

A Historical Consideration of Seed Saving and Suggestions for Future Seed Savers

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Abstract

Seed saving, whether performed by subsistence farmers, by breeders at land grant universities, or the seed industry, provide the world's farmers with the needed supply of seeds to produce food crops annually. This thesis considers historical agricultural trends as they relate to the process of seed saving. It utilizes information gathered from primary source materials, historical monographs, and FAO and NGO publications. Chapter two discusses six universal agricultural dichotomies and how they relate to seed saving over time and globally. The dichotomies examined as they relate to seed saving include: subsistence and commercial, commons and commodity, public and private, basic and applied, global north and south, and urban and rural food production. Subsistence and commons oriented agricultural systems have historically traveled towards commercial and commodity forms in developed countries like the United States. As a result, seed saving moved from something farmers did to either public or private institutions that performed basic and applied research for genetic improvement of agricultural crops. As breeding programs looked outward for better breeding materials (germplasm) the importance of the Global North and South and Urban and Rural locales became important. Based on the results of this examination, it is clear that prioritizing subsistence practices and understanding seeds as a commonly held resource play important roles in maintaining agricultural diversity, particularly for more commercialized and commodity oriented agricultures. This shift from subsistence to commercial agriculture in the Global South jeopardizes subsistence agriculture's ability to maintain agricultural diversity. Chapter three utilized a case study framework and focused on American seed saving within the Corn Belt from 1890 to 1950. The Corn Show, a common annual showcase of corn seed savers in the Midwest, supported both subsistence and commercial agricultural ideals. It also set the stage for the

introduction of hybrid corn and suggested an alternative to the commodification of seeds by the industry. These results suggest that seed saving programs today could benefit from a culture that values subsistence practices while still utilizing the benefits of contemporary methods that are common to commodification. The added benefit of community and diversity that are realized by seed saving could develop a culture of seed production that is capable of contributing to rural development goals. This thesis concludes by tying together its discussion of dichotomies, reinforcing the connectedness between different agricultural production systems, and thus, the need for many different types of seed saving.

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Chapter 1 - Introduction: Seed Saving Past and Present

Seed saving is the process of saving and/or selecting seeds from one season for use in future seasons and has historically been an indicator for stable and sedentary communities.¹ Early technologies like pottery and granaries and the surpluses of grain they provided supported the rise of civilization.² Similarly, as selection occurred, the first beginnings of genetic manipulation set apart agricultural civilizations as compared to foragers. These seed saving technologies had social, economic, and political significance, just as their modern counterparts, mechanical dryers and grain silos.³ Unsurprisingly, farmers, farmer associations, businesses, and state agronomists of the land grant system in the United States prioritized the methods and processes associated with seeds, seed saving, and breeding.⁴ This era from 1890 to 1930 suggests the potential benefits seed saving may realize today within the developing world, while also challenging many assumptions as to what a ‘developed’ agriculture ought to look like.

This thesis aims to examine the process of saving seeds in order to understand what past efforts to improve seed saving suggest to present day seed savers who face pressures to modernize. As agricultural modernization occurred in the US, so did the decline of seed saving. Seed saving currently exists in the US by small commercial and non-for-profit seed producers in addition to advanced home gardeners. The thesis considers the broad agricultural trends that have brought us to the present, how those trends shape seed saving in the Global North and the Global

¹ R. Douglas Hurt, *American Agriculture: A Brief History*, (West Lafayette, IN: Purdue University Press, 2002), 3, & 4, Carolyn Steel, *Hungry City How Food Shapes Our Lives*, (London: Chatto and Windus, 2008), 7, & John Lanchester, The Case Against Civilization: Did our hunter-gatherer ancestors have it better?, *The New Yorker*, September 18th, 2017, <https://www.newyorker.com/magazine/2017/09/18/the-case-against-civilization>.

² Hurt, *American Agriculture*, 10, 18, & 20.

³ J. L. Anderson, *Industrializing the Corn Belt: Agriculture, Technology, and Environment 1945-1972*, (DeKalb, IL: Northern Illinois University Press 2009) 172 & 173.

⁴ P.G. Holden, *ABCs of Corn Culture: Or Making Two Nubbins to Grow Where Only One Grew Before*, (Springfield, OH: Simmons Publishing, 1907), 14- 38, and Martin L. Mosher, *Early Iowa Corn Yield Tests and Related Later Programs*, (Ames, Iowa: Iowa State University Press, 1962), 15 -17.

South, and utilizes corn seed saving in the American Corn Belt from 1890 to 1930 as a case study. Finally, this thesis considers how seed saving might be maintained as a widespread practice that is practiced by diverse types of seed savers.

The process of crop domestication improved, spread, and diversified millions of useful varieties and thousands of cultivars.⁵ The ability to save seed by farmers dictated which crops a region traditionally grew and how fast and well crops adapted to new regions. The advancement into the American Corn Belt growing region (primarily Ohio, Indiana, Illinois, Iowa, and Nebraska) from New England and the Middle Colonies were benefited by the fortuitous hybridization of two previously separated corn landraces.⁶ Other crops like wheat and oats were stymied by the Midwestern climate and languished until the introduction of varieties from the Eurasian continent were identified.⁷ Access to, and development of high quality seeds supported rapid industrialization within the United States.⁸ Today the flow of seeds and their genetic traits, often referred to as germplasm, continue to precede the flow of agricultural commodities.

While the idea of a Midwestern farmer saving his seed has past, his success remains linked to subsistence agricultures. These linkages are apparent by contrasting the seed economy of the Global North and the Global South. The seed industry responsible for provisioning the Global North is highly consolidated and four companies control close to 60% of the market. In contrast, in the Global South 80 to 90% of seeds are provisioned via seed saving or informally through local seed networks. These two systems have grown in importance as our global

⁵ “Who will Feed Us?: The Peasant Food Web vs. The Industrial Food Chain,” *ETC Group*, 3rd ed., (2017), 19.

⁶ Jack Kloppenburg, *First the Seed*, (Madison, Wisconsin: University of Wisconsin Press 2004), 94.

⁷ *Ibid.*, 56, 60, and 78.

⁸ *Ibid.*, 14 & 49.

agricultural systems strain to meet the challenges of food insecurity and diminishing agricultural resources.⁹

In an effort to appraise the process of seed saving, understand its purpose, and introduce a more comprehensive discussion, the goal of this project is to build a deeper understanding of seed saving. It will consider six dichotomies that are historically universal in agriculture:

- commercial and subsistence
- commons and commodity
- public and private
- basic and applied
- urban and rural

These dichotomies relate to different types of seed saving practices across the spectrum of the seed industry, public research institutions, commercialized farms, subsistence farmers, not-for-profits, or home gardeners. They also assist in understanding the agricultural transitions of the developed world from 1900 to present and how a centuries worth of sweeping changes built new roles, rules, and expectations around seeds and seed saving. This approach is useful because it is effective at revealing the strengths and weaknesses of such changes broadly and the agricultural benefits realized by diverse groups of seed savers.

It is argued that the question of who will save seeds is greatly dependent on the state, and inertia of these dichotomies of agriculture. The arrangement of these dichotomies predict who among different types of seed savers will save seeds, what their primary motives in participating in the seed economy are, types of seeds and by consequence, the genetic diversity that ultimately

⁹ Ibid., 78, T. Rauch, M. Schmidt, and D. Segebart, “New Rural Dynamics and Challenges in the Global South,” *Geographica Helvetica* 69, (2014): 225, & T. Rauch, “New Ruralities in the Context of Global Economic and Environmental Change—Are Small-Scale Farmers Bound to Disappear?” *Geographica Helvetica* 69, (2014): 228, 229.

will be saved. This framework explains historical conflicts between types of seed savers and specific dichotomy arrangements. As an example, the goals of subsistence seed saving of commonly held seeds are at odds with the goals of the private seed industry hoping to market their seed commodities. Though these goals are opposed and in conflict, it is clear that our global food system depends on seed saving practiced in a non-commercial setting, and perhaps, food produced in a commercial one.¹⁰ Across the globe, seeds represent local, and personal measures against food insecurity. These resources carry forward untapped potential that is necessary for commercial agriculture.

Moving forward, this thesis will relate the history of American agriculture through the six dichotomies outlined in order to better understand the process of seed saving. These dichotomies explain how seed saving left American farms and suggest what might be needed to prevent this process from reoccurring as agriculture in the Global South mimics the Global North. A case study of corn seed saving in the American Corn Belt from 1890 to 19500 will be considered with the goal of understanding why seed saving was important to farmers in this era, and how a similar modern effort emphasizing seed saving might benefit a new generation of small-scale growers in the Global North and South. By tying the dichotomies framework to a case study, this thesis concludes with recommendations that assist in balancing subsistence and commercial motives for seed saving and agriculture broadly.

¹⁰ Jack Kloppenburg, *First the Seed*, 178.

Chapter 2 - Past and Present Agricultural Dichotomies and Seed

Saving

The practice of agriculture is extremely diverse across the world. Examples from subsistence farming to industrial agriculture and everything in between contribute to the global food system. Across this spectrum, seeds and seed saving also come in diverse forms. Seeds may represent a commonly held resource saved by farmers, a product of state supported breeding, or the result of private and patented breeding. The diversity of agricultural systems as well as seed saving practices is the result of geography, soil type and growing environment, the movement of crop species, and historical patterns of socioeconomic and cultural development. These forms represent the foundation from which the agricultural resources of the future will spring. To explain our diverse agricultural systems and their shared future, we consider historical trends and transitions among agricultural forms from the perspective of seeds and seed saving.

A few comparisons are needed to visualize the spectrum of agricultural systems. Consider a typical row crop farmer of the Midwest that grows multiple thousand acres of genetically modified corn and soybeans for commodity markets *and* an urban or peri-urban market farmer that grows a ¼ acre of heirloom vegetables for direct-to-consumer markets. The success of both of these farmers is critically linked to their ability to procure quality seed with useful genetics.¹¹ While these examples may be familiar, both are relatively recent historical developments, particularly in their use of purchased seed. They contrast with American farm

¹¹ Seth J. Wechsler, "Recent Trends in GM Adoption," *United States Department of Agricultural Research Economic Research Service*, July 12, 2017, <https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx>, and Curtis Stone, *The Urban Farmer: Growing Food For Profit on Leased and Borrowed Land* (Gabriola Island, Canada: New Society Publishers, 2016), 11, and 12.

families in the 1900's and present day subsistence farmers of the Global South.¹² Both routinely produce a diversity of cereal, fruit, and vegetable crops as well as livestock; and whenever possible save seeds for coming seasons.¹³ Although many of them are connected to commercial markets, these farmers engage in subsistence practices in order to provide for their families.¹⁴ Many of the differences and similarities between these different types of farmers open up the research framework of this project.

A historical and comparative perspective utilizing questions that relate to how the practice of agriculture changes over time and which changes are desirable through a review of historical, sociological, Food and Agriculture Organization, and Non-Governmental Organization literature was conducted. This review process developed a historical narrative that is guided by six agricultural transitions, which are presented as dichotomies.¹⁵

The dichotomies utilized in our discussion are: subsistence and commercial, commons and commodity, public and private, basic and applied, Global North and Global South, and urban and rural. A dichotomy poses two ideas in contrast to one another. The studied agricultural transitions are organized as dichotomies. These are effective at showing change over time, and can be valuable for revealing strengths and weaknesses. Furthermore, they predict who saves seeds, their motivation for seed saving, and the types of seeds that are saved. The results are reported as a historical narrative that utilizes dichotomies to explain changes within the process of seed saving.

¹² Mary Neth, *Preserving the Family Farm: Women, Community, and the Foundations of Agribusiness in the Midwest, 1900-1940*, (Baltimore, MA: The Johns Hopkins University Press, 1995), 3, and "Who will Feed Us," *ETC Group*, 8, & "Sustainable Peasant and Family Farm Agriculture Can Feed the World," *Via Campesina Views*, (2010): 2, http://www.alimenterre.org/sites/www.cfsi.asso.fr/files/61_paper6-en-final.pdf.

¹³ Michael Carolan, *The Sociology of Food and Agriculture* (New York, NY: Routledge, 2012), 17, "Putting the Cartel Before the Horse ... and Farm, Seeds, Soil, Peasants, etc.: Who Will Control Agricultural Inputs, 2013?," *ETC Group*, No. 111, (2013) : 6, http://www.etcgroup.org/putting_the_cartel_before_the_horse_2013, & Jack Kloppenburg, *First the Seed*, 51.

¹⁴ *Ibid.*, 51, and "Putting the Cartel, 6.

¹⁵ R. Douglas Hurt, *American Agriculture: A Brief History*, (West Lafayette, IN: Purdue University Press, 2002), 35.

These dichotomies are described in Table 1.¹⁶

Table 1. Definitions of Agriculture Dichotomies

Subsistence	Agriculture emphasizing resources at hand for production, provisioning, and economic subsistence.	Commercial	Agricultures emphasizing the benefits of economic integration, market-oriented production, maximum profitability
Commons	Goods and services without a fixed value such as genetics, social capital, or biological processes.	Commodity	Goods and services with a fixed value such as farm machinery, agricultural inputs, and outputs.
Public	Publically funded institutions or initiatives such as the Land Grant University System.	Private	Private business or industry funded by sale of products such as the businesses of the seed industry.
Basic	Research with the goal of revealing basic principals without an immediate commercial application.	Applied	Research utilizing an industry practice with the goal of producing a commodity.
Global North	The ‘developed’ world where economic arrangements have oriented agriculture towards conventional practices.	Global South	The ‘less developed’ world where economic expectations orient agriculture towards subsistence practices.

¹⁶ Kloppenburg’s, *First the Seed* informed development of these dichotomies. Please see: ¹⁶ Jack Kloppenburg, *First the Seed*, (Madison, Wisconsin: University of Wisconsin Press 2004).

Urban	Cities; most economic activities include manufacturing or service industries.	Rural	Outside of cities; most economic activities are directed towards agriculture or the natural world.
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The first dichotomy, subsistence and commercial, is defined in degrees because American agriculture connected farmers to markets even in its most primitive state.¹⁷ American farmers in the Colonial period traded their products domestically and internationally for finished goods from Europe and later on, the cities of the eastern seaboard.¹⁸ This commercial emphasis remained interwoven with subsistence techniques that emphasized the value of resources at hand and the ability to engage in labor-intensive techniques to save cash expenditure.¹⁹ This may be well exemplified by either the turn-of-the-twentieth century corn farmer in the US or by peasant farmers in the Global South. Farmers in the “Corn Belt” growing region of the US (primarily Ohio, Indiana, Illinois, Iowa, and Nebraska) kept a wide variety of crops and livestock for commercial markets including: corn, wheat, oats, alfalfa, poultry, hogs, and dairy.²⁰ Commodity crops were complemented by numerous other crops that were utilized for home consumption. The distinctions between commercial and subsistence were frequently blurred as many commodity crops were used as feed or entered into local or informal economies.²¹ Similarly, work was shared across rural communities via bartering and for pay.²² Farms were seen as a

¹⁷ Ibid., 35, 78, & 117.

¹⁸ Neth, *Preserving the Family Farm*, 18.

¹⁹ Cochrane, *The Development of American Agriculture*, 129, & “Who will Feed Us?” *ETC Group*, 8, & “Fighting Poverty and Hunger: What is the role of Urban Agriculture?,” *Food and Agriculture Organization of the United Nations*, Policy Brief No. 10 (2010): 1, <http://www.fao.org/docrep/012/al377e/al377e00.pdf>.

²⁰ Michael Carolan, *The Sociology of Food and Agriculture*, 17.

²¹ Mary Neth, *Preserving the Family Farm*, 18, 19.

²² Ibid.

family resource that buffered families and their communities from environmental and economic mishaps.²³

Seed saving remained a consistent feature of the subsistence and commercial agriculture of the American Midwest until the introduction of hybrids.²⁴ Seed saving fit well alongside the host of other activities performed on farm that allowed farmers to minimize expenses. Public efforts during the turn-of-the-20th century to improve seed saving extended and emphasized this arrangement. The land grant university identified seed saving as a subsistence activity that could help a farmer improve production and thus commercialize.²⁵ These institutions competed directly with the small vegetable seed industry, which focused on crops that were sold prior to bearing seed.²⁶ This enhanced food security, supported expanding populations, and bolstered industrial development without challenging the ability of farmers to save seed.²⁷ Land grant universities supported seed saving by advancing the basic sciences responsible for understanding the biological processes of agriculture and genetics.²⁸ In particular, the concepts of heritability provided a body of knowledge that was instrumental to the commodification of the biological processes that underlie farming.²⁹ Subsequently, commercial businesses began marketing products that fixed the commercial value of biological processes formerly performed on farm.

The transformation of knowledge into products initiated the transition from commons to commodity and moved seed saving off the farm. The process of commodification transformed invaluable biological processes and social relationships like soil fertility, animal-based traction,

²³ Ibid., 18, & 39.

²⁴ Kloppenburg, *First the Seed*, 52.

²⁵ P.G. Holden, *ABCs of Corn Culture: Or Making Two Nubbins to Grow Where Only One Grew Before*, (Springfield, OH: Simmons Publishing, 1907), 14, & 30.

²⁶ Kloppenburg, *First the Seed*, 61.

²⁷ Ibid., 51, P.G. Holden, *ABCs of Corn Culture* 51, J.S. Leaming, *Corn and Its Culture*, 11, Funk Bros Seed Co., 10.

²⁸ Kloppenburg, *First the Seed*, 68, & 74.

²⁹ Ibid., 66,

pest-management via crop rotation, seed saving, or informal labor arrangements.³⁰ The processes of the commons are consistent with subsistence agriculture. Both align farmers within social and biological relationships that buffer them from markets where they have little control. Despite these protections, farming remained painstaking work that demanded brains and brawn.³¹ Commodities promised to streamline these cumbersome and slow processes in exchange for greater market participation.³² Commodities increased in importance and availability throughout the twentieth century. Their success can be linked to the relationship between public research institutions and private businesses.³³ This was especially true for the development of hybrid breeding and seed production technologies.

Open-pollinated seeds are difficult to commodify because an improved cultivar could be reproduced one hundred fold by any purchaser of seed or stock.³⁴ This reality made seed saving and selection a good fit for public institutions. Products of the commons were improved with public resources and then returned to the commons.³⁵ Farmers and society benefited from greater harvests. Hybrid technologies, which utilize inbred lines, improve the yield of crops grown from good crosses at the expense of the ability to predictably save good seed.³⁶ Hybrids discouraged seed saving because seed saved from hybrids did not come true. Hybrids were thus an ideal commodity since a farmer would need to return to the market place yearly. As the land grant system refined hybrid technique, the process was quickly taken up by private businesses throughout the Corn Belt growing region. Like other commodity transitions, farmers were required to

³⁰ J. L. Anderson, *Industrializing the Corn Belt: Agriculture, Technology, and Environment 1945-1972*, (DeKalb, IL: Northern Illinois University Press 2009) 8.

³¹ Gordon L. Iseminger, "North Dakota's Cornhusking Contests, 1939-1941," *Agricultural History* 71, No. 1 (1997), 19, and Neth, *Preserving the Family Farm*, 18.

³² Neth, *Preserving the Family Farm*, 272, & J. L. Anderson, *Industrializing the Corn Belt*, 8.

³³ Jack Kloppenburg, *First the Seed*, 22.

³⁴ *Ibid.*, 37.

³⁵ *Ibid.*, 80.

³⁶ Noel Kingsbury, *The History and Science of Plant Breeding*, (Chicago, IL: The University of Chicago Press 2009), 218.

purchase seeds on a yearly basis in order to utilize hybrids.³⁷ Therefore, farmers discontinued the practice of corn seed saving.³⁸ This paradigm shift gained greater traction with the passage of plant patent acts in 1930 and 1970.³⁹ These developments allowed the industry to make seeds distinctly a product rather than a service. The resulting decreased role of farmers in seed saving elevated the importance of the public and private sectors.

The public role in seed saving has historically been important because agriculture was seen as the foundation for a community or nation's economic success. Seed saving and selection has received cultural and political attention. Seed exchange led to the development and spread of most agricultural crops prior to the Columbian Exchange.⁴⁰ Local cultures have been built around the selection, saving, and exchanging of seeds.⁴¹ Following the Columbian Exchange, seed distribution networks were formalized and expanded globally as governments' complemented seed saving by the farmer.⁴² These services were especially important in the United States and Europe where 'foreign' crops may not have been suited for the local environment and soil type. The movement of wheat and oats from Western Europe to the Americas and maize and potatoes to Europe are examples of state supported seed exchange and distribution.⁴³ The public role in seed saving is characterized by its historically close relationship

³⁷ Susan A. Mann, and James M. Dickinson, "Obstacles to the Development of a Capitalist Agriculture," *Journal of Peasant Studies* 5, No. 4 (1978): 466. Gabriela Pechlaner, "The Sociology of Agriculture in Transition: The Political Economy of Agriculture after Biotechnology," *Canadian Journal of Sociology* 35, NO. 2 (2010): 243, and Kloppenburg, *First the Seed*, 37. Michael Mascarenhas and Lawrence Busch, "Seeds of Change: Intellectual Property Rights, Genetically Modified Soybeans and Seed Saving in the United States," *Sociologia Ruralis* 46, No. 2 (2006): 122 – 138.

³⁸ Kingsbury, *The History and Science of Plant Breeding*, 219.

³⁹ Kloppenburg, *First the Seed*, 130, 132.

⁴⁰ *Ibid.*, 39, & 130.

⁴¹ Pueblo Indian agriculture as articulated by Richard I. Ford, and Vorsila Bohrer provide good examples of cultural practices and processes designed to inform, reinforce, and manage the seed saving and selection. Please see: Richard I. Ford, "The Color of Survival," in *Discovery*, ed. Noble, David Grant and Philip W. Brittenham, Santa Fe: School of American Research, 1980, or Vorsila Bohrer, "Zuni Agriculture," *El Palacio* 67, No. 6 (1960): 181-202.

⁴² *Ibid.*, 156.

⁴³ *Ibid.*, 78.

with farmers. The Morrill Act of 1862, which established the land grant universities further elevated this relationship.⁴⁴ As agriculture became more commercial and its processes more commodified, public institutions were situated to perform crop improvement. The value of public research dollars spent on the development of hybrids credit the land grant system.⁴⁵ Yet, this success only intensified the contentious relationship between public and private seed savers who saw public programs constraining their ability to produce high quality seeds.⁴⁶

The ongoing and unresolved conflict between the public and private sectors quickly evolved into a debate revolving around who should be performing basic and applied research. The development of hybrid technologies and recombinant DNA technologies are examples of basic research. The application of those technologies into finished cultivars has been framed as applied research. The development of hybrid corn represented a turning point, for while it proved the value of the land grant university, it also gave private business the knowledge to produce a valuable commodity⁴⁷ and fashion a profitable seed economy.⁴⁸ This meant moving public breeders away from the development of public inbred lines, seed certification systems, the release of finished cultivars, and out of breeding entirely.⁴⁹ Throughout the latter half of the twentieth century many of these goals were achieved. The Plant Patent Act of 1970 was in many ways a culmination of these efforts as it did not specify that a cultivar be strictly better, but merely novel and pure.⁵⁰ The extent to which the private seed industry was successful represents the ability of public institutions to maintain support of the commons. More importantly, the

⁴⁴ Kloppenburg, *First the Seed*, 132.

⁴⁵ *Ibid.*, 237

⁴⁶ *Ibid.*, 133.

⁴⁷ Willard W. Cochrane, *The Development of American Agriculture: A Historical Analysis* (Minneapolis, MN: University of Minnesota Press, 1979), 129 – 132.

⁴⁸ Kloppenburg, *First the Seed*, 130 & 134.

⁴⁹ *Ibid.*, 134 & 135

⁵⁰ *Ibid.*, 139.

arrangement of the public and private as well as basic and applied dichotomies meant that the exchanges of technology and germplasm between the Global North and Global South would be conducted in the context of commercial and commodity oriented systems of agriculture.⁵¹

This exporting of knowhow from Global North to Global South, often referred to as the Green Revolution, emphasized the transition from subsistence and commons oriented agricultures toward commercial and commodity forms.⁵² By boosting productivity and improving market integration, there would be more money in the pocket of the farmers and thus, cheaper food for purchase.⁵³ This approach has remained foundational to rural development theory. Social work directed at rural communities in the Global South has consistently found that rural economic activity is closely linked to poverty reduction, food security, and ultimately economic development elsewhere.⁵⁴ The spread of commercial and commodity styles increased yields on the best croplands of the Global South.⁵⁵ In the midst of this process, the Global North and the Global South claimed seeds as part of humanities agricultural heritage.⁵⁶ Yet, this meant different things according to the variable relationships among subsistence and commercial and commons and commodity. If the Global North prevailed, the dichotomies of public and basic and private and applied would shape the use and commodification of seeds. This arrangement was ideal for the seed industry because of its success at constraining the public breeding apparatus.⁵⁷ In the Global South's perspective, seeds were property of the commons.⁵⁸ Access and crop

⁵¹ Ibid., 160

⁵² Ibid., 161

⁵³ Gustavo Anriquez, and Kostas Stamoulis, "Rural Development and Poverty Reduction: Is Agriculture Still the Key?" Agricultural Development Economics Division, The Food and Agriculture Organization No. 07-02, (2007) 3.

⁵⁴ Ibid., 17.

⁵⁵ Kingsbury, *The History and Science of Plant Breeding* 284 & 285.

⁵⁶ Kloppenburg, *First the Seed* 286 & 287.

⁵⁷ Ibid., 151.

⁵⁸ Ibid., 171

improvement fit this narrative. The problem arises in the fundamental differences between the dominant agricultural types of the Global North and South.

Adding to these ongoing conflicts, the dichotomy of urban and rural is important to consider in the context of seed saving. This dichotomy is driven by specialization in particular crops by farmers, the addition of mechanization to row crop agriculture, and the resulting migration of people into cities. Migration is linked closely with rural development.⁵⁹ As agricultural economies transition to commercial and commodity alignment, productivity increases while the need for labor decreases.⁶⁰ Migration from rural areas to urban ones places increasing demands on urban infrastructure because those migrating typically do so under duress.⁶¹ Urban food insecurity goals remain unmet in the Global South.⁶² While historically agriculture has moved out from urban spaces, its practice is increasing.⁶³ Urban agriculture provides a measure against food insecurity.⁶⁴ A similar trend toward urban agriculture has emerged in the Global North, though for different reasons.⁶⁵ Either way, practitioners of urban agriculture in the Global North and Global South align closely with subsistence and commons. The urban setting is one passed over by the Green Revolution techniques. The urban setting and the seeds most useful therein will become increasingly important as our world population continues to urbanize.

⁵⁹ Cochrane, *The Development of American Agriculture*, 129-134.

⁶⁰ Ibid.

⁶¹ Bruce Frayne, "Survuvak if the Poorest: Migration and Food Security in Namibia," in *Agropolis: The Social Political and Environmental Dimensions of Urban Agriculture*, ed. Luc J.A. Mougeot (Sterling VA: Earthscan 2005), 32 & Cochrane, *The Development of American Agriculture*, 129-134.

⁶² Anriquez, and Stamoulis, "Rural Development and Poverty Reduction" 3.

⁶³ Luc J.A. Mougeot, "Introduction," in *Agropolis: The Social Political and Environmental Dimensions of Urban Agriculture*, ed. Luc J.A. Mougeot (Sterling VA: Earthscan 2005), 32Cochrane, *The Development of American Agriculture*, 5.

⁶⁴ Ibid., 4.

⁶⁵ Jennifer Cockrall-King, *Food and the City: Urban Agriculture and the New Food Revoultion*, (Amherst, NY: Prometheus Publishing 2012), 17.

It is clear from the examined trends that subsistence and commons reinforce one another. Where farmers emphasize subsistence practices, seed saving tends to be a smart use of time and biological resources. Even as these two dichotomies reinforce one another, they do not rule out commercial motives. The century prior to the introduction of hybrid corn was characterized by partially commercialized agricultures and public efforts to improve seed saving.

On-farm seed saving education was central to turn of the century ‘progressive’ agriculture.⁶⁶ The development of hybrid seed saw an attempted introduction of non-commodity hybrid production forms.⁶⁷ Cooperatively produced hybrid seed corn, small-scale production of hybrids with state developed inbred lines, state seed certification programs, and even the release of state varieties were effective checks to the rapid growth and consolidation of the seed industry.⁶⁸ These programs did not exclude commercialization and they did not challenge the prerogative of the farmer to save seed to the extent demanded by the seed industry. These agricultural footnotes reveal the potential for commercializing agricultural systems to emphasize the process of seed saving as a resource of the commons. In another example, American farmers growing soybeans utilized between 40 to 60% saved seed until the introduction of RoundUp Ready Soybean in 1996.⁶⁹ In this case, larger and more commercialized farmers tended to save

⁶⁶ This process will be elaborated in the following chapter, and may be traced in Kloppenburg’s *First the Seed*. This shift is discernable when comparing: P.G. Holden, *ABCs of Corn Culture: Or Making Two Nubbins to Grow Where Only One Grew Before*, (Springfield, OH: Simmons Publishing, 1907), Frederick Richey, ‘The What and How of Hybrid Corn,’ U.S. Department of Agriculture, *Farmers’ Bulletin No. 1744* (1935), and G.H. Stringfield, ‘Corn Production,’ U.S. Department of Agriculture, *Farmers’ Bulletin No. 2073* (1960).

⁶⁷ Thomas E. Hall, ‘Purchasing Hybrid Seed Corn Cooperatively,’ Cooperative Research and Service Division, Miscellaneous Report No. 100 (August 1946), 1, Frederick Richey, ‘The What and How of Hybrid Corn,’ U.S. Department of Agriculture, *Farmers’ Bulletin No. 1744* (1935): 10, and R.O. Snelling, C. M. Woodworth G. H. Dugan, A.L. Lang, J.H. Bigger, *Developments In Hybrid Corn Production* (Springfield, Ill: Illinois Farmers’ Institute, 1938-39), 8-10.

⁶⁸ Kloppenburg, *First the Seed*, 105-107.

⁶⁹ Michael Mascarenhas and Lawrence Busch, “Seeds of Change,” 129 & 132

the most seeds.⁷⁰ This suggests a more harmonious relationship between commercial and commons.

The potential for commercialization, however, is a matter of priorities and the state of agricultural commodification. The relative value of saved seeds is reduced in agricultures that favor commodities—inputs and outputs.⁷¹ Traction, fertility, weed, and pest management, which may be achieved via biological processes, are complemented or replaced by the use of tractors, implements, fertilizers, herbicides, and pesticides.⁷² If seeds are foundational to commons oriented answers like crop rotation, then their value will decrease as these processes leave the farm. The utility of seeds is closely linked to the level of commercialization and commodification. Commercialization may make seed saving less likely, but it is the combined emphasis of commercial and commodity that has consistently moved seed saving off the farm. The commodification of corn supports this observation.

Our public institutions have and continue to represent the commons especially where its on-farm utility is diminished by the transition toward commercial and commodity alignments. Public institutions are well positioned to pursue socially desirable lines of inquiry requiring long-term investment with limited financial reward. These pursuits are unlikely to attract private investment. Secondary or horticultural crops, hard to breed crops, mixed variety lines, open pollinated varieties, and perennial commodity lines are examples of desirable seed selection and saving outcomes best left to public institutions.⁷³ The public apparatus within the United States has proven immensely successful as evidenced by return on investment calculations, their

⁷⁰ Ibid.

⁷¹ Neth, *Preserving the Family Farm*, 272, 273.

⁷² Ibid., and Kloppenburg, *First the Seed*, 29.

⁷³ Ibid.

reputations for only releasing improved lines, and the volume of improved lines produced in the past century.

On the other hand, the motives of private businesses are well positioned to compete for quality, to pursue protected product development via hybrid breeding or genetic modification, and the development of synergistic input packages such as Roundup and Roundup Ready soybeans.⁷⁴ These advantages have allowed the seed industry success, especially in past decades as public research funding has waned. The seed industry's successes in genetically modified commodity crops like corn, soybean, and cotton are proven by their widespread adoption in the US and abroad. Nevertheless, the seed industry has occasionally fallen victim to its own virtues, especially where high levels of consolidation are concerned. Private breeders decidedly downplay the significance built into homogenous monocultures of high-yielding crops. This reality was proven in the 1971 corn blight outbreak, which took even public breeders by surprise. This problem relates to the nature of an agriculture that has prioritized commercial and commodity forms.

The greater operational freedom and sense of service within public institutions have historically held the seed industry to high standards via seed certification and the release of only strictly better cultivars.⁷⁵ Where the seed industry has enforced its public and basic ideal, public breeding is limited in its ability to shape the direction of seed saving, selection, and crop improvement. Furthermore, the current state of seed selection and saving has blurred the distinctions between public and private. It is not uncommon that public institutions are beholden to private businesses for funding, or contractually obligated to provide research and resources to

⁷⁴ Ibid., 249.

⁷⁵ Ibid., 135, & 142-146.

private businesses.⁷⁶ Public windfalls—hybrid and genetic modification technologies—have tended to migrate toward the private sector.⁷⁷ This blurring of public and private has weakened the public breeding apparatus and enriched private businesses locked into marketing and consolidation contests.

These dichotomies and their emphasis on deploying public and private resources reveal the extent to which farmers operating under subsistence-commons regimes have been overlooked as potential contributors to our seed resources. Arranged thus, our agricultural systems are effective at finding solutions to technical problems. The traits backcrossed into our commodity crops are testament to this acumen.⁷⁸ Yet, this emphasis overlooks and undervalues the benefits of maintaining a diverse gene pool. It takes for granted that needed traits will be available and assumes the ability to know the relative and future value of traits.

The dominant public and private dichotomy of the Global North has recently been challenged by the increasing importance of not-for-profits and regional businesses dedicated to seed saving. Writing in 1991 in *Seed to Seed*, Suzanne Ashworth articulated the lack of focus given to the process of seed saving, “a comprehensive guide to saving seeds on a small scale was not to be found. Instead, bits and pieces of relevant information were hidden in obscure publications on such diverse topics.”⁷⁹ Here, work and the emergence of seed saving enterprises proves Jack Kloppenburg’s argument that private businesses have pushed public research institutions out of direct competition with the seed industry.⁸⁰ Instead of the public championing the commons, businesses focusing on obscure or heirloom seeds are flourishing by emphasizing

⁷⁶ Ibid., 232.

⁷⁷ Ibid., 110, 195.

⁷⁸ Kloppenburg, *First the Seed*, 168.

⁷⁹ Suzanne Ashworth, *Seed to Seed: Seed Saving Techniques for the Vegetable Gardener*, (Decorah, IA: Seed Savers Exchange 1991), 7.

⁸⁰ Kloppenburg, *First the Seed*, 344.

the maintenance of open pollinated varieties and the development of new cultivars for specific localities.⁸¹ These businesses span the public and private dichotomy but work in the commons by performing the service of seed saving. Here is further proof that seed commons exist alongside commercial agricultural styles.

Not-for-profits have also developed to ensure the maintenance of our agricultural resources on behalf of the commons. Their work resembles turn of the century land grant efforts. Seed Savers' Exchange has produced extensive resources detailing the cultural practices needed to grow crops for seed, the principals surrounding the maintenance of varieties, and the physical requirements of saving seeds.⁸² This extensive information prepares growers to save seed at a level required to maintain and improve upon cultivars' agricultural diversity.⁸³ The work of Native Seeds/Search has taken on the challenge of preserving the Southwest's agricultural heritage by combining seed with oral histories that detail cultural practices.⁸⁴ Finally, the organic seed alliance has worked to breed new vegetable crop varieties.⁸⁵ The businesses and not-for-profits discussed here point to the dominance of the expectation that public or private resources should manage our seed resources and suggest that the practice of seed saving could be reintegrated in the Global North.

This opportunity is built into the re-emergence of urban, peri-urban, and diversified agriculture as a response to food insecurity and economic restructuring that have reprioritized

⁸¹ These businesses include Seed Savers Exchange, Seeds of Change, Native Seeds/Search, Siskiyou Seeds, Baker Creek Heirloom Seeds, and others across the country. Michael Tortorello, "Heirloom Seeds or Flinty Hybrids?," *New York Times* (New York, NY), March 23rd, 2011.

⁸² This information is available either at their website, or their two written works. Please see: Seed Saver's Exchange - <http://www.seedsavers.org/>, and Micaela Colley, and Zystro Jared, *The Seed Garden: The Art and Practice of Seed Saving*, (Decorah, IA: Seed Savers Exchange, Inc. 2015), 45.

⁸³ "Seed Saving Chart," *Seed Saver's Exchange*, 2016, http://www.seedsavers.org/site/pdf/Seed%20Saving%20Guide_2017.pdf.

⁸⁴ "Past Projects: Cultural Memory Bank," *Native Seeds/SEARCH*, accessed November 6th 2017, <http://www.nativeseeds.org/component/content/article?id=15>.

⁸⁵ "Research," *Organic Seed Alliance*, accessed November 6th, 2017, <https://seedalliance.org/research/>.

subsistence and commons alignments. Seed saving is uniquely positioned to benefit diversified small-scale agriculture in the developed world. This potential is not guaranteed, as popular styles of urban agriculture developed by Curtis Stone and others emphasize a dizzying level of commercialization.⁸⁶ The rapid turnover of crops and direct sale to high value markets leave little time or space for seed saving in small-sized urban or peri-urban areas.⁸⁷ The leaders Coleman, Fortier, and others are lukewarm on the topic of seed saving. In his manifesto on Urban Market Farming, Curtis Stone relates the unsustainability of lawns, the changing demographics that are resulting in urban spaces wanting care, and the importance of social capital.⁸⁸ It is clear these growers mean to reinvent the food system, but thus commercialized, seed saving has been largely left out.⁸⁹

Seed saving enterprises, small businesses and not for profits, though operating within a larger commercial agriculture, have framed seeds within the commons. They have centralized seed saving as a process for farmers and backyard gardeners. Food production is again becoming a means to provisioning and an end to seed saving.⁹⁰ Without pretension, seed saving manuals tend to explain cultural techniques, harvest, preparation for cooking, and seed saving and selection.⁹¹ As the Global North seeks to restore what it may have lost in the culture of seed saving our discussion transitions to what might be lost as the Global South transitions toward commercial and commodity.

⁸⁶ Curtis Stone, *The Market Gardener*, 15 – 18, 20-25

⁸⁷ *Ibid.*,

⁸⁸ Curtis Stone, *The Market Gardener*, 3-6, and Michal Pollan, “Farmer in Chief,” October 9th, 2008.

⁸⁹ For their part, the market gardeners require a wider variety of seeds as part of their diversified agricultures and this has spurred independent seed saving enterprises to engage the process of seed saving.

⁹⁰ Please see: Jere and Emilee Gettle, *The Heirloom Life Gardener: The Baker Creek of Growing Your Own Food Easily and Naturally*, (New York, NY: Hyperion, 2011), or Micaela Colley, and Zystro Jared, *The Seed Garden: The Art and Practice of Seed Saving*, (Decorah, IA: Seed Savers Exchange, Inc. 2015).

⁹¹ Consider the A to Z plant guide which brings cultivation, provisioning, and seed saving together in Jere Emilee Gettle, *The Heirloom Life Gardener*, 83 to 213.

In the developing world the potential of seed saving, though overshadowed by production and food security themes, fits well into the established doctrine of rural development and its current emphasis on inclusive development.⁹² Rural development, traditionally characterized as improving farm production via an emphasis on technology, has become more inclusive.⁹³ One outcome of this shift has been a move to actively cultivate ‘scale neutral’ technologies to improve the production of peasant growers.⁹⁴ While ‘scale neutral’ technologies remain elusive, seed saving comes close for its accessibility. It has been shown that labor-intensive tasks like seed saving have tended to improve food security to a greater extent than more capital-intensive improvements.⁹⁵ Success has been linked to technologies that take advantage of the resources of the rural poor.⁹⁶ These resources include their access to land, seed or animal stocks, and their own labor.⁹⁷ The innumerable niches passed over by the ‘green revolution,’ from which increased gains may be limited, include climatic and geographic extremes; these are rural and urban microenvironments.⁹⁸ Unsuitable for conventional agriculture there is little private incentive to develop cultivars specific to small niches. These places are most likely to reach their potential when tended by subsistence growers, utilizing small-scale management practices, and utilizing saved seeds that have been acclimated to the specific locality. In many places this

⁹² Mahmood Hasan Khan, “Rural Poverty in Developing Countries: Implications for Public Policy,” International Monetary Fund, No. 26, (2001), and M. Franz, M. Felix, and A Trebbin, “Framing Smallholder Inclusion in Global Value Chains—Case Studies from India and West Africa,” *Geographica Helvetica* 69 (2014): 239-247.

⁹³ Gustavo Anriquez, and Kostas Stamoulis, “Rural Development and Poverty Reduction: Is Agriculture Still the Key?” Agricultural Development Economics Division, The Food and Agriculture Organization No. 07-02, (2007) 1–41.

⁹⁴ “Agricultural and Rural Development For Reducing Poverty and Hunger in Asia,” 4.

⁹⁵ Khan, ‘Rural Poverty in Developing Countries.’

⁹⁶ Khan, ‘Rural Poverty in Developing Countries.’

⁹⁷ Ibid.

⁹⁸ “The Future of Food and Agriculture,” *Food and Agriculture Organization*, 4, & 47, <http://www.fao.org/3/a-i6583e.pdf>.

reality exists, but in many more, state funding for public resources have been sapped and market forces have pressured growers to commercialize and allowed seeds to be commodified.⁹⁹

Seed saving complements breeding efforts by maintaining and developing diverse landraces, which historically have supported the genetic development of elite breeding lines.¹⁰⁰ Despite the fact that seed savers are potential markets to be gained by the seed industry, seed savers provide a vital service that is decidedly unattractive to capital.

The Global North and Global South dichotomy explains the challenges facing the developing world. The hemispheres were not created equal. Subsistence growers maintain most of the world genetic diversity in the Global South.¹⁰¹ This dichotomy and the developmental trajectory it enables shapes how seed saving and public and private plant breeders relate. The Global North relies heavily on crops that were domesticated elsewhere for food and industrial processes.¹⁰² Since the turn-of-the-twentieth century, seventeen commercially important crops have been improved by vital traits acquired from landraces in the Global South.¹⁰³ Wheat received nine vital traits from abroad during this time period.¹⁰⁴ Additionally, urban agriculturalists in developed countries, facing similar challenges to the small landholder, are uniquely poised to redefine the farmers' relationship to seeds and seed saving. The now essential urban agriculturalist and small landholder may challenge the historical trends that have relegated seed saving to public or private breeders and practice of agriculture to strictly rural spaces. This is not to argue the rural norm moot, but instead that seed saving and selecting by individual

⁹⁹ T. Rauch, "New Ruralities in the Context of Global Economic and Environmental Change," 234, & Per Pinstrup-Andersen and Rajul Pandya-Lorch, "Agricultural Growth is Key to Poverty Alleviation in Low-Income Developing Countries," International Food Policy Research Institute, 2020 Brief, (1995): 2.

¹⁰⁰ Kloppenburg, *First the Seed*, 167.

¹⁰¹ *Ibid.*, 189.

¹⁰² *Ibid.*, 178, & 179.

¹⁰³ *Ibid.*, 168

¹⁰⁴ *Ibid.*, 114.

farmers and communities is a socially desirable outcome that enhances public and private breeding initiatives.

These benefits are hard to quantify when compared with the benefits of hybrid or biotechnology because seed saving benefits play at and with the ‘nature’ of the commons and commodity dichotomy. Our economy of seeds is effective at pursuing developments in the public sector via public funding and rewarding developments in the private sector via patenting. When breeding materials return to their places of origin as commodities, the commons is commodified and seed saving ceases. This principal was proved in the Corn Belt of the US. This system of exchange and commodification, though beneficial to capital, damages the seed saving that maintains and develops the breeding materials needed for improved cultivars. These cultivars are a distinct result of subsistence and commons oriented agricultures whose ‘products’ are invaluable but un-patentable.¹⁰⁵ This problem is further compounded by the seed industries’ cavalier desire to market its improved seeds to the Global South.¹⁰⁶ This desire is closely aligned with the ‘best practices’ to integrate the small landholder and urban farmer into an increasingly global food system, but nevertheless limits our potential to respond to future agricultural challenges because it directly undermines the seed saving processes that make our global food systems tick.¹⁰⁷

In exploring agricultural dichotomies and relating those to seeds and seed saving several themes arise. First, the dichotomies are not stable phenomenon. They are subject to change and tend to be shaped by agricultural stakeholders. Secondly, certain arrangements tend to shape the process of seed saving and selection. These arrangements answer the basic question of who and

¹⁰⁵ Ibid., 189, 190, and “ Who will Feed Us?: The Peasant Food Web vs. The Industrial Food Chain,” *ETC Group*, (2017): 12-14. <http://www.etcgroup.org/whowillfeedus>.

¹⁰⁶ “Putting the Cartel before the Horse,” 6.

¹⁰⁷ Kloppenburg, *First the Seed*, 180.

how seeds will be saved and prepared for coming seasons. Thirdly, since the introduction of hybrid seeds, the arc of history has tended to prioritize greater commercialization, commodification, and more centralized breeding.¹⁰⁸ Fourth, this arrangement is only possible because of agricultural endowments possessed by the developing world and the global political economy of seeds.¹⁰⁹ Finally, the prioritization of commercialization opposes the maintenance and vitality of the commons upon which it depends. Because the dichotomies surrounding seeds are mutable, shape the process of seed saving, are historically neglected, and necessary to maintaining food systems, some method of safeguarding the people and places where seed saving is practiced is called for.

The dichotomies surrounding seed saving are inherently unstable but they are not completely unpredictable. The modern era has been characterized by a move started in the North towards more commercialized agricultures.¹¹⁰ This process continues today in the Global South. Seeds and seed saving, a time consuming and tedious process may be more easily purchased under such an arrangement. Still, the process of commercializing does not guarantee the absence of seed saving.

Seed saving can exist in commercial agricultures so long as seeds exist within a commons. For decades, seed saving was characterized as a farmer activity that assisted in commercializing a farm.¹¹¹ Thus characterized, seeds and seed saving remained within the purview of the farmer and the public, as embodied by the land grant system and farmer associations. With the introduction of hybrids, it was anticipated by some within the land grant

¹⁰⁸ Ibid., 290.

¹⁰⁹ Ibid., 180

¹¹⁰ J.L. Anderson *Industrializing the Corn Belt*, 7 & 8.

¹¹¹ P.G. Holden, *ABCs of Corn Production*, 14, & 30

system that this arrangement would carry over into the hybrid era.¹¹² The demise of corn seed saving occurred only with simultaneous commercialization, commodification, and a moving of the political economy of seeds away from farmers and into a debate concerning public and private breeding. The emergent third and fourth dichotomies show that even long established arrangements like farmers saving seed may be created, shaped, and reversed overtime by effort on the part of agricultural stakeholders. The question of who will save seeds is thus greatly dependent on the state, and inertia of the dichotomies of agriculture at large and related to seed saving.

Though counter to capitalist imperatives, decentralized seed saving and selection working within the commons under subsistence or limited commercial influence is a socially desirable outcome that supports the call for all agricultures. It is an appropriate and accessible technology for those with limited means. It is a valuable complement to publicly and privately funded breeding programs. Whether accomplished by an urban or rural subsistence farmer of the Global South, or a not-for-profit, regional seed saving business, or a home gardener of the Global North, seed saving contributes to the upkeep of our agricultural resources upon which the task of feeding future generations depend.

Conventional agricultures' dependence on foreign germplasm in the past century has proved invaluable. Yet, this dependence relies on the continued availability of landraces maintained by seed savers. This implies an economic hinterland where subsistence practices have not been fully transformed by a commercialized agriculture. The seeds needed for the Global North's elite breeding lines are to be found only where their own products have not been

¹¹² Thomas E. Hall, 'Purchasing Hybrid Seed Corn Cooperatively,' Cooperative Research and Service Division, Miscellaneous Report No. 100 (August 1946), and Frederick Richey, 'The What and How of Hybrid Corn,' U.S. Department of Agriculture, *Farmers' Bulletin No. 1744* (1935): 10.

marketed. Furthermore, the ability to acquire, transform via backcrossing, and subsequently market the improved lines to the Global North or the Global South depend on the largesse and depth of our global seed commons. The question moving forward becomes, can our prioritization of commercialization, commodification, and public and private breeding balance adequately with the need for margins where subsistence and commons styled agricultures support the seed saving that underlies a resilient global agriculture?

In expanding the topic of seed saving outward to agriculture, this discussion of seed saving becomes central to how agriculture intensifies and minimizes its environmental impacts in coming generations. Seed saving becomes one among many beneficial agricultural outcomes such as soil conservation, water quality management, habitat development, and the sustenance of human communities. In the same way that a need for all agricultures has been made, a call for all types of seed saving is needed. Both of these calls argue for a less rigorous framing of the discussed dichotomies, for each arrangement affords strengths and weaknesses unavailable in other arrangements.

If subsistence agriculture and seed saving are not to be dominant or widespread in our global agricultural systems moving forward, it will be important to look for other means to carry on the practice of seed saving and the maintenance of unimproved landraces. Much like the public research institutions of the turn of the twentieth century period, seed saving enterprises either as not-for-profits or as businesses must continue the work of maintaining our agricultural heritage and attempt to realize the benefits of seed saving that will go unrealized if we look only to the third and fourth dichotomies. If history provides any indication as to where the next germplasm breakthrough will be found, it will likely arise in the developing world.¹¹³ Our ability

¹¹³ Kloppenburg, *First the Seed*, 168.

to draw on those landraces will be limited as economic hinterlands are increasingly integrated. Solutions will be limited to those possible only via advanced breeding technologies that attend to the third and fourth dichotomies of seed saving.¹¹⁴

If our revised emphasis and expanded inclusiveness of all agricultures is indeed sincere it is critically important that seed saving be recognized for its potential to benefit local and regional growers via crop specialization, and to support our global breeding resources by maintaining a diverse germplasm supply. The vision proposed in this paper seeks to most adequately balance and deploy the seed resources available by suggesting a mixture of subsistence and commercial, and public and private, and urban and rural that is diversified, balanced, and intentionally plays to the strengths of its components. As exemplified by turn of the century seed saving programs, seed saving is an accessible means by which a variety of diverse growers have the opportunity to contribute to our future agricultural resources. A final lesson, which recalls the idea of ‘all seed saving’ and ‘all agricultures,’ is found in how the dichotomies of seed saving reveal a need for multiple forms and a rejection of singular solutions.

¹¹⁴ Ibid., 244.

Chapter 3 - Corn Shows Yield Trials, and the Coming of Hybrid

Corn

This paper explores several overlooked social dimensions of American corn seed saving and encompasses the half-century prior to the rapid acceptance of hybrid seed corn.¹¹⁵ Prior to the development of hybrids, the primary agricultural drivers or stakeholders--land grant schools, farmer associations, farmers, and even businesses—agreed on the farmer’s principal role as seed saver. Starting in 1890, these stakeholders built yearly institutions in the form of the corn show and later, in the annual yield trial that emphasized the importance of seed saving to farmers. In this context, seed saving became an integral piece of progressive agriculture, while it continued to occur within the traditional world of agricultural work. Corn shows built knowledge, skills, and consensus around ‘good’ seed corn. Later on, as corn shows fell out of favor, annual yield trials modified that knowledge and focused it around the idea that ‘better’ seed corn would yield more. Together, corn shows and annual yield trials created a framework whereby farmers knew what the corn of the future would look like and how well it would yield. These two farmer institutions intensified hybrid seed corn’s appeal to farmers in excess of its economic value and provided the framework through which hybrids were adopted.¹¹⁶

This study draws on agricultural journals, extension materials from Corn Belt states, farmer association materials, seed catalogs, and early retrospectives on corn seed saving and hybrid seed written for farmers and the general public. These primary sources presented ongoing developments in and around the process of seed saving, revealed differences of opinion and

¹¹⁵ In focusing on social dimensions, this work notes its specific debt to Kloppenburg’s, *First the Seed*, which well articulates the development of agricultural state science and the seed industry within the United States.

¹¹⁶ Norman Simmonds, *Principals of Crop Improvement*, (New York, NY: 1979), 51, and G.F. Sprague, “Heterosis In Maize,” in *Heterosis: Reappraisal of Theory and Practice*, ed. R. Frankel (New York, NY: Springer-Verlag, 1983), 48.

provided a sense of the prevailing wisdom in corn culture. The goals, tone, authorship, and timeliness of each work reveal how researchers, associations, businessmen, or farmers encouraged farmers to grow more corn, and how each group answered the question of who ought to save seed and under what circumstances. These works often indicated how many farmers competed in a corn show, or how many provided seed for a yield trial. These numbers are helpful for understanding the widespread nature of both phenomenon, but they are imperfect in explaining how farmers actually saved seed.¹¹⁷ This is because farmers may have saved different lots for showing and growing, and other farmers were known to sell winning ears. It is important to understand that while participation and seed saving generally overlapped one did not guarantee the other and vice versa. What these sources lacked in ‘on farm’ happenings they made up for in explaining an idealized form of farmer and farming. Often aspirational, the tone of these works revealed how farming should have proceeded according to ‘best practice.’¹¹⁸ Across this time period and among different agricultural stakeholders ‘best practice’ was contested. Over time, certain values were prioritized at the expense of others. This reduced seed saving’s viability as much as hybrid seed corn’s yield.

Farmers primarily saved seed prior to and during the turn of the 20th century period, and until the introduction of hybrid corn.¹¹⁹ Although families, local community, or businesses saved seed, land grant schools, farmer associations, and businesses conceptualized seed saving as a

¹¹⁷ For examples of land grant materials detailing participation see, P.G. Holden, *ABCs of Corn Culture: Or Making Two Nubbins to Grow Where Only One Grew Before*, (Springfield, OH: Simmons Publishing, 1907), or Martin Mosher, ‘Method of finding for distribution and further development a good type of corn for Clinton County, Iowa, conditions’ (master’s thesis, Iowa State University, 1915). For examples of corn show or yield trial participation see, Gail T. Abbott, ‘Ohio Corn Show and Tests,’ *The National Stockman and Farmer*, January 27th, 1910, p. 1145. Or A.R. Weed, ‘Corn Speaks for Itself at Eureka Show: Exhibition of Three Years Work Shows Which Type is Getting Results,’ *Orange Judd Farmer*, January 15th, 1922, p. 30 & 46.

¹¹⁸ The idea of ‘best practice’ is hard to define, but is best understood as a compromise between agricultural drivers. ‘Best practice’ took into account what was possible, according to the land grant system and businesses, and what was practical, according to farmer journals, and the local farm environment.

¹¹⁹ Jack Kloppenburg *First the Seed*, (Madison, WI: University of Wisconsin Press, 2004), 57 and 72.

process to be undertaken by individual farmers.¹²⁰ It was a seed economy where farmers expected, in most cases, to save their own seed.

In this way, seed saving fit into the world of work characterized by the process of ‘making do’ as elaborated by Mary Neth. ‘Making do’ required the whole family to bet on their families’ ability to produce their own goods and services through labor-intensive practices against uncertain commodity markets.¹²¹ Commonly, ‘making do’ meant saving seed. Land grant research supported this arrangement by testing local seed against seed obtained from other states and abroad. Especially with corn, local acclimated seed performed better.¹²² This favored local seed economies. Farmers were encouraged to save seed or obtain seed from local sources because it out performed foreign seed.

‘Making do’ connoted a host of community-based activities, captured by the verb ‘neighboring,’ that connected family to necessary seasonal exchanges of work and resources to ensure the success of a farm neighborhood.¹²³ Because success depended on familial and community resources, such exchanges were socially predictable, economically important, and carried the weight of institution.¹²⁴ A farmer who saved seed ‘made do,’ and if that seed was shared or exchanged, the farmer ‘neighbored.’ Land grant schools, farmer associations, and businesses spoke to these traditional notions in how they explained the process of seed saving.

Despite the adequacy and resiliency fostered by farmer survival strategies, farmers during this time period received widespread attention as a population maligned by backwardness. It was

¹²⁰ Seed selection and saving is a consistent feature land grant publications and best exemplified in P.G. Holden’s work, W.T. Ainsworth, *Practical Corn Culture: Written Especially for the Corn Belt Farmers*, (Mason City, IL: W. T. Ainsworth and Sons, 1914), and Vernon Shoesmith, *The Study of Corn*, (New York, NY: Orange Judd Company, 1912).

¹²¹ Mary Neth, *Preserving the Family Farm: Women, Community, and the Foundations of Agribusiness in the Midwest, 1900-1940*, (Baltimore, MA: The John’s Hopkins University Press, 1995), 18.

¹²² Martin Mosher, ‘Method of finding for distribution and further development a good type of corn for Clinton County, Iowa, conditions’ (master’s thesis, Iowa State University, 1915) 1.

¹²³ Mary Neth, *Preserving the Family Farm*, 42.

¹²⁴ *Ibid.*

hoped by progressives within and without agriculture that its backwardness could be reformed and rationalized. By this logic agricultural communities needed to achieve urban standards of modernity in order to become the stable and robust communities that could counter balance the damaging moral effects of urbanized communities. This would in most cases be accomplished by improved agricultural techniques, greater income, and the ability to successfully navigate an increasingly consumer society. These goals were approached on national, state, and county levels; on the front lines of these changes were academics within the land grant system and extension agents who went about the day-to-day work of encouraging farmers to adopt more progressive practices—seed saving was one prominent feature of this general program of farm improvement.

‘Corn evangel’ Perry G. Holden of Iowa State College expounded his vision – better corn seed saving was the future of agriculture and it fit into familiar ways of working.¹²⁵ Holden drove home his five-point message on good seed corn during whistle stop tours through Iowa, at recently established corn shows across the state, in print, and went so far as to purchase an entire rail car of the best seed corn he could find for distribution to Iowa growers. While Holden’s work was extraordinary for its grandiose gesture, its content remained simple: save better seed.¹²⁶ Bulletins and other information produced by the land grant system mimicked Holden. More importantly, these works aligned the goals of better seed saving with gender, age, and value expectations familiar to farmers. Holden’s and other extension works detailed the culture of corn for a male audience. Pictures, diagrams, and authors depicted male farmers saving seed.¹²⁷ Still,

¹²⁵ P.G. Holden is frequently referred to as an Evangel by contemporaries such as Henry A. Wallace, and Richard Crabb. Richard Crabb, *The Hybrid Corn Makers: Prophets of Plenty*, (New Brunswick, NJ: Rutgers University Press, 1947), 144 - 145.

¹²⁶ Martin L. Mosher, *Early Iowa Corn Yield Tests and Related Later Programs*, (Ames, Iowa: Iowa State University Press, 1962), 112.

¹²⁷ Holden, *The ABCs of Corn Culture*, 15-23, 50, 65, & 79.

even this spoke an understanding of labor flexibility on the farm. Holden noted the work of a seed test, storage, and seed picking occurred inside the house. Holden revealed a gendered understanding when he said to perform the test on the kitchen table if need be, "...keep in a warm place where it will not freeze. There is no place in the house too good for this germinating box."¹²⁸ A candid picture of a brother and his younger sister reviewing a seed test was captioned, "Hundreds of Iowa boys and girls tested the seed corn for the crop of this year. The young people in this case got too anxious, and will have to wait a few days..."¹²⁹ This assignment fits the expectation that rural youth would help out with tasks as they were capable.¹³⁰ Holden's idealized process for saving seed took into account the existing style of agriculture and so the process of corn seed saving was connected to a flexible labor system. Holden's attention to strategies that traded familial labor for valuable on farm products aligned with a farmer's sense of thrift.¹³¹ Holden argued seed saving was economically valuable and the farmer as the primary saver of seeds.

Farmer associations and businesses also contributed to the focus on better seed saving during this time period. Farmers associations supported seed saving by acting as more formalized community networks that often provided, tested, or purchased seed in a way consistent with 'neighboring.' These institutions provided the 'work' of 'progressive' projects. Though they operated on a variety of levels—county, state, or region—they remained primarily local institutions. Seed businesses, if uncomfortable with seed saving, also spoke to these notions by

¹²⁸ Ibid., 30.

¹²⁹ Ibid., 37.

¹³⁰ Neth, *Preserving the Family Farm*, 19.

¹³¹ Recommended practices were commonly subjected to the litmus, 'Does it pay?' In this case, Holden estimates the cost of a germination test at 10 cents allowing for two dollars per day for labor and 25 cents to make the germination box.

emphasizing thrift, including saving instructions, and including saving stories in their referrals.¹³²

Where seed saving was concerned the lines between farmer, businessmen, researcher, and association participant were blurred.

In his short work on corn culture, farmer-breeder J. S. Leaming offered farming philosophy as a grower with 60 plus years' experience, good corn culture as a farmer, and high quality seed corn as a seedsman. For Leaming 'making do' was central to farming. Instead of purchased fertilizers, Leaming 'made do' with red clover, "We say to farmers—do not be wheedled around by commercial fertilizers when you have right at hand a grass in the shape of red clover that will fertilize with comparatively but small expense."¹³³ Even as a seedsman, Leaming's pitch underscored that selling good seed and saving seed were part of the same enterprise. Leaming looked forward to providing seed to interested growers, but remained invested in others saving his seed as he explained the process in detail.¹³⁴ This discussion cemented and praised the union of 'making do' and seed saving, even if occasionally purchased, by placing it within the realm of tasks a farmer accomplished adequately well with indigenous resources.

Corn shows built consensus among agricultural stakeholders on the topic of seed saving by solidifying the dual nature of seed saving as progressive and traditional. They created a public space for farmers and their corn to compete, land grant schools to present findings and best practices, associations to serve and recruit within the community, and for businesses to show off their wares. They began in the 1880s, enjoyed their greatest popularity around 1910, and

¹³² Funk Bros Seed Co., *Book on Corn for 1912*, (Bloomington Illinois: 1912) 10-11.

¹³³ J.S. Leaming, *Corn and Its Culture: By a Pioneer Corn Raiser, with 60 Years Experience in the Cornfield*, (Wilmington, OH: Journal Steam Print 1883), 11.

¹³⁴ *Ibid.*, 11, 12, & 15.

continued into the 1920s and later.¹³⁵ The progressive goals of the corn show emphasized, “The increased yield of better and pure-bred corn in the community, for better corn means better yields, better methods, in fact better everything that pertains to corn and corn growing.” The judge’s goal was to award, “First prize to the sample that will be of most benefit to the corn grower.”¹³⁶ These goals complimented seed saving and focused attention on corn grown and saved by individual farmers. While corn shows explained a specific way of seed selection and saving and judged corn with an elaborate and somewhat arbitrary scorecard, the corn show was hardly an esoteric consideration of jargon and abstract principals, but rather focused on corn and corn growing because it was universal to the Corn Belt experience. Furthermore, corn shows were curated by communities’ agricultural stakeholders, balanced progressive notions like competition with more traditional ones like cooperation, served as sources of civic pride, and represented an opportunity to swap seeds, talk shop, and learn with other community members. Corn shows, like seed saving, were combinations of progressive and traditional agriculture and despite their inability to consistently improve corn were a beneficial institution that improved farmer’s ability to select and save seed while building a consensus on what good seed corn ‘looked’ like.¹³⁷

The Illinois Corn Growers Association inaugurated the Corn Show and their scorecard in 1890 with the goal of ‘developing an interest in better seed corn,’ and formalized seed saving as a competition between farmers, who may have already been competing to grow the best corn.¹³⁸ Its rules took into account ‘common sense’ points that had appealed to corn farmers for the better

¹³⁵ ‘The Ohio Corn Show,’ *The National Stockman and Farmer*, December 27th, 2013, p. 981, & Wallace and Bressman, *Corn and Corn Growing*, 251.

¹³⁶ W.W. Williams, ‘What a Corn Show Has Done,’ *The National Stockman and Farmer*, February 27th, 1913, p. 1305, and Mosher, *Early Iowa Corn Yield Tests*, 97.

¹³⁷ Fitzgerald, ‘Farmers Deskilled: Hybrid Corn and Farmer’s Work,’ *Technology and Culture* Vol. 34, (Apr. 1993): 334.

¹³⁸ *Ibid.*, 329.

half of the previous century.¹³⁹ As a result, corn shows favored cylindrical ears of a specific length and number of rows, that were finished tip and butt, with limited space between kernels; kernels were to be deep, keystone in shape, wide, and having large germs.¹⁴⁰ These basic values were elaborated by cultivar. The cultivar Reid was ideal cylindrical, the cultivar Leaming ought to taper toward the tip. Region dictated a cultivar's minimum ear length. Northern Illinois's ideal ear was shorter than the ideal ear of Central and Southern Illinois.¹⁴¹ In addition to cultivar type and region, corn shows were typically divided into yellow and white color classes—variegated ears were taboo, “ashamed to show and ashamed to plant”¹⁴²—and into single and ten ear exhibits—occasionally 30 or 70 ear samples were called for.¹⁴³ Farmers won if their sample was truest to cultivar type with nearly identical ears. Winning required feats of attention to agronomic detail. Finding the perfect ears required ritual-like observation and patience during harvest—hours and attention in excess of adequate seed saving.¹⁴⁴

Because the judging process tested each ear internally against its own ten-ear sample and externally against the idealized ear, a farmer hoped to select ten that were uniform and met the cultivar standards. The corn scorecard represented the highlights of an exacting and rigorous process that called farmers to, “Become so thoroughly familiar with every characteristic of the ear as to be able to recognize at a glance the strength or weakness of each.” The scorecard acted

¹³⁹ Wallace and Bressman, *Corn and Corn Growing*, 251.

¹⁴⁰ Ibid., Greater detail on the diversity among corn show ideal types see Shoesmith's *The Study of Corn*, Ainsworth's *Practical Corn Culture: Written Especially for the Corn Belt Farmers*, or Olin A. Dobbins, ‘Ohio Corn Show as a Farmer Saw It,’ *The National Stockman and Farmer*, December 17th, 1908, p. 873.

¹⁴¹ Vernon Shoesmith, *The Study of Corn*, (New York, NY: Orange Judd Company, 1912), 110.

¹⁴² It is unclear why this was so, but generally speaking variegated corn was an unsettling phenomenon. See Ainsworth ‘Testing the Seed Corn.’

¹⁴³ Ralph M. Ainsworth, ‘Testing Seed Corn,’ *Orange Judd Farmer*, September 23rd, 1916, p.4. 30, & John B. Peelle, ‘Lessons From The Corn Show.,’ *The National Stockman and Farmer*, February 17th, 1910, p. 1258, & ‘Corn Show Awards,’ *The National Stockman and Farmer*, February 10th, 1917, p. 1211, & Gail T. Abbott, ‘Ohio Corn Show and Tests,’ *The National Stockman and Farmer*, January 27th, 1910, p. 1145.

¹⁴⁴ Wallace and Bressman, *Corn and Corn Growing*, 255.

as a grammar for reading the differences between ears, samples, and cultivars.¹⁴⁵ In his preface to explaining the corn scorecard, W.T. Ainsworth explained, “We have tried to explain as clearly as possible in this chapter, the factors which enter into the selection of corn for seed and exhibition purposes. To tell on paper how to select corn is almost impossible.”¹⁴⁶ The scorecard was a tool for beginners, was frequently used in agricultural curriculum, and it noted the dozen or more variables to keep in mind, but personal experience with the judging process and knowledge of what localities favored improved a farmer’s chances of winning.¹⁴⁷

The scorecard’s flexibility aside, winning, it was hoped, would indicate ears worthy of growing that were the product of good seed saving. This was a consistent feature of materials promoting the corn show as a means to improve a farmer’s corn crop. Shoesmith’s work included pictures of ‘winning’ and ‘losing’ samples—their captions underscore the connection between winning samples and good quality seed corn, “Uniformity in size, shape, color, indentation, etc. The type is well fixed, and the characteristics will be transmitted to their offspring with considerable certainty.”¹⁴⁸ A losing sample had, “Little breeding or type; and moreover he (the farmer) shows little knowledge of seed selection, as is evidenced by the almost entire lack of any standard in his selection.”¹⁴⁹ As P.G. Holden explained, raising a poor sample or having poor seed corn, “Means a poor stand, with missing hills, one-stalk hills, and weak stalks producing little or nothing.”¹⁵⁰ Progressive farmers went to corn shows and aspired to save good seed.¹⁵¹ In the corn show, seed saving became progressive and intentionally competitive,

¹⁴⁵ Shoesmith, *The Study of Corn*, 34.

¹⁴⁶ Ainsworth, *Practical Corn Culture*, 103.

¹⁴⁷ Wallace and Bressman, *Corn and Corn Growing*, 254.

¹⁴⁸ Shoesmith, *The Study of Corn*, 39.

¹⁴⁹ *Ibid.*, 38.

¹⁵⁰ Holden, *The ABCs of Corn Culture*, 32.

¹⁵¹ *Ibid.*, 14.

yet it had social dimensions that checked the sometimes-substantial cash prizes and tendency to engage in all-out competition.

A 1910 article in *The Craftsmen's* prepared readers for sensations to follow with its title—*A Two Hundred-And Eighty-Dollar Bushel of Corn: A Corn Show in Omaha*. The perfect bushel of corn, the holy grail of the corn belt, sat behind glass, visibly protected by, “A chain that could have held an elephant.” It was sold for famine prices in times of abundance and the Kellogg thousand dollar silver cup was traded for, “The best ear of corn ever grown.” The progressive narrative and the corn show were one and both reappraised farming.¹⁵²

Farmers, progressive values, and seed saving were built into corn shows. Participants, while learning how to save better seed, were taught how to become professionals who utilized scientific knowledge, and bought into the thrilling pace of agricultural change. Because, “Our farm products do not keep pace with our population... The corn show is showing how to change this. It is telling the farmer how to make his acres more productive.”¹⁵³ The farmer, “Proved to the city man that farming is something more than drudgery; that it offers a chance to use the brains and is a business wherein both inventive genius and business ability may be brought into play.”¹⁵⁴ Framed thus, farming was, “A business that may be highly interesting as well as highly remunerative.”¹⁵⁵ While *Craftsmen's* work was intended for a general audience, the progressive goals noted were common among smaller corn shows. In the 1913 Ohio Corn Show, the Ohio Corn Improvement Association held their yearly meeting and managed the proceedings.¹⁵⁶

Among many offerings, Ohio state agronomists presented on ‘Factors Influencing the Yield of

¹⁵² Frederick J. Burnett, ‘A Two-Hundred-And-Eighty-Dollar Bushel of Corn: A Corn Show in Omaha: Its Value to the Farmer,’ *The Craftsman*, Volume 19, no. 3 (December, 1910): 289 - 291.

¹⁵³ *Ibid.*, 290.

¹⁵⁴ *Ibid.*, 293.

¹⁵⁵ *Ibid.*, 290.

¹⁵⁶ ‘The Ohio Corn Show,’ *The National Stockman and Farmer*, December 27th, 2013, p. 981.

the Corn Crop’ and ‘The Last Word in Corn Improvement,’ while International Harvester presented ‘Alfalfa on the Corn Farm.’ Community businesses offered \$1,200 for the event’s cash prizes for several hundred entries.¹⁵⁷ Continuing, the article argued the corn show was, “A lesson ‘worth any price,’” a place where the old-fashioned farmer, “Is lost to his old traditions.”¹⁵⁸ The corn show presented to farm youth “The possibilities of the calling... that it is not necessarily the mere routine of chores and plowing, but can be made an occupation, a profession.” Additionally, the corn show inspired the, “Possibilities of developing a new variety of corn... of making nature do one’s bidding.”¹⁵⁹ Because of these wonderfully progressive qualities, “A State could well afford to send a delegation of old-fashioned farmers to the corn show every year.”¹⁶⁰ Despite its progressive alignment, and especially, at its high tide in the 1910s, corn shows functioned in a familiar world of work, harnessed local agency and strove for fairness in competition.

Corn shows were civic exercises curated by agricultural stakeholders who fit progressive agriculture to their locality and ensured a fair public competition for farmer and seed corn. So while the 1913 Ohio corn show featured a statewide association, speakers from the land grant school, and national businesses, a smaller corn show as was held in Tazewell County in Pekin, Illinois in 1924 was put on by the Pekin Association of Commerce and the Tazewell County Farm Bureau. Speakers included local business leaders like seedsman J.O. Sommer, veteran corn judges, and USDA breeder J.R. Holbert who presented on ‘The Time Factor in Corn Planting.’ An ‘attractive list of cash prizes’ was provided for around 100 entrants.¹⁶¹ The corn show format where associations provided legwork and judging, land grant researchers and extension agents

¹⁵⁷ National corn shows were even more well-funded see, ‘Corn Show at International,’ *National Stockman and Farmer*, November 13th, 1920, p. 994.

¹⁵⁸ Burnett, ‘A Two-Hundred-And-Eighty-Dollar Bushel of Corn,’ 293.

¹⁵⁹ Ibid.

¹⁶⁰ Ibid.

¹⁶¹ ‘Tazewell Holds Corn Show at Pekin Next Week,’ *Orange Judd Farmer*, January 1st, 1924, 10, & John B. Peelle, ‘Lessons from the Corn Show,’ *The National Stockman and Farmer*, February 17th, 1910, 1258.

presented and assisted in judging, businesses provided prizes and speakers, and farmers provided their samples of corn remained consistent as corn shows represented communities, counties, states or regions.

This arrangement kept corn shows accountable and flexible to their communities' and farmers' expectations. When things got out of hand, as they did in the 1910 Ohio State corn show, communities responded constructively. The state show held in Columbus resulted in Clinton County thinking, "She was the center of the earth, and for no reason at all except that Clinton carried away more prize money than any other county."¹⁶² Covered in another article, the landslide victory of Clinton County was part of the west central region's ascendancy. Out of 88 counties, 25 counties of this region over the previous three years had won three fourths of all ribbons and over 90% of all prize money.¹⁶³ The 'section show' was unacceptable and "Realizing the injustice of expecting the less favored sections of the state to compete," resulted in four divisions of competition for the State.¹⁶⁴ Tasso Tearell, who bred Clinton County's successful ears, soured local farmers to entering a corn show in Sabina, a small town in Clinton County because Terrell would take all the prizes.¹⁶⁵ Organizers, "appealing to local pride and a wise arrangement of the prize list," prevailed.¹⁶⁶ The turnout of 144 entries, one-fourth the size of the state show, merited boasting.¹⁶⁷ Most importantly, a newcomer to the corn show won and "Illustrated the fact that no man can win all the prizes and because the man who has the courage to 'go in' has a good chance to win."¹⁶⁸ Nevertheless, Terrell took several first prizes.¹⁶⁹

¹⁶² Peelle, 'Lessons from the Corn Show,' 1258.

¹⁶³ Gail T. Abbott, 'Ohio Corn Show and Tests,' *The National Stockman and Farmer*, January 27th, 1910, p. 1145.

¹⁶⁴ Ibid.

¹⁶⁵ Peelle, 'Lessons from the Corn Show,' 1258.

¹⁶⁶ Ibid.

¹⁶⁷ Ibid.

¹⁶⁸ Ibid.

¹⁶⁹ Ibid.

While the corn shows were built on a consensus of what good corn was, their success required a level of ambiguity not present in all-out competition—at state and local levels efforts were made to ensure a level playing field. Better farmers had better chances at winning, but all farmers had a chance. Efforts were made to share success by awarding many prizes to many sections for many varieties, and this expanded the number of winning farmers and by consequence winning ears and cultivars. Farmers’ journals printed notoriously tedious lists to showcase the hundreds of winners at local, state, and national corn shows.¹⁷⁰ Corn shows reflected the variety of cultivars grown within their region and as a result provided additional incentive to grow, select and save several different cultivars.¹⁷¹ The corn show was a byproduct and extension of seed selection and saving; while coopted by the progressive agenda the corn show never challenged the assumption that farmers would save seed. It hoped to enrich and reward better cultivation. Taken all together, the 1910 Ohio corn show assessment reflected “Did it pay? Of course it paid... It is not the money you win, but the things that you learn. That makes a corn show pay.”¹⁷² This type of broader evaluation combined with invested stakeholders’ careful management provided the corn show durability as an institution even as the corn shows’ shortcomings became increasingly apparent during the late 1910s.

Another article responding generally to criticisms in 1908, described the corn show as a ‘mighty’ useful institution, even if it could “Not show or tell the whole story of corn.” During this time period, when the ‘whole story’ of corn and heredity were vaguely understood, the corn show’s judging imperfectly selected and saved better corn. This undermined its perceived value

¹⁷⁰ ‘Corn Show Awards,’ *The National Stockman and Farmer*, February 10th, 1917, 1211, Abbott, ‘Ohio Corn Show and Tests,’ 1145, ‘Corn Show Awards,’ *The National Stockman and Farmer*, February 10th, 1917, 1211, ‘Utility Corn Show Winners,’ *Orange Judd Illinois Farmer*, February 15th, 1927, 128, & ‘Corn Show Winners at Springfield,’ *Orange Judd Farmer*, October 9th, 1915, 13.

¹⁷¹ *Ibid.*

¹⁷² Peelle, ‘Lessons from the Corn Show,’ 1258.

as an institution.¹⁷³ Farmers asked, “Why are we paying prizes at times to corn that won’t yield?”¹⁷⁴ This question drew support across the Corn Belt and beyond. Henry Wallace, secretary of agriculture, early hybrid developer, and owner of Wallaces’ Farmer magazine and Eugene Funk, seedsman, breeder, and developer of the corn score card, championed this criticism of ‘pretty ears.’ Both on various occasions in the 1910s and 1920s went on record to challenge the value of the corn show.¹⁷⁵ These dramatic instances emphasized the gap between the corn show’s goals and its potential to improve the quality of corn grown in the Corn Belt. Corn shows incentivized seed saving, and taught better corn culture. Corn shows were effective in communicating the best ways for farmers to select and save their own seed, and had the potential to improve selecting and saving up to a point, especially where seed quality was poor. Unfortunately, most developments in breeding up to this time, like top crossing, in essence crossing two open pollinated cultivars, or ear to row breeding, the practice of organizing fields and saving by isolating the best ears, were more purposeful articulations of mass selection and good seed saving protocols.¹⁷⁶ Because seed saving, top-crossing, and ear-to-row breeding failed to adequately select for higher yielding strains, Corn Belt growers were dissatisfied and looking for ‘better’ corn. The corn show’s inability to predict corn’s yielding power pushed agriculturalists first to compromise and revise the corn show scorecard. This led to a brief refocusing of the show around the ‘utility type’ corn that modified the scorecard and included a germination test as part of the judging process.

¹⁷³ ‘The Corn Show,’ *The National Stockman and Farmer*, November 12, 1908, p. 749.

¹⁷⁴ Abbott, ‘Ohio Corn Show and Tests,’ 1145.

¹⁷⁵ *25th Anniversary Hybrid Seed Crop: Funk Farms Birthplace of Commercial Hybrid Corn* (Bloomington, Ill: Funk Bros. Seed Company, 1941), 10, & Richard Crabb, *The Hybrid Corn Makers: Prophets of Plenty*, (New Brunswick, NJ: Rutgers University Press, 1947), 145.

¹⁷⁶ Kloppenburg, *First the Seed*, 78.

The utility corn shows began in the 1920s and incorporated new findings related to the higher incidence of corn diseases. The utility corn show incorporated a germination test, increased the ‘weight’ of points for seed qualities associated with vigor, and decreased the number of points awarded for aesthetic qualities.¹⁷⁷ This shift generated controversy that made especially apparent the shortcomings of the corn show. Growers who favored ‘pretty ears’ and the older style of judging were at odds with the ‘utility type.’ The opposite camp saw the pretty ear as a misstep toward the development of better corn and the ‘utility’ type as a positive refocusing of the corn show’s energies. Stories about ‘Utility’ corn reframing the status quo abounded, ‘put(ting) the most money into the pocket of the farmer,’ and asked rhetorically, “Queer that such a standard should be used to judge a corn show, isn’t it?”¹⁷⁸ As ‘utility’ corn shows won out, a sense of righteousness emerged from the winning camp that revised the conventions of good seed corn. Farmer, seedsmen, and agricultural institutions encouraged growers to shift to the utility type arguing “If you are a serious minded corn grower, we urge you to attend, learn what you can, and help push this good idea along.”¹⁷⁹

The transition to the ‘utility’ corn show exercised compromise in the same way that the corn shows were carefully curated to ensure a public forum for fair competition. The corn show was not jettisoned, but shifted to ‘utility’ corn. This represented the degree to which farmers were invested in the corn show, despite their misgivings, and by consequence, the depth of their opinions regarding corn. If the corn shows were institutions that focused on seed saving’s ability to improve the quality of the seed saved, then saving seed, competing in a show, and good seed corn overlapped well enough to justify the activity’s maintenance.

¹⁷⁷ ‘Rules to Govern ‘Utility Corn Show,’’ *Orange Judd Farmer*, December 4th, 1920, 10.

¹⁷⁸ ‘Where Beauty Means Bushels Per Acre: Basis of Awards at the Utility Corn Show,’ *Orange Judd Farmer*, January 15th, 1921, p. 49.

¹⁷⁹ ‘The Utility Corn Show,’ *Orange Judd Farmer*, January 1st, 1921, 4.

Even as ‘utility’ corn more adequately predicted which ears would produce ‘good’ seed corn, it was not an annual yield trial, which compared cultivars by yield. Where the corn show emphasized process the yield trial measured product. Where the corn show counted on good seed saving and good seed corn to overlap, the yield trial counted on yield to represent good germination, maturation, and harvest. As yield trials grew in popularity this shift in measures created a value system that prioritized yield.

Yield trials shared social features with corn shows; proponents of both hoped to improve the quality of corn available to community members. Without the score card, the yield trial was both practical and straightforward or a deliberate slight to the corn show and its ‘pretty ears.’ Nevertheless, yield trials utilized collaboration between land grant schools, farmer institutions, and farmers at the community level.¹⁸⁰ In 1914, M.L. Mosher conducted the first yield trial in Clinton County Iowa in collaboration with Iowa State College, the Clinton County Commercial Club, and local area growers.¹⁸¹ This early yield trial found the best yielding corn within the community and made it available to community members. Over three consecutive years, the Clinton County study winnowed the one hundred or so farmer’s samples from the 18 townships down to six. Mosher recommended these samples as the best and highest yielding within the county and generally they were accepted widely across the community.¹⁸² This early yield trial was not continued, but laid the foundation for future trials at the county and state level, and also established the precedent of using yield as the singular measure of a cultivar’s value. A decade later, the Iowa State Annual Yield Trial was established simultaneous to the Woodford County

¹⁸⁰Martin L. Mosher, *Early Iowa Corn Yield Tests*, 82.

¹⁸¹ Martin Mosher, ‘Method of finding for distribution and further development,’ 1.

¹⁸² *Ibid.*, 32.

yield trial conducted in Illinois, which brought to the fore the leading open pollinated cultivar grown by George Krug.

Annual yield trials emphasized yield like many studies conducted by land grant schools, where yield was the independent variable, but annual yield trials differed in what yield signified. Research produced by land grant schools tended to suggest a cultural practice would result in a certain yield; annual yield trials suggested a certain cultivar would yield better. Yield was not necessarily a poor measure because many qualities like vigorous germination, strong stalk, or resistance to diseases and pests correlated with yield. Nevertheless, yield changed the nature and outcomes of these sorts of farmer competitions, for the annual yield trials put corn cultivars' of farmers' and businessmen into direct and more narrowly defined competition that prioritized certain cultivars over others.

So while the Woodford County yield trial and others carried forward collaboration among agricultural stakeholders and emphasized cooperation and fair play, it limited the number of winners and narrowed the meaning of success. Where the corn show showcased numerous individuals and their ears, the annual yield trial highlighted one or two really outstanding cultivars. Unlike losing a corn show, where a farmer might return the following year to test his lot again, the annual yield trial settled the matter. Farmers, who may have been working with their corn for years, learned their corn was inferior on a yield per acre basis. Some commented on the Woodford County trial that continued participation was, “costing me money to keep on growing this corn when I know it doesn't produce as well as other corn, but I'll grow enough to finish.’ ...They changed the seed on the bulk of their corn crop...They were ‘good sports’.”¹⁸³ Farmers were compelled socially to maintain their corn for the trial, but following the trial,

¹⁸³ A.R. Weed, ‘Corn Speaks for Itself at Eureka Show: Exhibition of Three Years Work Shows Which Type is Getting Results,’ *Orange Judd Farmer*, January 15th, 1922, p. 30 & 46.

which concluded in 1922, they rapidly sought out and planted the high-yielding Krug corn. Some estimates suggest over half the fields within central Illinois were planted to Krug corn only a few years following the trial.¹⁸⁴

The ‘good sports’ of Woodford County were ready for Krug corn in the same way that the Corn Belt was ready for hybrid corn. After nearly a half-century of corn improvement that focused on better seed saving by farmers, farmers looked forward to solving the challenges that were unexpectedly built into the program of better seed saving.¹⁸⁵ While the seed saving methods of the corn show tended to improve the quality of seed corn it did so primarily by reducing the potential for miss-haps related to not germinating, weak germination, disease management, and resistance to pests. But, this manner of seed saving proved inadequate to extending the limits of cultivars through better selection. This shortcoming of the corn show left farmers with a familiar starting point for improving their corn, but also floundering for a more predictable way to improve the quality of their corn. Yield trials, though they reduced the number and types of acceptable corn, provided a more reliable medium for improving corn after two decades of debate related to the corn show’s inability to predict which ears would yield best. The erratic nature of corn improvement combined with an emphasis on yield created desire for greater predictability and yield; hybrid corn aptly met both expectations. This desire dovetailed with hybrid’s economic potential and the use of familiar patterns of adopting. Together these factors accelerated hybrid’s rapid and universal acceptance.

Annual yield trials did not solve the seed saving question like hybrid corn would, but they obliterated the value of ‘pretty ears’ and weakened the corn show as an institution. Yield trials

¹⁸⁴ Martin L. Mosher, *Early Iowa Corn Yield Tests and Related Later Programs*, (Ames, Iowa: Iowa State University Press, 1962), 82.

¹⁸⁵ Many of these challenges have been argued by Kloppenburg as arising from gaps in scientific knowledge. See *First the Seed* Chapter 5 *Heterosis and the Social Division of Labor*.

created a framework that provided hybrid corn the opportunity to out yield open pollinated corn in a public setting. They solidified the image of the ‘better’ corn of the future—this corn would yield well, on sturdy stalks, and be resistant to diseases and pests. As it happened, hybrid corn provided just those solutions in an enticing package.

As hybrid corn gained increasing attention from agricultural stakeholders a variety of collaborative steps were taken among stakeholders, but these steps tended to be overshadowed by the success of the ‘big six’ hybrid seed corn producers.¹⁸⁶ These collaborative steps fit within the precedents established by the corn show and the annual yield trial that emphasized community control and participation even if programs and projects were stratified beyond the county or states level. Land grant schools and the USDA both devoted resources to explaining how to produce hybrid seed corn.¹⁸⁷ These instances reveal the expectation that hybrid corn production would be another step along a path toward better seed corn where farmers, supported by the land grant system, farmer associations, and businesses, would be the principal actors. It is clear from these sources that hybrid production might have fit within more traditional ways of work and extended the expectations created through the corn show and annual yield trials.¹⁸⁸

Documents published from within the land grant system and the USDA explained how a small grower or individual farmer would have produced their own hybrids at the farm or community level.¹⁸⁹ These documents focused on the details of hybrid production at a small scale and provide estimated acreages and yield estimates. Detailed to the type of apron with

¹⁸⁶ ‘The Story of Hybrid Corn,’ *Wallaces’ Farmer*, August 13th, 1938, 14.

¹⁸⁷ Thomas E. Hall, ‘Purchasing Hybrid Seed Corn Cooperatively,’ Cooperative Research and Service Division, Miscellaneous Report No. 100 (August 1946), and Frederick Richey, ‘The What and How of Hybrid Corn,’ U.S. Department of Agriculture, *Farmers’ Bulletin No. 1744* (1935): 10.

¹⁸⁸ Hall, ‘Purchasing Hybrid Seed Corn Cooperatively,’ and G.H Dugan, C.M. Woodworth, A.L. Lang, J.H. Bigger, and R.O. Snelling, *Developments In Hybrid Corn Production* (Springfield, Ill: Illinois Farmers’ Institute, 1938-39), 8-10 , and Richey, ‘The What and How of Hybrid Corn,’ 10.

¹⁸⁹ Snelling, *Developments in Hybrid Corn Production*, 9, and Richey, ‘The What and How of Hybrid Corn,’ 10.

round cornered pockets, tools to plant with, and instructions, the USDA explained how the work of planning, planting, and de-tasseling for a hybrid operation ought to be completed.¹⁹⁰ They explained in laymen's terms the principals behind inbreeding and crossing. Several land grant schools, including those in Iowa and Wisconsin offered courses detailing the work.¹⁹¹ Furthermore, they encouraged farmers to write their extension station for inbred lines. These made clear the expectation that farmers could adopt hybrid seed production into their own production system as part of 'making do.' The USDA also invested time in co-operative production and purchase. Co-operative production never gained much of a market share, reaching only 1% in Corn Belt states, alongside on-farm hybrid production the possibility of 'making do' with hybrids was explored. In Wisconsin, a scheme of certification hindered larger companies and supported some 436 farmers in the process of hybrid production by providing drying and grading equipment and the needed inbred lines to engage in "Farmer Enterprise."¹⁹² Even if these alternatives received less attention and failed to mature, their existence reveals ambiguity within the land grant system, which on the other hand, played an integral role in providing inbred lines to the early hybrid companies. It is clear from these cursory efforts that the land grant system went to lengths to open up possibilities that aligned with 'making do' and with prior seed saving expectations. These alternative programs suggest that while hybrid corn's success may have been predictable, its close relationship and control by private businesses was more novel than expected.

For many agricultural stakeholders, especially seedsmen, hybrid production was best left to the experts and not farmers. This group supported the rapid privatization of hybrid production

¹⁹⁰ Snelling, *Developments in Hybrid Corn Production*, 9.

¹⁹¹ Kloppenburg, *First the Seed*, 106

¹⁹² *Ibid.*

arguing production was impractical because the process was time consuming, painstaking, potentially risky, and economically unfeasible for the average farmer and better accomplished by private businesses as opposed to the land grant system. In their perspective, it made sense to move seed saving off of the farm.¹⁹³ These individuals came from the camp that earlier had criticized the ‘pretty ear,’ or had discouraged earlier breeding practices because they, like hybrid corn, were unpredictable with low chance of reward for the individual farmer. These individuals focused on the high amount of bookwork and the potential for error in the handwork related to de-tasseling or ‘selfing’ associated with hybrid development. Despite the validity of their claim, it failed to take into account what farmers might have accomplished. As an example, farmers with their flexible labor pools might easily have produced hybrids from state-developed inbred lines for their locality via ‘neighboring.’ This message reversed decades of consensus building that farmers would save seeds, arguing that farmers would make poor producers of hybrids.

These forces congealed into a powerful advertising campaign that generally agreed hybrids were what farmers ought to adopt if several caveats were accounted for. Farm journals, USDA publications, extension materials, businesses, and other farmers encouraged farmers to switch to hybrid varieties. The six largest seed companies, American National, Dekalb, Funk, Leonard-Michael, Lester-Pfister, and Pioneer Hybrid, utilized large magazine spreads. Advertisements emphasized hybrid’s beneficial physical traits and glamourized their production systems as scientific, efficient, high-tech, and specialized. Businesses tapped into progressive agricultural assumptions that prioritized science and technology. As DeKalb inflated their capabilities, ‘flabbergasted’ farmers learned of DeKalb’s breeders’ genius, superior expertise, 42 years’ experience, and their industrial capacity, which included endless conveyor belts, huge

¹⁹³ Much attention is paid in ‘The Story of Hybrid Corn’ and in ads published in *Wallaces’ Farmer* by the ‘big six’ seed companies to the elaborate and unreplicable nature of hybrid production.

furnaces, man-sized fans, multiple batteries of graders, and the hired eyes of trained inspectors.¹⁹⁴ Extension documents were more evenhanded in dealing with the benefits and shortcomings of hybrids. They cautioned that a poorly adapted hybrid would do worse than open pollinated cultivars and explained that per unit volume hybrids tended to have lower protein content.¹⁹⁵ It was common to emphasize the increased importance of fertility management and soil conservation as part of adopting hybrids. Many stakeholders foresaw a day when the increased yield of hybrids would allow farmers to grow less corn to retire and restore marginal lands.¹⁹⁶ Businesses and other agricultural institutions were effective in disseminating information, but farmers and their informal social networks were the final arbiters of adoption, as numerous studies found local hybrid growers in good standing among the community as the surest predictor of widespread acceptance.¹⁹⁷ Farmers tended to avoid going ‘all-in’ and would adopt hybrids over several years. In this way, farmers adopted hybrids in a manner that resembled other technology adopting patterns. If the process was familiar, its pace was not. The rapidity of hybrid corn adopting far exceeded that of other technologies like the radio, which took decades to reach levels of ownership over 50%; hybrids did this in four to five years.¹⁹⁸ Within less than a decade, hybrid use within the Corn Belt was nearly universal. Furthermore, hybrids, once adopted, enjoyed continuous use unlike other staples of modernity, a fact made more remarkable because hybrids had to be purchased each year.¹⁹⁹ Not all farmers were keen on this arrangement, because it pulled them further into a commercialized economy, but

¹⁹⁴ ‘The Story of Hybrid Corn,’ *Wallaces’ Farmer*, 30-31.

¹⁹⁵ N.P. Neal, and A.M. Strommen, ‘Wisconsin Corn Hybrids—1948 Yield Performance – 1943-1947 and General Recommendations,’ College of Agriculture, University of Wisconsin, (January 1948): 3.

¹⁹⁶ No. 45. ‘Fortunes Washed Away: Hybrid Corn’ Series of Discussions on Soil Conservation in the Ohio Valley, U.S. Department of Agriculture Soil Conservation Service, Cincinnati, WLW, March 4th, 1939, 8.

¹⁹⁷ Fitzgerald, ‘Farmers Deskilled,’ 684.

¹⁹⁸ Ronald R. Kline, *Consumers in the Country: Technology and Social Change in Rural America*, (Baltimore, MA: The Johns Hopkins University Press, 2000), 114.

¹⁹⁹ *Ibid.*, 286.

nevertheless, hybrids were well received by the vast majority of farmers and farm communities.²⁰⁰

Hybrid corn was universally adopted a decade after its widespread availability in 1935. In 1939 it was planted to fifty percent of all corn acres; in Iowa in 1940 it accounted for eighty-eight percent of corn planted. Hybrids thrilled the general populace because they magically yielded twenty to thirty percent more bushels per acre than the best open pollinated varieties, and while treated less sensationally, the agricultural world, as represented in *Wallaces' Farmer*, understood the “Far reaching changes in farm management, in farm machinery, in soil fertilization, in livestock feeding and breeding...” and, “Fundamental changes in food production...” and foresaw how these changes would shape the future of agriculture.²⁰¹ Hybrid corn solidified the reputation of land grant schools by providing a symbol of ‘book farming’s’ potential. Hybrids increased the material output of the Corn Belt and increased the need for a variety of agricultural goods and services.²⁰² Agricultural leaders expected the success of hybrid corn, but less so the dominant and unprecedented role played by businesses in hybrid production. Hybrid corn matched a half centuries’ worth of consensus building as to what good seed corn should be with hybrid seed corn. After decades of attention from land grant schools, agricultural associations, businesses and farmers, open pollinated varieties were consistently out yielded by hybrids on sturdy stalks. A short exchange between father and son from a USDA radio script captured the reality,

²⁰⁰ ‘Hybrid Corn’s Empire Grows,’ *Business Week*, April, 1941, p. 28-30.

²⁰¹ ‘The Story of Hybrid Corn,’ *Wallaces' Farmer*, 1.

²⁰² J. L. Anderson, *Industrializing the Corn Belt: Agriculture, Technology, and Environment, 1945-1972*, (Dekalb, IL: Northern Illinois University Press, 2009), 172.

Cliff: ...the hybrid out yielded the standard corn, 76 bushel to 56 bushel. Even though there was a greater volume of standard corn...

Dad: ...the old ears have more cob—but cobs sure don't weigh much.

Cliff: Yeah, and another thing, dad, you can't fatten hogs on cobs. Well, anyway, that settles the matter.

Dad: I guess it does. And come to think of it, I liked the way that hybrid stood up straight...

Cliff: ...The stalks weren't so tall... We didn't have so much heavy fodder to handle, either. More leaves and every stalk on that darned hybrid had an ear...²⁰³

Despite its rapid adoption, hybrid corn's success was predicated on high-level seed saving achieved through the corn show, the focus on yield encouraged by the annual yield trial, and the consensus on 'good' seed corn created by both. These institutions created in farmers a set of seed corn appraisal skills, and while it has been argued that hybrids robbed farmers of these skills, these skills also assisted farmers in evaluating their hybrids; when farmers saw hybrids they knew they were looking at 'good' seed corn even if they could not tell by looking at the seed.²⁰⁴ Furthermore, the institution of the yield trial made it clear hybrids were achieving higher yields when well adapted to climate on fertile soil. The importance of the corn show and yield trial were echoed in failed attempts to make hybrids the next step in farmer-centered seed saving. These attempts included collaborative methods of hybrid corn production, individual production, and state certification among agricultural stakeholders.

²⁰³ 'Fortunes Washed Away: Hybrid Corn' U.S. Department of Agriculture Soil Conservation Service, 5.

²⁰⁴ Fitzgerald, 'Farmers Deskilled: Hybrid Corn and Farmer's Work,' 334.

While changes to the corn show and the increased attention paid to the annual yield trials modified what farmers expected from ‘good’ corn and how they appraised it—primarily by yield—they did not necessarily change the basic way farmers and other stakeholders curated their seed saving practices. The transition to hybrid corn broke precedent in how agricultural drivers were organized around seed saving. These factors, combined with the economic incentive to ‘solve’ the question of ‘better’ seed corn, closed the door on open pollinated corn varieties. As a result, farmers and their elaborate culture of seed saving, which fit well with traditional patterns of work, parted ways.

Chapter 4 - Conclusion

Seed saving of most commodity crops within the Corn Belt is a decidedly antiquated phenomenon; despite this fact, systems of agriculture in the Global South similar to turn of the 20th century America face pressures to modernize.²⁰⁵ In the Corn Belt, the cascade of agricultural changes unleashed by agricultural modernization was in many cases desirable and sought after by agricultural stakeholders, but they were not without unintended consequences.²⁰⁶ If the forms of agricultural modernization utilized by the Global North were a perfect fit, then we could concern ourselves with superlative production. Instead the Global South offers the opportunity to fit the best of modernized agriculture to unique challenges while mitigating its problematic consequences.

The major findings of this thesis are listed below. They begin with similarities between American Corn Belt Farmers and subsistence farmers of the Global South.

- Corn Belt farmers of the early twentieth century and present day farmers in the Global South are decidedly similar in their approach to agriculture—their dichotomies align closely—and their reliance on seed saving. Both farmers balance commercial and subsistence needs, utilize a mix of resources from commons and commodity sources, and both have similar relationships with public institutions and private businesses. ‘Making do’ continues to play a role in sustaining family farming enterprises. Mary Neth’s *Preserving the Family Farm* is analogous to recent works in sociology that have focused on ‘rural livelihood’ as it extends

²⁰⁵ Per Pinstrup-Andersen and Rajul Pandya-Lorch, “Agricultural Growth is Key to Poverty Alleviation in Low-Income Developing Countries,” International Food Policy Research Institute, 2020 Brief, (1995): 5, & M. Franz, M. Felix, and A Trebbin, “Framing Smallholder Inclusion in Global Value Chains—Case Studies From India and West Africa,” *Geographica Helvetica* 69 (2014): 241.

²⁰⁶ J. L. Anderson, *Industrializing the Corn Belt: Agriculture, Technology, and Environment 1945-1972*, (Dekalb, IL: Northern Illinois University Press 2009) 193.

from the countryside.²⁰⁷ Sociologists contend that Neth's neighborhood of farm communities reaches beyond and into geographically distant cities.²⁰⁸ This underscores the dual commercial and subsistence nature of small-scale farms prior to modernization and supports the contention that where 'making do' remains relevant seed saving persists out of necessity.

- Similarly, farmers in the Corn Belt characterized seeds within the commons, as evidenced by the collective efforts of farmers, land grant schools, and businesses to improve seeds.²⁰⁹

While the Corn Show lacks a counter part in the modern-day Global South, vociferous and widespread protests in India and other countries over the extension of patent protections for imported seeds places seeds within the commons and reveals the extent seeds have been commodified in the global north.²¹⁰

- Farmers in the Corn Belt and the Global South have worked to improve their seed resources in conjunction with public research institutions. These institutions strive to improve the lives of farmers, while focusing on yield as their primary measure of success; historically this tended to commodify agriculture. Farm commercialization and seed commodification have tended to make seed purchase an all or nothing proposition.

These similarities must be considered alongside historical differences. These include the current state of globalization, the declining level of financial support relative to private investment in the seed industry, and the unique challenges facing the Global South.

²⁰⁷ Mary Neth, *Preserving the Family Farm: Women, Community, and the Foundations of Agribusiness in the Midwest, 1900-1940*, (Baltimore, MA: The Johns Hopkins University Press, 1995), 18, and T. Rauch, M. Schmidt, and D. Segebart, "New Rural Dynamics and Challenges in the Global South," *Geographica Helvetica* 69, (2014): 226.

²⁰⁸ Ibid.

²⁰⁹ Consider our case study or please see: Martin Mosher, 'Method of finding for distribution and further development a good type of corn for Clinton County, Iowa, conditions' (master's thesis, Iowa State University, 1915).

²¹⁰ Vandana Shiva, "Manifesto on the Future of Seed," in *Manifesto's on the Future of Food and Seed*, ed. Vandana Shiva (Cambridge, Massachusetts: South End Press 2007), 85-88.

- The forces of globalization that pitted Corn Belt farmers against growers in Europe now include growers in the Global South and a global market.²¹¹ The global food system, a boon for consumers, places farms more closely aligned with subsistence and commons in competition with commercialized commodity farms. As happened in the Global North, this situation tends to press farmers to rapidly modernize. This is problematic for seed saving because modernization tends to reduce the value of on-farm provisioning activities and the number of cultivars grown for specific crops. Recent attempts at agricultural development focusing on the commercial integration of small holders, an admirable response to indigenous challenges, may similarly bring about a reduction in seed saving.²¹²
- Decay in publically funded research limits the reach of state supported institutions in the global north and especially in the global south. Relative to private spending in breeding and crop development, our breeding and seed priorities more closely align with commercial and commodity goals and forms.²¹³ As on-farm seed saving becomes less prevalent, and where public breeding is marginalized, farmers will increasingly be limited to the choices available on the market. This is problematic because the goals of the associated dichotomies commercial, commodity, private, and applied favor crop homogenization and erodes the ability to save seed in a socially optimal way. This

²¹¹ T. Rauch, “New Ruralities in the Context of Global Economic and Environmental Change—Are Small-Scale Farmers Bound to Disappear?” *Geographica Helvetica* 69, (2014): 229.

²¹² “Agricultural and Rural Development For Reducing Poverty and Hunger in Asia: In Pursuit of Inclusive and Sustainable Growth,” International Food Policy Research Institute & Asian Development Bank, (2007) 7, & M. Franz, M. Felix, and A Trebbin, “Framing Smallholder Inclusion in Global Value Chains,” 241 245.

²¹³ Rauch, “New Ruralities in the Context of Global Economic and Environmental Change,” 229.

prioritization overlooks the potential to be gained from public breeding, seed saving enterprises, and on-farm seed saving, while reducing the diversity of cultivars.²¹⁴

- The preservation of future agricultural resources depends on our ability to make space for a diversity of seeds and seed savers much the same way corn shows purposefully expanded farmer participation and acceptable cultivars.
- Public breeding initiatives, best positioned to produce finished cultivars with limited commercial value, have the potential to build resilience within these small systems.²¹⁵

The success of these places depends on the extent to which improved processes and techniques can complement farm survival strategies like ‘making do’ among which is seed saving. Given our current knowledge of seed saving, which elaborates the population, isolation, and methods for needed saving of open pollinated seed, small-scale farms are situated to perform this task for their own provisioning and for agriculture as a whole.

If the last two leaps in agricultural productivity, first in the US and Europe during the mid-century period and the green revolution of the Global South after, are credited to agricultural modernization, is it possible to expect similar solutions to work in places already overlooked by these revolutionary transitions?²¹⁶ These smaller agricultural margins whether in the Global South or North, whether urban or rural, will benefit from elements of agricultural modernization, but given the smaller payoff it is unlikely these places will or should abandon completely their alignment with subsistence and commons.

²¹⁴ Kloppenberg, *First the Seed*, 350, 354.

²¹⁵ *Ibid.*.

²¹⁶ *Ibid.*, 149, & “Who will Feed Us?: The Peasant Food Web vs. The Industrial Food Chain,” *ETC Group*, (2017): 12-14. <http://www.etcgroup.org/whowillfeedus>.

The potential of seed saving depends upon our ability to adequately appraise it. Our understanding of seed saving, breeding, genetic modification, and the ability to preserve and prepare seeds to match the needs of the present exceeds that of our fore bearers. It is clear that Corn Shows came up short because of gaps in participants understanding of the transfer of heritable traits in corn. Despite this fact, corn shows succeeded in creating a mass culture of attentive seed savers. This culture did its best at deciding what it valued in seed corn much the same way subsistence farmers, home gardeners, commercialized farms, public research institutions, and the seed industry have worked to articulate and manifest their agricultural values in the seeds of a given crop or cultivar. Our past culture of corn seed saving exemplified collaboration among agricultural stakeholders, widespread participation, and a diversity of crops and cultivars. These qualities persist in the Global South and are slowly being re-cultivated in the Global North. This emphasis complements the needs of a global food system for its ability to preserve and improve our seed resources for coming generations. Despite our enhanced control over the biology of seeds, we are little removed from our ancestors in knowing what ears will ‘win’ against the challenges of the future; their example suggests for seed open and fair competition among savers and possibly, prizes.

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