agribusiness**



Source: based on author’s compilation (see in-text citations)

In addition, since the purchase of Syngenta, other outward acquisitions of major seed companies have continued. In July 2017, CITIC Agri Fund (*Zhōngxìn nóngyè kējì gǔfèn yǒuxiàn gōngsī*, 中信农业科技股份有限公司), owned by the state-owned conglomerate CITIC Bank and LPHT purchased Dow AgroScience’s corn business in Brazil. As established in Chapter 5, LPHT itself is owned in part by CITIC, which as a state bank reports to the Ministry of Finance. This transaction offers LPHT significant resources, including “corn seed production sites and four research centers, along with a copy of the



Dow AgroSciences' Brazilian corn germplasm bank, certain commercial and pipeline hybrids, and the Morgan trademark. CITIC Agri Fund also received a license to the Dow Sementes trademark for 12 months" (Dow, 2017). The sale itself took place as a result of Dow's required divestiture under its merger with DuPont Pioneer. Combined, these financial transactions create a significant network of global resources under the (indirect) supervision of the PRC's top government body, the State Council.

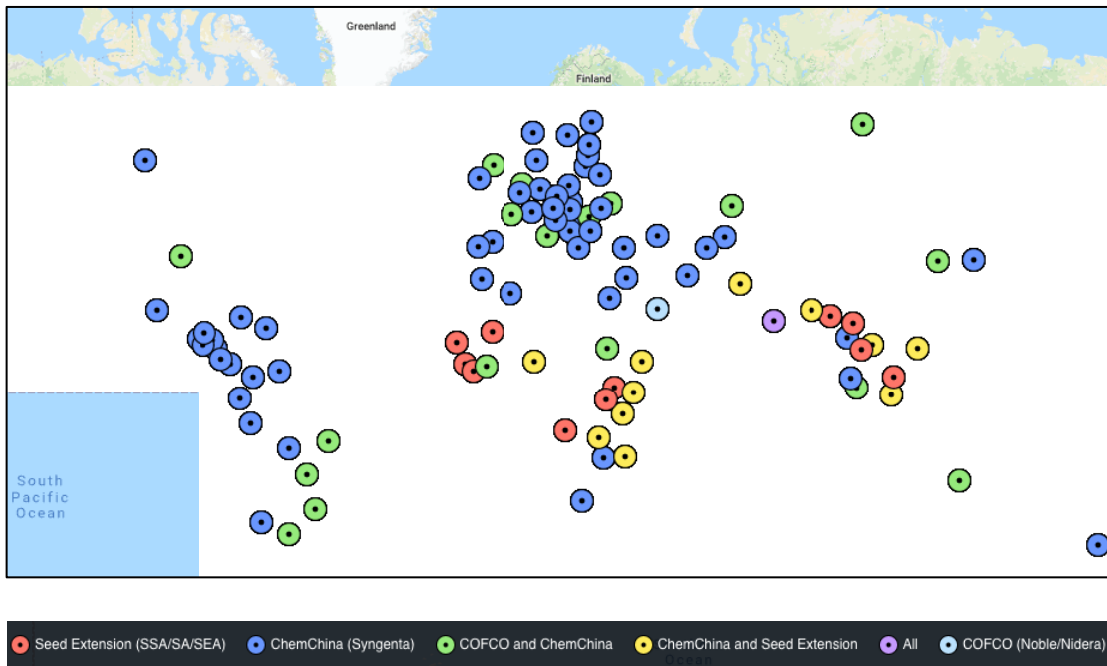
Though the PRC will continue to require grain imports for its feed requirements, a larger share of that imported grain will now be grown using seed varieties and inputs that are researched, developed, and sold by domestically controlled SOEs. The acquisition of Syngenta greatly expands the PRC's structural power in the global food system through access to established commercial seed markets, infrastructure, and access to significant intellectual property rights in the GM seed sector. These resources, ultimately reporting to the State Council, have the potential to have access to preferable regulatory treatment in Mainland China and preferential state support in international markets. As noted in Chapter 5, the previous lack of competitiveness in GM seeds relative to foreign-owned companies is a critical reason that the PRC has not commercialized GM grain crops for domestic cultivation. As such, these acquisitions address a critical national food security concern for the Party-state, by having a SOE among the global agribusiness giants with intellectual property in biotechnology, but potentially at the expense of the concerns of domestic food activists.

## 6.5. Discussion and conclusion

Beginning in the late 1990s, the Party-state was faced with a new dynamic in the context of national food security. For the first time in the history of the PRC, a significant portion of domestic grain requirements was being sourced through imports. U.S. global agribusiness supplied inputs and shipped/processed these grains, particularly soybean and later corn. As seen in Chapter 5, these agribusinesses were simultaneously attempting to enter the PRC's domestic agricultural markets. These new pressures forced a reformulation of the concept of national food security in the context of changing domestic consumption and increased economic integration. In order to retain agricultural self-reliance, national food security required an external dimension. This external dimension is embodied by the agricultural going-out policy and is focused on the export of domestic technologies and securing ownership over a portion of global agricultural supply chains. The increasing concentration of foreign-owned agribusiness placed further pressure on the Party-state and state-owned agribusiness to more rapidly pursue a series of mergers and acquisitions at the global level.

Whereas control over the domestic grain seed market involved the exercise of structural power over China's domestic market, gained through historical autonomy from the global food system and broader global economy, the Party-state's pursuit of international expansion involved building power in a concentrated global food system. The two mechanisms laid out above focus on establishing networks through seed extension and export projects, particularly in SSA and South/Southeast Asia, and acquiring the resources of existing global agribusiness firms. Figure 6.7 brings together much of the empirical detail as laid out above.

**Figure 6.7 Contemporary global grain presence of the PRC**



**Source:** Alemu, Cook, & Qi (2015); Baig (2018); CAAEPD (2018); CADF (2018); Cao & Qiu (2016); CGCOC Agriculture (2018); Chen (2017); Chen, Chen, Wen, Li, et al., (2012); FAO (2015, 6); Government of Uganda (2016); Hunan Daily (2016); Lawther (2016, 61-62); Lei, Huan, & Fan (2012); Li et al. (2010); LPHT (2018); Nidera (2015); Noble Agri (2015); Siddique (2014); Srean et al. (2012); Syngenta (2017); Wang (2005); Wang (2012); Wang (2015); Xinhuanet (2017); Xinhuanet (2018); Xiong et al. (2010); Yang et al. (2002); Ye & Fan (2008, 35-36); Zhang (2007, 29); Zhang & Xun (2007); Zhou et al. (2014)

Specifically, Figure 6.7 amalgamates the information presented in Figures 6.2, 6.4, and 6.5, to present the recent foreign expansion of China’s agribusiness network, through 1) the overseas projects and partnerships of domestic seed companies and institutes in SSA, South Asia, and Southeast Asia, 2) COFCO’s purchase of Noble and Nidera, and 3) ChemChina’s purchase of Syngenta. Together this information paints a picture of a striking expansion of global infrastructure and resources, largely in the realm of the grains sector. Importantly this network is based on projects and acquisitions since 2005, and mostly post-2010. Prior to this time, the PRC’s foreign agribusiness network was

significantly smaller, mainly containing older foreign seed partnerships along with several of COFCO's trading desks.

The cumulative effect of this network expansion is two-fold. First, markets and infrastructure for PRC-developed seed are expanding and branching out domestically owned intellectual property and agribusiness operations. The expansion of networks serves to support PRC agribusiness firms and research institutes while also establishing their presence abroad in markets that are less concentrated in terms of dominant global agribusiness firms. As stated in central policy documents in section 6.2., this permits nationally owned firms to expand their markets abroad with the aim of increasing their ability to compete in global markets and increasing competitiveness at home. In terms of Syngenta and other seed acquisitions, agribusiness from the PRC has secured control over a wider range of foreign germplasm and GM patents, including through SOEs that report to the Party-state. Second, control over a portion of global resources in the grain and seed industries means that imported commodities to China are not completely foreign-sourced. Rather, the value and supply chain of imported commodities are increasingly owned by actors from the PRC; an increasing share of the seed with which the grain is grown and the infrastructure used to transport it, are owned by the PRC. In this sense, self-sufficiency has been projected abroad. Over time, the foreign expansion of domestic seed may increase the quantity of grain produced using resources owned by actors from the PRC. Nevertheless, not all overseas seed ventures (particular exploratory test sites) will result in an increased foothold in international markets. Further, China continues to import significant quantities of grain through foreign-owned grain traders, including the ABCD firms (Hall, forthcoming; Oliveira, 2017). The global

orientation of self-reliance remains in its beginning state, though significant reorientation in market structure has taken place.

For the Party-state, the importance of establishing broad networks through state-owned agribusiness is not only to control the flow of resources. It enables greater structural power. As shown in the case of Agrisure Viptera, the volume of the PRC's grain imports already provided an element of informal structural power. To an extent, being a large customer allows the PRC to set international variety approval standards, in the absence of formal rules, given that a significant share of grains will be shipped to the country, even at the expense of other powerful actors in the global food system. Expanded international networks in multiple links in the grain supply chain can offer greater ability to: 1) execute existing informal structural power, and 2) influence formal regulations at the national and international level. In fact, the Party-state has set objectives to affect this kind of structural power, seeking to "actively participate in the formulation and revision of international trade rules and international standards, and advance the mutual recognition of the results of agricultural product approvals" (CPC Central Committee, 2016b). The Party-state's newfound power, and its ideational underpinnings, has shifted the dynamics of the global food system. The global food system's geopolitical poles are now shifting (Belesky & Lawrence, 2018; Margulis, 2014). By establishing positive power via agribusiness networks in the global food system the Party-state is increasingly positioned to shape the capacities of other actors in the global food system to act.

However, this expansion has not gone unnoticed or unopposed. Resistance is seen in multiple corners, from the protests lodged due to the Agrisure Viptera rejections,

to the focus on China's place in land grabs and opposition to seed extension projects, to the invocation of national security concerns in the United States regarding the Syngenta purchase. In the context of overseas seed extension, there is an ironic symmetry between hybrid rice expansion projects and the Cornell-Nanjing project that was once demonized in the early Mao period. The increasingly wide literature on specific overseas development projects of the PRC raises questions about displacement of both people and traditional crops, and the unevenness of these impacts (Brautigam & Zhang, 2013; Cotula, 2013; Lawther, 2017). Meanwhile in the context of broader global agribusiness acquisitions, and as indicated in critical statements from several U.S. state actors, it is clear that the U.S. does not have a distinct or structured approach to national food grain security in the way that the PRC does. While these questions remain pertinent, the motivations behind these extension activities and agribusiness acquisitions should be re-evaluated in the framework of securitized foodways. In addition to these international sources of opposition, there has also been resistance domestically within the PRC itself. I turn to the dynamics of this domestic opposition next.

# Chapter 7: National Food Security and People's Food Sovereignty<sup>29</sup>

## 7.1. Introduction

In the context of global agribusiness concentration and the Party-state's securitized foodways imperative, can local alternatives exist China? The previous chapters largely focus on commercial grain and grain seed in the PRC and globally. However, each chapter also introduced elements of opposition to the food system promoted by Party-state policy relative to establishing a domestic commercial seed system and exerting control over elements of the global industrial food system. This chapter examines the dynamics of domestic PRC food movements linked to global advocacy for agricultural alternatives, and their relationship to the Party-state's national food security imperative. I argue that the shared normative priority related to independence from foreign control provides critical food organizations with normative space to operate and develop nascent networks within the PRC. Some scholars argue that the Party-state's quest for independence is akin to the goals of the food sovereignty movement (Zhang, 2018). However, the Party-state's pursuit of securitized foodways through a globally competitive industrial food system sets limits on the ability of alternative food movements to scale up, even though these movements can exercise some negative power vis-à-vis actors supporting the industrial food system.

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<sup>29</sup> This chapter is based on a sole-authored publication in the Canadian Journal of Development Studies (Gaudreau, 2018).

There is a distinct overlap in the pro-autonomy arguments of Party-state actors and of alternative food movements in the PRC. Like the Chinese Party-state and agribusiness actors, global food sovereignty movements have emerged as critical or oppositional forces to concentration in global agribusiness (Wittman, 2011). The voices of such food movements are similar in the PRC where there is opposition in some corners to both the dominant global food system and to agricultural biotechnology (Zhang, 2018). Meanwhile, Party-state and corporate actors in the PRC have expressed concern over global agribusiness markets, using a stream of logic and supporting arguments that *partially* mirror food activists both in China and globally (see also Yan et al. 2016). This partial similarity in each group's arguments creates both opportunities and challenges for potential food sovereignty activists in China. The overlap uniquely affects the normative space in which local food movements can successfully position their activities.

I begin this chapter by reviewing the arguments made by Party-state and agribusiness actors in China relative to the global food system and corporate concentration in foreign-owned agribusiness. I then turn to the position of alternative food movements and food sovereignty activism in the PRC, focusing on global agribusiness concentration as a source of anti-neoliberal motivation. Next, I present a case example of the 2014/15 revisions to the PRC's Seed Law, where both agribusiness and NGOs attempted to exert influence over the rules governing seed property rights and seed saving. Finally, I examine the interaction between the discourse of both groups to better understand opportunities and constraints presented both in relation to the PRC and critical food studies more broadly.



## 7.2. Corporate concentration and national food security

As seen in Chapter 5, foreign-owned agribusiness firms (who retain 49% ownership) have not gained a majority share in PRC grain seed companies. Further, foreign agribusiness firms in China's grain seed industry hold a minority position both in terms of market share, though they do have a presence in grain seed sales and research capacity, and dominate the vegetable seed market (Elgion & Zuo, 2014). The Party-state's national food security priority has specifically aimed to keep foreign agribusiness at bay within the PRC. This priority is reflected in striking discourse from Party-state and corporate PRC actors regarding concentration in global agribusiness, and the threat it poses for China's food security.

On one hand, there are many actors that promote a level of international partnership with major global agribusinesses. For instance, the deputy CEO of China's largest state-owned seed company, CNSGC, which has joint ventures with Monsanto, indicated that, "[a]t present, China still must cooperate with these transnational seed enterprises who have mastered advanced biotechnology, after all the foreign seed industry is more than ten years ahead of us" (Chen & Wu, 2009). Similarly, a high-ranking State Council representative indicated that in the context of increased foreign agribusiness presence in China, domestic seed firms will strive to develop their own breeds, and will learn from foreign partnerships (Chen & Wu, 2009). Of course, the joint ventures presented in chapters 5 and 6 also point to the established partnerships between domestic and international seed companies. Global agribusinesses, for their part, encourage partnership in China (see Fortune & DuPont, 2013).

On the other hand, there is a broader policy discourse among state, Party, and business officials that puts specific boundaries on the above statements. This discourse places the national economy at odds with incumbent global agribusiness actors. In 2010, Yin Chengjie, a Party member and rural economist, spoke out about global agribusiness power. As a member of the Agricultural and Rural Affairs Committee, a top state-political body working on agricultural subjects, he articulated the issue as follows,

An important aspect of the [international] agricultural industry is that some MNCs control agricultural technology. There are currently about 9000 patents held on a number of crops, of which 45% are held by four MNCs. Many agricultural multinationals achieve influence and control over the industry by controlling production and supply of seeds of native plants through genetic resources and patent applications. (Yin, 2010, 7)

For Yin, the issue is to avoid dependency on foreign agribusiness within China. The potential source of dependence is through the concentration of control over seed technology and germplasm resources, which presents a potential threat to China's food and economic security (Yin, 2009, 2010). It is significant that Yin expressed these opinions while in the position of Deputy Director of the Agricultural and Rural Affairs Committee, as it demonstrates a stream of thought that is present in prominent state forums. In a similar vein, representatives of Shandong Denghai Seed Company (who have the majority share in a joint venture with DuPont Pioneer) wrote that,

China's seed industry does not have large companies. Small companies and research institutes alone, if confronting transnational corporations, would be

disastrous. Therefore, we should accelerate industry-research combinations, and establish industry leading innovation alliances, and cultivate an internationally competitive seed industry “aircraft carrier” enterprise to maintain national control of the seed industry, promote economic development, and ensure national food security. (Yang et al., 2010)

These authors, who work for a major foreign-domestic joint venture, argue that China ought to protect against domestic take-over by scaling up to create a large, competitive, nationally owned firm. In fact, the authors directly invoke the term “national food security”, written in Chinese as “national food grain security”, in the context of the tension between global and national markets. Food security is thus employed to denote the necessity for China’s grain seed markets to be distinct from those controlled by multinational agribusiness. Importantly, though the problem identified is the concentrated structure of the global seed industry, their solution is to mimic this structure with a nationally owned “aircraft carrier” agribusiness able to compete against current power-holders. The beginnings of this process are seen in chapters 5 and 6.

Other commentators express the issue of concentration in terms of national sovereignty. State and corporate representatives related to Shofine Seed Company argue that, “transnational corporations principally use technological lock-in to reinforce the technical dependence of the host country, reducing technological spill overs and maintaining the advantage of monopoly. With the continuous expansion of transnational seed companies’ R&D activities in China, our country has lost its ‘technological sovereignty’ in seed science and technology” (Zhang et al. 2014, 13). In this argument, the global seed industry has the ability to create dependency, which undermines

national sovereignty by disabling a nation's capacity to reproduce its own agricultural inputs from domestic sources of technology. Given the expansive networks of the handful of foreign-owned MNCs, the authors see national capacity as threatened by concentration and foreign ownership.

Within both state and corporate discourse in the PRC, there is specific focus on the threat of global agribusiness concentration. This threat spurred the global acquisitions discussed in Chapter 6. In addition, the orientation of many Chinese academic studies focus on the need to protect and promote the domestic seed industry over foreign agribusiness, particularly as a result of the oligopolistic structure of the global seed industry (Huang & Liu, 2015; Jing & Li, 2010; Liu & Li, 2011; Zhang & Pan, 2014). Such articles typically provide policy direction to address the place of Chinese industry within concentrated global agribusiness, whether at the level of patent rights, research promotion, or to provide broader theoretical context. Li et al. (2009) argue that,

[t]he real reason [developed countries don't end agricultural subsidies] is that since the Second World War, the 'weaponization of agricultural products' has become an important strategic means for the developed countries to control the food sovereignty of underdeveloped countries, comprehensively controlling their economy, politics and society.

This view is parallel to the very processes discussed by food regime theory in the context of U.S. relationships with developing countries' agricultural systems. Given that food security is expressed as a national security concern in the context of agribusiness concentration and dependency, alternative development policies are proposed.

Transnational control of corn seed has been argued to be a particularly sensitive area of food security requiring state intervention, given recent increases in corn planting throughout China, for example Xianyu335, and the entry of foreign MNCs in the seed market (Xiong, 2013). As discussed in Chapter 5, GM corn and rice seed have not been introduced commercially in China, thereby restricting varieties introduced by MNCs. Opinions are mixed on timelines for domestic commercialization of GM seeds. GM researchers in the PRC typically expect that it is inevitable, while hybrid grain breeders are more circumspect.<sup>30</sup> However, given the preoccupation of state and corporate commentators, GM seed adoption in China would be acceptable given national ownership over the technology, thereby avoiding foreign dependence (see also Zhang, 2018).

As seen in chapters 5 and 6, the Party-state's response to the challenge of corporate concentration has been to at once expand and consolidate domestically owned networks of industrial grain seed while acquiring existing global agribusiness networks. The effect on domestic agriculture is to reinforce the PRC's industrial food system, based on purchased seed and agrochemical inputs, and supported by subsidies to HYVs and financial support to dragonhead enterprises (Veeck, 2013). All the while, these policies are enacted using terms such as food security and sovereignty. However, these terms refer to national security and national sovereignty over agricultural inputs. This distinction is important in the context of alternative food movements and food sovereignty advocacy in the PRC.

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<sup>30</sup> Author interview, Yunnan Province, China, October 2015; Author interview, Beijing, China, November 2015

## **7.3. Food movements and the potential for food sovereignty in the PRC**

Food sovereignty is a perspective and practice advanced by indigenous peoples, small farmers, food activists, and scholars, among others. In light of current trends in global agribusiness, food sovereignty movements seek to offer a local solution to global food and environmental crises. The concept gained traction in the 1990s through the network of La Via Campesina with a strong presence among peasant and small farmers in developing countries. The organization indicates that its network reaches some 200 million people in 73 countries (La Via Campesina, 2011). Though La Via Campesina is often the central focus in discussions of food sovereignty, many voices contribute to the activities of the movement (Edelman, 2014; Shilomboleni, 2017). Common among these voices is the articulation of struggle against a neoliberal food system, which prioritizes capital accumulation through such features as free trade and investment, industrial monoculture, and privately funded agricultural research (Clark, 2015). As a result, many participants in the movement have goals defined as “strongly oppos[ing] corporate driven agriculture and transnational companies that are destroying people and nature” (La Via Campesina, 2011). The proposed solution offered by food sovereignty advocates points to localized food systems largely divorced from global value chains as a means to create a more sustainable food system in opposition to the dynamics characterized by global agribusiness.

In fact, food sovereignty advocates argue that global industrial agriculture is a driver of world hunger, and point to neoliberal state policy as an enabler of this dynamic

(Trauger, 2014). Trauger (2014) argues that the contemporary nation-state *has* to enable global agribusiness in order to reproduce its (neo)liberal sources of power. Similarly, the crystallization of a co-opted state, powerful agribusiness, and the advent of biotechnology, is seen as threatening the potential for food sovereignty (Otero, 2012). The place of the nation-state has been a point of contention within food sovereignty activism, playing both the role of host to global industrial agriculture and an important actor for food sovereignty (see Declaration of Nyéléni, n.d.; Edelman, 2014). For example, Clark (2015, 183) uses the case of Ecuador, whose state has partially institutionalized food sovereignty, to argue the necessity of state sovereignty to alter “the neoliberal global food system.” In its application across countries and communities, common resistance to neoliberalism takes differing shapes (Alkon & Mares, 2012; Shilomboleni, 2017).

Seeds are a crucial element of food sovereignty, prioritizing the use of local seed varieties and the independence of seeds from the agribusiness system described above (Wittman, 2011). Indeed, “seed sovereignty” is a necessary component of food sovereignty (Kloppenborg, 2010). Local seed saving and exchange independent from commercial systems is often carried out through kinship networks and peasant organizations, but these mechanisms can be put at risk through unfavourable state policies (Bezner Kerr, 2013). While property rights systems that give privilege to commercial seed varieties are seen by many food sovereignty scholars as the antithesis to seed sovereignty, some advocates have attempted to strengthen collective rights over seeds by engaging in “open-source” systems of property rights (Kloppenborg, 2010).

This approach continues to place seeds at the centre of the movement but attempts to reposition state legal authority to serve its needs.

In the PRC, while the industrial food system has expanded, alternative and local food movements have developed across the country over the last decade. A small but growing number of alternative food networks (AFNs) have emerged, including community supported agriculture organizations and other locally based food production/distribution groups, building primarily on concerns over food safety and quality (Scott et al., 2014). These types of organizations represent a form of autonomous power in terms of civil society participation in organic and sustainable production methods apart from the PRC's mainstream industrial food system, though there is diversity in their motivations and their level of "alternativeness" to industrial food production (Si, 2015). This phenomenon is typically urban centred and consumer driven, which might limit the connection between these local food movements, peasant farmers, and ecological values (Si et al., 2015). Also, the emergence of rural cooperatives in China, closely related to the rise of AFNs, are critiqued for being incorporated into China's domestic commercial production system (Yan & Chen, 2015). Discourse related to "peasant" forms of farming associated with many food movements, once celebrated in the PRC, is now used in a disparaging context of backwardness (Schneider, 2014b). These political-economic fluctuations in China's food system point to a nascent, heterogeneous space for alternatives to agro-industrialization that might ally with the values espoused by food sovereignty. These 'local' dynamics help to provide a minimum of context for the possible diffusion of the global food sovereignty movement into China.



With these caveats in mind, AFNs in China can be considered key spaces of resistance to agro-industrialization, and potential partners in food sovereignty movements (Schumilas, 2014). Some scholars argue that China is still a country that has a unique continuation of peasant agriculture given the small scale of farms in the PRC (van der Ploeg & Ye, 2016b). Further, there is room for AFNs in China to create connections domestically and internationally in order to collaborate on issues such as food sovereignty (Si & Scott, 2015). However, it is not clear where food sovereignty fits into the dynamic and how it is defined in the context of the PRC. Though food sovereignty is often mentioned by scholars of Chinese agriculture, its meaning tends to shift with each use in its various contexts (see van der Ploeg and Ye 2016a). In fact, the last several years have seen a significant increase in the use and exploration of the term in Chinese language scholarship and practical applications. Liang (2014) notes that within China, the term food sovereignty was originally written as “grain sovereignty” (*Liángshí zhǔquán*, 粮食主权). This term was not used in the same manner as peasant organizations like La Via Campesina. Rather, the concept was used in the context of China’s accession to the WTO and the potential threat of higher grain prices, undermining national sovereignty. For Liang (2014), the issue was to re-frame the meaning of food sovereignty in China by introducing the work of the international peasant movement and encourage the adoption of its normative content.

Local food movements have also engaged with the concept of food sovereignty, influenced by La Via Campesina. Partly in response to creating a term that reflects the peasant-led meanings, the latest translation of food sovereignty in Chinese is the term “people’s food sovereignty” (*Rénmín shíwù zhǔquán*, 人民食物主权). Though La Via

Campešina is referenced in works written in Chinese, and communication exists between activists, the peasant network has no official presence within Mainland China. Food sovereignty activists have reiterated that in translating the term for use in China, the intent is to modify the concept to suit local needs.<sup>31</sup> One of the primary organizations promoting food sovereignty in Greater China is the People's Food Sovereignty Network (*Rénmín shíwù zhǔquán wǎng*, 人民食物主权网), which has worked with peasant and alternative food organizations for several years. As part of its motivation for networking with local peasant organizations in China, the People's Food Sovereignty Network highlights corporate control in global agribusiness and has shared translations of theoretical and practical works generated by the global food sovereignty movement, such as Vandana Shiva's *Stolen Harvest*.

Within Mainland China, the organization has also worked with others to actively oppose global agribusiness. For example, the organization reported that, "On May 23, 2015, the Chinese people joined [global protests] for the first time, along with people of the world who took to the streets against Monsanto's seed industry monopoly and the penetration of transgenic technologies, winning the support of millions of internet supporters" (People's Food Sovereignty Forum, 2016). This activity was part of the broader global demonstration organized in part by La Via Campešina, which has a stated objective to "[bring] together those struggling against Monsanto specifically and those challenging agribusiness in general...", in order to, "develop common goals and a shared vision with which we can transform our societies" (Via Campešina, 2012). Prominent food sovereignty scholars have also reached out to audiences within the PRC. In a widely

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<sup>31</sup> Author interview, Hong Kong, October 2015.

circulated Chinese language interview with Southern Reviews Magazine (*Nán fēng chuāng zázhi*, 南风窗杂志), Canada Research Chair in Human Rights, Social Justice and Food Sovereignty, Annette Desmarais, echoed these viewpoints to a readership in the PRC. When asked about the greatest challenge to reaching food sovereignty, Desmarais indicated that food sovereignty must rebel against those with the most power in the food system, including transnational corporations and the political elite of each country (Ye, 2013).

Other scholars and rural development specialists have taken on similar tones, arguing that a particular threat to food sovereignty is the introduction of GMOs that serve, “rich countries to continue to create wealth and create resources for multinational companies” (Zhou, 2011). As noted in Chapter 6, ChemChina’s acquisition of Syngenta was met with a domestic petition to the Ministry of Health (and formal investigation by SASAC) in opposition to the potential introduction of GM crops to mainland China (Collier, 2018). Likewise, as discussed in Chapter 5, Greenpeace China has conducted campaigns and investigations against the illegal planting of GM rice varieties and the potential for foreign ownership over inputs into GM rice seeds developed by domestic research institutions (Greenpeace & TWN, 2009). Broader negative public opinion remains an obstacle to the Party-state’s advocacy for acceptance of GM foods (Yan et al., 2016). However, the primary concern for the Party-state (and many activists) is the role of global agribusiness firms in controlling ownerships over seeds, and the ability for small farmers to retain access to seeds for planting.

Beyond GM seeds, food sovereignty advocates from the PRC argue that seed sovereignty is difficult to achieve as a result of drastically declined biodiversity given the

reach of commercial hybrid seeds (Zhang, 2014). In fact, organizations that work to build locally contained food systems are often stymied by the lack of traditional grain seed varieties available in the PRC.<sup>32</sup> This dearth of farmer-saved grain varieties, which accelerated in the 1970s and 1980s, makes it very difficult to pursue this direction to its fullest intent. One organization based in Beijing, Liang Shuming Rural Reconstruction Center (LRRC) (*Liángshùmíng xiāngcūn jiànshè zhōngxīn*, 梁漱溟乡村建设中心), has worked to remedy this issue by promoting food sovereignty and seed sovereignty. The LRRC is named after the prominent rural organizer of the 1930s focused on domestically resourced agricultural development, as discussed in Chapter 4. The organization specifically argues that the concept of “food grain security” must change to an understanding of food sovereignty, with seed sovereignty at its base (LRRC, 2015). Though partner organizations have had some success in promoting local seed exchanges throughout the country, the network is consistently faced with the need to articulate its objectives in the face of state promotion of commercial seed companies.<sup>33</sup> Rather than multinationals, it is typically domestically owned seed companies that are favoured by the state. The conflict between the Party-state promotion of a domestic commercial seed industry and AFN organizations in the PRC is illustrated below in the context of the new Seed Law.

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<sup>32</sup> Author interview, Hong Kong, October 2015.

<sup>33</sup> Author interview, Hong Kong, October 2015.

## 7.4. China's Seed Law and alternative food networks

Despite the rhetorical overlap related to opposing foreign agribusiness control, the ideational imperatives of each group begs for different solutions. One tangible arena in which these normative priorities have come up against each other is in the development of the PRC's new Seed Law. Beginning in 2011, the State Council proposed that the existing Seed Law be revised based on the Party-state's intention to develop a "modern crop seed industry", initiating a review and modification process for the next three years (Ye & Liu, 2014). The National People's Congress had several targets for the revision but focused on simplifying the introduction of new seed varieties to commercial markets (for certain crops) and strengthening property rights and registration regimes (CCM, 2015f). The initial drafting process of the revised Seed Law in 2013 was based on input from state institutions as well as seed companies and breeding stations (Chen, 2014). In 2014, the public consultation process began, involving wider input from research institutes, universities, seed companies, and localities (Ye & Liu, 2014).

With the momentum for the draft Seed Law focused on creating rules that were advantageous to the industrial seed system, some agribusiness actors and commercial breeders focused on extending the rules to farm-saved seed. As a representative in the National People's Congress, Li Denghai of Shandong-Denghai made several proposals for amendments including further restrictions on the use of seeds. More specifically, he proposed to revise PRC law to include prison terms for the unauthorized production or sale of protected varieties, and also, that "[w]hoever produce[s] seeds without license or not in accordance with the license or produce[s] and sell[s] seeds of protected varieties without authorization and cause[s] serious harm to society or seriously disrupt[s] the

market order shall be deemed as having committed the crime of illegal operation" (Seed China News, 2015, March). A prominent seed breeder also indicated that it was necessary for the Seed Law to strengthen intellectual property on grains like wheat in order "to incentivize research and industry development", given the continued practice of seed saving.<sup>34</sup> In other words, in the name of extending the sphere of the commercial seed system, some actors were attempting to have the Seed Law expand control over farm-saved seeds, closing the space available for alternative food movements to operate.

However, oppositional voices from the PRC's new AFNs also involved themselves in the consultation process. A group of organizations called the Farmer Seed Network (*Nóngmín zhǒngzǐ wǎngluò*, 农民种子网络) opposed the draft of the revised Seed Law during the public consultation period. Included among the organizations were three groups that work with AFNs, peasant farmers, and food sovereignty researchers: the LRRC, the Third World Network (TWN), and the Center for Chinese Agricultural Policy Research (*nóngyè zhèngcè yánjiū zhōngxīn*, 农业政策研究中心) at CAAS (Wugu Net, 2015). Each organization focuses on an aspect of farmer and peasant rights, and both the LRRC and the TWN were previously involved in food sovereignty and anti-GMO activities. The TWN, for example, co-authored the Greenpeace reports on GM rice seed. The organizations of the Farmer Seed Network made revising the draft Seed Law their primary short-term goal.<sup>35</sup>

The network focused their efforts on those sub-sections of the draft Seed Law that presented the greatest significance to local saved seed. Prior to the consultative

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<sup>34</sup> Interview, Beijing, December 2015.

<sup>35</sup> Interview, Hong Kong, October 2015; Interview, Beijing, December 2015

draft being circulated there was pressure from industry to eliminate the farm-saved section that appeared in the original Seed Law. Section 27 of the 2000 Seed Law had stated that,

The remainder of conventional seeds propagated by peasants themselves for their own use may be sold and exchanged at rural fairs without seed trading licenses, and measures in this respect shall be formulated by the people's governments of provinces, autonomous regions or municipalities directly under the Central Government. (NPC, 2004)

In late 2014, members of the network drafted their own consultation letter and proposed amendments for submission to the National People's Congress. The three groups of the Farmer Seed Network, and their affiliates, drew on each other's experience in cooperative plant breeding as well as legal and policy review to outline a position. The priority was to ensure that farmers in the PRC could continue to save their seed for self-planting, exchange, or sale.<sup>36</sup> Further, the groups held several information sessions and events with other NGOs and small farmers to discuss the Seed Law revisions and potential issues it presented (Wugu Net, 2015).

The overall changes to the Seed Law reflect a tension between Party-state control over the domestic seed market: encouraging commercial seed markets and maintaining local spaces. In terms of Party-state control the new Seed Law asserts that the state has "sovereignty over germplasm resources" (*Guójiā duì zhǒngzhí zīyuán xiǎngyǒu zhǔquán*, 国家对种质资源享有主权) and that any foreign germplasm cooperation must have state

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<sup>36</sup> Interview, Beijing, December 15

approval (NPC, 2015a, 2.11.). Further, in terms of the variety approval process, though the number of varieties that require a more stringent approval process was reduced from 28 to 5 crops - rice, wheat, corn, cotton and soybean - all remain under strict regulation (CCM, 2015f). In terms of maintaining local spaces, the concerns of the Seed Network were well founded. Prior to the adoption of the new Seed Law, additional amendments were introduced by agribusiness-friendly representatives in an attempt to significantly diminish the ability for farmers to save and exchange seed (NPC, 2015b). These attempted amendments did not reach the final text of the new Seed Law, and the wording largely retained the language promoted by the Farmer Seed Network groups that permitted local seed exchange. However a modification was made to the previous Seed Law, where the new text's section 37 (section 27 of the old Seed Law), now states that,

Farmers' own surplus conventional seeds for their own use can be sold and exchanged in **local** bazaars, and no seed production and operation license is required. (NPC, 2015a; emphasis added)

The significant change that was made was to add the word "local" (*Dāngdì*, 当地) and remove sub-national jurisdiction for formulating respective administrative measures (NPC, 2015b). However, as the TWN indicates, "local" is not defined and may be difficult to enforce (Zhu, 2016).

This struggle over the rules governing farm-saved seed is an example of the power of ideational autonomy, and the mobilization of norms through networks. The new AFNs that have emerged within the PRC, from urban centres to rural areas, have



established autonomous food and agricultural practices beyond the reach of the domestic industrial food system. Through a common commitment to goals outside of the Party-state's promotion of national seed industry, these organizations have developed networks and are capable of mobilizing these goals to influence the formulation of rules that govern the domestic seed industry.

## **7.5. Discussion and conclusion**

In China, discourses related to food sovereignty take on distinct characteristics where the language of state and business actors mirror key aspects of language associated with local and peasant food movements. Within the broader literature on global agribusiness and local food alternatives, there is a focus on issues of corporate power and the often complacent or facilitative role of the state. The sections above point to an overlap in language used by each camp, in addition to a common line of argumentation: the need to protect national agriculture from the power of foreign-owned global agribusiness. This overlap reveals a distinct dynamic found in the interaction between state and corporate actors within the PRC, and potential Chinese partners for the global food sovereignty movement. Where many critical scholars argue that states are often captured by norms of economic globalization in the agribusiness sector, in part through the power of MNCs, the PRC presents a different case in some important respects. For the PRC, the Party-state's priorities come before agribusiness actors.

Both state-corporate and AFNs summon very similar facts regarding global agribusiness concentration, putting them to use as a call to attention for audiences within the PRC. It is interesting to note that some Party-state actors actually draw the

work of food sovereignty activists to support their claims regarding corporate concentration. For example, state and academic commentators in support of domestic industry often use data on agribusiness concentration from the ETC group, an organization that favours peasant agriculture. The common reference point of global agribusiness concentration as a rallying cry for their respective causes creates a point of similarity between both groups in the PRC, a similarity that does not commonly exist. At least on the surface of the argument, each group is pointing to the need to overcome the structural influence of the major seed companies in order to avoid dependence on the technologies they promote and intellectual property that comes with it.

Meanwhile there are terms that complicate the differentiation between each group. The common referents of food security (understood as food grain security) and food sovereignty are imbued with ties to the national security and national economic development (Boland, 2000). Some supporters of food sovereignty in China use the government's language of food grain security as a means to appeal to government sensibilities. Liang (2014, 50) writes that,

Our government has a full understanding of the importance of food sovereignty for food security, and has repeatedly stressed that the Chinese people's rice bowls should be firmly held in their own hands at all times; our rice bowls should be mainly loaded with Chinese food. This is certainly the idea of food sovereignty, the idea of Chinese-style food sovereignty.

In this appeal, advocates have an avenue to communicate their goals in an atmosphere where state priority of national food security and self-reliance in terms of ownership over food grain production has an overlap with the localized and independent language

of food sovereignty. Similarly, others, referencing La Via Campesina, argue that food sovereignty in China means moving to a perspective of national security that takes into account both global dynamics and local sustainability (Zhou, Pan, & Dong, 2012). In essence, there is an attempt by food sovereignty activists and scholars within the PRC to use the common frame of reference regarding independence from foreign control while employing similar state-centric terms with the goal of promoting their own end-vision of sustainable food systems.

What is crucially at odds in harmonizing the Party-state view of national food and seed security with that of People's Food Sovereignty is that the dominant norms of the former are predicated on the continued development of a nationally based commercial seed industry. As seen in the development of securitized foodways, the Party-state seeks to address the issue of corporate concentration by developing an independently (nationally) owned domestic seed industry that can compete with global MNCs both at home and abroad. Though China's domestic seed market remains fractured, the replacement of conventional farmer-saved seed varieties with hybrid corn and rice varieties in an effort to build this commercial sector is already widespread. The prominence of commercial grain seed makes it much more difficult to move forward with the seed sovereignty that underlies food sovereignty. However, the discursive dependence of the Party-state on agriculture, despite recent negativity towards the peasantry (Schneider, 2014b), still lends legitimacy to arguments for continued and renewed independent forms of production. This struggle over the meaning of food sovereignty, and ultimately the mechanisms of choice for self-reliance, is emblematic of

a potential internal challenge to the ideational power of the Party-state's national food security norms.

The example of the new Seed Law points to this struggle. While the Seed Law is generally focused on creating the rules that govern the domestic commercial seed market, the Party-state set parameters that exert national control and limit foreign acquisition of germplasm resources. Further, despite the attempts of prominent representatives of the commercial seed industry to extend the depth of commodified seeds, AFNs were able to make a successful normative case to retain space for peasant seed exchange outside of the commercial system. The inherent contradiction in this dynamic is that the Party-state is at once seeking to develop a domestic seed industry that competes commercially with foreign agribusiness, while simultaneously limiting foreign interaction on one hand, and preserving non-commercial (peasant) space on the other. Though the state-centric debates of the securitization of food are long standing, the contemporary parameters in the PRC have the potential to further evolve with the introduction of global activist discourses and local food movements. The term People's Food Sovereignty is a re-appropriation of the term food sovereignty in the context of long-standing state policy that discursively reinforces the need to be self-sufficient in production, despite recent changes. It destabilizes the focus of the nation-state's "sovereignty" to highlight sovereignty in food systems at a lower scale of organization, while piggybacking on the concerns reflected in Party-state policy.

Within this ideational struggle there are both opportunities and constraints. Space for alternatives exists in the PRC and is articulated in a way that is not often found in other places. The space allows an element of legitimacy to local food movements who

can frame their activities as aligning with state policy. However, while the overlap provides opportunity to express food sovereignty in the language of the state, it also acts as a constraint in the opposite direction; this close association with national food security is a double-edged sword. Food sovereignty is problematic given the term's frequent usage to reflect the need to protect the economic nation (see Tong, 2015). The global orientation of many state/industry actors in China displays a priority to compete internationally, rather than scale-up alternative local food systems (see Si & Scott, 2015). In other words, while food sovereignty movements seek to offer local solutions that address the problems associated with industrial food systems, the Party-state holds these goals as subservient to the need to develop national agribusiness players that can both serve domestic needs and navigate global markets.

In many ways, these opportunities and constraints are distinct to China. A significant difference in the PRC is that multinational agribusiness control is much less strong, and the state is active in articulating an element of autonomy from flows of global agricultural capital. The PRC's policy of national food security presents a barrier to food sovereignty, though one that offers a modicum of legitimacy for local alternatives. Rather than adopting a strictly neoliberal vision of food security by promoting unrestricted economic integration, the PRC is differentiated by the promotion of domestic industry over global (foreign owned) agribusiness through securitized foodways.

# Chapter 8. The Future of China in the Global Food System

## 8.1. China's securitized foodways

### *8.1.1. The PRC's grain seed market and the global food system*

What explains the low concentration of the dominant agribusiness multinationals in the PRC's commercial grain seed market? The contemporary place of the PRC in the global food system began on the fringes of the U.S. food regime. Republican China had strong agricultural partnerships with the U.S. agricultural actors that became leading proponents of the green revolution. However, rather than following the path of the U.S.-led green revolution and food aid architecture in the mid-20<sup>th</sup> century, the Party-state of the PRC developed a distinct conception of national food security based in self-reliance outside of U.S. ambit.

At the time, national food security was to be achieved through self-sufficiency in both grain production and seed breeding technologies. Despite U.S. efforts to gain access to agricultural markets in developing countries in the post-war period, the Party-state was able to exercise negative power by “go[ing] it alone” rather than establishing connections to the food regime of the period. Self-reliance under Mao was reached through a focus largely on the use of within-country resources in the context of a U.S. embargo. This included, at first, seed varieties left by agricultural exchanges with the U.S. and Europe, and later transformed to a more insular focus on domestic germplasm and breeding programs. In both cases, the pursuit of self-reliance through self-

sufficiency in production, agricultural inputs, and capital, created a divorce from the developing agricultural networks of the U.S. food regime in terms of food aid, technologies of the green revolution, and development finance. This path created the conditions for the development of a domestic seed breeding and extension system, initially autonomous from the developing structural power of the U.S. state and agribusinesses.

This historical experience would go on to shape the current structure of the commercial grain seed market in China. Alongside the U.S. food regime, the PRC's negative power in the global food system translated to an immense structural power within its own borders. As the corporate food regime unfolded, beginning in the 1980s, the PRC's diffuse domestic extension system transformed into thousands of commercial seed companies. The Party-state's emphasis on national food security remained, but the mechanisms to achieve self-reliance shifted. Foreign germplasm and international agribusiness investment were gradually permitted, but tightly controlled by domestic rules governing investment, the diffusion of foreign technology, and access to the loose network of domestic seed companies. As a result, the PRC's home-grown seed industry expanded mostly in the absence of agribusiness MNCs. Self-reliance in grain seed varieties was maintained through rules governing the domestic economy, made possible by the disconnection from the previous U.S.-led food regime. The exercise of negative power during the U.S. food regime led to the creation of a significantly different industry structure in the PRC vis-à-vis the global seed industry.

Within China, state-owned and private seed business multiplied in the 1980s and 1990s, building on the seed research and extension networks of the Mao era, and

developing newfound agribusiness enterprises. Though the number of seed enterprises expanded to over 10,000 after the turn of 21<sup>st</sup> century, recent consolidation has left the seed industry with 5,000 seed companies at the local, provincial, and national level. Several dozen are leading consolidation as mandated by government policy, with a handful of top firms partnered in majority-owned joint ventures with global agribusiness MNCs. The Party-state maintains control over these MNCs through restrictions on joint venture shares, on the type of technology eligible for investment, and on the type of technologies allowed in the grain market. National food security through self-reliance no longer includes strict separation from foreign technologies and investment; domestically, it focuses on industry development and the ability for national firms to control and compete with MNCs.

### ***8.1.2. Securitized foodways and its challenges***

What is the relationship between the PRC's grain seed industry structure and the overall place of China in the global food system? Over time, the Party-state's power shifted from negative to positive forms in the context of its interaction with powerful state and corporate actors in the global food system. Within this shift, the core of the Party-state's normative focus on national food grain security remained constant. However, the mechanisms to retain self-reliance changed over time. Currently self-reliance is pursued through expanded Party-state ownership of increasingly integrated domestic and international agribusiness networks. The Party-state's true imperative, beyond maintaining domestic grain production, is to retain national authority over its sources of grain, whether inside China or abroad.



The structure of the domestic grain seed industry, and the pursuit of self-reliance, is intimately related to global food system dynamics. There are two important connections: competition with concentrated global agribusiness MNCs on world markets and increased reliance on grain imports. Given that agribusiness from the PRC is faced with a degree of MNC competition on domestic markets, the Party-state seeks to ensure that its own companies can compete, not just domestically, but internationally as well. As a result, various grain seed companies have expanded abroad, particularly in South and Southeast Asia as well as SSA. Companies like LPHT and Chongqing Seed Company, among many others, have an increasingly significant presence abroad and are extending their domestically developed seed varieties. Examples of these regional footprints were shown in Figures 6.2 and 6.3. Further, the Party-state has acquired multinational seed companies, including Syngenta and others, offering not only foreign market presence and resource networks (see Figure 6.5), but also germplasm resources and technology that may be used to compete in home markets.

In terms of grain imports, the volume of soy and corn imported to the PRC rapidly increased around the turn of the 21<sup>st</sup> century. At the time, the imported soy and corn were principally derived from the seeds of major agribusiness MNCs, sourced from only a few countries, and handled by the trade/processing networks of the ABCD firms. Though the PRC's self-reliance was threatened by dependence on global agribusiness and foreign states, the country's position as a significant importer offered a first glimpse of structural power through influencing supply chains and business practices, as seen in the case of Agrisure Viptera corn rejections. The domestic change regarding import requirements ushered a reframing of outward self-reliance, embodied by COFCO's

purchase of Noble and Nidera to expand its network of trade infrastructure (see also Zhang, 2018). As COFCO itself stated, these investments secure “stable food corridors” for grain to enter the PRC (COFCO, 2017). Combined, the international focus on seed and grain trade businesses are evidence of a shift in the concept of national food security through self-reliance to a focus on authority over the wider supply chain, specifically seed and trade, as a supplement for domestic production. The purchase of global agribusiness firms and foreign extension of domestic seed companies reflects a newly formed positive power in the global food system.

While it is clear that the Party-state has developed positive power in agricultural markets, it has not usurped the dominant global food system nor has it facilitated the emergence of alternative food systems. Also, it is not a certainty that the Party-state will maintain control over the networks that national agribusinesses have developed, or that these networks will advance its structural power. Central to the power dynamics between the PRC and the dominant global food system is property rights and agribusiness concentration in the context of GM crops, particularly rice, corn, and soy. Given the level of state and corporate investment in GM crops in the PRC, it is clear that the Party-state intends to pursue commercial planting of GM grains. However, the lens of securitized foodways helps to assess the parameters of this pursuit. The Party-state will only open domestic commercial planting when it is certain that: 1) it can control the rules of planting GM crops within its domestic agricultural system; and 2) the vast majority of planted GM grain seeds can be produced by domestically owned agribusinesses primarily using germplasm and genetic traits that are owned by domestic actors. In the meantime, imported GM soy (and corn) will largely be sourced

from the global networks established by State-owned agribusinesses: Syngenta and Longping Hi-Tech will sell seed and the grain will be imported increasingly by COFCO.

The Party-state faces significant obstacles to developing a controlled domestic GM grain seed market. Already, domestically engineered GM rice seed has been planted illegally and its harvests sold at retail. This rice potentially contains patented traits owned outside of the PRC, increasing the risk of a lawsuit from foreign MNCs once commercialized. Foreign owned global agribusinesses have also become even more concentrated over the last years, with the primary holders of commercial GM grain patents consolidating into two enormous firms: Monsanto-Bayer and Dow-DuPont. Upon commercialization, the competition for control over the PRC's GM seed market would increase significantly. The expiry of GM soy and corn patents will allow for domestic seed companies to produce generic varieties for sale on the domestic market, but the issue remains for newer patents and for GM rice.

It is unclear as to whether Party-state actors can use current mechanisms to continue to control the domestic grain seed market (see also Kerr, 2007). When it comes to the regional dispersion of seed approvals within China, the current strategy is mixed. For corn and rice seed, it is possible for the PRC to segment foreign GM seed joint ventures by region given that production of these grains is scattered throughout many provinces and in different parts of the country. However, the situation is rather different for soybean, as only two provincial level areas (Heilongjiang and Inner Mongolia) are responsible for more than 50% of national acreage planted to the crop (see Appendix II). As a result, any entry of foreign-owned GM soy would be narrowly focused in concentrated production areas. Further, the interests of national firms focused on

agricultural biotechnology versus those focused on non-GM varieties diverge on this issue, as do the opinions of different state and civil society advocates. Nevertheless, Party-state policy continues to focus on the eventual adoption of GM grain seeds.

Given the global concentration in patents over GM grain seed products, existing joint ventures in the PRC's grain seed market are of particular importance. Dow-DuPont Pioneer's existing minority partnerships with Shandong Denghai and Gansu Dunhuang provide key paths into the PRC's corn seed market in eastern and central China. However, like the delay to approve Syngenta's MIR162 trait for import, the government will likely retain control over the domestic commercial planting approval processes. Authority over these rules could allow preferential approval if the Party-state perceives a risk that market share is entering the hands of foreign-owned agribusiness. Similar questions exist for Monsanto and Bayer's joint ventures, particularly given Monsanto's partnership with CNSGC. With CNSGC's parent company, Sinochem, now the de facto owner of Syngenta, there are conflicting interests in terms of managing the domestic market.

The acquisition of Syngenta and the foreign expansion of agribusiness from China have extended the geographic area planted to seed owned by actors from China. Syngenta comes with intellectual property rights over GM grain seeds currently planted in many countries outside of the PRC, and potentially within the country if Party-state policy shifts to allow commercial planting. Similarly, national agribusiness companies, both biotech and not, have sought to expand presence in foreign markets in an effort to gain a competitive edge. In doing so, the Party-state and seed companies are adopting a remarkably similar approach to the U.S.-led extension of seeds under the green

revolution, an event escaped by China at the time (Brautigam, 1998). This principle holds for grain trade and processing as well, where Noble and Nidera now provide COFCO with access to markets and trade networks across the globe. However, despite this rapid expansion, PRC-owned networks of seed companies and grain traders remain small in comparison to the largest agribusiness MNCs.

There are additional factors that challenge the PRC's pursuit of securitized foodways. More specifically, domestic movements promoting alternative food systems have grown within China. National food security, along with rural development, is a priority of the Party-state. The oppositional discourse of state and corporate actors in the PRC towards global market concentration and foreign MNCs allows for some common targets with both local activists and food sovereignty advocates. Though the Party-state's national food security priority takes precedence within the PRC's domestic grain seed markets, there remain spaces with a degree of independence from commercial seed markets and industrial production methods.

However there are limits to this space given differences in prescription between national food security and people's food sovereignty. Where Liang (2014) points to the government's statements that the "the Chinese people's rice bowls should be firmly held in their own hand at all times" and mostly with Chinese food, the Party-state has slowly begun to redefine the meaning of holding the bowl in one's own hands. In this case a bowl of noodles is a more apropos metaphor. Whereas the edge of the bowl used to be national borders, the noodles have now spilled beyond borders to stretch across the globe.

### ***8.1.3. Insights for critical food studies, GPE, and AFNs***

What insight does the concept of securitized foodways provide for scholars of critical food studies and GPE? Currently, critical food studies scholars have described the contemporary PRC's food system engagement as mercantilist (Belesky & Lawrence, 2018; McMichael, 2013) and a form of state-capitalism (Belesky & Lawrence, 2018; Schneider, 2017). Further, scholars have pointed to the primarily domestic networks of Chinese agribusiness (Schneider, 2017). This work provides excellent analysis of the material relationship between the Party-state and agribusiness both within China and abroad.

However, food regimes' underlying explanation as to why Party-state policy has directed material resources to these ends is implicitly rooted in the logic of capitalist expansion rather than in the subjective self-interest of the CPC. Though the food regime heuristic specifically accounts for geopolitical configurations, the underlying motivation of the states and other actors at the centre of these configurations tend to fly under the radar. This is an important shortcoming in the context of China given the country's long history of state security concerns with respect to grain, and the long rule (and memory) of the CPC. Scholars from international relations and GPE regularly point to the importance of normative food security drivers that shape the Party-state's actions (McBeath & McBeath, 2010; Wong & Huang, 2012; Zha & Zhang, 2013). However, these scholars often employ a narrow conceptualization of Party-state food security, focusing solely on production rather than on entire supply chain. An exception is Zhang (2018), who places significant emphasis on the Party-state's recent national food security

priorities in a global context. The study of food regimes could benefit substantially by taking these normative drivers further into account.

Scholarship that seeks to understand or explain China's place in the global food system must account for important historical and normative differences that distinguish the PRC from traditionally dominant actors in the global food system. The PRC did not simply encounter the global food system free of context and history. Rather, the country has interacted with previous configurations of the global food system, and these interactions have shaped the normative priorities of the Party-state over time. The CPC as an institution observed food regime dynamics since the beginning of the second food regime. This begs scholars to assess the ideas and principles that drive the Party-state's engagement in the global political economy, their relationship to the material and ideational structures of the global food system, and the impact on food system alternatives.

Similarly, recent framing of the PRC's place in the global food system in terms of land grabs is much too narrow a focus in terms of the PRC's relationship to land and production. While land grabs remain part of the story, the PRC's off-land investments have far broader impact on the planting choices and land management practices available to farmers across the world. In the same vein, many recorded land grabs include test sites for hybrid seed development in the host country. In some cases the intent may be to build large-scale production farms, but as seen in Chapter 6 many cases will likely aim to diffuse domestic technology in order to build markets in the seed industries of Southern countries. The expansion of the PRC's grain trade infrastructure also establishes a more direct connection between a large number of farmers and

businesses controlled by the Party-state. These relationships may not be best investigated using the lens of land grabs, but will create similar power relationships with peasants and farmers that come in contact with these dynamics (Hall, Hirsch, & Li, 2011).

The study of alternative food movements both within China and globally is also implicated in China's food grain security. Whereas Zhang (2018) is optimistic that the PRC is making links between a reconfigured corporate food regime and a food sovereignty movement, I argue that the overlap in goals between the PRC and food sovereignty advocates is largely limited to shared foreign opposition (Gaudreau, 2018). The creation of a domestic grain seed market has largely conflicted with food sovereignty principles, relying on chemical inputs and the wide extension of hybrid seeds. Farmers interested in using saved grain seed often have difficulty accessing traditional varieties due to the long-term saturation of commercial seeds. However, the overlap in goals does provide China's AFNs with space to operate, despite industry pressures to further limit AFN activities like seed saving. Given that the study of AFNs in the PRC is interested in "scaling-up" the activities of alternative food movements (Si & Scott, 2015), the concept of securitized foodways helps to establish the parameters within which AFNs must operate in China. The insights of securitized foodways can also help AFNs to articulate alternative food systems strategically and map the agribusiness landscape that AFNs must navigate.

More generally, the emergence of China in the global food system has triggered significant change in the structure of global grain markets. A large Southern state now has significant global reach largely built on a domestic market relatively independent of



ownership by agribusiness MNCs. A new food regime is in development, though not yet fully formed. Given that previous food regimes have a significant relationship to U.S. agriculture, it is important to recall that the PRC's place in the contemporary food regime involves resistance to U.S. ownership and a small extension into U.S. seed and grain trade. While this dynamic in the U.S. market represents a significant change from one or two decades ago (let alone 40 years ago) it is by no means a complete retraction of U.S. agrifood power.

Nevertheless, securitized foodways provides an example of how power dynamics can change in the global political economy, and the global food system more specifically. Negative power proves to be a key concept to account for change. Power frameworks are often most interested in the powerful, those who can exercise influence and shape capacities to act. For example in food regimes, change is to occur based on the internal contradictions among the powerful food regime actors and not through external force (McMichael, 2005). In contrast, the inclusion of negative power via autonomy provides analytical space to account for those that the powerful cannot reach. In the PRC, this negative power vis-à-vis U.S. state and corporate actors was employed for decades, allowing for distance between food regimes and the PRC's domestic system. In other words, the roots of change can be found at the limits of positive power rather than in their contradictions. This concept is equally useful for advocates of alternative food systems, which often seek space to escape the encroachment of powerful industrial agribusiness.

However, negative power alone is not sufficient to affect the power dynamics of the dominant global food system. In sum, three factors contribute to the PRC's current place

in the global food system: the Party-state's long-standing normative priority regarding self-reliance and national grain security, the historical autonomy of the PRC from the U.S. and early corporate food regimes, and the more recent exercise of material power through the expansion of domestically owned agrifood networks within China and abroad.

## **8.2. Securitized foodways and trajectories of the global food system**

What is the future for China's securitized foodways? The Party-state's principle of self-reliance through ownership and control of the grain and grain seed market actors has endured for more than half a century. Though this control is not absolute, the normative priority is clear. As such, it is reasonable to assume that this principle will apply in the foreseeable future, and that it will guide the actions of the Party-state in both domestic and international markets.

As consolidation among foreign-owned seed and grain trade companies continues, the perceived threat to the PRC's national food security will remain. Future trajectories will likely see Chinese seed companies continue overseas expansion and acquisition, particularly in key crops where domestic firms may not be able to compete with Bayer-Monsanto and Dow-DuPont. In terms of grain trade, COFCO will likely continue the acquisition of grain trade infrastructure to serve both PRC and global markets. Some of this infrastructure will likely be in traditional exporting countries like Argentina, Brazil, and possibly the U.S. However, given recent focus on seed extension in Africa, South/Southeast Asia, there will likely be further investment in key grain

procurement ports for example in rice exporting countries in South and South East Asia. Further, Ukraine will likely be a continued source of corn, soy, and potentially other grains.

With increased interaction between still-dominant global agribusiness and PRC-owned agribusiness, there is also the potential for further conflict between firms. The potential for Syngenta to receive preferential treatment in terms of approval for grain imports, domestic investment regulations, and for commercial planting approvals stands out as a potential fault line, as expressed by Chuck Grassley. Further, if COFCO begins to handle a significant share of grain destined for the PRC, this would increase competition between grain traders headquartered in the U.S., Europe, and Japan. For example, Hall argues that Japanese grain traders are explicitly serving the Chinese market in order to remain competitive and able to supply Japan (Hall, forthcoming). If the Chinese market is to be served mostly by Chinese-owned agribusiness, the gamble on economies of scale may falter. However, unlike rules regarding foreign investment in the grain seed industry, the Party-state has not publicly established a target threshold in terms of overseas market control that would satisfy its security concerns in the global grain seed and trade sectors.

Currently, the PRC's structural power is limited given its minority position in global agribusiness and infrastructure networks, and its limited role in creating international trade rules as they pertain to agriculture. However, the PRC remains a key importer, allowing the Party-state to shape some informal rules in relation to the markets that serve its import demand. As also noted by Zhang (2018), the Party-state is seeking to increase future engagement in shaping formal rules through international

institutions. This has certainly begun at the regional level through initiating or participating in multilateral initiatives such as the Asian Infrastructure Bank and the ASEAN +3's Emergency Rice Reserve System. Similarly, the PRC's agricultural demonstration centres in SSA and SEA may result in deeper connections in the regions. These initiatives, however, are still young.

In the near future, if the Party-state expands its structural power over the networks and rules of the global food system, it has the potential to create a unique food regime shaped on elements of the U.S. and corporate food regimes. A PRC food regime would be constructed on the Party-state's national food security priority and characterized by the export of domestically owned (and developed) grain seed technology and the *import* of world grain through domestically owned channels. This configuration would closely resemble the U.S. food-regime, though resolving its central conflict between the export of technology and grain. It would also resemble the corporate food regime in its reliance on a trade and investment enabled global governance architecture and widespread agribusiness networks.

### **8.3. Future research**

The subject matter and corresponding arguments of this thesis are broad by design. Similarly, this thesis is designed to open doors for a broad research agenda related to the PRC's place in the global food system and the global political economy. Having explained why China's grain seed sector is so different and how this difference has been maintained and expanded abroad, an emerging area of research is opened wider. Scholars of critical food studies, GPE, and political power can see China's nascent

transnational grain and seed industry as a new terrain in the study of global food and economic systems. The research agenda includes, but is not limited, to the following subjects.

- **China's interaction with previous food regimes:** while this dissertation focused on grain and began in the second food regime, empirical study of China's place in the first food regime is particularly intriguing. As mentioned in Chapter 2, Imperial and early Republican China interacted with the dynamics of the first food regime in surprising ways. However, much more can be done to understand how the Qing Dynasty understood the relationship between the United States and Britain, as well as its own relationship to British agrifood power. This type of study can be linked in to additional research, along with this dissertation, to establish links and breaks in Greater China's interaction with the global food system over time.
- **Case studies or case comparisons of specific businesses or sets of business from the PRC:** concentrated studies on specific agribusiness actors from the PRC can better examine and test their activities and networks in terms of foreign and domestic grain seed extension, normative commitment to the Party-state and national food security, and their historical development in the context of the domestic political economy. Such studies would also allow for closer examination of bureaucratic politics regarding the relationship between agribusinesses and specific Party-state entities. Agribusinesses that might be targeted for such study include: LPHT, COFCO, Sinochem/ChemChina, CNGSC, Shandong Denghai, and Origin Agritech. This type of research has already begun, but the landscape is vast.

- **Negative power and change:** given that most power frameworks seek to explain the actions of the powerful, they do not account for negative forms of power (for an exception, see Cohen & Chiu, 2013). However, negative power, or conscious autonomy from the powerful, is a key concept to theorize changes in power dynamics. On one hand, this concept and its application in the context of food politics will be of interest to scholars of GPE seeking to interpret the place of not only the PRC but also other emerging powers. While it may not contribute to an explanation in all cases, its applicability is worth examining to account for shifting global power structures. On the other hand, the concept may be useful on a lower scale for critical food studies scholars and alternative food movements seeking to change power dynamics in the face of powerful actors.
- **China's AFNs and the industrial food system:** on the topic of AFNs in the PRC, current research has concentrated on establishing the existence, practices, and motivations of these organizations. However, the expansive industrial grain seed system and supporting state policies in the PRC might constrain the expansion of AFNs into key grain crops. As such, determining the intersection between China's alternative food systems and China's industrial food system, particularly in the seed sector, is an area of research that may provide insights into both limitations and opportunities for AFNs to scale-up.
- **China's place in global food governance:** as mentioned above, the PRC has engaged regional institutions to establish food and grain related organizations and rules. Other scholars have already begun to examine the PRC in global food and trade governance institutions (Falkner, 2006; Hopewell, 2016; Trethewie, 2013).

However a more concentrated focus on in the PRC's involvement in upholding or changing global food governance institutions would be fruitful. Such studies could focus on current activities in GMO governance, in formal institutions, private governance arrangements, and informal rules related to product launch and approval processes.

The topics mentioned above are by no means an exhaustive list and scholars across the globe have already begun to undertake these tasks. However, too often the research is occurring with a specific disciplinary focus in mind, and the studies that exist speak at cross-purposes. In developing a research agenda, it is my hope that a broader discussion is stimulated, bringing together a range of perspectives and expertise to better situate the changing place of China in the global food system. Further, in carrying out this research agenda it is important for (inter)disciplinary scholars embedded in academic communities outside of Asia to collaborate with colleagues and researchers specialized in Chinese area studies, as well scholars based in Greater China and in Asia more broadly.

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# Appendix I

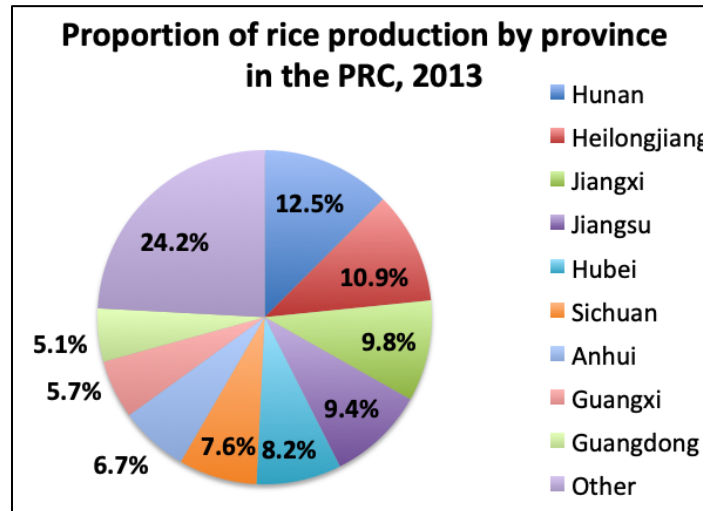
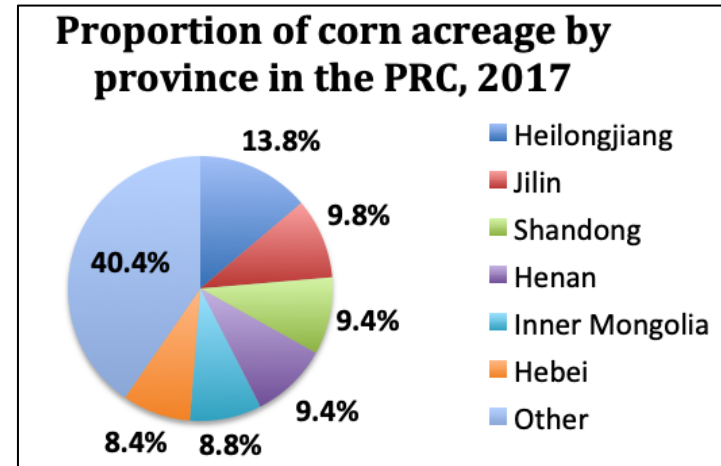
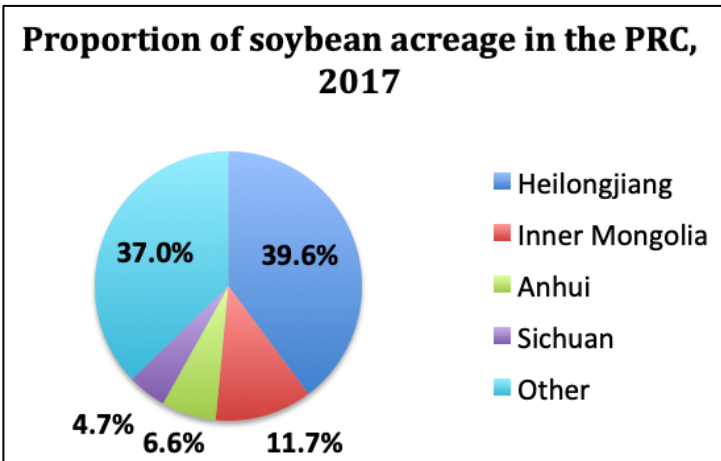
## Major Grain Seed Companies of the PRC

Company	Primary grain seed type	Company type focus	SOE/ Private	Ownership / Largest shareholder	Source
*Agria Shenzhen / 中冠农业	Corn	Private Research	*Private (unlisted)	Li Juan (95%) Lai Fulin (5%)	Agria Corporation (2015)
Beidahuang Kenfeng Seed/ 北大荒垦丰种业	Corn Rice	Licensed Seed Foreign Partnership	SOE (unlisted)	Heilongjiang Beidahuang Nongken Group Co., Ltd. (47.26%)	CCM (2017)
Beijing Dabeinong Technology / 北京大北农科技	Corn	Private Research Licensed Seed	Private (listed)	Shao Genhuo (42.44%)	TEJ (2017a)
*Beijing Origin / 北京奥瑞金	Corn Rice Canola	Private Research Licensed Seed	Private (*unlisted)	Han Gengchen (34.4%) Yang Yasheng (28.68%) Yuan Liang (25.8%)	Origin Agritech (2013)
China National Seed Group / 中国种子集团	Corn Rice	Licensed seed Foreign Partnership	SOE (unlisted)	Sinochem (100%)	CCM (2015c)
Gansu Dunhuang / 甘肃敦煌	Corn	Private Research Foreign Partnership	SOE (listed)	Jiouquan District Modern Agricultural (Holding Group) Company (12.92%)	TEJ (2017b)
Grand Agriseeds Technology / 海南神农大丰种业科技	Rice	Private Research Licensed Seed	Private (listed)	Huang Peijing (17.72%)	TEJ (2015)
Guangdong Golden Rice Seeds / 广东省金稻种业有限公司	Rice	Licensed seed	SOE (unlisted)	CNSGC (Sinochem) (majority) Rice Institute of Guangdong Academy of Agriculture Science (minority)	CCM (2015c)
Hefei Fengle / 合肥丰乐种业	Rice	Licensed Seed Private Research	SOE (listed)	Hefei Construction Investment and Holding Co., Ltd (34.11%)	TEJ (2017c)
Heilongjiang Longke Seed /	Corn	Licensed seed	Private	Beijing Dabeinong (majority)	Liu (2018)

黑龙江省龙科种业	Soy Rice Wheat		(unlisted)		TEJ (2017a)
Hunan Dongting Hi-Tech Seed / 湖南洞庭高科种业	Rice	Licensed seed Private research	SOE (unlisted)	CNSGC (Sinochem) (majority) Yueyang Agriculture Institute (minority)	CCM (2015c)
Liaoning Dongya Seed / 辽宁东亚种子	Corn	Private research	Private	N/A	CCM (2015c)
Longping High-Tech Agriculture / 隆平高科	Rice Corn	Private Research Licensed seed Foreign Partnership	SOE (listed)	CITIC (15.43%) Hunan Xindaxin (11.49%) Hunan Hybrid Rice Research Center (5.32%)	TEJ (2017h)
Shandong Denghai / 山东登海	Corn	Private Research Foreign Partnership	SOE (listed)	Laizhou Agricultural Science Institute (53.2%)	TEJ (2017g)
Sichuan Ludan Seed / 四川省绿丹种业	Rice Corn Wheat	Foreign Partnership Licensed Seed	N/A	N/A	N/A
Wanxiang Doneed Seed / 万向德农	Corn	Private Research Licensed Seed	Private (listed)	Wanxiang Sannong Group (48.76%)	TEJ (2017d)
Winall Hi-Tech Seed / 安徽荃银高科种业	Corn Wheat Rice	Private Research Licensed Seed	Private (listed)	Zhang Qin (10.73%) Jia Guilan (9.41%) Beijing Dabeinong (7.51%)	TEJ (2017e)
Zhongnongfa Seed Industry Group / 中农发种业集团	Wheat Corn	Private research Licensed Seed	SOE (listed)	China National Agricultural Development Group (37.7%)	TEJ (2017f)

\*Beijing Origin and Agria Shenzhen have unique ownership arrangements, designed to allow for engagement in foreign ownership and stock exchange listing abroad (NASDAQ and NYSE, respectively). Neither company is listed on Chinese stock exchanges.

# Appendix II



Source: Statista.com