Corn Capital.

How Corn Shaped the Landscape, Industry, and Culture of Olivia, MN.

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Abstract

Olivia, MN, is a town of 2,500 inhabitants in the Northern Corn Belt, known as the "Corn Capital of the World." The author provides an eco-biography of Olivia, MN by showing how corn shaped the landscape, industry, and culture of the "Corn Capital." Olivia serves both a case study location to document the changes in Midwestern agriculture, as well as a unique global corn research and development hub and center for corn celebrations. Both Native Americans and European settlers used corn to actively shape the landscape of the area, turning prairie and marshlands into farmland. Olivia's economy was and is also shaped by corn as the town has become one of the key research and production sites of seed corn, therefore tying it intimately into the global agro-business network. This dissertation traces the transformation of landscape around Olivia, the history of the industrialization and globalization of the seed industry, the environmental impacts caused through the creation of the Corn Belt, as well as the ways in which corn influenced local celebrations.

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List of Abbreviations

3MG	3rd Millennium Genetics
CCFE	Coop County Farmers Elevator
FAST	Functional Analysis System for Traits
GLO	General Land Office
GM	Genetically Modified
GMO	Genetically Modified Organism
HT	Herbicide Tolerant
IA	Iowa
IL	Illinois
IN	Indiana
IR	Insect Resistant
ISF	International Seed Federation
MAS	Marker-Assisted Selection
MI	Michigan
MN	Minnesota
MTSA	Monsanto Technology Stewardship Agreement
NB	Nebraska
OPV	Open Pollination Variety
PPA	Plant Patent Act
PVPA	Plant Variety Protection Act
R&D	Research and Development
RBA	Rauenhorst, Bellows & Associates
U of M	University of Minnesota
USDA	United States Department of Agriculture
WWII	Second World War

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Introduction: Get Back to the Country

The first time I visited Olivia, MN, was in 2014. Heading west on Highway 212 from the Twin Cities in my rental car, I wondered what would await in me in the "Corn Capital of the World." I was headed there in the last week of July—just in time for the first sweet corn to be ripe and to participate in the annual Corn Capital Days.

On my drive from the Twin Cities to Olivia I passed by many cornfields. But the view of sheer endless cornfields on both sides of the highway, interrupted only by the also frequently seen soybean fields and the occasional farm house, is a common sight in large parts of the Midwest. So I wondered what exactly made Olivia "the Corn Capital of the World"—instead of other towns located in the Corn Belt.

Olivia, MN, according to the 2010 census, is a city of 2,484 residents,[1] located less than 100 miles west of Minneapolis. It was first platted[2] in 1878 and officially incorporated in 1881. Like most of Minnesota, Olivia was settled in the late nineteenth century. In 1850 the whole territory of Minnesota had a population of only about 6,000 people.[3] By 1880 it had reached 780,000. In those 30 years,

[1] US Census Bureau, "Minnesota: 2010: Summary Population and Housing Characteristics" (Washington, DC, 2012), 56.
[2] Referring to its first mentioning on a plat made of Renville County.
[3] This number does not include Native Americans.

immigrants from Europe and the eastern United States had poured into Minnesota.[4]

Olivia is the largest city of Renville County and serves as its county seat. Through the Twin Cities & Western railroad line, it is tied into the Midwestern railroad network, connecting it with Minneapolis and South Dakota. The US Highway 212 and the US Highway 71 cross in Olivia and the city is home to a small, regional airport, mostly used by planes that spray crops. On first glance, Olivia looks similar to other small towns in the Midwest: the downtown area is a small conglomeration of shops, restaurants, and coffee shops, nestled around the only intersection in the town with a traffic light. Other than that, one can find a handful of small parks, a public library, a high school, a dive bar, a short nine-hole golf course, and three gas stations Olivia. However, Olivia's role in the global corn industry is what makes the town deserving of a closer observation. In 2004, a resolution by the Minnesota Senate officially designated Olivia the "Corn Capital of the World," making the previously self-proclaimed title official through a piece of legislation.

Olivia and Renville County are part of the so-called Corn Belt, one of the most productive agricultural regions of the world. In 2016, American farmers planted 94 million acres of corn and generated a corn harvest with a $51.5 billion crop value.[5] Corn is the number one cash crop in the United States, grown in all 50 states—something that holds true for very few other agricultural products. This shows both the high adaptability of corn varieties to different climatic zones and the high economic potential it has as a cash crop, which makes corn very

[4] Catherine Watson et al., eds., "Minnesota: Still a New Land," special issue, *Minneapolis Tribune* (1976): 9.
[5] National Corn Growers Association, "World of Corn 2017" (Chesterfield, MO, 2017), http://worldofcorn.com/pdf/WOC-2017.pdf, 3.

attractive to grow for farmers. Even though corn is grown all over the United States, the Corn Belt is the heart of American corn production. Today, the Corn Belt today stretches from Kansas and Nebraska to Ohio; its southern boundary embraces parts of Missouri and Kentucky, its northern border cuts through the Dakotas, Minnesota, and Michigan.[6] Olivia is located in the northern part of the Corn Belt. Most of the states that are part of the Corn Belt are part of the American Midwest—with the exception of Kentucky. Currently, Iowa is the state with the single largest corn yield. Over half of the US corn harvest is produced by just four states: Iowa, Illinois, Nebraska, and Minnesota. The United States contributes roughly 40% to global corn production and is the world's largest corn producer, followed by China and Brazil.[7] The Corn Belt is the heart of global corn production.

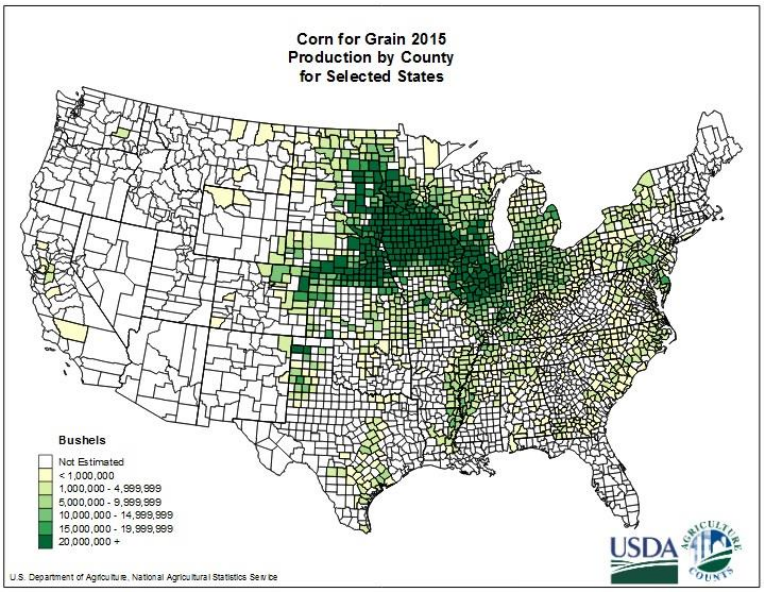

Figure 1: USDA graphic highlighting the counties with the highest corn yield making up the current Corn Belt[8]

[6] Allan G. Bogue, *From Prairie to Corn Belt: Farming on the Illinois and Iowa Prairies in the Nineteenth Century*, Reprint ed. (Ames Iowa: Iowa State University Press, 1994), 1.
[7] National Corn Growers Association, "World of Corn 2017."
[8] USDA, "Corn for Grain 2015." Washington, DC, 2016.

But what makes Olivia the "Corn Capital" of one of the largest and agriculturally most productive regions of the world? In terms of corn production, Renville County is the highest yielding county in all of Minnesota and usually the highest yielding county outside of Iowa and tends to rank in the top five of the corn producing counties of the United States.[9] The high corn yield produced in Renville County is part of the reason why Olivia is known as the "Corn Capital." But if yield were the only factor, the title would have to go to Algona, Kossuth County, Iowa—the county seat of the highest yielding county in the United States. So why Olivia? In addition to its productivity it is also home to many seed companies, producing corn and soybean seeds for the global market. There are 14 seed companies with a presence in Olivia. They range from small family-owned businesses to branches of multinational seed corporations, like Monsanto or Dow. Corn is the main focus of Olivia's seed production, although soybeans also account for a significant proportion. Soybeans are the second most important field crop in the United States and commonly grown in crop rotation with corn.[10] The large geographic overlap of corn and soybean production explains why the seeds are also produced in the same area. Interestingly, the region is always referred to as the Corn Belt—never as the Soybean Belt.

Corn as an Agent

This dissertation argues that corn influenced and shaped Olivia, MN, and turned it into what it is today. The transformation of the surrounding landscape, the

[9] USDA, "Minnesota Ag News: 2015 Corn County Estimates" (St. Paul, 2016).

[10] The reason why soybeans are grown in crop rotation with corn is simple: due to the biological make-up of both plants, they are great supplements for one another. Corn requires a lot of nitrogen and therefore takes a lot of nitrogen out of the soil. Soybeans on the other hand produce nitrogen and deposit it in the soil. Therefore soybeans are a natural way of replenishing the soil after a corn was grown there.

emergence and globalization of an entire industry, and the way the town celebrates community are all profoundly shaped by corn. Corn is a chief driver of all these developments.

"Corn. It is a part of who we are as Americans," Pam Johnson, former President of the National Corn Growers Association says. "Corn feeds innovation and fuels our economy. Corn nourishes our cultural identity, lighting night skies on Independence Day and filling traditional cornucopias at Thanksgiving. Our nation's corn farmers, through their unwavering dedication and steady perseverance, grow a crop that sustains our people, feeds our economy and buttresses our national identity."[11] So corn not only shaped Olivia but arguably large parts of American industry, culture, and identity.

In Olivia these influences are particularly visible as corn is farmed all around Olivia, the corn seed industry is the most important industry branch in Olivia, and corn is at the heat of celebrations every year. Even though this density of seed companies and frequency of corn celebrations are unique to Olivia, what can be observed in the Corn Capital is also representative of larger developments in the American Midwest and in the seed industry. Through corn, large parts of the prairie were transformed into farmland and new innovations in seed breeding shaped the seed industry. Corn influenced local celebrations over various centuries.

[11] National Corn Growers Association, "World of Corn 2013" (Chesterfield, MO, 2013).

Methodological Approach

By using Olivia as my lens, I can trace larger developments that took place in American agriculture, but can also focus on how these developments played out in one specific community. Tracing the "life story" (biography) of one specific location and taking into account the different people, environmental and industrial factors that influenced the development of the location allows me to write an "eco-biography" about Olivia.[12] Similar to a human biography, an eco-biography not only reflects what shaped the subject of the research, but also what impact the subject of the story leaves on others. In Olivia's case, the impact of developments of the corn research and development in the town, have a global reach. Through oral interviews I can give a voice to people who are usually just anonymous actors in the background: the corn seed breeders. Telling their stories paints a vivid picture of how the seed industry evolved. Combining it with the accounts of other Olivians, I aim to create an accurate depiction of how Olivia has changed over time due to the various uses of corn.

I combine the concept of the eco-biography with the Stephanie LeMenager's concept of "commodity regionalism," as coined in her book *Living Oil*.[13] LeMenager developed the approach out of Jenny Price's "mango body whip story." Finding an item called "mango body whip" on a receipt, Price took "this as an excuse for an investigative foray to the store that sells the product, […] a brief description of its components, where they came from, and the labor and resource

[12] The term "eco-biography" was coined by Mark Cioc and William Cronon who introduce the concept in the book Cioc Mark and William Cronon, *The Rhine: An Eco-Biography*, 1815-2000, Weyerhaeuser Environmental Books. Seattle and London: University of Washington Press, 2002. One example for an eco-biography about a town is Morrissey, Robert, "The Power of the Ecotone: Bison, Slavery, and the Rise and Fall of the Grand Village of the Kaskaskia", *Journal of American History* 102, no. 3 (2015): 667–692,

[13] Stephanie LeMenager, *Living Oil: Petroleum Culture in the American Century*, Oxford Studies in American Literary History 5 (Oxford, New York: Oxford University Press, 2014), 12.

inputs required to bring 'mango body whip' to the Beverly Center shopping mall."[14] Price explains that such stories "look for and follow the nature we use, and watch it move in and out of the city, to track specifically how we transform natural resources into the mountains of stuff with which we literally build cities and sustain our urban lives."[15] LeMenager says that she practices "a variant of this narrative—and critical—method," which she calls "commodity regionalism." According to LeMenager "commodity regionalism activates vital historical and ecological frames, opening an explicit point of view onto global-scale forces and flows, such that we can see and sense them. The regional frame assists, too, in the pursuit of the psychologically ultradeep, the affects and emotions lodged in"[16] the research object. Corn is undoubtedly a global commodity and by looking at one specific area that farms corn, produces seed corn, and celebrates corn—Olivia, MN—I can show the large-scale, even global, impacts of the developments happening in Olivia, as well as the effects that this commodity has on one of its core regions of production.

One of the strengths of LeMenager's approach is that is includes the cultural aspect of living with a global commodity. Olivia is a prime case study for this as corn has been celebrated in Olivia almost since the foundation of the town. LeMenager's approach allows me to look at what living with and celebrating corn means for the people of Olivia, in addition to analyzing the geographic, environmental, and economic changes it has brought to the area. One of the advantages of focusing of a region rather than a nation state is that "regions have become more socially and economically significant—in some respects more so

[14] Ibid., 11–12.
[15] Jenny Price, "Thirteen Ways of Seeing Nature in L.A.: A Third Way: As the Resources We Use," http://www.believermag.com/issues/200604/?read=article_price.
[16] LeMenager, *Living Oil*, 12-13.

than nations—when globalization assumed its mature form in the late twentieth century."[17] LeMenager argues that by using the national frame many people ignore the regional impacts that global commodities have.[18] Nevertheless, she also acknowledges that the term "region" is used to describe places of varying scales—in my case I will focus most prominently on the town Olivia and its direct surroundings in Renville County. However, some of the developments I discuss impact the wider region—the Corn Belt and the Midwest.

Using the concepts of eco-biography and commodity regionalism allows me to look at a place through the eyes of a global commodity and to trace the local impact the commodity has. By limiting my focus on the narrow geographical region of Olivia, MN, and its surroundings, one of the prime corn-growing and corn-seed-production regions in the world, I telling both the local history of the town, its community and how Olivia was predominantly shaped by one commodity crop, as well as to tell the story of how Olivia, through seed research and development, is tied into the global corn industry.

My Sources and Current State of Research

Some of the most important sources for my project are the oral interviews I conducted in 2014 and 2015. The majority of the people I interviewed work or worked in the corn seed industry in Olivia. Hearing their stories on what changed in the corn seed industry, how things changed, and how that affected life in Olivia gives us valuable insights into how local impacts of a globalized industry play out. On top of my own oral interviews, I was able to draw on more local voices from

[17] Ibid., 13.
[18] Ibid., 12.

the book *Things We Know Best: An Oral History of Olivia, MN and Its Surrounding Countryside*[19]—an oral history collection from Olivia by Joe Paddock that was published in 1976.

The Renville County Historical Society archive in Morton, MN provided an invaluable source of local history. By reading through old newspaper articles in the *Olivia Times-Journal* and by going through boxes of old Corn Capital Days program flyers and company brochures and various other sources, I was able to piece together the various stories that took place in Olivia over the last roughly 130 years and trace many local developments.

Between 1927 and 1968 Frank Svoboda was the Agricultural Agent of the Extension Service in Renville County and I am grateful he left an extensive paper trail including the annual reports of the County Extension Service and notes on local events, and summarized his knowledge in the 1976 published book *Looking Back: A History of Agriculture in Renville County, Minnesota*.[20] As valuable as the book was a source, it did not put some of the described local events into a larger context and as it was published in 1976, it lacks all the developments that took place in the seed industry and in agriculture after its publishing date.

In the University of Minnesota (U of M) archives I was able to find the information on the role of U of M researchers in the development of hybrid corn and information on collaborations between the university and the seed industry in Olivia. The John R. Borchert Map Library provided me with maps and aerial photography—most importantly with the "Composite Map of United States Land

[19] Joe Paddock, *Things We Know Best: An Oral History of Olivia, MN and Its Surrounding Countryside* (Wilmar: Maracom/Color Press, 1976).
[20] Frank D. Svoboda, *Looking Back: A History of Agriculture in Renville County, Minnesota*, 1st ed. (Olivia, Minn.: Renville County Historical Society, 1976).

Surveyors' Original Plats and Field Notes"[21] that was most valuable for gaining an understanding of the landscape before European settlement.

The Minnesota Historical Society's sources helped me learn about the Native American history of present-day Minnesota and provided sources such as the transcripts of Hubert H. Humphrey's speech in Olivia, as well as a large selection of images, including photographs of Dakota Native Americans and of the Trojan Seed Company headquarters in Olivia, among others.

One of the limitations in my sources is that I was not able to obtain company records of local Olivia seed companies, such as Trojan Seed, as the records were transferred to the new owners (such as Pfizer and Monsanto) that bought the local seed companies and therefore were not accessible to me. However, the oral interviews with seed breeders and local newspaper articles helped me gain a good understanding of mergers and acquisitions that took place and cover the missing information.

Looking at the published books on the subject of corn, the most frequent type are those that address corn as a food source or the industrial uses of corn, e.g., Michael Pollan's *The Omnivore's Dilemma: A Natural History of Four Meals*[22] or James McWilliams' *A Revolution in Eating: How the Quest for Food Shaped America*.[23] Betty Fussel's The *Story of Corn*[24] is a cultural history of the crop, touching upon a wide array of topics from Mayan culture to the introduction of popcorn in American movie theaters. Dorothy Giles's 1940's *Singing Valleys:*

[21] *Composite Map of United States Land: Surveyors Original Plats and Field Notes*, 1962nd ed. (Ely, MN: J.WM. Trygg), Minnesota Series, Sheet 6.
[22] Michael Pollan, *The Omnivore's Dilemma: A Natural History of Four Meals* (Penguin, 2007).
[23] James E. McWilliams, *A Revolution in Eating: How the Quest for Food Shaped America,* Arts and Traditions of the Table (New York: Columbia University Press, 2005).
[24] Betty H. Fussell, *The Story of Corn*, 1st ed. (New York: A.A. Knopf, 1992).

The Story of Corn[25] is a good primary source on how corn was seen by contemporaries in the mid-twentieth century.

Various scholars have looked at aspects of technical innovations in US agriculture. Deborah Fitzgerald's *Every Farm a Factory: The Industrial Ideal in American Agriculture*[26] skillfully traces the mechanization of American farms. Similar to Fitzgerald's book in scope but including biological innovations is Alan Olmsted and Paul Rhode's *Creating Abundance: Biological Innovation and American Agricultural Development*.[27]

To understand the transformation of landscape in the American Midwest, two books proved to be particularly rich resources: Hugh Prince's *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes*[28] and Cynthia Clampitt's *Midwest Maize: How Corn Shaped the American Heartland*.[29] Prince's books traces the physical changes that took place in converting the wetland prairies into farmland whereas Clampitt's book looks at how closely tied the emergence of the Midwest is to growing corn, focusing on cultural and food practices of Midwestern communities.

All images and pictures by other people or institutions are accredited. If not specified, the photos were taken by me.

[25] Dorothy Giles, *Singing Valleys: The Story of Corn* (New York: Random House, 1940).
[26] Deborah Kay Fitzgerald, *Every Farm a Factory: The Industrial Ideal in American Agriculture* (New Haven: Yale University Press, 2003).
[27] Alan L. Olmstead and Paul Webb Rhode, *Creating Abundance: Biological Innovation and American Agricultural Development* (New York: Cambridge University Press, 2008).
[28] Hugh C. Prince, *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes,* University of Chicago geography research paper no. 241 (Chicago, Ill.: University of Chicago Press, 1997).
[29] Cynthia Clampitt, *Midwest Maize: How Corn Shaped the U.S. Heartland,* Heartland foodways (Urbana: University of Illinois Press, 2015).

Structure of Project

The dissertation is divided into three thematic chapters. By using "corn" and "Olivia" as my lenses, I am able to look at developments taking place over longer periods of time, from the ice age to modern times, and to include various groups of people, from Native Americans to corn husking champions and modern corn breeders. It also allows me to touch upon various topics to discuss the environmental, geographic, industrial and cultural changes that took place. I can do so because I mostly exclude developments that took place in other areas and cities of the United States and focus on one specific town.

The first chapter looks at the transformation of landscape around Olivia. I argue that corn was used as a tool to change the landscape. Tracing the origins of the rich soils found around Olivia, the chapter begins with the last ice age's effects before turning to humans' uses of the land. Corn was one of the first plants cultivated by Native Americans in the area. The chapter looks at their farming practices, conflicts over land between Native Americans and settlers, and the settlers' use of corn to break the prairie. To increase agricultural productivity, drainage played an important role. The corn yields were upped—but at an environmental cost. Keeping Olivia in mind, I zoom out to explain the importance of the railroad in shaping the Midwest and to show how the Corn Belt has shifted over time. The chapter closes by thinking about corn and landscape on a more abstract level by analyzing how the value of nature has shifted over the course of the twentieth century.

In the second chapter I explore the origins of and changes in the corn seed industry and how Olivia became home to so many seed companies. Explaining the science behind corn breeding and the role of the University of Minnesota in

developing hybrid corn, I lay the foundation for telling the history of seed companies in Olivia. Giving a voice to the corn breeders behind these companies, I can personalize the often abstract "seed industry" and show how important the individual decisions and actions of certain corn breeders are for shaping the future of their companies. Farmers across the globe are growing seeds that have been developed and tested around Olivia, making a small community of roughly 2,500 people an important hub in the global seed market. The breeders' stories—from deciding to found a new company to the loss of six high-ranking seed industry officials in a plane accident—reciprocally impact the seed industry and the community of Olivia. Tracing the dynamic of globalization, I look at how corn research itself became internationalized, how mergers and acquisitions changed the face of the global corn seed industry—and how through this the seed industry became a target for critics all over the world. By framing Olivia as the global corn seed hub that it is, I argue it can be seen as "Nature's Village." It is my aim to understand and tell the story of Olivia's history in the corn seed industry and to show how the town is tied into the global corn seed network.

After looking at the changes to Olivia's landscape and industry, the third chapter focuses on how the celebrations centered on corn have changed. The Green Corn Festival shows how Native Americans who lived in present-day southwestern Minnesota used corn as the basis of their harvest ceremony. The European settlers' corn celebrations are also rooted in harvest traditions. A contest that is now almost forgotten used to be one of the most popular athletic events of the 1920s and 1930s: the corn-husking championship. Around the same time as corn-husking competitions emerged, corn shows were also on the rise. Looking at corn shows and husking contests in Olivia and Renville County helps to capture the

spirit that prevailed during those days. With the success of the corn seed industry in Olivia, the companies organized corn-centered events: in the 1970s, the Cornland, USA show brought tens of thousands of visitors to Olivia. Around the same time, in 1968, local businesses initiated an annual festival, the so-called Corn Capital Days. Looking at how the festivities have changed, but also at the conflicts that exist with people working in the corn seed industry, show us the shifting dynamics of celebrating corn in Olivia. But not all attempts of celebrating and honoring corn and the local seed industry were successful. In the early 2000s, plans to construct a Minnesota Center for Agricultural Innovation in Olivia failed. Shortly thereafter, however, Olivia was recognized as "The Corn Capital of the World" by the Minnesota legislation. Looking at how corn is celebrated on an everyday basis and how corn has become a symbol for the Midwest in popular culture concludes this chapter.

1. Transforming the Land: How Corn Broke the Prairie

"Unless swimming naked in the ocean, man can never be far from corn,"[30] historian Howard T. Walden wrote in 1966. Walden was referring both to the seemingly ubiquitous presence of cornfields in the United States and many parts of the world, and to the omnipresence of corn-based products in industrially manufactured foods and other goods in our everyday lives. What was true in 1966 continues to be true today. But how did a plant that is not even endemic to the United States end up becoming its number one agricultural crop and occupying large parts of US farmland? What happened to the original landscape cover of what is now the Corn Belt, and what changes were necessary to adapt the landscape to the current monoculture farming of corn?

This chapter aims to explore how the landscape around Olivia changed through the use of corn. While focusing on Olivia, it traces developments that happened throughout large parts of the Midwest in the late nineteenth and twentieth centuries. What is perceived as "normal" landscape nowadays—vast stretches of agricultural fields, mostly covered with corn—is the result of human-made alterations to the landscape to make it suitable for agricultural use. Currently, most of the Midwest is dedicated to agriculture, predominantly to corn and soybean production. One cornfield borders another, which was made possible through technological innovations: breaking the prairie sod, employing drainage tiles, and using improved hybrid seeds helped to convert prairielands and swamps

[30] Howard Talbot Walden, *Native Inheritance: The Story of Corn in America* (New York: Harper & Row, 1966), 173.

into agricultural fields. Corn played a central role in this landscape transformation process.

The term "Midwest" itself for the region of the American heartland is fairly new. Initially this area was called "Middle West," and it was only in 1918 that the name "Midwest" was coined as a fixed term for the central region of the United States including the states of Kansas, Nebraska, Illinois, Indiana, Michigan, Ohio, Wisconsin, Minnesota, North Dakota, South Dakota, Iowa, and Missouri.[31] Today, the terms "Midwest" and "Corn Belt" are often used to refer to the same area. Historically, the term "Corn Belt"—first coined in 1839—predates the term "Midwest. This chapter will look in detail at the developments and shifts of the Corn Belt and the role of the Midwest in its creation.

Focusing on Olivia and the use of corn there, I will track landscape changes over the longue durée, taking into account natural factors, such as the effects of the last ice age and beavers' impacts on waterways—both of which laid the foundation for agriculture in the area—as well as social factors, including the effects of the different farming techniques used by Native Americans and European settlers. The Homestead Act of 1862 and conflicts over land between different groups greatly contributed to landscape changes. Therefore, I will examine how each of these factors shaped Olivia and its surroundings.

The story of the transformation of the landscape around Olivia is the story that is—with regional variations—true for many towns in the American Midwest. It is the story of European settlement in the United States in the late nineteenth century, the conversion of prairielands to agricultural fields, and the role technical innovations played in this process. Each town has unique homesteading stories

[31] Clampitt, *Midwest Maize*, 31.

and agricultural difficulties to deal with. Zooming in on Olivia allows me to showcase in detail the developments that took place in this one specific location.

Impacts of the Ice Age

The soil around Olivia, MN is rich in nutrients. Its natural color is very dark, almost black. The origins of the rich soil date back to the last ice age, from around 110,000 BC to 12,000 BC. The last ice age divided Minnesota, broadly speaking, by an imaginary diagonal line that cut from the northwestern corner to the southeastern corner. The so-called Canadian Shield covered the landmass that is now northern and eastern Minnesota.[32] The areas that were buried underneath the Canadian Shield are now amongst the world's richest areas in terms of mineral ores. One can find substantial deposits of nickel, gold, silver, and copper. In the northeast of Minnesota, vast quantities of rock and soil were scraped from the glacial centers to its margins by slowly moving ice and were then redeposited as drift or till. The northeastern part of Minnesota is characterized by many scattered lakes and mining areas—explaining the origins of what would become the nickname of the state: "land of 10,000 lakes."[33] The lakes are the remains of the former ice coverage that crawled over large parts of the state. The name "Minnesota" stems from the Dakota word "Mnisota," meaning "sky-tinted waters," or "sky-blue waters."[34] So not only the nickname, but even the state name itself, can be traced back to the many lakes that resulted from the ice age.

[32] E. C. Pielou, *After the Ice Age: The Return of Life to Glaciated North America* (Chicago: University of Chicago Press, 1991), 108–9.
[33] According to the Minnesota Office of Tourism, the precise number of lakes in Minnesota is 11,842. Number taken from Minnesota Office of Tourism, "All About Minnesota" (Explore Minnesota Tourism, St. Paul, 2006), 1.
[34] Ibid.

The rich soils in the southwestern part of the state are also a legacy of the last ice age: much of the drift was deposited into old preglacial river valleys, while some of it was heaped into belts of hills, into so-called terminal moraines at the margin of the glacier. The fertility of the southwestern part of the state is significantly higher than that in the northeastern part of Minnesota. The shift of soil due to the Canadian Shield explains why less agriculture is found in the rocky part of the state, which as a result has many lakes and little topsoil. The areas along the margins of the Canadian Shield are now among the most fertile lands in North America. The southwestern part of the state, home to Olivia, is where the terminal moraines deposited the till and loess they had gathered and pushed in front of them—which clarifies the origin of the rich soils found in the Minnesota River valley around Olivia, MN.

These geological factors also help account for the current division of industries in Minnesota: mining is mostly practiced in the northeast, whereas agriculture thrives in the southwest. Around Olivia, there is a clay subsoil layer roughly 10 ft (3 m) below the surface. It helps to store rainwater in the topsoil for several weeks—an important feature for corn growers.[35] This is why Olivia, unlike many other places, can get by with comparably little rain over the summer; if there is enough rainfall in the spring, the water can be stored in the thick topsoil above the clay layer for a significant amount of time.

The last ice age set the stage for turning the land around Olivia into prime agricultural country. For a long time after the ice vanished, plants and animals were the only species to inhabit the area. Eventually, Native Americans made the territory their home.

[35] A. T. Andreas, *An Illustrated Historical Atlas of the State of Minnesota* (Chicago: A. T. Andreas, 1874).

US Original Land Survey

The first archeological traces of Native Americans in Minnesota can be traced back to roughly 6000 BC.[36] Even though the Chippewa, Winnebago, Dakota (Sioux), and other Native American tribes have impacted and to a certain extent shaped the land they lived in, the account of their impact is mostly anecdotal.[37] The first detailed map of the area around Olivia and all of Minnesota was created in 1796 by the office of US Surveyor General who was set up to survey lands as the nation expanded westward. The office was placed under the jurisdiction of the General Land Office (GLO) in 1836. The surveys were conducted in anticipation of subdividing the land and selling it to settlers moving into the area. On top of surveying and platting the land, the GLO was also in charge of managing the sale of public land to settlers under the Homestead Act. Explorers surveyed and mapped the area of present-day Minnesota in 1836/37, marking the naturally occurring landscape they found.

The historical geographer Hugh Prince challenges the "assumption that the plats and notes of the U.S. original land survey recorded 'original' landscape and depicted 'natural' vegetation."[38] He admits that it is hard to trace the exact degree of change inflicted upon the landscape by Native Americans prior to the arrival of the Europeans, but Prince argues that their agricultural techniques most likely altered some of the surface through draining certain areas and spreading seeds of various plants, thus introducing them to new areas. Another factor that further shaped the "natural" landscape prior to the mapping by the US Survey was the use

[36] Johnson, Elden, *Prehistoric Peoples of Minnesota* (St. Paul: Minnesota Historical Society 2004), 7.
[37] Ibid. and Pond, Samuel, *Dakota Life in the Upper Midwest* (St. Paul: Minnesota Historical Society 2008).
[38] Prince, *Wetlands of the American Midwest*, 76.

of animals by both Native Americans and settlers. European trappers' hunts for beaver skins in the seventeenth century had a particularly big impact on the landscape.

When explorers surveyed the area of present-day Minnesota in 1836/37, trappers had already hunted beavers in large numbers in the area of Canada and northern USA. Beavers greatly influence the form and shape of waterways, particularly in wetland prairies. The trappers' yearning to make a living by catering to the European fashion trend of fur hats drastically reduced the size of the beaver population, which profoundly altered the waterways. The ecologist Glynnis Hood comments on the effects of the loss of beavers due to trapping: "Gone was a keystone species whose very presence ensured wetland habitats and productive waterways for hundreds of other species."[39] Hood thinks that we will never know exactly how the loss of millions of beavers changed the landscape, but we do know, without a doubt, that their loss had lasting effects on the landscape, particularly on waterways and their ecosystems.[40] That the area around Olivia was home to beavers can be seen by the name of a township just south of Olivia called Beaver Falls, as well as by the origins of Renville County's name. The county is named after Joseph Renville, who was a fur trader in the area. Son to a French trader and a Dakota woman, he became a successful businessman because he spoke French, English, and Dakota and made a living trading fur.[41]

Keeping in mind Prince's call not to assume that plats and notes of the US original land survey depict purely "natural," untouched landscape, there is still a

[39] Glynnis Hood, *The Beaver Manifesto* (Victoria, BC: Rocky Mountain Books Ltd., 2011), 31.
[40] Ibid., 115.
[41] Warren Upham, *Minnesota Place Names: A Geographical Encyclopedia* (St. Paul: Minnesota Historical Society Press, 2001), 489.

lot of useful information in the plats and notes that can help us gain a better understanding of the landscape before large-scale European settlement.

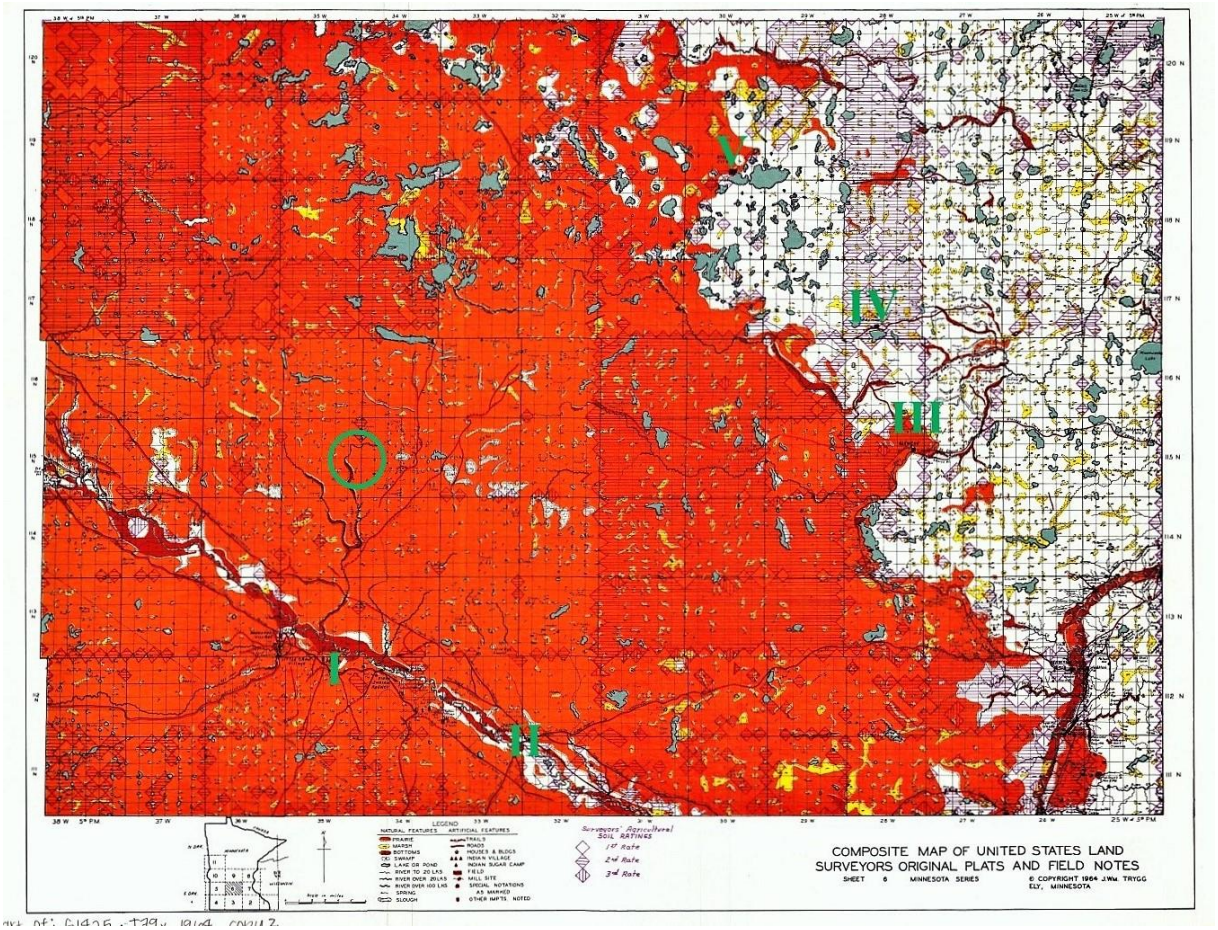

Figure 2a: Surveyor Original Plats and Field Notes. Location of Olivia marked with green circle.[42]

Green circle: location of Olivia
I: Native American settlements: Shakopee Village, Little Crow Village, Indian Agency
II: Fort Ridgeley
III: Glencoe
IV: Fremont
V: Stella City

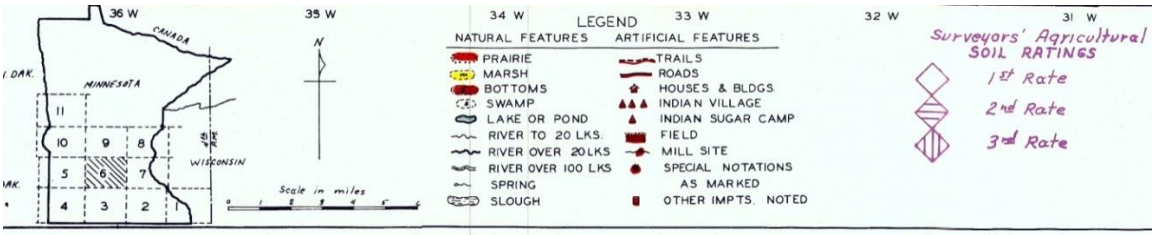

Figure 2b: Notes to go with Surveyor Original Plats and Field Notes

[42] Source: John R. Bochert Map Library, University of Minnesota.

The "Surveyor Original Plats and Field Notes" map shows that the area around Olivia was originally covered with prairie grass (areas marked orange on the map). The notes of the surveyors do not specify what type of prairie grass was found in the vast areas they marked as "prairie."

When the surveyors created this map, there was no settlement on the location of present-day Olivia. According to the waterways on the map, Olivia (indicated by the green circle) would be established at the east fork of Beaver Creek. South of Olivia, where Beaver Creek enters into the Minnesota River, the surveyors indicated settlements of Native Americans. The surveyors marked "Shakopee Village," "Little Crow Village," and an "Indian Agency" (marked on map with "I") as being located right next to one another. This is the area of present-day Morton, MN. The surveyors also marked known trails of Native Americans. Some are just marked as "Indian Trail," but others are referred to by specific names, like the "Yellow Medicine Trail" or the "Lac Qui Parle Trail."[43]

The map indicates that there were four European settlements. Three of them are little towns—namely Glencoe, MN (which is roughly 40 miles east of Olivia and still exists today, marked on map with "III"), Fremont (marked with "IV"), and Stella City (marked with "V"). The latter two settlements no longer exist. All three settlements are located along the line where prairie grass borders "other surface" (marked white). The vegetation of the area marked as "other surface" is not specified. According to Tom Mack, a retired corn breeder living in Olivia, "back in the days, the woods started over at about Glencoe."[44] So, the white area at least partly marks forest-covered areas. The fourth European settlement on the

[43] Today, two of the counties nearby Renville County are called "Yellow Medicine County" and "Lac Qui Parle County."
[44] Oral interview with Tom Mack (formerly Trojan and Keltgen Seed), 26 July 2014.

map is Fort Ridgely (marked on map with "II").[45] The fort was built roughly 15 miles downstream of the Native American settlements and was located 33 miles (53 km) southeast of Olivia. Today, a small state park is home to what remains of the fort.

The surveyors were responsible for classifying the soils they found, bearing in mind the existing settlements and possible future uses of the land. In the key of the map, these rankings are named "Surveyors' *Agricultural* Soil Ratings." The area around Olivia was ranked as "1st Rate"—the highest ranking—indicating that the surveyors considered the area around Olivia to be prime agricultural land.

The composite map created by the GLO land surveyors served as a basis for the homesteaders who would come to settle in this area. They described a landscape dominated by the prairie and with almost no evidence of any settlements, either Native American or European, as of 1836/37.

Native American Corn Farming and the US-Dakota War of 1862

The surveyor map paints a picture of an almost untouched landscape, only sporadically impacted by the scattered Native American settlements found in the Minnesota River Valley (marked with "I"). However, various Native American tribes were living in the area that comprises the current state of Minnesota, and as hunting and gathering were the most common ways to secure their food, they required vast stretches of land to sustain their lifestyle. The Chippewa, Winnebago, and Dakota (Sioux) tribes were the most prominent Native American

[45] In the map it is spelled "Ridgeley"—the second "e" is probably a typo by the cartographers as in every other document it is spelled "Ridgely."

tribes in what is Minnesota today. The area around present-day Olivia was home to the Dakota (Sioux).

The surveyors indicated three Native American settlements close to present-day Olivia: "Shakopee Village," "Little Crow Village," and an "Indian Agency." "Little Crow" was the English nickname given to the Dakota chief Taoyateduta of the Mdewakanton Dakota. Therefore, the "Little Crow Village" indicates where Taoyateduta lived with his band. Similarly, "Shakopee" was the nickname for the chief of another band of the Mdewakanton Dakota, called Shakpedan. The "Indian Agency" was an institution authorized by the US government to oversee what the Native Americans were doing and to make trades with them. After 1850, the more commonly used name for these kinds of institutions was "Bureau of Indian Affairs."

Native Americans farmed very few crops—with the exception of corn, which they probably considered their most important field crop—as they obtained the majority of their food through hunting and gathering. The importance of corn for the Native Americans is reflected in their language. In the Agawam Indian language for example, the year begins with the month of "Squannikesos," which includes part of April and part of May, and whose name means "when they set Indian corn." Other months are also named after the corn cycle, indicating the weeding of corn, the hilling of corn, and the ripening of corn.[46]

The most common way of growing corn was as part of a mixed field: the corn was planted along with beans and squash, a combination referred to as "three sisters," as the crops benefited from one another. The beans could wrap themselves around

[46] William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England*, rev. ed. (New York: Hill and Wang, 2003), 43.

the cornstalks and the squash could spread out close to the surface, providing shade for the soil and preventing it from drying out, and preventing weeds from growing. This form of companion planting helped to prevent soil depletion as beans deposited nitrogen in the soil, which is necessary for corn to thrive.[47] Among the Native Americans, growing and tending corn was seen as a woman's duty—a fact that surprised the European settlers when they first saw the division of duties among the Native Americans.[48]

Figure 3: Picture titled "Indian women and children guarding corn from blackbirds," by Adrian J. Ebell, August 1862.[49]

Balmer says that up until 1837 "agriculture as an enterprise of the individual farmer, either Indian or white, took form slowly in Minnesota."[50] In 1837, the settlers acquired a large area of Minnesota through a treaty with the Dakota. Before that, "no lands within the present limits of Minnesota were open to

[47] Part II of "Histories of Maize and Domestication" talks about early forms of corn agriculture and the emergence of growing the three sisters together. John E. Staller, Robert H. Tykot, and Bruce F. Benz, *Histories of Maize in Mesoamerica: Multidisciplinary Approaches* (London: Routledge, 2016).
[48] Brian Donahue, *The Great Meadow: Farmers and the Land in Colonial Concord* (New Haven, CT: Yale University Press, 2007), 41–43.
[49] Source: Minnesota Historical Society, http://collections.mnhs.org/cms/display.php?irn=10185777.
[50] Frank E. Balmer, "The Farmer and Minnesota History," *Minnesota History* 7, no. 3 (1926): 209.

settlement to the whites, for except for the military reservation all was Indian territory."[51] The military reservations Balmer refers to were established after treaties with the Native Americans in 1805 and 1825—the first of the treaties being made only two years after the territory of south central Minnesota had been acquired as part of the Louisiana Purchase of 1803.

While the number of European settlers was still low, Native Americans and European settlers mostly lived peacefully next to one another. They saw each other as trading partners and it was not uncommon for European men to marry Native American women. Joseph Renville, for whom Renville County was named, was the child of a French-Dakota marriage.[52] He is considered a "bois brûlé"—the offspring of a Native American and a person of European, especially French, ancestry. However, with a steep incline in European settlement in the mid-nineteenth century, conflicts started to arise.

Between 1837 (signing of the first treaty over a large MN territory) and 1858 (MN obtaining statehood) almost all Minnesotan land, except for a few small patches, was acquired by European settlers through treaties with the Native Americans living there. The treaties were problematic: most of the time, Native Americans couldn't properly read the contracts they signed and they often only received a fraction of the money that was agreed upon. Furthermore, Native Americans had a different understanding of ownership and property rights than the settlers they signed the treaties with. Michael Childs, a Dakota, says that "we didn't own the lands, they belonged to everybody, and so we were willing to share with others. And it was used against us; the generosity was used against us." What Childs was

[51] Ibid.
[52] Minnesota Historical Records Survey Project, *Inventory of the County Archives of Minnesota: No. 65 Renville County (Olivia)* (St. Paul, 1940), 7.

referring to when he talks about their "willingness to share" is the Dakota's concept of "usufruct rights": the Dakota were willing to share their access to the lands with the settlers, but thought that both parties would be able to use the lands for things like hunting and agricultural purposes. The settlers, however, thought that through the agreement they possessed sole ownership of the territories. These differences in property rights versus usufruct rights quickly led to conflicts between the two parties. For Childs—who thinks that the settlers exploited the Dakota—the treaties are "not worth the paper they were written on."[53]

Figure 4: Attack on New Ulm during the Sioux Outbreak, 19–23 August 1862.[54]

South central Minnesota was a contested landscape. It is important to understand that both Dakotas and settlers were trying to use the natural resources of the land to secure food and ensure their well-being. In 1862, most of the Dakota had lost the majority of their land and were starving, which led to the six-week US-Dakota

[53] "U.S. –Dakota War of 1862: It Was Used against Us: The Generosity Was Used against Us," Minnesota Historical Society, US, 2011, http://www.usdakotawar.org/node/1033.
[54] Painting by Anton Gag (1904) Source: Minnesota Historical Society, http://collections.mnhs.org/cms/display.php?irn=10331400&websites=no&q=Attack%20on%20New%20Ulm&startindex=1&count=25.

War of 1862.[55] The uprising of the Dakota started with an attack on the settlers of New Ulm, a settlement about 50 miles southeast of Olivia. A painting by Anton Gag depicts the scene, showing a burning house in the background and the Dakota (Sioux) in the foreground, taking cover behind a cornfield.

In the painting we can see that most of the landscape was still covered with prairie grass. The only exception, besides the settlers' houses, is the prominently featured cornfield. It is unclear whether this cornfield belonged to the Dakota or the settlers. As depicted in the painting, it was common practice to fence in cornfields. This was an adjustment made after the settlers' introduction of hogs to North America. Fences were built around the cornfields to protect the harvest and to keep out the free-roaming hogs, rather than to keep them in a constrained area.[56] The Dakota's loss of their corn through the damage done by the settlers' hogs was a common point of conflict between the two parties.

On the second and third day of the US-Dakota War, on 18 and 19 August 1862, the Dakota attacked Renville County. At that time, around 1,200 settlers lived there. According to contemporaries, Renville County "suffered severely in the massacre of August 1862."[57] One of the settlers, C.S. Bryant, describes the progress of events as follows:

> "Early on the morning of the 18th the Indians were observed simultaneously along the river from the Birch Coolie to Beaver Creek, and about six or seven o'clock the flight of the inhabitants and the work of death began. About twenty-eight men, women and children assembled at the house of Jonathan W. Earle, near Beaver creek. […] They started to make their escape to Fort Ridgley, having with them Mrs. Henderson, who was sick, but they were soon overtaken by the savages, who after taking away their

[55] For more on the causes of the US-Dakota War, see Kenneth Carley, *The Dakota War of 1862*, 2nd ed. (St. Paul: Minnesota Historical Society Press, 2001), 1–6.
[56] Cronon, *Changes in the Land*, 130–32.
[57] Andreas, *An Illustrated Historical Atlas of the State of Minnesota*, 253.

> teams, fired upon them and killed Wedge. They then took Mrs. Henderson and two children from the buggy, and throwing them on the ground, placed a bed over them, set it on fire and hastened on after the others. […]
> Early the same morning, about fifty Indians, under Shakopee, appeared at the German settlement above alluded to, and attacked the house of John Meyer, killing his wife and all his children. […]
> On the Sacred Heart, a flourishing German settlement had sprung up, and when the news of the outbreak reached the place, the people gathered at the house of Paul Kitzman, and prepared to make their escape to Fort Ridgley. On their way, they were met by a party of eight Sioux, who pretended to be friends, and induced them to turn back; but on nearing their homes they were fired upon, killing all of the men, and horribly murdering most of the women and children. But few escaped. Over forty bodies were afterwards found and buried on that terrible field of slaughter.
> Other murders were committed in various parts of this county."[58]

According to the Minnesota Historical Society, over 160 Renville County residents were killed and more than 100 were taken captive. With a few exceptions, the bodies of those who died are in unmarked graves, where they fell.[59] Even though the Dakota killed over 160 residents of Renville County, it is important to keep in mind that they were stripped of all of their lands and facing hunger when they resorted to attacking the settlers.

The settlers saw them as "savages" who left a "terrible field of slaughter"—and responded accordingly: After a short trial in front of the Military Court, 38 Dakota men were hanged in Mankato, MN, and Fort Snelling[60] was turned into an internment camp for hundreds of Dakotas.[61] Roughly 4,000 spectators came to the hanging of the Dakota men in Mankato. To keep the peace, Col. Miller had banned the sale and consumption of alcohol within a ten mile radius of the town.

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[58] Ibid.
[59] "The US-Dakota War of 1862: Renville County," Minnesota Historical Society US, http://usdakotawar.org/history/renville-county.
[60] A fort at the location of present-day Minneapolis/St. Paul.
[61] Carley, *The Dakota War of 1862*, 68–75.

The bodies of the Dakota were put in a mass grave but many of them were dug up and used as medical cadavers by physicians.[62] This illustrates the brutality that could be found on both sides when it came to retaliating: Settlers lamented the "horrible killing" of their own but did not hesitate to kill many (often innocent) Dakota after short trials and use their bodies for medical experiments. The conflict over land claimed the lives of 700–900 settlers and Dakotas over a period of six weeks.

As a consequence of the events between August and December 1862, acts of Congress in 1863 revoked all treaties with the Dakota, which meant that they were exiled from Minnesota. The government began paying bounties for Dakota scalps because they now were regarded as fugitives. In the spring of 1863, a military campaign against the Dakota drove them further and further west. Except for a handful of small reservations found in Minnesota today, the 1863 military drive ended the Dakota's claims to land in the state.

Bringing the Plow to the Prairie: European Settlement in Renville County

When the European settlers came to Minnesota in the nineteenth century, they came to establish permanent settlements. They often settled in regions where the climate reminded them of their home country. As one of the northernmost states in the United States, Minnesota mostly attracted northern European settlers: Scandinavians, Bohemians, Irish, and Germans. To this day, many Olivian surnames show these origins: Baumgartner, Heller, Peterson, and so forth are commonly found surnames in Olivia's directory.

[62] "The Trials & Hanging," Minnesota Historical Society US, http://usdakotawar.org/history/aftermath/trials-hanging.

Unlike the Dakotas who relied heavily on hunting and gathering, for the early settlers farming was both the most common way of producing their own foodstuffs, as well as a way to make a living by selling the surplus. Wherever the settlers went and settled, they tried to establish agricultural fields around them. The settlers were amongst the major forces transforming the American heartland into one of the most productive agricultural regions of the world: the Corn Belt.

In the 1840 census, only a few settlers were living in the area of present-day Minnesota. According to the census, the total yield of all crops harvested in Minnesota that year was 9,031 bushels—made up of 8,014 bushes of potato, 606 bushels of corn, and 411 bushels of other crops. Over the course of the next 80 years, many settlers came to Minnesota and changed the face of farming and the landscape. The overall production of crops increased tremendously and the output of any given crop multiplied considerably, but particularly that of corn: "The corn production amounting to 606 bushels in 1840 increased to over eight-four million bushels in 1920," Balmer noted in 1926.[63] This trend shows the explosion of agriculture, and particularly of corn growing, in the second half of the nineteenth and first decades of the twentieth century in Minnesota. Between 1840 and 1920, corn production in Minnesota increased by an astonishing 140,000 percent, which required the freeing up of arable land.

Corn was not a very common crop in Europe, and the settlers were neither used to growing nor eating it. Coming from Europe, they were used to a wheat-based diet. The settlers adopted growing corn from the Native Americans. Through trade with the Dakotas the settlers obtained their first seed corn. The advantages of growing corn over wheat were that it could be grown very easily almost anywhere and it

[63] Balmer, "The Farmer and Minnesota History," 213.

was a good crop to break the hard prairie soil. As a consequence, the settlers were quick to incorporate corn into their diet. Corn was a more important basic ingredient in the settlers' diet than it is for most Olivians nowadays. Many settler recipes were based on corn: hominy, corn bread, and corn mush were commonly found on the settlers' dinner tables.

When the settlers came looking for places to build their homes, most of Minnesota was prairieland. The prairie grass cover was continuous and formed a thick and deep sod, up to a meter deep, held together by the dense and deep roots of the prairie grass. Typically, the prairie was hard to break with the plow or any other agricultural instruments.[64] The early settlers had to use alfalfa and corn to achieve this: "the roots of the corn did what their tools would not do. They broke the tenacious prairie sod." Dorothy Giles said, "next year it was possible to put a plowshare into the ground and to drive a long straight furrow. The earth that rippled away from the blade was dark and rich and sweet to smell."[65] Once broken, the prairie sod could be shaped into brick form and was used to build houses, the so-called "sod houses." Sod was an inexpensive and readily available resource to build simple settler homes. Nonetheless, breaking the sod to create agricultural fields was a task that required hard manual labor. The use of corn helped to facilitate this hard manual work, as farmers had discovered the mechanical soil breaking action of corn roots.[66] In an article featured in the farming journal *The Cultivator*, the farmer W.G. Edmundson shares his experiences with other farmers of breaking the sod with the help of corn: "A small hole is cut in the sod with an old axe, or a grubbing hoe, in which the seed is

[64] John T. Schlebecker, "Tillage and Crops on Prairies and Plains: America 1830–1960," *Journal d'agriculture traditionnelle et de botanique appliquée* 24, no. 2 (1977): 173, doi:10.3406/jatba.1977.3280.
[65] Giles, *Singing Valleys*, 139.
[66] Schlebecker, "Tillage and Crops on Prairies and Plains," 173.

deposited, and covered; and the crop from that time forward, receives no cultivation, or attention, till it is matured, ready for harvest."[67] He goes on to comment on the "extreme toughness of the unrotted sod" and that "[through the use of corn] nature herself wisely provides for the extermination of the wild grasses and plants, that so profusely spread over the prairie surface, requiring only on the part of the husbandman, a single plowing, by which the soil becomes divested of every species of herbage except such as may be planted by the hand of man."[68] In the first growing season, corn was essential for the settlers to break the prairie sod. Corn doubled as a food source and prepared the soil for further plowing, often mechanical, in the next growing season.

The role of corn as an early foodstuff for both animals and humans is important: Dorothy Giles said in 1940 that "corn has fed all our great national movements, as corn had always been the food of the frontier."[69] The promise of good farmland and almost certain harvests attracted many European immigrants in the nineteenth century. "The tide of migration moved on. Every country in Europe added to it. The news of fertile and cheap cornland had spread around the globe, kindling the imagination of poets and startling peasants out of their apathy," Giles says. "Why, in that country, it was reported, a man could plow a furrow forty miles long. When you broke the prairie sod and planted the American corn you were sure of a harvest. Corn couldn't fail. Later, when the corn had ravished land of its superabundant strength, you could sow wheat. There was no possibility of hunger in America."[70] Even though corn was easy to grow and crucial for the settlers to establish their farms in the prairie, it certainly was not true that "corn couldn't

[67] Tucker, Luther, ed., *The Cultivator: A Monthly Journal Devoted to Agriculture, Horticulture, Floriculture*, vol IX (Albany: Packard and Van Benthuysen, 1852), 67.
[68] Ibid.
[69] Giles, *Singing Valleys*, 122.
[70] Ibid., 137.

fail" or that there was "no possibility of hunger in America." But Giles manages to capture the spirit that prevailed among many settlers and that was passed on in letters to family and friends back in Europe. There was a perceived sense among a large group of Europeans that the United States were "the Land of Cockaigne" in the late nineteenth centuryIn reality, however, the life of the early settlers along the frontier was often marked by hard work and uncertainty. In Minnesota, long and cold winters in areas far away from the next larger settlement, and a lack of access to electricity or medical care didn't always match the image of having come to the land of "milk and honey." In the early days of settlement, the European immigrants also feared clashes with the local Native American population, as they had experienced or heard about during the US-Dakota War of 1862. By trying to establish themselves in a new country, many settlers had to endure a lot of hardship before being able to permanently settle in their new home country. Nonetheless, the possibility of owning one's own piece of land for very little money and living independently in a farming community attracted large groups from Europe in the nineteenth century, despite the hard labor that came with it. . The group of Europeans settlers was made up by various individuals that tried to escape religious or political persecution in Europe as well as by opportunists who were hoping for a better life in the United States.

Fields of Opportunity? The Role of the Homestead Act of 1862

One important piece of legislation that made available cheap farmland to settlers was the Homestead Act of 1862. The act allowed every adult[71] over the age of 21

[71] This applied to both men and women; however, it excluded Native Americans, African Americans, and other minorities.

to claim a piece of land of 160 acres (or 80 acres) for a small registration fee.[72] The new law required three steps: file an application, improve the land, and file for deed of title. The Homestead Act played an important role in the settlement of the Midwest and the Western United States. It allowed many people to become landowners who otherwise didn't have the means to buy land. But what might look like a noble generosity of the US government towards its people was also a strategic tool, as this act played a significant role in securing a westward movement of the population and ensuring the settlement of rural parts the country with American citizens.

Homesteading embraced one of the founding fathers' core ideals: Thomas Jefferson's idea of the "yeoman farmer." A yeoman farmer was a small-scale land-owning farmer, typically a subsistence farmer. Jefferson believed that hardworking yeoman farmers were crucial for the young democracy and he argued that independent farmers formed the basis of Republican values.[73] Farming was a substantial part of the development and growth of the young nation. And corn soon emerged as the most popular field crop. "Corn provided infant America

[72] The original wording of the Homestead Act is "That any person who is the head of a family, or who has arrived at the age of twenty-one years, and is a citizen of the United States, or who shall have filed his declaration of intention to become such, as required by the naturalization laws of the United States, and who has never borne arms against the United States Government or given aid and comfort to its enemies, shall, from and after the first January, eighteen hundred and sixty-three, be entitled to enter one quarter section or a less quantity of unappropriated public lands, upon which said person may have filed a preemption claim, or which may, at the time the application is made, be subject to preemption at one dollar and twenty-five cents, or less, per acre; or eighty acres or less of such unappropriated lands, at two dollars and fifty cents per acre, to be located in a body, in conformity to the legal subdivisions of the public lands, and after the same shall have been surveyed: Provided, That any person owning and residing on land may, under the provisions of this act, enter other land lying contiguous to his or her said land, which shall not, with the land so already owned and occupied, exceed in the aggregate one hundred and sixty acres." Act of 20 May 20, 1862, Homestead Act, Congress of the United States of America.

[73] Samuel C. Hyde, "Plain Folk Yeomanry in the Antebellum South," in *A Companion to the American South*, ed. John B. Boles (Malden, MA: Wiley-Blackwell, 2004), 139.

with a backbone while it was developing the use of its legs,"[74] Giles said in 1940 to show how essential corn was for the westward expansion and the development of the United States as a nation. In the second half of the nineteenth century, the United States was still a very dynamic, evolving country. Growing corn was one of the best ways for farmers to secure their own survival and to make a living.

Many of Olivia's first citizens came as a result of the Homestead Act. Clara Helmer was one of the Olivians interviewed for Joe Paddock's 1976 oral history project and tells the story of how her family came to the area: "My dad come to this country in the year 1890. He came to America in 1873, and he lived some time in Ioway [Iowa]. Then he came to Minnesota in 1890. From South Dakota. Mother used to tell us different stories." Helmer recalls, "Between blizzards, tornadoes, grasshoppers, and the Indians, they had a rough going. When they came here, they only had a wagon and the two horses, fifty dollars in cash, and their clothing and very few pieces of furniture. And they took up this homestead five miles north of Olivia, and that's where I was born."[75] Helmer's account of her parents' arrival in Olivia vividly shows some of the hardships the homesteaders had to endure: uncertain weather (which could be devastating for the crop), fear of clashes with Native Americans, as well as poverty (or at least very little money). The homesteaders could only better their situation through successful farming efforts. Corn was feeding them and they hoped to make some money by selling their surplus crop. Christena Svoboda remembers that her family came to Olivia after an unsuccessful homesteading attempt in South Dakota. Her father first claimed an 80 acre homestead just north of Olivia and later bought another 80 acres right next to it. Compared to South Dakota, Svoboda said that "Oh, yes, the

[74] Giles, *Singing Valleys*, 92.
[75] Paddock, *Things We Know Best*, 13.

lands, it is better here. And better livin' here."[76] Surely there were also failed homesteading attempts around Olivia, but they are hard to quantify due to the lack of data on unsuccessful homesteads. Therefore, the accounts of the successful attempts are usually the only ones that can be found in local resources as they were passed on by the homesteaders that eventually became rooted in the community. .

The oral history accounts not only help depict the first homesteaders that came to Olivia, but also what the landscape looked like before European settlement. One of the interviewees, Emil Karnik, recalled what it was like when his family settled in Olivia:

> "When the folks came here, it was all prairie land. It was just a few farmers around here. And Bird Island,[77] that was the only thing that had trees. When the prairie fires used to come, they used to burn out everything. And dis here Bird Island, there was water standing, a slough around the whole island, and that didn't let the fires in there, and that's why the trees got to grow in there. Nowadays there ain't nothin' there, by God. It's all worked into good field. But when folks first come over here, it was all prairie land.
> Daddy used to have a team of horses. Dere even used to be some neighbors with ox, but Daddy had the walking, breaking plow, and he used to break the meadows up for plowed ground, to make a field out of it. Dere was lots of it unbroken prairie, farmers here and dere, five, ten miles apart.
> It was all different kinds of grass in dem prairie. It was some tall, and some of it was slough grass, and some of it was bastard grass, they used to call it. I don't know what it was. And some of it just regular June grass. And where there was any water or any ravines, that was mostly slough grass. And that used to grow tall. That used to grow big, three foot tall and higher."[78]

Karnik's account of the early settlement days reflects what the surveyor map also shows: the area around Olivia was covered by prairie grass, with some marshland

[76] Ibid.
[77] Bird Island is a town 5 miles (8 km) east of Olivia.
[78] Paddock, *Things We Know Best,* 9.

and some trees scattered in between. His detailed description gives us further insights into what the surveyors had broadly marked as "prairie": it seems that mixed prairie grasses, at least some of them tall prairie grasses, covered the area around Olivia. Karnik also mentioned sloughs: because of the thick clay layer underneath the prairie, it was common for swamps to emerge there.[79]

The 1862 Homestead Act brought many settlers to Olivia. It was the settlers' agricultural efforts and their use of corn that changed the face of the landscape that surrounded Olivia. After they broke the prairie using corn, their plows dug up the prairie grass and transformed the rich soils into agricultural fields. This is true for a much larger proportion of the US landscape than the mere surroundings of Olivia: as most of the early settlers in the Midwest were farmers, it is important to acknowledge their role as key figures in changing vast stretches of the American heartland. Prairie grass, meadows, and forests had to make way for cornfields.

Down By the River: Draining the Prairie

This section will look more closely on the draining of the prairie and the effects it had on corn growing. The surveyor map shows that the predominantly prairie-covered area around Olivia was interwoven with marshland and sloughs; hence, it can be classified as a "wetland prairie." Even though agriculture heavily relies on access to water to ensure crop growth, too much water also poses a problem for farmers. If the soil is too wet, crops cannot prosper and will die. Harold Dirks talks about this phenomenon in his oral history account: "He [a Bohemian named Steve Kartak] told us, 'My dad said to me, "Steve, this country here will never be

[79] Schlebecker, "Tillage and Crops on Prairies and Plains," 173–74.

settled. Too much water. You know, if you drive through the country and you look out over those black fields now, you'll see white water jugs on the posts. Lots of 'em. Those mark tile inlets. And that's where there was water."[80] John Baumgartner remembers just how much water there must have been and how extensive the network of waterways was: "In my grandfather's day, if you had a little canoe, you could go by boat all the way from here to Mankato which is 90–100 miles that way," he said. "This was a very wet, buggy area."[81]

Dirks's and Baumgartner's accounts fall in line with the original remarks of the land surveyors. Their notes, accompanying the map, provide more specific information on individual townships in Renville County: "This township is so cut up with deep and impassable reed sloughs as to prevent but few inducements to agriculture. Its such soil as can be found is 1st rate rich bottom, but it is in small patches compared to the low wet marshy land it can never be worked to advantage unless the sloughs are drained which would seem almost impossible,"[82] the surveyors remarked on Melville township, which is located just east of Olivia. For other townships of Renville County water is reported as less problematic, and the surveyors speak of "nearly all fine farming land well watered in the southwestern portion" in their notes.[83]

When the settlers came to Olivia, they had to find a way to deal with the swamps and sloughs. They first attacked the problem of excess water individually by digging ditches—but that often meant that they were turning their excess water into their neighbor's problem![84] In the long run, this was not a feasible option, as

[80] Paddock, *Things We Know Best*, 10.
[81] Oral interview with John Baumgartner (Baumgartner Environics), 25 July 2014.
[82] Survey remarks cited in Svoboda, *Looking Back*, 23.
[83] Survey remarks cited in ibid.
[84] Ibid.

it led to multiple conflicts among the residents. Therefore, as early as 1897, a petition was filed at the district court that turned ditches into a public interest: from now on, all ditches were classed as county or judicial ditches. It was now the counties responsibility to handle the draining through ditches in a comprehensive manner. Renville County takes up an area of approximately 630,000 acres, of which 6,386 acres—or 1/10 of the county—were covered by water in 1900.[85] Frank Svoboda thinks that "Renville County has been a leader in the drainage of land to recover it for agriculture."[86] He even thinks that it was the active drainage systems that helped turn Renville County into the leading agricultural county in Minnesota.

Draining the land for agriculture helped increase yields, as steadily managed water levels ensure better root growth for corn plants. High yields meant that the investment costs of the drainage system were quickly recovered. Drainage tiles were first introduced to the United States by the Scottish immigrant John Johnston and helped farmers dry out large, marshy areas all over the Midwest.[87]

The figure from Prince's book *Wetlands in the American Midwest* illustrates how through drainage, deeper root growth is encouraged and leads to a more even growth pattern among the corn plants, which results in a higher yield per acre.

[85] Ibid., 22.
[86] Ibid., 25.
[87] Clampitt, *Midwest Maize*, 57.

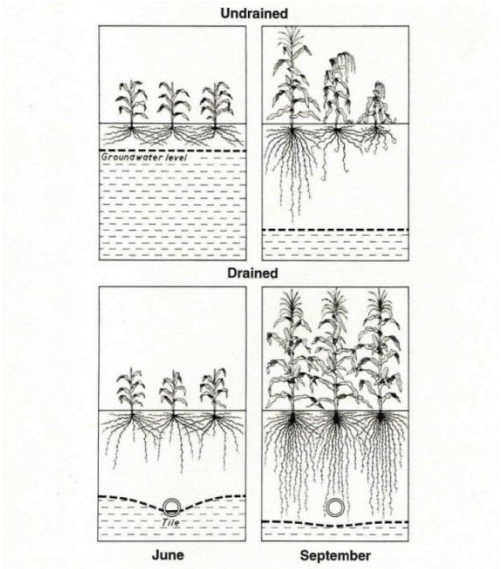

Figure 6.5 Effect of tile draining on corn root growth

Tile drains lower ground water in spring. In undrained soils, root growth is stunted by high levels of ground water in spring and plants wilt in late summer. On drained soils plants develop deep rooting systems that sustain them through the summer. Drawing by John Bryant.[88]

Figure 5: Effect of tile draining on corn root growth

Artificial drainage started around 1900 in Renville County and was recognized as a good way to improve the yield. In 1930, the U.S. *Census of Agriculture* described drained lands as more profitable for agricultural purposes than undrained lands—and even said that they often increased in value.[89] In Renville County extensive drainage systems were installed. Besides stressing the fertility of artificially drained lands, Prince says that prairie soils "are heavy soils to cultivate but under proper management produce the highest yields of corn in the world."[90] This is also true for the surroundings of Olivia, which were converted from wetland prairie to highly productive agricultural fields. Renville County nowadays is among the most fertile regions of the United States. These prime agricultural conditions established between 1890 and 1930 through drainage would turn out to be one of the main reasons for seed companies to settle in this

[88] Prince, *Wetlands of the American Midwest*, 223.
[89] Ibid., 3.
[90] Ibid., 54.

area, as the soils provided perfect conditions for growing experimental crosses and testing corn in yield trials.

A map of the US Bureau of Census featured in Prince's book shows which areas of the Midwest show high levels of drainage for farming by 1930:[91]

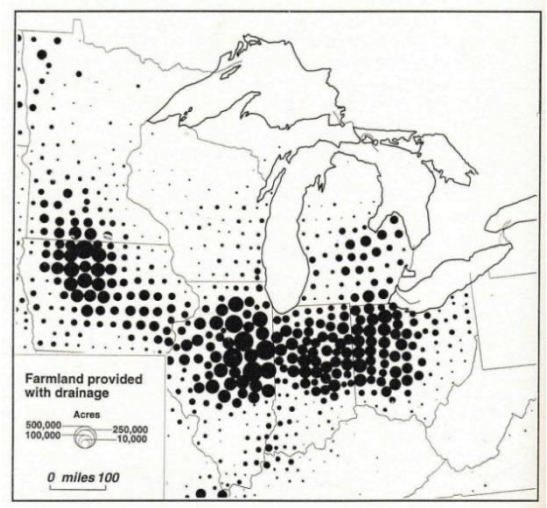

Figure 6.8 Drained farmland in the Midwest, 1930

The area of each circle represents the area of farmland provided with drainage in each county. *Source:* U.S. Bureau of Census, *Fifteenth Census of the United States, 1930*, vol. 4, *Drainage of agricultural land* (Washington, D.C. 1932).

Figure 6: Drained farmland in the Midwest, 1930

The overlap of the indicated drained area and the expansion of the Corn Belt is very large.[92] Illinois, Iowa, Indiana, Ohio, and southwestern Minnesota—including the area around Olivia—have seen the largest proportion of drainage of agricultural fields and are all part of the Corn Belt.

Using corn to break the sod and draining the prairie to convert it into fertile agricultural land were two of the key factors that helped create the Corn Belt: "The acreage planted to corn was highest in the central prairie district, where it accounted for between 40% and 50% of land in crops. […] Drained lands also produced the highest yields per acre. […] The production of corn multiplied in the

[91] Ibid., 232.
[92] For a map of the Corn Belt see p. 3.

1880s and 1890s on newly drained land. It has been asserted that drainage undertakings were largely paid for in corn."[93] Draining wetlands and cultivating corn were two processes that went hand in hand in the late nineteenth and early twentieth centuries. The money spent on installing drainage systems in wetland prairies was paid for by the profits of selling more corn. Currently, the tile ditch systems in Renville County expand some 3000 miles—and approximately three-fourths of the county is drained.[94]

The amount of drainage in Renville County exceeds the national average. However, the US Department of the Interior's Fish and Wildlife Service estimates that in a period of 200 years, from 1790 to 1990, roughly 53 percent of the original wetlands in the lower 48 states were drained. Some states, like Iowa, California, and Indiana even lost around 90 percent of their wetlands.[95] As in Olivia, agriculture was the main driver behind this development all over the United States. The drainage of the wetlands meant the fragmentation and destruction of the habitat of hundreds of thousands of wetland species, both plants and animals. Waterfowl species lost their breeding habitats.[96] In the nineteenth century, there was a sharp decline in migratory waterfowl species due to a lack of water surfaces available to them. Besides the habitat loss, by draining wetlands, other services that wetlands provided were lost as well. Wetlands provided a natural form to retain storm water, served as flood protection, enhanced the water quality, and they even served as freshwater fisheries. Through their ability to store

[93] Ibid., 234.
[94] Svoboda, *Looking Back*, 22.
[95] Thomas E. Dahl, "Wetland Losses in the United States: 1780s to 1980s" (US Fish & Wildlife Service, Washington, DC, 1990), 1.
[96] Ibid., 10.

carbon, wetlands helped to regulate the climate.[97] In contrast to that, modern forms of agriculture, which are dominated by monoculture style planting—and monoculture cornfields are a prime example for that—have very poor water storing capacities, particularly after heavy downpours of rain.

Laying New Tracks: How the Railroad Shaped Olivia's Agriculture

Despite the negative environmental consequences, drainage systems upped the productivity of the fields around Olivia. However, during the same time drainage tiles were introduced another technical innovation changed the face of the landscape and the evolution of Olivia: the coming of the railroad. Olivia is part of the Twin Cities & Western Company's railroad line, which runs from Minneapolis to South Dakota. Railroads had a dramatic impact on the Midwest and the West during the time of the westward expansion of the United States, as they dramatically cut down the speed of shipping and travel.[98] This made the settlement of the West much easier, and cities that were directly connected to a railroad line were far more attractive than ones further away from the railroad. The historian Christian Wolmar even speaks of the "railroad age" that had arrived by 1835. He says that "nothing could stop it [the railroad] from transforming America."[99]

As Minnesota was one of the later states to be settled, it took a little while for the railroad to arrive from the East Coast. The railroad came through Renville County in 1878, as an extension from the line that was built from the Twin Cities to

[97] Jos T. A. Verhoeven and Tim L. Setter, "Agricultural Use of Wetlands: Opportunities and Limitations," *Annals of Botany* 105, no. 1 (2010), doi:10.1093/aob/mcp172.
[98] Clampitt, *Midwest Maize*, 47.
[99] Christian Wolmar, *The Great Railroad Revolution: The History of Trains in America* (New York: PublicAffairs, 2013), 23.

Glencoe in 1877.[100] "My grandfather on my mother's side carried a pack from Glencoe to southwest of Buffalo Lake to claim his homestead in 1877." Willard Beck said. "He rode the train as far as Glencoe, and then the next year he brought my mother and his family, brought them out in a covered wagon." The railroad was expanded further after the arrival of Beck's grandparents. "In 1878, the railroad built through to Montevideo. In 1879, they made it through to Ortonville. And I believe, if I'm correct, they got as far as Aberdeen in 1881,"[101] Beck said.

With many towns springing up over a short period of time during the settlement of Minnesota, the ones along the railroad had better chances to prosper than those further away. Transportation to and from Olivia became easier, faster, and cheaper for both people and goods. Having a railroad stop in the town also provided business, as passengers passing through needed to be lodged, fed, and could potentially be interested in other business ventures. Being located on a railroad line was one of the reasons that Olivia grew in size compared to some of the smaller towns nearby that were founded around the same time but were without a railroad stop. "The town grew with the railroad, and the railroad grew with the rising volume of the Corn Belt agriculture," Mark Kramer commented on towns along the railway in the Corn Belt. "More and more trains carried crops east and goods west."[102]

The railroad played an important role in transporting corn produced around Olivia to the next largest cities. Before it is put on the tracks, corn is brought to the grain elevator, where it is stored and then put on train wagons. Olivia's first grain elevator was established in 1906. On 26 March 1906 the "Olivia Farmers

[100] Paddock, *Things We Know Best*, 44–45.
[101] Paddock, *Things We Know Best*, 44–45.
[102] Mark Kramer, *Three Farms: Making Milk, Meat, and Money from the American Soil*, 2nd ed. (Boston: Little, Brown, 1980), 121–22.

Cooperative Elevator Company" was incorporated and the first grain elevator started operation in the same year.[103] It was built right next to the railroad stop, which allowed farmers access to the grain markets in the Twin Cities and as far as Chicago.

Figure 7: Picture of the Olivia depot and railroad station, unknown date. The grain elevators can be seen in the background.[104]

Having the grain elevator set up next to the railroad stop was and is a common practice for farming towns along railroad lines. Today, a modernized and enlarged grain elevator can be found at the Olivia railroad stop. To this day, the elevator in Olivia belongs to a farmers' cooperative, which changed its name a few times over the years and in 2019 is called "Co-op Country Farmers Elevator" (CCFE).[105] Within Olivia, the grain elevators are the tallest structures and can be seen from almost anywhere in the town.

[103] Svoboda, *Looking Back*, 144.
[104] "The Olivia Depot and Railway Station." Picture from the Renville County Historical Society (DSCN 6033).
[105] The CCFE was incorporated July 1986 and is the result of a consolidation between Sacred Heart Farmers Elevator (formed in 1886), Renville Farmers Elevator (formed in 1890), Danube Farmers Elevator (formed in 1906), and Renville Co-op Fertilizer Company. In 1990 the Olivia Farmers Elevator (formed in 1906) became part of CCFE and in 1993 the Vigaro Farm Market fertilizer plant in Olivia was purchased. To find out more: http://www.coopcountry.com/fccp-about-16867.

The origins of Olivia's name are also tied to the railroad: Albert Bowman Rodgers, an eminent civil engineer who located the railroad, supposedly gave the town its name. "The first station agent to be placed in Ortonville, Minn., was a woman. Her name was Olive. She was a particular friend of Chief Engineer Rodgers, and it was for her he named Olivia."[106] At least, that is the official version cited in Upham Warren's *Minnesota Place Names*. But the origins of Olivia's name are disputed. It is also possible that Olivia was named after Margaret Olivia Sage, the wife of Russell Sage, another official of the Chicago, Milwaukee, and St. Paul Railroad.[107] What is undisputed is that a railroad official named Olivia after a special woman in his life.

When the railroad passed through Renville County and came to Olivia in 1878, it facilitated access to and from the town, as well as the transportation of people and goods. Homesteaders coming to the area chose Olivia over towns without direct railroad access, and corn—one of the most important exports of Olivia—could now be transported more easily to the grain market in the next larger cities, such as Minneapolis and Chicago.

History of the Corn Belt

Taking the changes in the landscape described above into account—from breaking the prairie sod to draining the wetland prairies, to connecting corn farmers with the big grain markets via the railroad— it is unsurprising that Olivia is nowadays seen as part of the Corn Belt. Olivians take pride in being one of the most

[106] Upham, *Minnesota Place Names*, 492.
[107] Ibid.

productive corn growing counties in the United States. But when looking back in time, Olivia was not always classified as part of the Corn Belt.

When referring to the Corn Belt, over time, different regions were understood to be part of this vast agricultural region that was artificially created by humans. "When one speaks of the Corn Belt there are different ideas of what is meant. Certainly in the days prior to 1900 Minnesota and other important corn growing states in the North Central region would have not been included," Dorothy Giles noted.[108] In 1963 the agronomist Herbert Kendal Hayes said that "in Minnesota corn now is the major crop, and in recent years Minnesota has been in the third to fifth place in the total production of grain, often exceeded only be Iowa and Illinois."[109] Though these statements seem to contradict each other, this change is explained by the development of the corn industry in Minnesota: the years between 1900 and 1960 marked a drastic increase in corn production in Minnesota.

The term "Corn Belt" does not refer to a fixed entity. From its beginning, what was understood to be the Corn Belt has shifted and expanded. The Corn Belt did not reach its full extent until the 1960s.[110] By tracing the expansion and shift of the Corn Belt, we can understand what factors impacted it.

The first area to ever be classified as the Corn Belt was the region of Tennessee, Kentucky, and Virginia. "By 1839, Tennessee and Kentucky joined Virginia to form the original U.S. Corn Belt. Tennessee led the nation in corn and swine

[108] Giles, *Singing Valleys*, 120.
[109] Herbert Kendall Hayes, *A Professor's Story of Hybrid Corn* (Minneapolis: Burgess Publishing Company, 1963), 106.
[110] Clampitt, *Midwest Maize*, 33.

production," [111] Troyer and Mikel noted. Since the European settlement of the United States began at the East Coast, it does not come as a surprise that the first states of the Corn Belt were—compared to today's Corn Belt—quite far east. When the first Corn Belt was established, manual selection was the means to "breed" corn. Farmers selected the best ears of corn and replanted them the next year. Certain strains of corn were more popular than others, but commercial hybridization of corn had not been discovered yet.

Within 20 years of having come into existence, the Corn Belt had started to shift towards the American Heartland: "By 1858, corn production moved 422 km (200 miles) north and 640 (400 miles) west to center in Illinois, Ohio, and Missouri. In 1878, Iowa first surpassed Illinois in corn production—about 500 counties made up the U.S. Corn Belt."[112]

The main reason why the Corn Belt expanded westwards was the necessity to feed farm animals, particularly hogs, and corn had proven to be a good, protein-rich feed for the animals. During the westward expansion of the United States, the population was growing (due to the continuing immigration from Europe) and American farmers had to secure the food supply for the nation. Corn played an important role for the feeding of the young nation. "For nearly 300 years, there was an open agricultural and territorial frontier in North America, with a corn belt on its outer fringes," ethnologist Arturo Warman says.[113] The image provided by Warman of a westward-moving Corn Belt on the outer fringes of the frontier can be explained by the versatility of corn. Corn was chosen over other field crops at

[111] A. Forrest Troyer and Mark A. Mikel, "Minnesota Corn Breeding History: Department of Agronomy & Plant Genetics Centennial," *Crop Science* 50, no. 4 (2010): 1143.
[112] Ibid.
[113] Arturo Warman, *Corn & Capitalism: How a Botanical Bastard Grew to Global Dominance* (Chapel Hill: University of North Carolina Press, 2003), 155.

it was an easy to produce food source that helped break the sod and fed both humans and animals. Of course, not all areas settled during the westward expansion became part of the Corn Belt. But as a "frontier crop" helping to break the sod and providing food, corn could be found in almost all settlers' and yeoman farmers' fields and homes, even if it was then abandoned for the sake of growing other crops after one or two growing seasons.

Today, the Corn Belt stretches from Kansas and Nebraska to Ohio; its southern boundary embraces parts of Missouri and Kentucky, and its northern border cuts through the Dakotas, Minnesota, and Michigan.[114] Over half of the US corn harvest is produced by Iowa, Illinois, Nebraska, and Minnesota. Considering how late Minnesota joined the Corn Belt, it is impressive how important the corn production of the state has become.

As the Corn Belt grew in size, its importance for the US economy grew as well. "The value of this crop," James Wilson wrote in 1908, then secretary of agriculture, "almost surpasses belief. It is $1,615,000,000. This wealth that has grown out of the soil in four months of rain and sunshine, and some drought, too, is enough to cancel the interest-bearing debt of the United States and to pay for the Panama Canal and fifty battle ships."[115] Over only a short period of time corn had become the most important cash crop in the United States.

By transforming the American heartland into "corn country," American farmers were able to produce a crop of such impressive value in 1908. Around 1900, agriculture in the United States was one of the main occupations of its citizens and it played a more important role, both politically and economically, than it did

[114] Bogue, *From Prairie to Corn Belt*, 1.
[115] USDA, "Yearbook of Agriculture 1908: Report of the Secretary" (Washington, DC: USDA, 1909), 10.

elsewhere, such as Great Britain. Even though the industrial production of goods expanded considerably in the early nineteenth century, agriculture was the largest "industry" during the time of the settlement of the Midwest and the western United States. And within the agricultural sector, corn was the most important field crop.

Once the European settlers had fully claimed the continent and established the Corn Belt, innovations in the breeding industry expanded the Corn Belt further. The chief force driving the expansion of the Corn Belt in the mid-twentieth century was the introduction of hybrid seed varieties. Corn plants could now be adapted to various climatic regions: shorter maturity periods or greater tolerance against heat or cold allowed the Corn Belt to expand into regions where it was previously thought impossible to grow corn. Olivia is a good example of this trend: today, the surroundings of Olivia are regarded as a prime corn-growing region, but within an area that extends much farther than the original expansion of the Corn Belt. Only by adapting hybrid seed corn to the climate of Minnesota (short maturity period, withstanding cold) could Olivia establish its fertile grounds as part of the Corn Belt.

What's the Value of Nature?

Coming back to Wilson's quote on the value of the corn crop grown over the course of just a couple of months in 1908, one wonders how a value of $1,615 billion could be created in such a short time out of "nothing but soil, seed, labor, rain, and sun."[116] However, the stated value of the 1908 corn crop at the grain

[116] Ibid.

market should not be taken at face value. First off, one needs to deduct the production costs: the labor of the farmers, machinery, etc. It does, however, raises yet another set of questions: What are the environmental costs of transforming the prairie into monoculture corn fields? What was the value of the landscape before vast stretches of the American heartland were turned into agricultural fields?

The concept of the "value of nature" is dynamic and has changed over time. To understand Wilson's quote, it is crucial to look at his contemporaries and their understanding of the "value of nature." For Wilson, all that mattered was the monetary value of the corn crop after harvest at the grain market. Jedediah Purdy, professor of environment law, discusses the changing attitudes of Americans towards "nature" over the course of history in his book *After Nature: A Politics for the Anthropocene*. He classifies the settlers' view of "nature" as "a providential vision, in which the natural world has a purpose, to serve human needs richly, but only if people do their part by filling it up with labor and development."[117] No intrinsic value was given to the existing landscape before it was converted into agricultural lands. Prescribing an intrinsic value to nature is a fairly new mindset that mostly developed in the second half of the twentieth century. Purdy describes this as an "ecological view of the world," which entails valuing ecosystems and natural landscapes for what they are.[118] Wilson's view on

[117] Jedediah Purdy, *After Nature: A Politics for the Anthropocene* (Cambridge, MA: Harvard University Press, 2015), 8.

[118] Purdy's analysis of the change of value reflects the most common view of the discourse on the "value" of nature in the United States. This discourse, however, is not undisputed. Environmental historian Alfred Runte argues in his book *National Parks: The American Experience* (Lincoln: University of Nebraska Press, 1979) that national parks are comprised of "worthless lands" that could only be set aside as national parks because they bear no other economic value. According to Runte, "no qualification outweighed the precedent of 'useless' scenery; only where scenic nationalism did not conflict with materialism could the national park idea further expand." (p. 65) Runte's "worthless lands" thesis did spark a debate among historians as to whether the national parks were established because they actually were "worthless lands" or despite their having worth (e.g., natural resources such as wood, or minerals, but also as a tourist destination or for

the record corn crop of 1908 fell in line with that of his contemporaries, who saw nature through their "providential view." For them, a large corn harvest was a symbol of progress—corn turned otherwise useless nature into a valuable commodity.

The geographer Scott Prudham also argues that "nature is converted—however unevenly—into a form of capital and commodity."[119] This view of nature as a commodity is also reflected in language: for settlers, expressions such as "improving nature" or "improving land" were very common. They were used as synonyms for "farming," particularly during the time of homesteading. For settlers, using the land for agricultural purposes was seen as an improvement of the land, as they were adding value to something that—in their eyes—did not have any value before. Turning "wild nature" into profitable agricultural lands that could be used to make a living was a desirable goal to them.

Thus, when looking at the transformation of prairielands to agricultural fields in the American Midwest through the eyes of the settlers—using Purdy's "providential vision"—the transformation must be seen as a success story. It is important to note that the early settlers still very much perceived nature as a commodity that could and should be used (and even exploited) to make money. In

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the housing market). The group arguing that national parks were created "despite their having worth" falls in line with Purdy's argument of the "ecological view of the world."

[119] Scott Prudham, "Taming Trees: Capital, Science, and Nature in Pacific Slope Tree Improvement," *Annals of the Association of American Geographers* 93, no. 3 (2003): 637, doi:10.1111/1467-8306.9303007. In this article Prudham looks at the industrial use of forests, particularly Douglas firs, along the US West Coast. Similar to corn breeding developments in the Midwest, private companies and agricultural colleges on the West Coast were working on modifying trees to generate higher yields. The processes described in the article (problem of "biological time"—for example seasonal crop cycles—as a limiting factor in improvements of plants, issues with crossbreeding between research plants and wild plants, patent rights to new varieties, etc.) bear a striking resemblance to the processes that took place in the corn-breeding sector. This shows that the discussed phenomena took place in a very similar form to other plants.

their understanding, value was added to the landscape by converting it into agricultural fields.

It is only through the more modern "ecological view" that we might see this transformation in a more problematic light, countering the agricultural profits with questions about the destruction of ecospheres and the loss of biodiversity. Even though nowadays there is still no unambiguous method of putting a dollar value on healthy soil or an intact ecosystem that can then be compared to agricultural profits, awareness has arisen that intact ecosystems are integral for biodiversity and the preservation of certain species. Therefore, today we attribute value to "unimproved nature" per se and see Wilson's quote through a different lens: agricultural production comes at a price. The profits of the annual corn crop have to be countered with environmental costs and problems like the depletion of soils, herbicide and pesticide runoffs into waterways, destruction of wildlife habitats, and the overuse of water for irrigation—to name only the most prominent agricultural problems.

The fact that prairie and wetlands as landscapes and ecosystems were not attributed value during the time of the settlement of the American Midwest has resulted in the drastic shrinking of the natural prairie-covered lands and wetland-covered lands in the United States. On top of seeing prairie as a land cover that needed to make room for cornfields, most settlers also did not perceive the prairie as a pristine or breathtaking landscape worthy of protection in the form of national parks or nature reserves—something all the first protected landscapes in the United States have in common. Therefore the first nature conservation efforts in the United States were focused on "spectacular" landscapes, such as high mountains or unique canyons, rather than on highly biodiverse ecosystems.

This resulted in prairielands being among the least protected landscape features in the United States.[120] Nowadays, there are only three big prairie reserves in the US—in Oklahoma, Kansas, and Montana.[121] Even though the growing awareness of the importance of ecosystems has led to a recent move towards greater protection of areas such as prairielands, less than 5 percent of the original expansion of prairie-covered land in the US has remained.[122] This shows the far-reaching effects of the different attitudes of humans towards the value of nature, and how this influences how they change the landscape surrounding them. Due to the settlers' "providential view" on nature, most of the prairie in the Midwest was turned into the Corn Belt. Understandably, they needed to ensure a supply of food for themselves and their animals. They opted to do this through establishing permanent settlements with adjacent agricultural fields, unlike the hunting and gathering lifestyle of the Native Americans. Nonetheless, with our current "ecological view," the destruction of over 95 percent of the prairielands found in the American Midwest must be considered a tragic loss of a large ecosphere.

Even though to this day the most common form of growing corn around Olivia and all over the Midwest is still in the form of a monoculture crop, some groups have started to approach agriculture in the prairie through a more holistic "ecological view." In the Land Institute in Salinas, Kansas, the goal of Wes Jackson and his team is "to create an agriculture system that mimics natural

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[120] "Oklahoma: Joseph H. Williams Tallgrass Prairie Preserve," The Nature Conservancy, http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/oklahoma/placesweprotect/tallgrass-prairie-preserve.xml.

[121] Montana: American Prairie Reserve (https://www.americanprairie.org/), Kansas: Konza Prairie (http://www.konza.ksu.edu/Splash/default.aspx), Oklahoma: Joseph H. Williams Tallgrass Prairie Reserve (http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/oklahoma/placesweprotect/tallgrass-prairie-preserve.xml).

[122] Less than 5 percent is the number quoted by the National Parks Service, https://www.nps.gov/tapr/index.htm, and The Nature Conservancy.

systems in order to produce ample food and reduce or eliminate the negative impacts of industrial agriculture."[123] Their research focuses on trying to find perennial crops that can be grown in the prairie and provide food while keeping the ecosystem intact. This approach only caters to a niche market of agriculture in the Midwest, but even large seed providers now encourage, and sometimes even require, farmers who grow Bt corn to dedicate a small portion of their field to growing a refuge variety to help battle the spread of pests among corn plants—acknowledging the importance of healthy ecosystems.[124]

Conclusion

These days, when visiting Olivia in July, one will see the town surrounded by lush, green cornfields. These human-made agricultural fields, however, have little to do with the original landscape cover that was once found in the area; they are the result of an array of factors that contributed to transforming the area into an agricultural hotspot of the Corn Belt.

Some of the circumstances beneficial to growing corn date far back and have natural origins: during the last ice age, large parts of North America were covered by the Canadian Shield. Olivia was at the margins of the ice shield, in an area where the terminal moraines deposited fertile loess. Paired with the naturally occurring subsoil clay layer found at a depth of about 10 ft, this has resulted in naturally very fertile soils that can be found in Renville County and possess the quality to store water well—a huge plus for growing corn.

[123] "About Us," The Land Institute, https://landinstitute.org/about-us/.
[124] "Learn More About Refuge Requirements: Protecting Against Insect Resistance," Monsanto, http://www.monsanto.com/products/pages/refuge.aspx.

In this naturally rich growing environment provided by the ice age, the predominant landscape cover that emerged was prairie. The area around Olivia was covered by wetland prairie—a prairie that is interspersed with marshes and sloughs. Some of the early effects of humans' interaction are hard to trace. We can only make assumptions about the ecological effects that mass trapping of beavers in the seventeenth and eighteenth centuries had on beaver habitats such as wetland prairies.

Similarly, we know that Native Americans used slash and burn techniques to create agricultural spaces, but it is hard to trace the exact consequences of their interactions with the landscape around Olivia. One thing that is certain is that it was Native Americans who first started growing corn in North America. And through trade they passed corn seeds on to the European settlers. This peaceful sharing of resources and land did not last long, however. The US-Dakota War of 1862, which cost the lives of many settlers and Dakota people, marked the climax over land disputes and the end of the hunter and gatherer lifestyle of Native Americans in Minnesota, as they were driven out of the state as a result.

One of the reasons why the conflict over land escalated in 1862 is the fact that in the same year the Homesteading act was passed, which encouraged the European settlement of the Midwest and the West of the United States. With the access to cheap land through the Homesteading Act, many European settlers poured into Minnesota. Their westward push interfered with the Dakotas lifestyle and destroyed their homes. Corn was key for successfully securing their settlements: they used it to break the hard prairie soil and started to incorporate it into their diets and to feed their animals with it. The settlement of European immigrants in

the Midwest was the single largest factor driving the conversion of the prairie into farmland.

To ensure the best growth for the corn crop, farmers did not shy away from technical innovations. A key technique that fostered corn growth and helped drain the wetland prairie was the introduction of drainage tiles. Town names like "Beaver Falls" and "Bird Island"—both very near to Olivia—are reminiscent of the water that was found in Renville County. However, nowadays, the majority of the county has been drained to facilitate agriculture.

Another technical innovation that boosted Olivia and transformed the region was the railroad. Because of it, cities with a train station, like Olivia, flourished over others that had no direct access to the railroad. The line passing through Renville County connected the Twin Cities with South Dakota and offered the farmer access to the grain markets in larger cities, like Minneapolis or Chicago.

The introduction of hybrid seeds and their quick adoption, particularly after 1940, was the third technological innovation that greatly influenced the surroundings of Olivia. Due to the creation of hybrid seed corn that had a shorter maturity period and was able to withstand colder weather, corn could now thrive around Olivia in a way old land races could not. Better-adapted hybrid seeds cemented Olivia as part of the Corn Belt and turned it into one of the most productive regions of the northern Corn Belt.

Since its first mentioning as "the Corn Belt" in 1839, the agricultural area classified as the Corn Belt has shifted dramatically. The original Corn Belt states were Tennessee, Kentucky, and Virginia. Corn was at the forefront of the westward expansion of the Unites States. With the help of corn, settlers claimed

agricultural land and fed themselves and their animals. The westward expansion of the Corn Belt was accompanied by a northwards shift of the Corn Belt. The key factors driving the expansion of the Corn Belt were settler movements and technical innovations, like drainage and the development of adapted hybrid seeds.

The wetland prairie, with its marshes and sloughs, that emerged and gave rise to the landscape of Olivia after the terminal moraines of the last ice age had deposited fertile soils, has been replaced by agricultural fields, predominantly cornfields. This development is true for vast stretches of the Midwest that have been turned into the Corn Belt. One of the main reasons why contemporaries thought so little about converting the prairie into cornfields was because they saw nature as a commodity that was waiting to be reaped. In their eyes, they were adding value to an otherwise useless landscape by adding some seeds and their physical labor. One of the unforeseen side effects of making farming one of the core businesses of the American heartland is that only less than five percent of the original cover of the prairie remains. In the late nineteenth century the breaking of the prairie with corn was seen as a victory over nature. The continuous desire to improve the corn yield has led to a number of technical innovations (drainage tiles, hybrid seeds, chemical fertilization etc.) that completely altered the landscape around Olivia. Today, the cornfields are thriving thanks to irrigation and the availability of modern hybrid seed technology. However, the present-day surroundings of Olivia are vastly different from the wetland prairie that used to be found in this area.

2. Globalizing Corn: Transformations in Olivia's Corn Seed Industry

One of the main reasons that Olivia became the Corn Capital is its role as a stronghold of the corn seed industry. "The development of the corn industry has resulted in greater farm profits and an increase in land values. The breeding of seed corn has been emphasized along with the growing of corn for feed."[125] This quote can be found in *The History of Renville County Minnesota*—a book that dates back to 1916! Only 29 years after Olivia was founded, the corn seed industry was already identified as an important industry sector for the town. Popular early open-pollination strains of corn, like the Minnesota 13 (also known as Minn13)[126] and Silver King, were bred by local corn breeders like E. G. Enestvedt and Joseph Keinholz. The authors of *The History of Renville County Minnesota* in 1916 predicted a bright future for the agricultural sector: "The future of the county, agriculturally speaking, is bright. Possibly there is no section in the state which is as uniform in soil conditions and topography as this county."[127] This uniformity and richness of the soil (dating back to the rich deposits during the last ice age) have proven to be important assets to attract many seed companies to the area. Nevertheless, the authors of the 1916 book probably could not have

[125] Franklyn Curtiss-Wedge, *The History of Renville County Minnesota, Volume II* (Chicago: H. C. Cooper Jr. & Co, 1916), 784.
[126] Minnesota 13 is one of the original cultivars that still has a far-reaching influence on the hybrid corn produced in the United States nowadays. According to Forrest Troyer "Reid Yellow Dent is the most popular cultivar of all time, Leaming corn is second, Minnesota 13 is third, and Northwestern Dent is fourth." (from Troyer, A. Forrest. "Background of US Hybrid Corn" *Crop Science* 39, no. 3 [May 1999]: 625).
[127] Ibid., 788.

imagined just how global and far-reaching the impact of the corn seed industry in Olivia would be. Today, 14 seed companies have a presence in Olivia, producing corn seeds that are grown all over the world, among them agricultural giants such as Monsanto and Dow.

The changes that took place in the seed industry in Olivia exemplify the overall developments that took place in the seed industry over time. The local developments in Olivia show how the seed industry has become ever more globalized, and what effect that had on individual local corn seed businesses. What started as a location for small, family-owned and -operated seed businesses turned into a home base for companies that are part of a multibillion-dollar global industry. In 2012, the International Seed Federation (ISF) assessed the global commercial seed market to be worth approximately $45 billion.[128] It is expected to grow to $83 billion in 2019.[129] Some of the corn seed companies that have research facilities in Olivia are well-known market leaders: Monsanto, DeKalb, and DowAgro Sciences—to name the most prominent ones. Olivia exemplifies the change the corn seed industry underwent from an industry with a local focus to one with a global focus: in terms of the size of the companies, the markets they provide seeds for, the financial equity of the seed industry, as well as the changed research and development (R&D) processes. Seed companies became part of a global network, but the production of seed corn itself has also been globalized: during the development process of new varieties, corn seeds are physically flown around the globe.

[128] International Seed Federation, "Estimated Value of the Domestic Seed Market in Selected Countries for the Year 2011," accessed 3 February 2017, pestlist.worldseed.org/cms/medias/file/GrowthIntlSeedTrade.pdf.
[129] Mordor Intelligence. *Global Seed Market 2014-2019. Market Shares, Forecasts & Trends*. Bangalore: Mordor Intelligence LLP, 2014.

Within the seed industry Olivia has claimed a prominent position as one of the leading corn seed producers in the world. In the United States, there are only a handful of towns where multiple seed companies have a presence: Champaign, IL, and Ames, IA— where the seed companies have close ties to the large agricultural state colleges that are located in both towns—as well as York, NB, and Constantine, MI, who have small local university presences. Olivia is the only seed hub in the United States that is located in a small town without a university presence.

To show how Olivia turned into the international corn hub it is today, it is important to understand the origins of the hybrid seed technology and industry, as well as the consequences of the introduction of early hybrids. This will help us understand the history of the seed industry in Olivia and why expert knowledge and the reliance on people is a distinctive feature of the corn seed industry. Looking at mergers and acquisitions helps to grasp the impacts on the local operations of companies in Olivia, as well as to see how the corn breeders and corn seed companies in Olivia became part of an ever more globalized network.

The Science of Corn Breeding and the Emergence of the Seed Industry

The development of the corn seed industry goes hand in hand with discoveries and breakthroughs in the fields of genetics, biology and agronomy. A brief summary of the most important innovations in the field of corn improvement will help to better understand the reasons for the emergence of seed companies as a business model and the role that universities, and particularly the University of Minnesota (U of M), played.

Since the beginning of agronomy and genetics research in the United States, corn has played a central role and served as a guinea pig for breeding experiments. This is due to multiple factors: corn is arguably "man's first, and perhaps his greatest, feat of genetic engineering,"[130] which means there is a long history of humankind's tinkering with corn. Another reason why corn is a desirable plant for experiments is its physical features that allow humans to interact with it easily: it is a large, sturdy plant, with the male and the female sex parts located on two distinct parts of the plant. This allows humans to intervene in the natural pollination process. Furthermore, one ear of corn has a large number of kernels and pollinating one ear leads to hundreds of saplings in the next generation. Compared to wheat, where one gets roughly 10–15 new plants per ear in the second generation, corn can deliver 200–600 new plants per ear of corn, per growing season. Corn has also proven to be a very adaptive species that can flourish in many different climates and environments. Its adaptability has led to the wide spread of corn over a variety of climatic regions. Few other plants are that adaptable to temperature, altitude, humidity, etc. After harvesting, corn can be used for a wide range of purposes. Over 90% of the US corn harvest is used for "industrial purposes," such as animal fodder, ethanol, corn starch, high fructose corn syrup, and many more.[131] Because of this versatility, corn became one the most popular field crops.

The first method to improve corn, as with other plants, was through selection. The indigenous people of central Mexico were the first to actively engage in selecting corn and when they migrated north they brought corn with them. Native

[130] Nina V. Fedoroff, "AGRICULTURE: Prehistoric GM Corn," *Science* 302, no. 5648 (2003): 1158, doi:10.1126/science.1092042.
[131] USDA Economic Research Service, ed., "Feed Grains: 2015 Yearbook," (2015).

Americans were growing corn in the area of the present day United States long before the Europeans arrived. They introduced corn to the European settlers and taught them how to grow. Both the Native Americans and later also the European-descendent farmers saved ears of corn that possessed the traits they liked, e.g., strong stalks or large ears of corn. They then replanted the corn seeds of the saved ears of corn the next growing season. "Most of the improvement of corn was done by the American Indians before 1000 A.D." Henry A. Wallace, Vice President to Franklin D. Roosevelt and long-term Secretary of Agriculture, said in 1956, acknowledging achievements of indigenous selection and breeding efforts of corn, "but the most spectacular changes have been made by the white man during the past two hundred years, especially during the past eighty years."[132] What Wallace referred to in this quote is the creation of hybrid corn.

Nineteenth-century nature observers and researchers laid the foundation for modern hybrid corn experiments through their observations on inheritance of plant traits. Charles Darwin and Gregor Mendel are among these researchers.[133] Inbreeding in general is regarded as a means to weaken a plant's vigor. Darwin noted this, too, when experimenting with inbreeding. But he also realized that inbreeding led to the crystallization of the features of a certain strain, which were particularly visible after inbreeding the plant for about three to five generations.[134] Being able to tell what the dominant features of a particular strain of corn are helped breeders tremendously in selecting which strains to cross. Had breeders previously crossed strains on a rather arbitrary basis, hoping for a favorable

[132] Henry Agard Wallace and William L. Brown, *Corn and Its Early Fathers*, rev. ed., The Henry A. Wallace series on agricultural history and rural studies (Ames: Iowa State University Press, 1988), 19.
[133] A good overview on the early contributors to hybrid corn research is provided by ibid.
[134] Ibid., 64.

outcome, was the crossing of two inbred varieties now a much more targeted process.

After 1900, Edward M. East, George Shull, George Krug, and many others picked up the theoretical framework provided by Darwin and Mendel and used it for the creation of the hybrid corn. The geneticists East[135] and Shull simultaneously worked on similar research and both came to the conclusion that cross-pollinating inbred corn strains would lead to more vigor in the F1 generation than in the parent generation. This meant that the lost plant vigor due to inbreeding could be restored and enhanced through crossbreeding. Farmers like George Krug or James Reid also played an important role by providing the necessary high quality inbred strains that could be used to produce crossbreds.

Most of the research that led to the development of hybrid corn happened at public universities. In 1851, seven years prior to Minnesota obtaining statehood, the U of M was established as the state's land-grant institution. When Abraham Lincoln signed the Morrill Act into law to establish land-grant universities all over the United States, the intention was to donate "Public Lands to the Several States and Territories which may provide Colleges for the Benefit of Agriculture and the Mechanic Arts."[136] Skeptics first mocked the land-grant universities as "cow colleges" due to their focus on agriculture, but they soon outgrew this reputation and established themselves as important institutions in the academic system.[137] As the U of M was a part of the land-grant university system, it is unsurprising that

[135] Edward Murray East was one of one of the key figures in the development of hybrid seed corn and is one of the handful of people featured in Henry A. Wallace's *Corn and Its Early Fathers*.
[136] "Public Law 37-108, 12 STAT 503: Morrill Act," in *Enrolled Acts and Resolutions of Congress, 1789 – 2011*.
[137] More on the history of land-grant universities: Roger L. Geiger et al., *The Land-grant Colleges and the Reshaping of American Higher Education,* Perspectives on the history of higher education 30 (New Brunswick (USA), London (UK): Transaction Publishers, 2013).

agricultural research was one of its early strongholds. The U of M played an important role in the research and development of early hybrid seeds. As research at land-grant-universities was closely linked to the interests of farmers, particularly before the 1950s, the stronghold of the U of M for corn breeding programs was vital for creating an environment that helped to foster the commercial corn seed industry in Minnesota.

Willet M. Hays, known as the "father of American scientific plant breeding"[138] and founder of the American Breeders Association was selected to be the first faculty member for the newly established Minnesota Agricultural Experiment Station of the U of M and he would go on to become the US Assistant Secretary of Agriculture in 1904 under the Theodore Roosevelt administration. Hays was one of the core drivers of corn-breeding innovation at the U of M and laid the foundation that other researchers built on in subsequent decades. One of the most important strains to have been developed at the U of M was the Minn13. Tracing the influence of inbred strains developed at the U of M, Toyer and Mikel concluded in 2010 that "Minnesota inbreds were used in 30.6% of the seed for the 1975 U.S. corn crop."[139] Minnesota was—unsurprisingly, when looking at its own geographic location—a key driver in the development of short season corn that helped expand the Corn Belt northwards.

Another figure from the U of M that plays an important role in the history of corn breeding is Herbert Kendall Hayes. He studied under Edward Murray East at Harvard before he became an associate professor at the U of M in 1915. Due to his studies with East, Hayes was a strong advocate for hybrid corn in the

[138] Troyer, Forrest A and Mark A. Mikel, "Minnesota Corn Breeding History: Department of Agronomy & Plant Genetics Centennial," 1142.
[139] Ibid., 1141.

1910s[140]—during a time in which no commercial use of hybrid corn had yet been developed. "From the time I stood there in Connecticut in 1910 and 1911 and saw those East single crosses," Hayes said, "the most beautiful corn I have ever seen, every ear so large and looking like the one right next to it—I was sure that somehow, some way and some day a practical use for it would be found, I never doubted from that time on that hybrid corn would come."[141]

As Hayes noted, one of the biggest problems of early hybrid corn was that, although it increased yields, it did not seem to be profitable. The reason was that the inbreds used to produce hybrids have pretty small ears and it required a lot of manual labor to produce a single-cross. Hence single-crosses seemed to be too unprofitable for larger-scale commercial use.

This changed in 1914 when Donald F. Jones presented a solution for how to make hybrid seeds attractive for applied agriculture. Jones, a corn breeder with a farming background, was trying to think of solutions to the problem outside of the lab. He combined the theoretical knowledge of his agronomy training with his practical experience of having grown up on a farm. Jones proposed the idea to produce double-crosses, which would make the production of hybrid corn seed feasible on a commercial scale. As mentioned, the problem with single-crosses was that they required a lot of manual labor to cross them in large enough numbers to produce the F1 generation, whereas with double-crosses, the F2 generation could be achieved through open pollination, vastly cutting down on the required manual labor.

[140] Ibid., 1144.
[141] Alexander Richard Crabb, *The Hybrid-Corn Makers: Prophets of Plenty*, 2nd ed. (New Brunswick: Rutgers Univ. Pr, 1948), 104.

To produce a double-cross hybrid, one requires four inbred parent strains (A, B, C, D) to start out with. For the F1 generation you cross A x B and C x D. This leads to two F1 strains: AB and CD. This was the status quo of single-crosses. The innovation came in the next step when crossing the two F1 generations AB x CD to create the F2 generation ABCD. Jones suggested the second crossing could be done through open pollination—solving the problem of the expensive and time-consuming hand pollination. He suggested alternating the parent rows, three rows of the female parent followed by one row of the male parent. To ensure that the plant selected to be the female parent didn't pollinate its own ears, the female rows had to be de-tasseled, creating a pattern on the cornfield of three de-tasseled female rows followed by one male row with tassels. When the pollination occurred, the male plants produced double-crosses in the female plants and selfed themselves. The corn seed producers could then harvest three rows of double-cross hybrid seeds (the 'female' plants) followed by one row of a selfed single-cross (the 'male' plants). The ears of corn of the male plants could be sold for commercial use, and the ears of corn from the female plants provided the desired commercial hybrid seeds. This innovation was a true game changer in the hybrid seed research as it provided a commercially feasible method for producing hybrid seeds.

The first commercially successful double-cross hybrid corn variety on the US market was the "Burr-Leaming," which was launched commercially in 1921.[142] Hayes from the U of M contributed to the "Burr White" inbreds that were used to create the "Burr-Leaming" hybrid.[143] The "Burr-Leaming" corn was an important

[142] Noel Kingsbury, *Hybrid: The History and Science of Plant Breeding* (University of Chicago Press, 2009), http://books.google.de/books?id=dGSj-CFxk-QC, 229–30.
[143] Forrest A. Troyer and Mark A. Mikel, "Minnesota Corn Breeding History: Department of Agronomy & Plant Genetics Centennial," 1144.

breakthrough in what would lead to a triumph march of hybrid seed corn. It was the first double-cross hybrid seed that was produced on a large scale and in an economically feasible way for the seed producers.

The fact that all early plant research in Minnesota happened at the U of M rather than in seed companies mirrors a trend that historian Jack Kloppenburg observed for all of the United States: "the history of plant improvement in the United States until 1935 or so is essentially that of the continuous growth and elaboration of publicly performed research and development in a virtual vacuum of private investment."[144] Kloppenburg, who is highly critical of the capitalistic system through which the seed industry succeeded, however fails to acknowledge that initial research within the realm of universities might have been necessary to spark and foster connections and research among farmers and private entrepreneurs.[145] One of these connections would be crucial for the emergence of the seed industry in Olivia.

The most attractive feature of the new hybrid corn was the increase in yields. But another important change that was made possible through the rise of hybrid seeds was the ability to breed for resistance against certain pests and enhance characteristics that would help the plants to flourish in the fields. The agronomist Perry G. Holden played an important role in discovering the ability to generate resistance in hybrid corn. Thanks to his discovery, corn plants could be selected

[144] Jack Ralph Kloppenburg, *First the Seed: The Political Economy of Plant Biotechnology, 1492–2000*, 2nd ed., Science and technology in society (Madison: University of Wisconsin Press, 2004), 12.

[145] In his book *First the Seed* Kloppenburg argues that the one of the core reasons for creating hybrids over improved landraces was a capitalist interest of the seed industry. He laments the loss of public leadership in breeding initiatives in the United States and criticizes institutions like the International Center for Improvement of Maize and Wheat (CIMYT) for their role in the Green Revolution. Kloppenburg argues that they didn't just care about producing higher yielding varieties for the Third World Countries, but that they appropriated free genetic material of plants that then no longer appeared as a free good but as a commodity, which had negative effects for the countries CIMYT took the germplasm from.

that were more resistant against certain pests or plagues. Selection could also include looking for more drought- or cold-tolerant varieties. Desired physical features of the plants were further criteria for selection: plants with stronger roots and stalks were favored. The goal was that weather phenomena like wind or rain should cause less damage in the corn field. With the mechanization of American farms progressing in the 1940s and 50s, corn breeders started selecting for a uniform position of the ears on the stalk, as more uniform corn plants made a field easier to harvest. The technical innovations in the second half of the nineteenth century provided new selection criteria for the development of new hybrid corn varieties. "Corn cultural practices and machinery were greatly improved from 1940 to 1980.Minimum tillage, more nitrogen, earlier planting, improved planters, higher plant densities, narrower rows (better spacing), and combine harvest were important selection screens" agricultural historian Forrest A. Troyer says.[146]

Over the course of the history of corn breeding, from the early days of hybrid corn research to the latest innovation with genetically modified seeds, the overall goals of what traits to strengthen have remained the same. "Basically that's nothing that has changed much over the last few years," Marv Boerboom, a Monsanto corn breeder, says. "You try to always improve the yield. Standabilty, in other words: better roots; strength, stock strengths; disease resistance, greensnap tolerance. So basically it is just trying to make the plant more defensive. Withstanding different environmental factors and diseases, while trying to continuously raise the yield level, so we can produce more per acre of land."[147] Creating suitable plant varieties through breeding is crucial, as only plants that are well adapted to their

[146] Forrest A. Troyer, "Background of U.S. Hybrid Corn," *Crop Science* May 1999, no. 39.3 (1999): 607.
[147] Oral interview with Marvin Boerboom (Monsanto), 24 July 2014.

environment will yield highly. "Adaptedness was critical, quality of germplasm (better acclimated to their present environment) won out over quantity and diversity of germplasm (number of chances)," Forrest A. Troyer said in 1999. "It was not a numbers game [referring to yield numbers]. The game was to improve the adaptedness of a tropical crop to the temperate U.S. Corn Belt environment. It still is."[148] This statement by Troyer shows the continuous strive for better adapted crops when creating new seed varieties.

As Troyer points out, corn is originally a tropical plant. However, the weather in the Corn Belt, particularly the northern Corn Belt (including Olivia), is far from tropical. Vast achievements have been made in making corn plants more resistant to cold weather. The breeders also categorize the different corn varieties according to their adaptedness. As Olivia is part of the northern Corn Belt, the local seed producers also mostly focus on producing "Northern Varieties." In warmer regions of the Corn Belt, drought resistance or heat tolerance are the desired qualities breeders strive for.

One striking side effect of the introduction of hybrid seeds is that it eliminated the necessity for local adaptation of landraces. Hybrids were tested at several locations for a few years and their widespread introduction replaced most of the locally adapted cultivars. Seed companies and the Extension Service offices gave out recommendations to farmers as to which varieties to grow in which region. The recommendations were based on climatic factors, soil quality, and other factors. Farmers and local seed breeders no longer only looked to their direct neighbors for seed corn but to larger seed companies that supplied the corn seeds for a wider area. Hybrids redefined what seed corn meant: whereas farmers used

[148] Ibid., 601.

to rely on their own saved seed—or a very local seed provider—hybrid corn often had qualities that made it well adapted for a wide-ranging area: As long as the climate and the soil conditions met the recommendations of the seed producer, a farmer could be pretty sure to get a good harvest out of the hybrid seeds.

What turned producing and selling hybrid corn into a profitable business for seed companies was that famers could no longer save and replant their own seeds, as the progeny of hybrid corn lacked both vigor and uniformity.[149] Once farmers started to adopt hybrid corn, they had to purchase new seeds from the seed companies every year. Nevertheless, for the prospect of higher yields and better adapted corn plants, farmers willingly gave up their autonomous seed-saving efforts and accepted the necessity of the annual seed purchase.

Problems with Early Hybrid Corn

Even though hybrid corn seeds would prevail in the Corn Belt in the long run, the start was somewhat bumpy. The story of how hybrid corn conquered the American Midwest and large parts of the global market is often told as a linear success story of technical innovation bringing higher yields and better adapted plants to farmers. Even though this is indisputably true in the long run, the early days of grappling with hybrid seeds weren't always as smooth.

One of the greatest problems with the introduction of hybrid corn was the loss of many local varieties of corn. As farmers stopped saving and replanting their own seeds and almost everyone started buying from the same seed corn suppliers,

[149] Annabel Ipsen, "Manufacturing a Natural Advantage: Capturing Place-based Technology Rents in the Genetically Modified Corn Seed Industry," *Environmental Sociology* 2, no. 1 (2016): 44, doi:10.1080/23251042.2015.1123598.

many local varieties were lost. "When Reid yellow dent[150] swept the Corn Belt from 1890 to 1920, it destroyed thousands of them [corn varieties]," Wallace said about the loss of corn varieties. "When hybrid corn swept the Corn Belt from 1930 to 1950, it destroyed most of what remained."[151] This shows how closely the success of hybrid corn is linked to the loss of biodiversity among corn plants. Nowadays a consciousness has developed that these old seeds might have qualities that could be desired in the future and that they need to be saved.[152] This includes resistance to certain diseases or has to do with the appearance of the plant itself, e.g., the amount of ears found per plant. To prevent the loss of further plant varieties, seeds are stored in seed banks.[153] The environmental historian Helen Curry explains the emergence of seed banks as a result of the realization that, due to hybrid seed corn, many local varieties would be lost. Curry examines the early methods of collecting and storing seeds, the first funding schemes and points out the crucial role American agriculturalists played in the foundation of the first seed banks.[154] As corn already had proven to have a high commercial value, corn varieties were among the first plants that were strategically collected and saved.

[150] Reid yellow dent is the name of a corn variety that was created by James L. Reid. He had crossed a flint corn variety with a floury corn variety and then through selection created this very popular open-pollination variety which he named after himself.

[151] Wallace and Brown, *Corn and Its Early Fathers*, 135–36.s

[152] In his essay on the background of US hybrid corn, Troyer talks extensively about the importance of various cultivars for the creation of new hybrids. "Variation available for selection is important" he says in Troyer, "Background of U.S. Hybrid Corn," 621.

[153] The most famous of the seed banks is the "Svalbard Global Seed Vault" by the Global Crop Diversity Trust, which is located in Norway (in Spitsbergen). It is built as an underground bunker and the Trust wants to save copies of as many seed varieties of all plants as possible to make sure that the genetic material is saved in case of human or environmental catastrophes. It is supposed to serve as a "backup" for other seed banks and doesn't work on creating new varieties (like other seed banks) but has a purely conservation function. More information on the Svalbard Global Seed Vault can be found on their homepage: https://www.regjeringen.no/en/topics/food-fisheries-and-agriculture/landbruk/svalbard-global-seed-vault/id462220/.

[154] Curry, Helen A. "Breeding Uniformity and Banking Diversity: The Genescapes of Industrial Agriculture, 1935-1970." *Global Environment* 10, no. 1 (2017), 83-113.

When seed companies emerged, they first were trading strains freely among themselves and collaborated with universities. As the competition among the companies grew and the number of seed companies shrank, they started to protect their strains more. Corn breeders of Olivia-based companies confirmed the growing hesitation of trading strains and linked it to a shrinking biodiversity. "The ongoing consolidation of various brands [of seed companies] I think has resulted in a loss of genetic diversity. Each of these companies had their own strains of unique inbred lines adapted to their areas. Many corn breeders used to freely exchange seeds between themselves since they were not in direct competition with each other. This facilitated variety improvements across the Corn Belt with breeders pulling out useful genes or traits from these exchanged lines and incorporating them into their lines," corn breeder Baumgartner said. "All parties, corn companies, farmers and consumers benefited from this free exchange of inbred lines. It ended in the 1980s with the patenting of inbred lines. Because of the tremendous development costs of new materials I understand the business logic of patents to protect your product." Baumgartner stresses that it isn't just about the total number of breeding efforts but the diversity of material that breeders work with: "But check the numbers! I estimate the total number of US corn breeding programs today to be about 25, not including university programs. Twenty years back there were about 300 seed companies, virtually each with its own breeding program. Yes, today there likely is more total breeding activity than in the past but much less individuality!"[155] Baumgartner rightly identifies legislation, such as the Plant Variety Protection Act and the Plant Patent Act, as reasons why the exchange of corn inbreds was restrained and companies preferred

[155] Dick Hagen, "Is Germplasm Ownership Short-changing Growers?," *Olivia Times-Journal*.

to invest in private R&D efforts.[156] However, the pool of genes for breeding programs didn't get smaller. Mergers and acquisitions led to fewer breeding programs, but each company now has a larger stock of genes from which to choose from, as through the mergers the breeding programs were consolidated. Therefore due to the shrinking level of breeding programs the level of creativity for new crosses/experiments has likely decreased, but there aren't fewer genetic strains that breeders can potentially use to create new varieties.

The promise that convinced farmers in the 1930s to invest in hybrid seeds was that by planting hybrid seeds they would get higher yields and hence higher profits—a promise, as it turned out, that could not always be kept. Early hybrids were often not yet tailored towards specific soils or weather phenomena. As farmers had often selected their seeds over a long period of time, the saved seeds of local varieties were sometimes better adapted than early hybrids that were not adapted to the conditions of the specific regions. Therefore in some regions farmers were disappointed that the yields weren't as high as promised. On the one hand switching from saving their own seed and replanting them the next year to buying hybrid seeds meant a new financial burden on farmers. By committing to hybrid seeds, the farmers lost the ability to save and replant their own seeds, as hybrid seeds only yield well for one generation and have a much lower yield when saved and replanted the next year. On the other hand, however, due to the introduction of hybrid seed, farmers were able to choose from a much wider selection and weren't limited to their local sources.

[156] Jorge Fernandez-Cornejo, *The Seed Industry in U.S. Agriculture: An Exploration of Data and Information On Crop Seed Markets, Regulation, Industry Structure, and Research and Development,* Agriculture information bulletin no. 786 (Washington D.C. (1800 M Street NW Washington 20036-5831): United States Dept. of Agriculture Economic Research Service, 2004), vii

As everyone started to grow the same varieties, another problem that occurred with early hybrid seeds was that the uniformity of the plants made it a lot easier for plant diseases and pests to spread, as the plants were now genetically very uniform. This unintended consequence increased the necessity to use herbicides and pesticides as the number of infestations went up tremendously. The European corn borer was one of the pests that was able to spread with a record distribution of infestations across the Corn Belt between 1930s and 1960s.[157]

Once breeders realized hybrid seeds also needed to be adjusted to regional conditions and implemented the necessary changes, the hybrid varieties yielded well, which led to an abundance of corn that now needed new markets or would lead to lower prices per bushel. As most farmers had switched to hybrid seeds and therefore had higher yields, the overall corn yield across the Corn Belt went up drastically in the 1940s and 1950s.[158] As with most goods in economic transactions, a higher supply of a certain product led to a lower price per item. In the case of hybrid corn this meant that farmers faced a lower price per bushel for their harvest. Therefore new uses for corn had to be found to keep up a steady demand for corn. The abundance of corn and the search for new markets due to high-yielding hybrid varieties is one of the reasons why corn is nowadays used for all sorts of different purposes, ranging from animal fodder to ethanol. It is easy to store, can be bred for specific purposes and therefore has emerged as a prime plant for industrial uses. The possibility of various uses of corn ensured a relatively

[157] T. A. Brindley, "Recent Research Advances on the European Corn Borer in North America," *Annual Review of Entomology* 20 (1975): 221, doi:10.1146/annurev.en.20.010175.001253.
[158] The overall corn harvest went up from 2,080 million bushels in 1930 to 3,075 million bushels in 1950. Statistics from U.S. Department of Commerce, *Historical Statistics of the United States: Colonial Times to 1970* (Washington, 1975), accessed 30 May 2012, http://www2.census.gov/prod2/statcomp/documents/CT1970p1-01.pdf, 511.

stable price for corn farmers as there was always a demand for corn—making it a relatively low-risk crop to grow.

One of the unintended consequences of the introduction of hybrid corn was that, as Deborah Fitzgerald argues, it "was an agent by which farmers were effectively deskilled."[159] This is an often overlooked "by-product" that emerged with the spread of hybrid seeds. Farmers were no longer able to use their own experience and knowledge to help decide which seed corn was more suitable for their own fields—they had to rely on companies to tell them what corn to grow. Fitzgerald argues that this development is similar to some of the mechanization processes in other trades. Farmers have just historically not been framed as "workers" or "laborers" as they often lack the social and economic homogeneity that can be found among factory workers.[160] Similar to their counterparts working in manufacturing trades, they used their knowledge to try to make a living. "Like their counterparts in the trades, farmers acted out of pride and economic self-interest; an indifferent farmer, like an indifferent carpenter, could not expect to prosper."[161] Hybrid corn stripped farmers of their acquired expertise that told them which corn varieties to save and to replant. Before the introduction of hybrid corn, "open-pollinated corn strains differed from each other both in their observable features and in the way they behaved in the field and […] farmers paid attention to these differences."[162] The hybrid seed varieties, on the other hand, were often very similar in their appearance and impossible to tell apart by just looking at them. Farmers' knowledge about corn plants and the differences between varieties, paired with their knowledge about how the plants performed in

[159] Deborah Fitzgerald, "Farmers Deskilled: Hybrid Corn and Farmers' Work," *Technology and Culture*, Vol. 34, No. 2 (1993): 327.
[160] Ibid., 326.
[161] Ibid., 334.
[162] Ibid., 330–31.

their fields, were tools that had shaped their financial independence.[163] This expertise—which was crucial to the financial success (or failure) of each farmer—was lost with the introduction of hybrid seeds as the knowledge about the behavior of corn plants was no longer in the hands of the farmers, but in the hands of the hybrid seed companies. "A farmer's interest in the long-term quality of his seeds was replaced by a short, annual interest," Fitzgerald says "There was no longer anything to build toward. For better or worse, each year's seed was an unknown quantity."[164]

Undeniably, farmers lost some of their expertise about the corn varieties grown in their fields. Nevertheless, certain farmers remained active agents in the development of hybrid corn varieties and weren't just mere consumers of a product. The U of M School of Agriculture, particularly the Extension Service, worked closely with farmers from the region for yield trials and demonstrations. Having learned from the problems of the poorly adapted early hybrids, these trials offered a way to test the seed corn under different circumstances and to show the local farmers how new varieties performed on the field. In 1935 Frank Svoboda, then agricultural agent of Renville County, was growing the varieties "Minn 401" and "Golden King" for demonstration purposes in his fields. The Extension Service had asked six farmers in Renville County to each grow two varieties for them in yield trials. All of them grew "Minn 401" (for comparison) and one other variety. Out of the six farmers, Svoboda had the highest yield for both the "Minn

[163] Ibid., 334.
[164] Ibid., 338.

401" variety, as well as for the "Golden King."[165] This speaks to the excellent growing conditions that are found around Olivia as Svoboda lived near Olivia.

The early hiccups of hybrid corn are often forgotten when telling the story of how hybrids swept the Corn Belt. Even though the introduction of hybrid corn seeds wasn't the smooth success story it is often portrayed as, farmers in the end still valued the advantages that hybrid seed corn had to offer over the disadvantages, including the loss of control over the production of seed corn. Hybrid seed producers also learned a lot through these early problems and started to tailor and recommend varieties depending on the soil quality and other factors to ensure the best results for the farmers who bought them. In the end, the positive attributes of hybrid corn led to its incredibly fast spreading all over the United States, particularly the Corn Belt: hybrid corn accounted for only 0.4% of the corn acreage in 1933, whereas only 12 years later, in 1945, it made up 90% percent of the planted corn acreage.[166] Open-pollinated corn varieties were now a thing of the past and hybrid corn was the new standard.

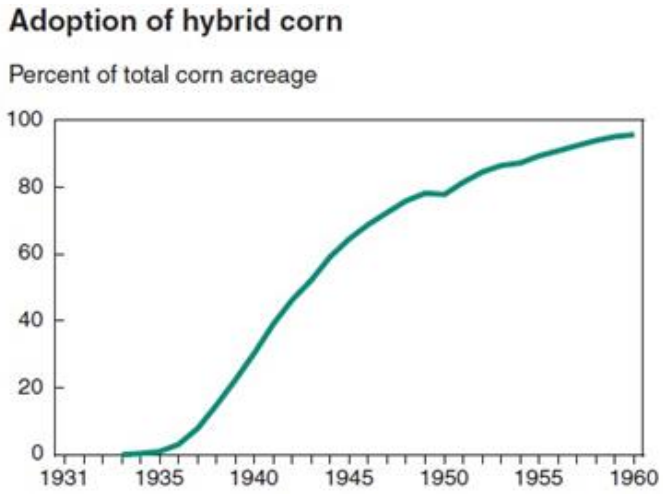

Figure 8: This graph shows the rapid adoption of hybrid corn in the United States, particularly from 1935 to 1950. [167] Sources: Agricultural Statistics, NASS, USDA, various years.

[165] Extension Service, Corn Demonstrations 1935, 1935 in *Department of Agronomy and Plant Genetic Records*.
[166] Fitzgerald, "Farmers Deskilled:," 340.
[167] Fernandez-Cornejo, *The Seed Industry In U.S. Agriculture*, 2.

With the rise of the hybrid corn, seed businesses started spreading all over the United States. Among the early corn seed businesses in the United States four proved to be particularly influential: Funk Brothers Seeds, DeKalb, Pioneer Hybrid Seeds and Pfister Seeds. Each company had a different core geographic area they focused on and produced seeds for. On top of this "big four," various smaller businesses sprang up all over the Corn Belt region.[168]

Homegrown: History of Seed Companies in Olivia

Today, Olivia is one of the centers of the global corn seed production. Even though as early as 1916 the corn seed industry was identified as an important business in Olivia,[169] the beginnings of the seed industry in Olivia were rather humble. The settlers that came to the area in the late nineteenth century adopted corn from Native Americans and grew it to the break the sod and to feed themselves and their animals. The corn varieties they grew were open-pollination varieties (OPV) of landraces.

The first technique of producing seed corn was therefore the selection of the best ears of corn of OPVs to replant the seeds oneself or to share them with others. They chose the ears of corn from plants that did particularly well. Some farmers had a better eye—and also a fair share of luck—in the selection process and started creating higher yielding strains. Some farmers opted to trade varieties, but most farmers were selling their seeds. These OPV varieties were often named after the people who had developed them (Reid Yellow Dent, Funk Yellow Dent,

[168] Curtis Norskog's book *Hybrid Seed Corn Enterprises: A Brief History*. (Willmar: Curtis Norskog, 1995) provides a good overview of the many companies that sprang up all over the Corn Belt.
[169] Curtiss-Wedge, *The History of Renville County Minnesota, Volume II*, 784.

Lancester Sure Crop)[170] or the area the strain came from (Minn13). In the Renville County area, the two most popular early strains were "Silver King" and "Minn13," commercially grown for seeds by E. G. Enestvedt and Joseph Kleinholz.

While the farmers and small seed companies were still focusing on selling OPVs in the 1910s and 1920s, important breakthroughs happened at the university level in the 1910s, 1920s, and the 1930s, like Jones' innovation of producing double-cross hybrids, that would lead to the victory march of hybrid corn varieties. Once all the factors that enabled the production of hybrid seeds in a commercially feasible way were discovered, hybrid seed companies started springing up and replaced the OPVs that were popular until then. The Trojan Seed Company was Olivia's first hybrid seed company and played an important role in turning Olivia into a corn seed hub. Therefore it is worth taking a closer look at the Rauenhorsts, the founding family of the Trojan Seed Company, and the enterprise they created.

In 1931, Howard Waitt, a student of the Agricultural College at the U of M, contacted the at the time Extension Agronomist of Renville County Ralph Crim to indicate that he was interested in growing hybrid seeds on a commercial basis. However, Waitt didn't have any equipment or land and needed a partner for his proposed business idea. Therefore Crim put Waitt in touch with George Rauenhorst from Olivia, who had the necessary land and was also interested in exploring the possibilities of hybrid corn. The two men started a partnership and planted 30 acres of parent stock of Minhybrid 401 and 402. Even though 1931 was a dry year, Waitt and Rauenhorst still succeeded in producing a total of 300

[170] Troyer, "Background of U.S. Hybrid Corn," 601–26 gives a good overview of the early corn breeders and their most successful strains.

bushels.[171] After only one year, the college student Waitt dropped out, but Rauenhorst decided to continue the production of hybrid seeds and founded the Troy Seed Company.[172] In 1948 a new corporation emerged out of the Troy Seed Company, called the Trojan Seed Company. The brothers Henry and George Rauenhorst Jr., sons of George Rauenhorst, purchased the shares of other family members and took over the enterprise. The headquarters of Trojan Seed were first located in Marshall, MN and relocated to Olivia, MN in 1952 and 1953.

George Rauenhorst, founder of the hybrid seed industry in Olivia, also played an important role in the establishment of the Renville County Crop Improvement Association. This local branch of the Minnesota Crop Improvement Association[173] was organized in December 1943. The main responsibilities of the Crop Improvement Association were to allot new seed varieties, increase, distribute and maintain pure seed strains. On top of these functions, the association also held county crop shows from 1943 to 1966 and awarded prizes for particularly high yielding corn varieties. As president of Olivia's first hybrid seed company, George Rauenhorst was elected to be the first director of the Renville County Crop Improvement Association. Some of the plots on George Rauenhorst's farm were used for the Crop Improvement Association, as they were turned into varietal plots to demonstrate a visible comparison between existing varieties.[174] The association planted various varieties so that the local farmers could see and compare them in the field rather than just in seed catalogues. Every year, the Minnesota Crop Improvement Association awarded certificates to a limited

[171] Svoboda, *Looking Back*, 82.
[172] Curtis Norskog, *Hybrid Seed Corn Enterprises,* 183.
[173] The 'Minnesota Crop Improvement Association' was founded in 1903. Its original name was 'Minnesota Field Crop Breeders Association' and was changed to its current name in 1913 (from: Svoboda, *Looking Back*, 100).
[174] Ibid., 101.

number of its members that helped contribute to the pure-seed program. Members of the Renville County Crop Improvement Association were also amongst those honored as premier pure-bred seed growers from time to time. George Rauenhorst was selected as an honored member in 1944.[175]

With the relocation of the Trojan Seed Co. to Olivia came a reorganization of the company. Henry Jr. and George Rauenhorst split their partnership: George took over the existing farms (roughly 1,000 acres) and Henry Jr. took over Trojan Seed Co. The move also triggered changes within the company: Up until the move, Trojan Seed Co. seeds were sold by salesmen directly off of trucks in which they drove around the area. This was changed to a distribution system working through seed brokers. Trojan also updated its portfolio and discontinued grass seeds and small grains and started to focus primarily on seed corn.[176] In 1954 Bob Rauenhorst was hired to become sales manager. Because the business flourished, they decided to expand production. In 1955 a new facility was opened up in Springfield, MN, and in 1959 another one was opened in Ames, IA.

In 1962 the head of the company, Henry Rauenhorst Jr., died in a car accident. To fill the gap, Bob Rauenhorst was named president of Trojan Seed after Henry Jr.'s death. In the next 10 years he built the company from $200,000 in sales a year to $20 million in sales a year.[177] In the 1960s, Trojan Seed Co. expanded its production even further by purchasing production plants from other companies. In 1965 a plant in Sac City, IA, was purchased from Charlie Ritter Sr. and 1967 one in Eldora, IA. With multiple locations in Minnesota and the Midwest, in 1967 Bob Rauenhorst founded a research farm in Kihei, Maui, Hawaii. This was the first

[175] Ibid., 102.
[176] Norskog, *Hybrid Seed Corn Enterprises*, 184.
[177] Black, Eric and Warren Wolfe, "Plane Crash Kills Six Seed Firm Officials," *Minneapolis Tribune*, July 13, 1978

research facility that was developed with the possibility for year-round research by an Olivia-based company. In 1969 Trojan seed acquired new farms in Winfall, IN. What had begun in 1931 as collaboration between a U of M student and a local farmer had turned into a business venture with facilities spanning from Olivia to Hawaii by 1967.

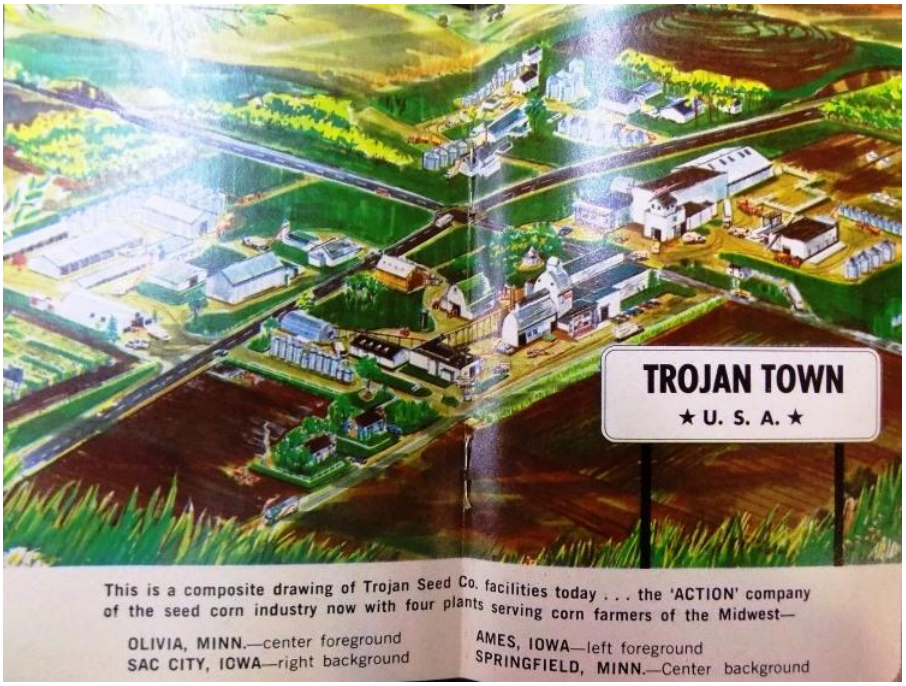

Figure 9: Trojan Town, USA. Caption reads "This is a composite drawing of Trojan Seed Co. facilities today … the 'ACTION' company of the seed corn industry now with four plants serving corn farmers of the Midwest (Olivia, MN—center foreground, Sac City, IA—right background, Ames, IA—left foreground, Springfield, MN—center background).

Nowadays, Steve O'Neill's company Corn Capital Innovations is located in the former building of Trojan Seed, depicted above. "At one time here, at this site, they employed almost close to 400 people. That's what they did out of this facility," O'Neill says. "I tell you: Trojan built a lot of what Olivia was. So you think about it, almost 400 families. It was production, it was retail, it was

marketing. It was everything out of here."[178] Trojan Seed was the heart of Olivia's industry.

1969 marked the end of Trojan Seed Company as an independent, family-operated seed company from Olivia, as Fuqua Industries from Atlanta, GA, bought up Trojan Seed. Because Trojan Seed was a well-known brand, they kept the company running under its name. In 1972 the production plant of Ainsworth Seed Company in Mason City, IL, was bought up to become part of Trojan/Fuqua. Its operation in Olivia remained similar to what it had been before the purchase of Trojan through Fuqua. This changed in 1973, when Fuqua Industries sold Trojan to Pfizer Genetics, a large multinational company. This shift from a local, family-owned business to being a branch of a multimillion dollar company played out on many levels, from how the business was operated to the stopping of local festivities that Trojan used to sponsor but Pfizer saw no necessity to support.[179]

Yet, other connections remained, such as the one to the U of M. On 10–11 April 1977 the U of M's School of Agriculture was holding its "Corn and Soybean" conference in Olivia. University researchers met with representatives of the seed industry, among them Bob Rauenhorst who had made a significant contribution to the success of Trojan Seed, to discuss problems and potential solutions for soybeans and corn. From proper equipment, to tillage, to how to handle corn borer infestations—over the course of two days, the participants discussed a wide range of topics.[180] This conference shows there was a willingness to exchange knowledge, expertise, and the results of research between the university and the seed companies. The goal was to establish a collaboration to deal with common

[178] Oral interview with Steve O'Neill (Corn Capital Innovations), 25 July 2014.
[179] More information can be found in Chapter III.4. "Cornland, USA"
[180] Corn and Soybean Conference, April 10, 1977, University of Minnesota Archives in *Minnesota Agricultural Experiment Station Records*.

problems. However, unlike in the days prior to 1935, strains of corn were no longer traded freely between universities and corporate companies.

The Trojan Seed Company was one of the earliest producers of hybrid corn seed in the area and the first hybrid seed company in Olivia. However, other enterprises also sprang up all over Renville County during the same time span as Trojan Seed was started, most noticeably Evensted Seed Co. from Sacred Heart,[181] known as one of the early producers of Minhybrids and Minn13, as well as of an early soybean, called "Bert," which won the Enevsted Seed Co. some awards.[182]

After Trojan Seed was sold to Pfizer, the former research director and vice president of Trojan Seed, Keith Keltgen, started a new local seed business in 1977, called Keltgen Seed, with five associates, all also former employees of Trojan Seed. This is an indicator of seed breeders' preference to work for a smaller local company, as Keltgen Seed was only started after Pfizer Genetics had bought up Trojan Seed. Keltgen Seed was founded by some of the most prominent researchers who used to all be employed at Trojan Seed Company and shared the desire to no longer work for Pfizer even though they wanted to continue working in the seed industry. One of the associates and founders of Keltgen Seed was Tom Mack. He said that in 1976 when they were still working for Trojan and had an unsatisfactory meeting with higher management people from Pfizer in the local restaurant at the Sheep Shedde Inn, they walked out into the parking lot afterwards. According to Tom Mack, "he said, 'I don't know what I'm going to do but I'm not going to continue to do this.' Keith said that." Then, "I said, 'Well,

[181] A town 17 miles west of Olivia with roughly 750 inhabitants in the 1940s and 1950s (2015 census: 520 inhabitants).
[182] Norskog, *Hybrid Seed Corn Enterprises*, 57.

isn't there something that we could do together? Somewhere? Why don't we start a seed company?'"[183] Creating their own company facilitated the everyday work, as decisions could be reached a lot more quickly. "All you had to do was walk next door and in three minutes you get a quorum and you can make a decision and you didn't have to spend weeks or months or years trying to decide on something that should take 20 minutes" Mack says.[184]

However, Keltgen Seed didn't stay a local business for very long. After six years in business, in 1983, Keltgen Seed was sold to United AgriSeeds. Dow Chemical purchased United AgriSeeds in 1987 and in 1989 Dow Chemical and Eli Lilly & Co formed a joint venture called DowElanco.[185] However, Keltgen Seed continued to be used as a brand name up until 1996. Technically speaking Keltgen was a subsidiary of United AgriSeeds, which in turn was a subsidiary of DowElanco. But the story of consolidation continued: on 3 July 1996, Mycogen officially merged with Keltgen Seed. "Merging with Mycogen brings Keltgen from the eighth place nationally as a corn supplier to fourth place position,"[186] local newspaper sources said. In 1987 a new $6 million processing plant was completed in Olivia. Merging with Mycogen meant the end of Keltgen Seed as a brand name. The Mycogen plant was bought up by Dow AgroSciences, who as of 2017, still had an ongoing operation in Olivia.

Another locally founded seed company was RBA Seeds—RBA standing for Rauenhorst, Bellows, and Associates. After Bob Rauenhorst had sold Trojan Seed to Pfizer he had to agree to sign a three- or four-year non-compete agreement

[183] Oral interview with Tom and Mary Mack (formerly Trojan and Keltgen Seed), 26 July 2014.
[184] Ibid.
[185] Norskog, *Hybrid Seed Corn Enterprises*, 103.
[186] "Keltgen Seed Is No More," *Olivia Times-Journal*, 8 July 8 1996

Pfizer—this was common practice in the industry.[187] Rauenhorst founded RBA Seeds the same year he sold off Trojan Seed in 1973. His business partner was Howard Bellows, the former president of the Southwest Minnesota State College in Marshall, MN. Due to the non-compete clause, in the first three or four years, RBA Seeds focused solely on the production of sunflower seeds as to not interfere with the corn seed business of Trojan/Pfizer. After the time span of the non-compete agreement had elapsed, RBA Seeds started working on corn seeds as well. Similar to the story of Trojan Seed, RBA Seeds first expanded by purchasing Farmers Seed and Nursery Co. in Faribault, MN, before RBA Seeds itself was sold to Stauffer Seeds, which was in turn sold to Syngenta. Syngenta gave up the production site in Olivia, selling it to Remington Seed who came to Olivia in 2001. Remington Seed's Olivia site focuses on soybean production.

The stories of Trojan Seed, Keltgen Seed, and RBA show how the 1970s to 1990s were the time when most mergers and acquisitions happened in the seed industry—to an extentwhere it was sometimes confusing to keep up with the various changes on multiple levels of control over one local seed company. The Plant Variety Protection Act (PVPA) of 1970 played a crucial role in sparking more investment in seed companies. Through the PVPA, intellectual property rights on varieties created by breeders were protected for 18 years and therefore made costly investments into new plant varieties economically more interesting for companies.[188] This led to a steep increase in corporate R&D and fostered the emergence of large seed companies.

[187] According to his nephew, John Baumgartner, it was a three-year non-compete clause. However, Curtis Norskog's in his book *Hybrid Corn Enterprises* speaks of a four-year non-compete clause.
[188] Fernandez-Cornejo, *The Seed Industry In US Agriculture*, vii.

Frank Svoboda draws an interesting comparison between the early days of the hybrid seed industry and the automobile industry: "Like the automobile industry before it, the hybrid seed corn production enterprise spawned many small production plants in the early years. […] Again, like the automobile industry, the market for hybrid corn was soon controlled by a relatively small number of companies with branches reaching throughout the corn-belt."[189] Svoboda draws a correct general conclusion, but forgets to acknowledge that in the seed industry there are still more niche markets for small-scale, local seed businesses than there are small-scale, local production sites in the automobile industry. In Olivia, many of the locally founded seed companies, like Trojan Seed and Keltgen Seed, were bought up by large-scale international corporations like Pfizer or Dow between 1970 and 2010. Nevertheless, even today there are local seed companies that are currently not interested in being part of international corporations, such as 3MG.[190] These small-scale businesses manage to succeed as they specialize specifically on the region they provide the seeds for or the traits of the corn strains that they work with.

The Human Factor: Employees of Seed Companies

One distinct feature of the corn seed industry in comparison to corn farming is that it still heavily depends on people as work force. The trend in conventional agriculture has been an ever-increasing mechanization and industrialization that allows for an ever greater acreage of land to be farmed by one farmer. The labor hours needed to produce (including planting, spraying, and harvesting) one acre of

[189] Svoboda, *Looking Back*, 83.
[190] 3MG is short for 3rd Millennium Genetics LLC

corn have dramatically declined over the past 120 years, from an average of 86 in 1800[191] to less than three in 2011[192]—or 1/30 of the 1800 figure. Because due to the mechanization of agriculture one farmer is able to farm an ever-greater area, the average farm size has steadily increased since 1800 and dramatically increased after WWII. This has resulted in a slow decline of many rural communities as less manual labor and therefore fewer farmers are needed to work the land. The shrinking percentage of the overall population that are farmers reflects this trend as well.[193] On top of that, many children of farmers opt to move to larger cities to pursue different careers. Overall, the rural population in most areas of the American Midwest has steadily decreased in the twentieth and twenty-first centuries.

Mechanization of course also affected and changed the corn seed industry. The technological innovations in the corn-breeding sector are easily as big as the innovations in farm machinery. The possibilities corn breeders have to alter corn plants have astonishingly advanced over the past roughly 120 years. The manual selection process that had dominated the corn seed "industry" (which wasn't very industrialized in its early days, as it was just a selection process) for over 4,000 years had to make way for high-tech innovations such as marker-assisted selection (MAS) or Functional Analysis System for Traits (FAST) technology used to create genetically modified corn seeds. Another example of modern technology used in the seed industry today is the so-called "chipper" as used by Monsanto. It

[191] U.S. Department of Commerce, *Historical Statistics of the United States*, 500.

[192] USDA Statistics "Implied Time to Produce Corn per Planted Acre and per Bushel, United States 1990–2011" (https://www.fieldtomarket.org/report/national-2/PNT_NatReport_Socioeconomic_ImpliedLaborHours.pdf).

[193] Compare USDA, "Census of Agriculture 1930: Volume 4, Part 1: General Report, Statistics by States" (Washington, D.C., 1931) to USDA, "Census of Agriculture 2012: Summary and State Data Volume 1 • Geographic Area Series • Part 51" (Washington, D.C., 2014).

is a tool that helps breeders identify genetically compatible strains for a corn variety they would like to work with. "It orientates every kernel and then takes a little chip out of the top of the kernel and catalogues that and [….] it matches the DNA sequences up with my model," Boerboom explains to show how modern technology can help him speed up breeding efforts by looking for a good strain to work with. "And out of these 3,000 kernels it sends me back 300 kernels that are most likely to have what I'm looking for in the population."[194] Boerboom added that modern technology and biotechnological innovations facilitate the individual steps during the research and development process for a new corn variety.

While acknowledging these technological advances, one important thing that has not changed very much in the seed industry is the amount of manual labor it requires to produce seed corn. It is one of the few agricultural sectors where the industrialization has not lead to a drastic decrease of employees. Nowadays, modern technology can be found in the labs, as well as on the fields, like GPS-assisted planters. But once the seed corn is planted in research plots, it still requires a lot of manual labor in the de-tasseling and pollination process. Machines today help with de-tasseling, but it still takes a skilled human eye to see where the machines have left tassels on the plants and where a shoot needs to be covered with a paper bag for pollination. Over the course of the growing season, each research plot needs to be closely monitored and logged by a trained person. Part of the job entails looking out for diseases or misshaped formations on the plant, as well as keeping a detailed record of each plot to ensure that as much information as possible about each strain or cross is gathered. The inspection of the plants is a task that cannot be taken over by a machine and requires an

[194] Oral interview with Marvin Boerboom (Monsanto), 24 July 2014.

experienced eye. It also takes a human eye to identify the most promising strains in the field and to decide with which strains to cross—even though today modern technology greatly helps with this task. Seed companies tend to hire highly skilled experts for their R&D departments. Most breeders hold a masters or PhD degree in agronomy or plant breeding. On top of that, the seed companies also create many opportunities for local hires with less plant-specific expertise. Some of the local jobs are year round, e.g., administrative tasks in the offices of the seed companies, whereas other tasks are seasonal, most of them being farm hands in the growing season to help out with the de-tasseling and the pollination process.

One of the reasons why the production of seed corn is a very labor-intensive process is the need to work with a large number of different strains to be able to find the most promising ones. The production of seed corn is very much an elimination process: after inbreeding various lines of corn, a corn breeder plants many crosses of different inbred strains on the research plots, as it is hard to predict just which crosses will be most potent and which traits will actually show up in the crosses. This process requires close record keeping of each strain of corn or cross in a seed log book. Only the crosses that look most promising will be tested on a larger scale in yield tests. "We throw away 98%, 99% of what we do. I mean, that's the way it is," Ed Baumgartner, founder of 3MG Seeds, explained. "When I first started working in this job in 1984, I was depressed for the first year or two. Because [we put in] all this hard work and we threw it away. Now I look forward to throwing it away because it means we get to work on new stuff. Get rid of the garbage. And there's a lot of it."[196] One can imagine how much record

[196] Oral interview with Ed Baumgartner (3rd Millennium Genetics), 28 July 2014.

keeping is necessary as a by-product to find the most promising strains, when roughly 99% of the experimental crosses are discarded.

When asked about the traits he tries to generate in his seed corn, Baumgartner states that climate change plays an important role in his selection process. "If you think about the future, we will be limited by water, we'll probably be limited on how much fertilizer we can put on, and we're going to need more production,"[197] Ed Baumgartner says. "Adaptability" is one of the key words for corn breeders and has been a goal since the early days of selecting corn. Producing corn varieties that grow well even in times of drought, or with too much rain, is the goal of this process. Resistance to heat and cold are desired traits as, due to climate change, the temperatures during a regular season are expected to fluctuate more than they currently do. Baumgartner's research includes looking at native genes in older corn varieties to find strains that are naturally more drought or insect resistant. But how does he know which varieties to pick? "You do what you can with data," Baumgartner says, "and some of it just comes down to instinct, taking a chance. What's going to work, what is not going to work?"[198] By using old varieties, Baumgartner takes a different approach than many other colleagues in the field: he does not use genetic modification but sticks to traditional hybrid crosses. For a smaller company, like Baumgartner's 3MG, such a step allows them to cater to niche markets that larger companies might sometimes overlook. He points out that the European market is almost exclusively non-GMO, but in the Corn Belt there are also farmers that opt to grow non-GMO corn.[199]

[197] Ibid.
[198] Ibid.
[199] Oral interview with Ed Baumgartner (3rd Millennium Genetics), 28 July 2014.

Development costs probably play a large role in Baumgartner's decision to opt to grow conventional hybrid varieties. According to sociologist Annabel Ipsen, it costs approximately $136 million to develop a GM seed variety and takes on average 10–15 years.[200] Unfortunately the USDA or other researchers offer no comparable statistics on the development costs of a regular hybrid variety, but it is significantly lower.

Focusing on the job market in the seed industry in Olivia, it is interesting to have a look at the different kinds of employment opportunities that are offered. Many of the seasonal jobs are summer jobs as farm hands for high school and college students. De-tasseling and pollinating corn plants are two tasks that have been done by local youths for many decades and continue to be done by the current local youth. "Buses would come in every day and we'd pick up kids from every town within 18–20 miles of here," Dick Hagen says, "As you know de-tasseling doesn't happen anymore because we mechanically do it. Well, you do have to do some hand de-tasseling in the research plot, but not the field seeds anymore."[201] When talking to Jeffrey Posch from DowAgro Sciences during the 2014 pollination season, he guessed that there were "probably 60–70 kids out in the field right now."[202] The required minimum age for seasonal farm hands is 14. Posch thinks that "the bulk of them are probably 15 or 16 years old. And then there is a number who's in that 17–18 college age range, as well. It's four weeks and then they are done. With all the seed businesses around employing kids, there is a high demand for their labor force."[203]

[200] Ipsen, "Manufacturing a Natural Advantage: Capturing Place-based Technology Rents in the Genetically Modified Corn Seed Industry," 45.
[201] Oral interview with Dick Hagen (formerly Trojan Seed), 28 July 2014.
[202] Oral interview with Jeffrey Posch (DowAgro Sciences), 25 July 2014.
[203] Ibid.

De-tasseling and pollination are jobs that link generations: "If there is a student in town and they have some ambition, they have a summer job. Basically everyone can get a job working in the seed company," Marv Boerboom said. As hybrid seed companies have been around in Olivia for over 60 years now, many generations have worked on the fields. "When I first started, the kids that worked for me, now their kids are working for me." Boerboom said, "So everyone in town has a pretty close connection with corn either through farming or they or their son or daughter work for seed companies. So they are all well connected and really understand the industry. We for example, when we hire kids, have a Parents Day, so they can come and learn what the kids are going to do. We might get one or two parents show up because they all have done it. They know what's going on."[204] Boerboom mentioned that in other towns, closer to large cities, more parents show up to Parents Days, as they are not familiar with the work that their kids will be doing out on the fields, working for the seed companies.

Working on the corn fields around Olivia as a teenager can almost be seen as a "rite of passage"[205] that one undergoes to be a "full-fledged Olivian." The experience of working long days during the summer months in the cornfields is not always a very pleasant memory—but it is an unforgettable one. "A lot of us know how to de-tassel corn! We know what that means," says Mary Mack, who used to work in the nursery plots as a teenager. "I know the discomfort of walking

[204] Oral interview with Marvin Boerboom (Monsanto), 24 July 2014.

[205] The concept of "rites of passage" was first described in 1909 by the French ethnologist Arnold van Gennep. He identifies different kinds of "rites of passage" in various cultures. He notes that they might appear in very different forms but all have the common purpose of structuring societies. To advance to a new stage in life, in almost all cultures certain rituals have to be undertaken; some last only for a short time, some last a long period of time. See: Arnold van Gennep, *Übergangsriten*, 3., erw. Aufl., Campus Bibliothek (Frankfurt a.M.: Campus Verlag, 2005).

into a cold wet cornfield at six in the morning."[206] But when thinking back to days as seasonal farm hands in the research plots around Olivia, most Olivians get somewhat nostalgic. Making sure that their children also work in the corn fields, at least for one summer, was a re-occurring consideration when talking to various Olivians about their experience out on the field during their own teenage years. Mary Mack and her father Tom Mack both think that the work in the cornfields as a teenager creates a good work ethic. And even though the technology has drastically changed the work in the research labs, in terms of labor on the research plots "many of the things we do today are exactly what they did 50 years ago," Posch says. "We have a lot of technology in agriculture, but when it comes to the cornfield work in research it's pretty similar to what we've been doing."[207]

Whereas many of the seasonal workers are local teenager with little experience, the employment requirements for the highly skilled jobs of corn breeders are much more demanding. Like many other corn scientists working for the seed companies in Olivia, Marvin Boerboom moved to Oliva for the job. Born and raised in southwestern Minnesota, he received his bachelor in science and agronomy from the University of Minnesota, and his masters and his PhD from North Dakota State University. "There are a few locals at the technician and assistant level, but the PhDs and masters usually come from different states. Not always, but yeah, they're hired in. They come here, move here."[208] Their expertise is crucial for the seed industry and brings in new people to Olivia. The seed companies who hire specialized breeders are almost the only employers for whom professionals relocate to Olivia. Almost all of the interviewed corn breeders moved to Olivia for work: Marvin Boerboom is Minnesotan, but not from Olivia,

[206] Oral interview with Tom and Mary Mack (formerly Trojan and Keltgen Seed), 26 July 2014.
[207] Oral interview with Jeffrey Posch (DowAgro Sciences), 25 July 2014.
[208] Oral interview with Marvin Boerboom (Monsanto), 24 July 2014.

whereas Jeffrey Posch is from North Dakota and Mauricio Urrutia from Chile. The two Baumgartners, Raechel and her father Ed, are the only local Olivians. Compared to other towns in the area, the seed industry attracts a very small, but highly specialized group of professionals to the area.

In comparison, in the next largest town, Willmar, MN,[209] one of the most important industries is a turkey processing factory. As most jobs in the turkey processing plant only require limited skills, the workers that are attracted by this industry are often unskilled laborers, many from Latin America and Somalia. The demographic of these workers is very different from the demographic of the highly specialized corn breeders that move to Olivia with their families. As the corn seed industry still relies heavily on expert knowledge and to a certain extent on manual labor, this has helped Olivia to keep up its number of inhabitants and not fall into the same pattern of rural population decrease as many other small rural towns all over the American Midwest. "Olivia has been able to maintain its population because of the seed industry," Posch says.[210] The size of Olivia's population would be affected by the closure or re-location of one or more of the larger seed research and development facilities currently in town, as the employees and their families would likely leave Olivia together with the companies.

[209] Willmar is located 26 miles north of Oliva and according to the 2010 census has a population of 19,600.
[210] Oral interview with Jeffrey Posch (DowAgro Sciences), 25 July 2014.

The 1978 Plane Crash

The employed corn breeders and their expertise is core to the success of the companies. As there are usually only a handful of breeders working at one research site, unforeseen events can easily disturb this fragile set-up, particularly in smaller companies with only one R&D site. An event occurring in 1978 played an important role in shaking up the "business-as-usual" in the seed industry in Olivia. Six of the employees of RBA Seeds, including very high-ranking officials and corn breeders, all left on a small chartered plane together on the morning of 12 July 1978 to attend a business meeting in West Lafayette, Indiana. Among them were the two founders of RBA, Bob Rauenhorst and Howard Bellows. When the plane was only about 80 miles southeast of Olivia, itcrashed close to Faribault, MN, and all six passengers were immediately killed.[211] The passengers were Robert J. Rauenhorst (age 49), Dr. Howard Bellows (age 51), Joseph Baumgartner (age 41), Tony Rauenhorst (age 29), Jill Kranz (age 34), and Dalton Gandy (age 60). Howard Bellows, who was flying the plane and had a private pilot license, was able to send a message shortly before the crash, notifying the Federal Aviation Administration that he was experiencing troubles. He wasn't able to conduct an emergency landing and only minutes later eye witnesses saw the plane—which at that point was in flames—soaring down from the sky and crashing into a field and bursting into flames.

This loss hit Oliva hard. It was a severe loss for the seed breeding industry as RBA Seeds was a very promising company on the rise that lost six of its most important employees on a single day. "We'd talked about this kind of thing happening, but nobody really thought it could happen to us. Maybe to some other

[211] Greg Hughes, "Plane Crashes; 6 Executives Killed," *St. Paul Pioneer Press*, 13 July 1978.

company, but not us." Ken Berndt, director of sunflower research at RBA remembers shortly after the plane crash, "We had groups like that up in the air two, three, four days a week. It wasn't unusual to have our top officers together in a plane heading somewhere."[212] This shows that the company was aware of the potential risk—but never thought it would actually happen to them. Less than a week after the tragic plane crash RBA Seeds announced that it would continue operations and that it would elect new officers in July 1978.[213] But RBA Seeds never fully recovered from the loss: in 1978—within months of the plane crash—it was sold to Stauffer Seeds Inc. and stopped its own operations.[214]

On top of losing six important people in the corn seed industry, it was also a loss for the community of Olivia: the six dead were well-known members of the community and left behind 21 children now missing one of their parents. The two families most prominently hit are the two families that have the closest ties to the seed industry in Olivia: the Rauenhorsts and the Baumgartners. "It was like the day John F. Kennedy died. When we got the news that Bob and Joe and everyone else had been killed in the plane crash, everyone was, well, they were just stunned," then Olivia police Chief Howard Sander said about the plane crash.[215] The plane accident goes to show that on top of technical innovations and planed re-structures of companies, the human factor and unpredictable events should not be underestimated as agents of change in the seed industry.

[212] Black, Eric and Warren Wolfe, "Plane Crash Kills Six Seed Firm Officials," 1.
[213] Dave Pedersen, "Tradgedy Calls Out for Unity in Olivia," *Olivia Times-Journal*, 19 July 1978.
[214] Curtis Norskog, Hybrid Seed Corn Enterprises, 155 and 171.
[215] Greg Hughes, "Olivia Stunned by Deaths," *St. Paul Pioneer Press*, 14 July 1978.

Spanning the Globe: How Corn Research Became an International Affair

In the hybrid seed industry, as in many other industries, it pays to be quick when it comes to creating new products. When deciding to work with a certain parent corn variety, it takes roughly eight generations of inbreeding a strain of corn for it to be considered purebred and ready for cross-breeding. As there is only one growing season per year in the Corn Belt, this means that inbreeding a line of corn in the Corn Belt takes about eight years. Therefore corn breeders were looking for ways to cut down the time required to inbreed a strain as this would dramatically reduce the time needed to develop a new strain—and as in most businesses, the saying "time is money" also holds true for the seed industry.

A new trend arose in the 1960s to speed up this process: with the promise of year-round growing seasons and the availability of cheaper international flights, breeders decided to have corn inbred in more tropical locations, such as Hawaii, Puerto Rico and Chile. Sociologist Annabel Ipsen estimates that currently at some point in its development cycle roughly 90% of US corn has spent time in either Hawaii, Puerto Rico, or Chile.[216] Ipsen says that by using one of these three locations "firms speed up the development process by maximizing nature."[217] "Maximizing nature" alludes to the fact that the time needed to inbreed corn was dramatically cut down due to very quick cycles of planting, harvesting, and replanting parent crops. Instead of eight years, it only takes three to four years to create corn inbreds in Hawaii, Puerto Rico, or Chile.

3MG has seed plots in Puerto Rico. Raechel Baumgartner, from 3MG North, says about their Puerto Rico location that "in Santa Isabella in Puerto Rico there are

[216] Ipsen, "Manufacturing a Natural Advantage: Capturing Place-based Technology Rents in the Genetically Modified Corn Seed Industry," 48.
[217] Ibid., 46.

two Dow stations, two Monsanto stations, one or two Syngenta farms, Pioneer has a farm; all within either Santa Isabella, where we are, or one town or two to either side."[218] She mentions that there are similar stations in Hawaii, Argentina, and Chile. The focus and scope of a seed development project impacts where companies choose to go. "To get massive seed increases, it's usually to South America where you can get a similar growing climate [to the Corn Belt]. Versus going to the tropics, to Puerto Rico or Hawaii, or places in Mexico, it speeds it up and is a little bit more stressful. So that is more time [saving] vs. seed quantity."[219] One clear advantage of Hawaii and Puerto Rico over other tropical locations that research facility managers see is that they are part of the US administration system in terms of regulations.[220] Geographically speaking Puerto Rico is also much closer to Minneapolis than Hawaii or Chile. The flight time to Minneapolis is less than six hours, cutting down on transportation time and cost.

The reason why 3MG operates out of Puerto Rico, on top of the practical above-named factors, is that Raechel Baumgartner's father, Ed Baumgartner, used to work for Mycogen and was sent to Puerto Rico for a period of 10 months. He was in charge of overseeing the Puerto Rico Mycogen research station. Together with his family he decided to stay longer and venture into a business venture of his own, 3MG, which he founded in 2006. To this day his business is built upon the principle of collaboration between research plots in Puerto Rico and Olivia. Their Olivia branch is called 3MG North and their Puerto Rico branch is called 3MG Caribe. Ed Baumgartner's daughter Raechel is in charge of the Olivia end of the business, whereas he spends most of his time in Puerto Rico. "It's warmer so we

[218] Oral interview with Raechel Baumgartner (3rd Millennium Genetics), 10 September 2015.
[219] Ibid.
[220] Ipsen, "Manufacturing a Natural Advantage: Capturing Place-based Technology Rents in the Genetically Modified Corn Seed Industry," 48.

can grow our crops faster. And the weather is very consistent […] we plant corn and irrigate and four days later it's out of the ground,"[221] Baumgartner said in 1998 when he first started working in Puerto Rico. The climatic conditions are far more favorable than the ones in Renville County. "The dependability of the weather makes our nursery program just like a clockwork," Baumgartner added and made sure to point to the weather as the key feature for the many growing seasons that can be achieved in Puerto Rico, "for example, the parents of seed corn varieties that we sell in Renville County take only 85 days from planting till harvest down here. If we keep right on schedule, we can squeeze in four crops a year. And in the development of new hybrids, that has great financial implications for a seed company."[222] As Baumgartner pointed out, the financial implications of a breeding program in warmer climate zones, in addition to the research and development in Olivia, are an important factor for seed companies. Therefore currently almost all seed companies use this model to speed up the development of new varieties and work cost-efficiently. When looking at Puerto Rico, Baumgartner says that virtually all major seed companies can be found on the island doing genetic research. They are all clustered in the south-central part of the island.[223] To illustrate just how clustered the research facilities are on the island, it is helpful to take into consideration the size of Puerto Rico and to remember that it is one of the top three locations for global seed R&D outside of the United States. The island of Puerto Rico is barely larger than Renville County: it measures about 35 miles north to south and 100 miles east to west. However, the island is a lot more densely populated: with a population of roughly 3.7

[221] Dick Hagen, "Baumgartner's Life in Puerto Rico," *Olivia Times-Journal*, 26 October 1998.
[222] Ibid.
[223] Ibid.

million inhabitants, it is a lot closer to the overall population of all of Minnesota (5.3 million), rather than the Renville county population (15,000).

The way the collaboration between the R&D stations in the tropics and the seed companies' R&D facilities in the Midwest plays out on a practical level is the following: corn breeders, together with automated machines such as "the chipper," identify varieties that they would like to work with and then—if they work with GM technology—insert new traits into the corn in their laboratories in the Midwest. They then send the seeds to the nurseries in South or Central America by plane. There, these varieties are inbred in two to three years. The corn seeds are then flown back to Olivia or other Midwest R&D facilities to create crosses. After discarding the vast majority of the crosses, only the most promising ones are selected to be tested in larger-scale yield trials. And only if the yield trials are satisfactory and the plants show all the traits that they are supposed to have (e.g., insect resistance, standability, leaf shape, etc.) will they be bred on a larger scale to then be sold to seed dealers and farmers. The selection process is very tedious. By the time a hybrid is offered for sale, according to Pioneer, it has been tested in more than 200 fields at over 1,500 locations.[224]

In September 2017 Hurricane Maria, a category 5 hurricane, hit Puerto Rico and caused tremendous damages. According to revised official numbers nearly 3.000 people died and over $91 billion damages were caused.[225] Hurricane Maria also destroyed research plots, among them those of 3MG Seeds. The Baumgartners opted to divide their plots in the direct aftermath of the hurricane: they grew some

[224] Ipsen, "Manufacturing a Natural Advantage: Capturing Place-based Technology Rents in the Genetically Modified Corn Seed Industry," 45.
[225] Fink, Sheri. "Nearly a Year After Hurricane Maria, Puerto Rico Revises Death Toll to 2,975" *The New York Times.* 28 August 2018. Accessed 12 May 2019: https://www.nytimes.com/2018/08/28/us/puerto-rico-hurricane-maria-deaths.html.

food for their local employees on the one half, but also re-planted their research crops to not fall behind schedule with their R&D seed operations.[226] In the future, more extreme weather phenomena are expected due to climate change. It will be interesting to see how this will impact the tropical research plots.

Shaking Up Business Structures: Mergers and Acquisitions in the Corn Seed Industry

The 1970 Plant Variety Protection Act (PVPA) laid the foundation for turning the 1970s into the heyday of the corn seed industry. Because of the PVPA, mergers and acquisitions started to reshape the seed market. With a boom in the seed industry, the population of Olivia grew. As new companies came to the town and existing companies expanded their production, they hired new employees and Olivia's population rose from 1,788 in 1940 to 2,802 by 1980.[227] The town prospered because of the revenue generated by the seed industry.

As recently as 1970, most seed firms were independent. In the 1970s mergers and acquisitions created a new seed industry structure, one dominated by large companies.[228] Since then, this new structure of an ever-smaller number of seed companies controlling the market has become a common feature. Other towns where seed companies have a presence were and are as affected as Olivia. An increasingly small number of seed companies competes over shares in the commercial global seed market, which in 2012 was assessed at approximately $45

[226] National Public Radio. "Puerto Rico's Hurricane Recovery Hinders Farm Businesses' Seed Research" *Food for Thought*. 29 November 2017

[227] US Department of Commerce, Bureau of the Census, *Sixteenth Census of the United States: 1940*, Washington, D.C.: US Government Printing Office (1942) and US Department of Commerce, Bureau of the Census, *US Decennial Census*. Washington, D.C.: US Government Printing Office (1982).

[228] Fernandez-Cornejo, *The Seed Industry in U.S. Agriculture*, 26.

billion by the International Seed Federation (ISF).[229] Compared to other global markets, the seed market is a relatively small global market. The global food and beverages retail market was assessed at approximately $5.98 trillion in 2012 and $4.8 trillion in 2009. This means that the value of the seed sector is less than 1% that of the global food retail market.[230]

Mergers and acquisitions bring with them much more than just a change of names on the company door—they have effects on the everyday work life of the corn breeders, as well as on the structure and research goals of the companies. Ed Baumgartner shares his experience of company ownership change: "When I got bought up into Dow—I started out in Keltgen, which was family owned—then you start going through all these corporate buy-outs. Pretty soon you get to a place you never intended to be," Baumgartner says. "Little by little. And all of a sudden I was like 'I don't like this anymore.' You know, I liked the people, but you lose your freedom of decisions to make. That is part of the reasons why I left and started a business of my own was because I didn't believe in the message they were saying."[231] Baumgartner prefers working for a locally owned and operated company and ended up founding his own because of his negative experiences working for a large multinational corporation. He is very set on not going back to a large company: "I always joke: when things go bad, I'm not going back to the big company. I'll sell meat on a stick in Puerto Rico on the beach before I go back to a big company. I had no idea working for a large company, how suffocating that could be. [...] You just lose your creativity."[232]

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[229] International Seed Federation, "Estimated Value of the Domestic Seed Market in Selected Countries for the Year 2011."

[230] Sylvie Bonny, "Taking Stock of the Genetically Modified Seed Sector Worldwide: Market, Stakeholders, and Prices," *Food Security* 6, no. 4 (2014): 527–28, accessed 2 February 2017, doi:10.1007/s12571-014-0357-1.

[231] Oral interview with Ed Baumgartner (3rd Millennium Genetics), 28 July 2014.

[232] Ibid.

Baumgartner is not the only one who prefers to work for a small company. Various people I interviewed said that because of mergers and acquisitions their jobs on a day-to-day basis changed for the worse by having to work for larger corporate companies. When looking back at their professional life, former employees usually recalled Trojan Seed, Keltgen Seed, and RBA Seeds as their preferred employers over larger corporate companies like Pfizer or DeKalb. "It was fun working with Trojan," Dick Hagen sums up his own experiences. "Then after that it became quite challenging. I stuck around for a few more years and so did a few others, but a lot of us started bailing out, because it was just a totally different structure."[233] Employees felt that big corporations with headquarters in a different state gave them less creative freedom as researchers. The corn breeders were assigned narrower goals and couldn't choose as freely anymore what they would like to experiment with. The lack of creativity in the workplace led some people to quit their jobs to either start their own business (like Ed Baumgartner, who started 3MG) or work in a different field (like Dick Hagen, who went to work in agricultural communications). Others stayed, as they preferred the security of working in a large company over the risk of founding one's own business. In the end, many corn breeders ended up working for large corporations even though they missed some of the advantages of working for a smaller, more local company. Moreover, since mergers and acquisitions meant there were fewer and fewer small companies, breeders didn't always have much choice as to where to work.

Nevertheless, there is a very close proximity among corn breeders in Olivia today, according to O'Neill. "So what people see in the news about company rivals

[233] Oral interview with Dick Hagen (formerly Trojan Seed), 28 July 2014.

fighting—that's what it looks like from the outside, but when you work internally, there's a very close relationship within a lot of these companies. I mean everybody knows everybody, it's very close. Perception and reality can be two very different things a lot of times."[234] When conducting the interviews, I also noticed that all the corn breeders in Olivia seemed to know one another. O'Neill says the common goal also unites them. "And we all work together to help push the things that Mother Nature tends to throw at us every day."[235]

The 1970s changed the face of the corn seed industry in Olivia. Because of mergers and acquisitions and new founded seed companies, the seed industry was thriving. In the 1980s, however, Olivia was hit hard by the farm crisis, just like many other rural areas all over the United States. Between 1981 and 1985 the value of farm real estate dropped nationwide, most prominently in the Midwest. In some states, including Minnesota, the value of farm real estate per acre dropped by as much as 55%.[236] The farm crisis led to many foreclosures and forced many small farmers to give up their land. "The lenders got hurt, the farm families got hurt," Roger Heller, farm and land broker, remembers. "There weren't very many winners in the whole thing."[237]

The farmers' financial hardship was also a problem for the seed industry: farmers either tried to save seeds again (as in the old days) or they opted to buy older, cheaper varieties. "When you go back into the mid-80s things weren't so nice here," Ed Baumgartner recalls. "You know, when we had the farm crisis, moneywise—it was really difficult. And even though we had good crops, there

[234] Oral interview with Steve O'Neill (Corn Capital Innovations), 25 July 2014.
[235] Ibid.
[236] USDA Economic Research Service, "The U.S. Farm Sector: How is It Weathering the 1980's?," *Agriculture Information Bulletin*, no. 506 (1987):12.
[237] Oral Interview with Roger Heller (Farm and Land Broker) 25 July 2014.

was no money to be made. A lot of people went bankrupt. We had a mass exodus of farmers in the 80s. Really tough times."[238] The height of the farm crisis was between 1982 and 1986. Before the farm crisis, "our farmland values in Renville County in 1980 were $3,000 an acre for a tillable acre," farm broker Heller says. During the height of the crisis, "in 1986 that had dropped to $800 an acre. By 1989/90 it was back up to $1,000–1200, by 2000 it was up to $5,000 per acre, by 2012 it was up to $10,000–12,000 per acre."[239]

Global Mergers

As a corn seed hub, Olivia is part of the global seed market network and reflects the changes that have happened on a global level. The result of numerous mergers and acquisitions led to the fact that in 2009 just six companies dominated 58% of the global seed market.[240] They are nicknamed the "Big 6" and are BASF, Bayer, DuPont, Dow Chemical Company, Monsanto, and Syngenta. Their dominance of the seed market—between them, they account for almost 60% of it—includes seeds for all plants. When looking just at the corn seed market, the dominance of the Big 6 exceeds 80%, as due to the early emergence of the hybrid corn seed market, the consolidation of the corn seed market exceeds that of other plant varieties. Currently five out of the seven largest seed companies originated as chemical companies: Monsanto, DuPont, Syngenta, Dow, and Bayer.[241]

[238] Oral interview with Ed Baumgartner (3rd Millennium Genetics), 28. July 2014.
[239] Oral Interview with Roger Heller (Farm and Land Broker) 25 July 2014.
[240] Hope Shand, "The Big Six: A Profile of Corporate Power in Seeds, Agrochemicals & Biotech," *Seed Savers Exchange*, Summer 2012 (2012): 11.
[241] Christine Chemnitz, ed., *Konzernatlas: Daten und Fakten über die Agrar- und Lebensmittelindustrie*, 1. Auflage 2017 (Berlin: Heinrich-Böll-Stiftung, 2017), 20.

Consolidating seed companies with chemical companies creates integrated companies that sell seeds and herbicides to go with the seeds alongside each other.

One company that pushed for mergers and acquisitions more radically than any of its competitors was Monsanto. Their actions changed the face of the seed industry. Monsanto was founded in 1901 as a chemical company before turning its core business to plant research. In the 1980s and 1990s they hired some of the most promising genetic researchers who often were very idealistic and had green mindsets as they went to school during the emergence of the environmental movement in the 1970s. They thought that "their work would be good for the planet, possibly making it easier to grow food or reducing agriculture's dependence on chemicals."[242] For them, engineered biology was the answer to the overuse of chemicals. However, it is important to note that the most commercially successful innovation from Monsanto is not a plant that doesn't require chemicals, but the discovery of glyphosate as a herbicide and creating plants resistant to it. [244] To this day, around 50% of Monsanto's profits are generated through glyphosate-resistant seeds and the sale of the accompanying herbicides and pesticides.[245] Much more than any of the traditional seed companies, Monsanto pushed for the use of biotechnology. Monsanto's R&D spending and acquisition offers for other companies far exceeded those of their competitors, which led to them acquiring among others DeKalb, Kruger Seeds, and Heritage Seeds. Due to its aggressive behavior in the seed market, particularly in the 1990s, "the reputation Monsanto

[242] Daniel Charles, *Lords of the Harvest: Biotech, Big Money, and the Future of Food* (Cambridge, Mass.: Perseus Pub, 2001), 24–25.
[244] Monsanto brought glyphosate to market in 1974. The brand name "Roundup" is Monsanto's most well-known glyphosate product line.
[245] Peter Kreisler, *Die Agrar- und Lebensmittelindustrie: Erfolgsmodell Agrarchemie*, with the assistance of Christine Chemnitz (Boell Stiftung, 2017), https://soundcloud.com/boellstiftung/die-agrar-und-lebensmittelindustrie-erfolgsmodell-agrarchemie.

acquired was that of a hard-driving, uncompromising company" Daniel Charles says, "bent on changing the rules of the game—and the face of farming."[246]

One of the rules of agriculture Monsanto changed was that it introduced the concept of "technology agreements." When farmers buy seeds from Monsanto, they have to sign a license. The agreements states that "any seed you acquire is for your use and cannot be given, sold or transferred to others, even if they have a valid MTSA [Monsanto Technology Stewardship Agreement]."[247] It used to be the case that companies that sold seeds had no way of preventing farmers from saving and replanting their seeds. Monsanto's introduction of technology agreements falls in line with the competitive, market-based mentality prevailing at the company, which was looking for ways to maximize its profits. The technology agreement practice has been adopted by other seed companies since, and allows companies to check whether farmers comply with the agreement or not.[248] Of course, Monsanto was not the only seed company that tried to expand its market shares. However, its approach was more aggressive than that of other companies and they were testing out more "out of the box" ideas than others, both in R&D of

[246] Charles, *Lords of the Harvest*, 190.
[247] Monsanto, *2015 Technology Use Guide* (2014).
[248] Monsanto, *2015 Technology Use Guide* (2014). In the section "Seed Patent Infringement" Monsanto says that "If Monsanto reasonably believes that a grower has planted saved seed containing a Monsanto biotech trait, Monsanto will request invoices and records to confirm that fields in question have been planted with newly purchased seed. This information is to be provided within seven days after written request. Monsanto may inspect and test all of the grower's fields to determine if saved seed has been planted. Any inspections will be coordinated with the grower and performed at a reasonable time to best accommodate the grower's schedule." One of the consequences of the introduction of MTSA was that Monsanto could sue farmers who grew their seeds without having bought them and the certificate to go with it from a Monsanto dealership. The most famous case that was the Monsanto Canada Inc. vs. Percy Schmeiser case, which was often portrayed as often portrayed as a David vs. Goliath case (Monsanto Canada Inc. v. Schmeiser [Supreme Court of Canada, 21 May 2004]). The court ruled in favor of Monsanto. This decision is often misrepresented as Monsanto suing an innocent farmer who ended up with Monsanto GM canola through unintentional contamination of his field. However, Schmeiser's field contained 95-98% Roundup Ready canola. The court found that such a level of purity could not occur by accidental means. Schmeiser also admitted that he had sprayed parts of his field with Roundup Ready and used only the plants that survived the spraying (aka plants that must have the resistance gene against Roundup Ready) to replant his fields the next year.

new varieties, as well as in introducing new business practices. Through their push towards a larger market share through mergers and acquisitions, they forced their competitors to follow suit in order to keep up.

In 2015 and 2016, the "Big 6" announced plans for further mergers and acquisitions that would reduce the number of competing companies on the world seed market even more: the China National Chemical Crop (more commonly referred to as "ChemChina") bought the Swiss-based seed and herbicide company Syngenta for $43 billion in 2016 and in December 2015 Dow Chemical and DuPont announced a $130 billion merger. After some unsuccessful bidding attempts, in August 2016 Monsanto accepted a $66 billion offer from the German chemical and pharmaceutical company Bayer[249]—a figure 40% over Monsanto's stock market value of that time.[250] It is uncertain what the planned merger means for individual R&D sites and whether Monsanto's Olivia branch will be affected by this transaction.

All three of these planned transactions still need to be reviewed (as of March 2017) by multiple different authorities in a number of countries and it is uncertain whether they will even be approved. Experts give the Monsanto/Bayer deal no more than a 50% chance of going through as planned.[251] The journalist Pat Thomas notes that "should any or all of the deals currently on the table be approved by international regulators it would essentially turn the Big 6 to the Huge 3."[252]

[249] Chemnitz, *Konzernatlas*, 20.
[250] Jürgen Salz, "Saat des Zweifels," *Handelswoche*, no. 8 (2017): 68.
[251] Katrin Werner, "Bei den Bauern geht die Angst um," *Süddeutsche Zeitung*, 16 September 2016, 215–16.
[252] Pat Thomas, "Bayer-Monsanto Merger - Corporate Madness or a Moment of Possibility?," *The Ecologist*, 19 September 2016,

According to the Wall Street Journal, the "Huge 3" would then dominate 83% of the global corn seed market and 70% of the global pesticide market.[253] It is worrisome for farmers that a shrinking number of companies will dominate the seed and herbicide markets. They fear less competitive prices, less innovation, and less selection. As not all companies operate everywhere on the globe, they worry that in certain regions one company would emerge as having a monopoly on the seed market.[254] Arguably that is already the case nowadays in certain areas, but this phenomenon would be aggravated if the planned mergers and acquisitions were approved as planned.

However, it is yet to be determined whether all of these planned consolidations will go through. It is highly unlikely that all of them will be approved as outlined by the companies, but probably some of them will go through or mergers will partly be allowed with certain restrictions. This will not only change the global situation for farmers buying seeds and herbicides; it will also have an impact on the production chains and research facilities of the big companies. Olivia will most likely also be affected by the changes. Some of the "Big 3" companies might merge their business sites or will relocate some of their research facilities. It is to be seen whether this will bring new research facilities to Olivia and strengthen its status as a global corn seed hub or whether Olivia will lose some R&D facilities to other locations. This goes to show that strategic company mergers have far-reaching effects for many people touched by the results: farmers fear increased prices and corn researchers are worried about their job, as they often are faced

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http://www.theecologist.org/News/news_analysis/2988139/bayermonsanto_merger_corporate_madness_or_a_moment_of_possibility.html.

[253] Jacob Bunge, "Bayer-Monsanto Deal Would Forge New Agricultural Force," *Wall Street Journal*, 14 September 2016, https://www.wsj.com/articles/bayer-and-monsanto-expected-to-announce-takeover-1473839357.

[254] Werner, "Bei den Bauern geht die Angst um," 16.

with only limited options: their job might be cut altogether, they might have to start working for a new company, maybe even having to re-locate to a new work facility, or having to quit their job if none of these options seem attractive enough. For the negotiators of these transactions it is almost impossible to fathom the far-reaching consequences of their decisions for their employees and customers all over the world.

Good Cob, Bad Cob? Genetic Modification and Public Reactions

Genetically modified (GM) seeds comprise a large proportion of the sales of the Big 6. Genetic modification was developed in the 1980s and commercialized in the 1990s. The latest version of this technique is gene-editing through CRISPR/Cas methodolgy. The foundation of GM seeds is still hybrid seeds, but they are altered by injecting specific genes into the DNA of the plant, which usually results in either insect resistance (IR) or herbicide tolerance (HT). These traits can also be stacked, meaning that a plant is then both insect-resistant and herbicide-tolerant. In most cases, the seed companies now supply the farmer with both the seed corn, as well as with herbicides and pesticides that go with the product, which explains why most seed companies are now tied to or were taken over by chemical companies. This practice is cemented through the technology agreements.

In Olivia, Marv Boerboom holds most patents for seed corn varieties. “I’ve got 60 of them,” he says. Boerboom doesn’t know the exact number of patents registered by the competitor Dow, but he imagines “they’ve got some of their own, 10 or 15.

I would be surprised if there's 80 or more that came out of this town."[255] Genetic modification of corn crops has been around on a commercial scale for roughly 20 years. In this time Olivia's corn breeders have been able to get roughly 80 varieties patented.

When it comes to protecting their intellectual property rights, most breeders and companies nowadays chose to file for "utility patents" rather than for "plant patents." Utility patents prohibit the replanting of seeds harvested from a licensed plant, which is what the seed companies aim for. Plant patents would allow farmers that hold technology agreement to sexually reproduce the seeds indefinitely, as long as they don't provide or sell the seeds to others for planting.[256] The reason why companies protect their GM seeds with patent rights is that it is very costly to develop new varieties. Due to the high development costs of around $136 million for a new GM seed variety, companies need ways to offset their expenses. One very common way is to pass on the higher R&D costs to the customer. Data from the USDA Economic Research Service shows that since the introduction of GM seeds, the average cost of corn seed per acre has risen dramatically. Between 1995 and 2011 it rose by 259%.[258] Yields have steadily increased, too, first with the introduction of hybrid seed corn, then further with GM corn. Modern corn varieties are more resistant to insects and possess other qualities, such as drought tolerance etc. that lead to less crop loss. However, the price that farmers have to pay for higher corn yields is high. A USDA report puts the yield gains in perspective to the rise of seed corn prices: while the

[255] Oral interview with Marvin Boerboom (Monsanto), 24 July 2014.
[256] Brian D. Wright, "Plant Genetic Engineering and Intellectual Property Right Protection," *Agricultural Biotechnology in California Series*, no. 8286 (2006): 1–2.
[258] Ipsen, "Manufacturing a Natural Advantage: Capturing Place-based Technology Rents in the Genetically Modified Corn Seed Industry," 45.

number of kernels per acre only increased around 30% between 1972 and 1997, the average seed cost per acre increased by over 500%.[259]

The steep incline in seed prices, paired with a fear of the unknown effects of genetically engineered seeds on humans and the environment, has led to much opposition against GM crops, particularly in Europe. Environmental groups and activists, as well as concerned consumers are on the forefront of opposing GM crops.[260] As the genes of the plants have been tinkered with, foods containing GM products have been negatively nicknamed "Frankenfoods." European consumers' resistance to "Frankenfoods" has led to much stricter regulations in the European Union than, for example, in the United States. [261] No new GM crops are allowed to be grown and if products contain genetically engineered crops or vegetables, they have to be labeled in the EU. GM corn in particular has turned into the "posterchild" for the opposition to GM crops, as can be seen during this protest of Greenpeace Spain against GM foods:

[259] Fernandez-Cornejo, *The Seed Industry in U.S. Agriculture*.

[260] Daniel Charles describes how the resistance emerged and was channeled into a successful movement in the chapters "Backlash," "The Wheels Come Off," and "The Deluge" in his book *Lords of the Harvest*, p. 205-261. In 2015 the Canadian singer/songwriter and environmental activist Neil Young released an Album titled "The Monsanto Years" in which he criticizes the business practices of Monsanto and other large international corporations. He is an outspoken opponent of genetically modified foods. In his song "Monsanto Years" Young says that "The farmer knows he's got to grow what he can sell, Monsanto, Monsanto / So he signs a deal for GMOs that makes life hell with Monsanto, Monsanto / Every year he buys the patented seeds / Poison-ready they're what the corporation needs, Monsanto." Neil Young, *The Monsanto Years* (Reprise, 2015), CD.

[261] Liepold, Annka. "Cows, Corn and Communication: How the Discourse around GMOs Impacted Legislation in the EU and the USA" In *Routledge Handbook of Ecocriticism and Environmental Communication* ed. by Scott Slovic, Swarnalantha Rangarajan and Vidya Sarveswaran, 255-264, New York: Routledge, 2019.

Figure 10: Greenpeace Spain protesting GM corn (picture credit: Danny Voglesang)

The historian Jack Kloppenburg argues that hybridization of seeds and later GM technology only served the capitalistic interests of the seed companies, never the interests of farmers. "It was neither chance nor an immanent and ineluctable technical logic that produced the development of hybrid corn," Kloppenburg says. "In the 1920s there were several possible paths to corn improvement. At least one of these, population improvement, may well have been as productive as hybridization."[262] It is hard to assess this claim as it is impossible to prove whether with the same investments that were put into hybrid corn research and GM research, population improvement of certain corn varieties would have led to the same results.

Kloppenburg cites a Kansan wheat breeder who argues against patents for plant genes. "If words were copyrighted, only the few who owned them could communicate and our society would be harmed," Rollin Sears said in 1998. "Genes are analogous to words in that they allow the creation of new plant cultivars just as words allow the creation of a book. Everyone in society should

[262] Kloppenburg, *First the Seed*, 281.

have the right to use genes. Cultivars (novel genotypes or combinations of genes), not genes should be eligible for patenting. It is now clear that the patenting of genes will result in only two or three companies having a major influence on the food system."[263] Looking at the planned mergers among the large seed companies, Sears's prediction cannot be dismissed easily. Even though the opposition against GM crops is much greater than the opposition against any other food innovation, the majority of the corn grown in the United States, including in Renville County, is genetically modified.[264] What might seem like a contradiction can be easily explained when looking at the uses of corn: in the United States the vast majority of corn is used for the production of ethanol, as animal fodder, or for industrial purposes.[265] Consumers therefore either do not consume it at all as a food source (e.g., when it is turned into ethanol)—or only indirectly without being aware of it (as meat or in ready-made products and soft drinks).

So despite consumers skepticism against GM corn—in Europe more so than in the United States—the fact that corn is mostly used for industrial purposes and therefore only rarely ends up directly on consumers' plates, has led to the fact that 89% of the corn planted in the United States in 2016 was genetically modified.[266]

[263] Ibid., 349.
[264] USDA Economic Research Service, "June Agricultural Survey for the Years 2000–16" (USDA Economic Research Service, Washington, D.C., 2016).
[265] Kenneth F. Kiple and Kriemhild Coneè Ornelas, "Maize," in *The Cambridge World History of Food* (Cambridge, UK, New York: Cambridge University Press, 2000), 99.
[266] USDA Economic Research Service, "June Agricultural Survey for the Years 2000-16."

Olivia as "Nature's Village"

Playing on the concept of William Cronon's book *Nature's Metropolis*,[267] which talks about how Chicago became a metropolis because of its use of natural resources and its location (it served as an important trading hub for agricultural goods), I argue that Olivia can be seen as "Nature's Village" due to its role in the global seed corn market. It has remained a fairly small rural community that even during the heyday of the hybrid seed corn industry was home to only roughly 3,200 inhabitants—a figure that is now back down to 2,500 people.

The seed corn produced in Olivia is—similar to the products traded in Chicago—industrialized nature. This industrialized version of nature is then exported all around the world. Similar to Chicago in *Nature's Metropolis*, Olivia also relies heavily on infrastructure and access to markets. For the seed industry it is important to be both within the vicinity of a larger, well-connected city—in Olivia's case that is Minneapolis—that can be accessed within a reasonable time frame, and far enough away from any larger city to ensure undisturbed fields and authentic growing conditions. In the early days the railroad played a crucial role in connecting Olivia to the Twin Cities. Since the 1960s, this has shifted and nowadays the connectedness to the R&D facilities in Puerto Rico, Hawaii, etc. is more important.

Just like Chicago, Olivia functions as a hub for industrialized nature: different generations of seeds are flown back and forth between Olivia and the tropical R&D nurseries during the time of inbreeding and experimentally crossing them. Almost all corn varieties that later enter the global seed market as a commercial

[267] William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W. W. Norton & Co Inc., 1991).

variety, have spent time in the tropics and the Midwest at a certain stage of their development. Even though in Olivia there is a strong research focus on creating varieties for the Northern Corn Belt, other varieties are developed for the global market. As a result, corn varieties produced in Olivia are grown all around the world.

Unlike Chicago, which was able to build its foundation on multiple industrialized natures (lumber, meat, grain), Olivia only ever focused on one industry: the seed industry. This seed industry requires a fairly large amount of agricultural space around its R&D facilities and only a limited amount of people during most parts of the years. Therefore the town grew during the heyday of the hybrid seed industry, when more corn breeders were hired, but reached a natural maximum capacity and could not have expanded to the same extent as Chicago did.

By no means am I trying to compare the importance and impact of Olivia to that of Chicago. However, the underlying principles of industrializing nature, transforming the landscape surrounding the city, and being an important trade hub are very similar in both cases. In Chicago's case, the hinterland supplies the resources and is connected to the big city through the railroad. In contrast to this, Olivia itself represents "the hinterland," which through its products, the corn seeds, reaches the regional and global market. However, what distinguishes Olivia from other "hinterland resource providers" is that its exported goods, seed corn varieties, not only reach the next largest city but go on to the global market—without further processing in a larger city, as the final product is already produced in Olivia.

Therefore, I argue that Olivia is a "globalized village"[268] because of its role as a corn seed hub. Its location in the rural Corn Belt and its relatively small number of inhabitants easily explain the "village" part of "globalized village." Just like most villages, it is almost invisible on a larger scale. The majority of the people have never heard of it, let alone know that it is one the most important global seed hubs. Even farmers that grow seed corn produced in Olivia are most likely not aware of the exact origins of their seed corn, either. The corn seed industry, however, ties Olivia into a roughly $45-billion-dollar industry—a truly "globalized" industry. Through the presence of some of the multinational seed companies like Monsanto or Dow, Olivia is closely tied to the international business world.

Conclusion

Olivia has been able to turn itself into one of the most important seed hubs in the Midwest. It serves as a good example for tracing the changes that corn seed companies underwent, from saving seeds, to crossing seed, and to genetically modifying seeds. With each innovation in the corn seed industry, farmers were less and less able to be part of the production process of seed corn. Through the introduction of hybrid seeds, small locally owned seed businesses sprung up all over the Midwest. In Olivia and elsewhere through mergers and acquisitions they ended up being replaced by a small number of large multinational seed companies.

[268] The term should not be confused with the term "global village" coined by Marshall McLuhan, who argues in his books *The Gutenberg Galaxy: The Making of Typographic Man* (1962) and *Understanding Media* (1964) that the globe has been contracted to a village through electronic technology.

The changes in the relationship between the U of M and Olivia exemplify the general trend in the relationships between universities and corporate seed companies all over the United States. Prior to 1930, agronomy research at the universities was conducted with the idea in mind that the knowledge produced at the universities should be readily available for the farmers all over the Midwest. Jones's 1916 innovation that produced double-cross hybrids laid the foundation for the production of commercial hybrid corn seeds. It took another 10 years until in the mid-1920s the first commercial seed companies emerged. The Dust Bowl and Depression of the 1930s both slowed down the sales of hybrid seeds and showed the necessity of well-adapted high-yielding corn seeds to ensure a good harvest. The lack of money during the Depression years is the main reason why it wasn't until the late 1930s that hybrid seed companies had significant sales numbers. The decades to come, particularly post WWII, would show how willing American farmers were to adopt hybrid seed corn. Commercial seed companies, like Trojan Seed, sprung up in many places in the Midwest and Olivia became home to a cluster of them.

The techniques for hybrid seed breeding were developed at the U of M and other public universities and many of the early strains of corn that were bred in private companies emerged from schools of agriculture of public universities. As the private seed companies grew, they started to create their own research facilities, but still often freely traded promising inbreds among one another. By the 1970s, the companies had taken over the commercial hybrid seed corn market and the universities were left to research new breeding techniques or improve hybrids of

otherwise neglected crops that did not have a big market and therefore are not interesting for commercial seed companies to develop.[269]

Two factors particularly contributed to the globalization of Olivia's seed industry. One is the emergence of the tropical R&D research facilities in the 1960s that resulted in physically flying corn seeds from the Midwest to the tropical nurseries and back. The second is the increase of mergers and acquisitions after the passing of the 1970 PVPA, which gave breeders 18 years of exclusive control over new, distinct, uniform, and stable sexually reproduced plant varieties, such as corn. It granted private companies the right to protect their corn varieties and was an important milestone in solidifying the breeding of hybrid corn as a business model due to the protection of intellectual property rights. Even though there are still smaller, family operated businesses in Olivia, most of the seed market in Olivia and globally is dominated by a handful of companies. Through the corn seeds produced by these multinational seed companies in their R&D locations in Olivia, the town is tied into the global network of seed producers.

But what are the reasons that Olivia emerged as a global seed hub rather than any other small town in the Midwest? Part of the explanation is the rich loess soils that originated in the last ice age and are found around Olivia. They provide perfect conditions for research plots and yield trials. The other part can be found in the early success of Trojan Seed and the strategically advantageous location of Olivia. "Well, Trojan was here and Keltgen Seed offshoots of that and RBA Seeds offshoots of Trojan," Marv Boerboom explains. "And so basically the seed industry was here in Renville County, as it usually ranged first or second for both corn and soybean production in MN. We have really deep rich soil. And we are

[269] Fernandez-Cornejo, *The Seed Industry In U.S. Agriculture*, 47.

kind of centrally located in the state. So it is kind of a natural good go-to place for someone wants to do yield testing in the central part of the Corn Belt in MN. It's a good location."[270] Boerboom says that Olivia gained reputation to be a successful home base for various seed companies which helped create momentum. "But part of it, you know, is that the town developed a certain reputation as having a couple of seed companies and then offshoots from that. And from the success from the seed companies that were doing here. So it seems like others came to follow that pathway."[271] Other corn breeders echoed Boerboom's reasoning that Trojan Seed's success played a major role in attracting other companies.

A combination of the quality of the soil, Olivia's location infrastructure-wise, and Trojan Seed's early success as a seed business in the northern Corn Belt are the factors that helped establish Olivia as a seed hub. Nowadays, the majority of the corn seed companies in Olivia are located along US Highway 212, west of downtown. Ed Baumgartner told me that it is jokingly referred to so as "seed row," as all the companies are lined up there.[272]

Since its first mentioning as one of Olivia's core business sectors in 1916, the seed corn business has evolved significantly. until today. Today, a on "seed row" a combination of small companies, like 3MG, and large global brands, like Monsanto and Dow, call Olivia home. The working conditions for breeders have changed both through the consolidation of companies, as well as through the technological innovations of the twentieth and twenty-first centuries. They have drastically cut down the inbreeding time per strain. The latest innovations in genetic engineering, such as marker-assisted selection (MAS) or Functional

[270] Oral interview with Marvin Boerboom (Monsanto), 24 July 2014.
[271] Ibid.
[272] Oral interview with Ed Baumgartner (3rd Millennium Genetics), 28 July 2014.

Analysis System for Traits (FAST) have turned modern corn breeding into a computer and robot assisted field of research. However, unlike in farming, where the rise of mechanization has drastically decreased the number of farms found in the Midwest, there is still a much greater need for manual labor, particularly well-trained professionals, in the corn seed industry. This is one of the main explanations for Olivia's rather steady population, during times of rural exodus in large parts of the American Midwest.

A side effect of the rise of consolidated seed companies was a change in reputation: corn breeders lamented a loss of creativity in the work place, the local community experienced a loss of support for local events, and consumers grew wary of genetically engineered corn. Whereas Trojan Seed was a highly esteemed local company in the period from the 1950s to the 1970s, Monsanto since the 1990s has to fight a bad reputation in many countries.

Corn and the science that made hybrid seed corn development a commercially feasible business venture shaped Olivia and turned it into a global corn seed hub. Olivia has played an important role in the development and promotion of new corn seed varieties and serves as an example of the larger developments the seed industry underwent in the twentieth and early twenty-first century.

3. Celebrating Corn: From Husking Bees to Corn Capital Days

"What happens in the cornfield, stays in the cornfield"—what might sound like a Midwestern bachelor party gone wild is the motto of the 2011 Corn Capital Days.Unlike the reference to stories in Las Vegas suggests, this chapter will, however, talk about what happens "in the cornfields" during the annual festival in the last week of July in Olivia. On top of the annual summer festivities, the town can look back on a rich tradition of corn celebrations, ranging from Native American harvest festivals in the area prior to European settlement, to corn husking competitions in the 1930s and 1940s, and to the Cornland, USA shows in the 1970s. Ranging from spiritual celebrations to sportsmanship competitions: what all of these diverse celebrations have in common is that they originate around the same field crop—corn—and are a way to celebrate community.

Olivians feel connected to corn like few other people. Corn is closely tied to the basis of the existence of most citizens, working for a seed company or farming corn. In his novel *Hombres de Maíz*, the Guatemalan author Miguel Angel Asturias tells the story of Guatemala's indigenous population.[273] Angel Asturias portrays the Mayan Guatemalans as the "men (and women) made of maize" and stresses the importance of this crop in their lives. He shows both the importance of corn as a food crop, and as part of the religious and origins stories of the

[273] Miguel Angel Asturias, *Hombres de Maíz,* El libro de bolsillo 413 (Madrid: Alianza, 1986 [1972]).

Mayas. Similar to Mayas, Native Americans celebrated corn in a ritualized way.[274]

Present-day Olivians and other Midwesterners have a mere material relationship with corn, not a spiritual one: "Corn, both natural and redeemed, invested with ceremony the tables of American settlers, but not their myths. These remained tied to the language of wheat, as formed by the English of the King James Bible,"[275] food historian Betty Fussell says. Unlike Mayan corn rituals and celebrations in South and Central America,[276] corn celebrations in Olivia after European settlement never had a religious or spiritual component.

Olivians aren't *Hombres de Maíz* in Angel Asturia's traditional sense, as they lack the spiritual connectedness to corn. However, I argue that due to their connectedness to corn through farming and celebrating it, and being citizens of the Corn Capital, they are still *Hombres de Maíz*—in a modern, industrialized sense. "Corn does not exist in a wild state because the plant cannot reproduce without human intervention. […] People and corn depend upon each other in order to subsist and survive as a species. They are members of the same close-knit club, almost a clan." Arturo Warman says.[277] By producing the seed corn that then grows into corn plants on farmers' fields around the world, Olivia plays an important role in sustaining the ongoing relationship and dependency between humans and corn.

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[274] More information on Native American corn celebrations can be found in chapter III. 1., which looks at the Green Corn Dance rituals.

[275] Fussell, *The Story of Corn*, 281.

[276] Mayan culture is known for multiple depictions of maize gods and goddesses. Furthermore, the Mayas also believed that their own people were made out of "maize dough"—as they saw maize as the foundation of all life forms. One can find more on the crucial role corn played in the Mayan world in Betty Fussell, "Seeds of Life," in *Story of Corn,* chap. 2 ; or in the BBC'S "After the Ice Age: Food and Sex (9000–3500 BC), A History of the World in 100 Subjects, Object Nr. 9, Maya Maize God Statue, http://www.bbc.co.uk/ahistoryoftheworld/objects/Hvi54RDiQym6Pgd3_IsRKA.

[277] Warman, *Corn & Capitalism*, 27.

As modern *Hombres de Maíz,* Olivians connect corn with what they think of as "home." For large parts of the Midwest, cornfields are now perceived as a typical landscape feature. It is interesting to note how the history of memory of which landscape is associated with "home" has changed in only roughly two to three generations. For those growing up in Olivia in the past 50 years, cornfields were the most common landscape feature to be found around the town. It is therefore unsurprising that nowadays cornfields are closely associated with "home"—rather than the prairielands and swamps that dominated the landscape before the settlers turned them into agricultural fields.

But how has one crop become so dominant in the memory of landscape? One of the reasons why one individual crop grown in the Midwest gets more attention than crops grown elsewhere is because the rest of the landscape features are very subtle: the area around Olivia and the Corn Belt region in general is characterized by flat, wide open spaces, part of the so-called "big sky country." Elsewhere in the United States, "home" is associated with mountainous landscapes, the coast, or other, more unique landscape features. As the landscape features of the Corn Belt itself are very unobtrusive, the "big sky" and the locally grown crops feature more prominently in the memory of that landscape. As people in the Midwest tend to drive more through agricultural lands than people living at either coast of the United States, for them, the crops grown in their area are their "home" environment, just like skyscraper landscapes or coastal features might be for people living elsewhere. Because they drive by planted crop fields all year round, they are usually more in touch with the agricultural schedule than city people. A great percentage of Midwesterners is either actively engaged in farming or close relatives and/or friends of those who are. Therefore the status of every year's

harvest—whether it is a good or a bad harvest—is of more interest to people living in the Midwest than elsewhere in the United States, and therefore they pay closer attention to how the corn is doing in their area.[278]

Even though there are some regional differences in the way cornfields look (e.g. center-pivot irrigation versus non-irrigated cornfields), the degree of standardization among the cornfields and adjacent farms is very high all over the American Midwest. That is why corn, more than any other crop, has become a symbol for all of the Midwest. Corn has come to symbolize "home" for people from Olivia and large parts of the Midwest. And Olivia, as the Corn Capital, is the heart of identification. Through the town, one can trace the changes of how corn was celebrated, associated with "home," and has reached the icon status it has today.

Dancing for a Good Harvest: The Native American Green Corn Festival

In the area of present-day Minnesota Dakota, Crow and Chippewa Native Americans were the first to practice ritualized corn celebrations. In 1820, then Governor Lewis Cass and his explorer friend Henry R. Schoolcraft witnessed a Native American corn festival near Fort Snelling they described in their accounts. Fort Snelling was one of the first forts erected in the 1810s in present-day Minneapolis, at the confluence of the Minnesota and Mississippi rivers.[279] . In a Crow village near Fort Snelling the Native Americans celebrated what was known

[278] The same holds true for other phenomena in other parts of the United States: people from New Orleans will care more about flood forecasts; people in Oklahoma are more alert during tornado season; and people from Olivia, MN and other parts of the Midwest care about the corn harvest.

[279] The location is near the Minneapolis airport, in the south of the Twin Cities. It can be visited today and it is classified as a National Historic Landmark.

as a Green Corn Dance. "From all that could be learned, it was a feast in honor of the Cereal goddess, or manito, of the Indians, which is annually held when the corn first becomes suitable for boiling in the ear," Cass reported.[280] Almost all Native American tribes celebrated the Green Corn Dance, which was spread out over the course of multiple days. Typically, the Green Corn Dance was held several weeks before the main harvest, when the ears of corn were nearly ripe. The ceremonial dances addressed the gods in control of the corn growth. They were also an annual rite of purification and renewal. The Native Americans considered it a crime against the gods to eat corn before the Green Corn Dance took place.[281] When the harvest season was approaching, each year chiefs had to determine when the Green Corn Dance should take place. Thus, designated tribe members were "appointed to visit the cornfields at sunrise every day, and bring to the council-house several ears of corn, there to be examined by one of the 'head men,' who decides, when it is in fit condition for eating, the date when the feast shall be called."[282] Once the ears of corn were considered fit for eating by the head men, they announced the Green Corn Festival date to their community.

During the festival, the fresh green corn was brought to the chief's cabin; both men and women sang songs, and Indian drums were played. For the younger Native Americans, there was a ceremony during which they were admitted the right to partake in the feast and were received in the "Green Corn society." According to an 1871 account of a Green Corn Dance by the Iroquois, their festival lasted three days and 500 to 600 Iroquois were present during this time. It is classified as a harvest festival that focuses mostly on corn but also gives thanks

[280] Account of Governor Cass, cited in Balmer, "The Farmer and Minnesota History," 205.
[281] "Holiday Symbols and Customs: Green Corn Dance*," The Free Dictionary*, http://encyclopedia2.thefreedictionary.com/Green+Corn+Dance.
[282] "Green Corn Dance and Great Feather Dance," *The Journal of American Folklore* 12, no. 4 (1891): 72.

more generally for a good harvest. As corn was often grown in combination with beans and squash, these three plants were called the "three sisters," and beans and squash were also honored during the Iroquois Green Corn Dance.[283] After thanks were given, ritualized dances followed, where men and women took turns dancing. At the end of each night, a feast concluded the festivities.

Some Native American communities also celebrated other elements of the corn crop lifecycle, such as the planting of corn, but the Green Corn Dance is the most important among the festivities and the most frequently celebrated.

Corn Husking Contests

Similar to the Green Corn Dance that took place around the harvest season, the origins of the settlers' corn celebrations in the Midwest are also found during the times of the corn harvest. Before the introduction of the mechanized harvester, the corn harvest was very labor intensive: it required ears of corn to be handpicked and husks to be stripped off before the ears of corn could be put in a crib for drying and storage purposes. The process of taking off was known as "husking" or "shucking". The handheld instrument used to take off the husks was called a "peg." It was common practice to invite neighbors over for "husking bees" (also known as "frolics"). Since everyone's corn had to be husked, harvest season was full of gatherings as neighbors moved from one farm to another.[284] Clampitt stresses the fun aspect that accompanied the purpose-driven gatherings. On top of shucking all of a farmer's corn, the huskers usually got to enjoy a meal and it was customary to have some accompanying music (usually fiddlers and/or singing). It

[283] The description of the Iroquois Green Corn Dance can be found in ibid.
[284] Clampitt, *Midwest Maize*, 11.

was common to serve the huskers corn whiskey during or after their husking chores. Some of the husking parties even had a playful take on the rural dating life: the finder of a red ear of corn would be granted the right to a kiss on the cheek or their choice of partner for the dance following the husking.[285]

Out of these husking gatherings, structured corn husking contests emerged to determine the best huskers, since men in particular liked to pride themselves on the amount of corn they were able husk in one day. To the then U.S. secretary of agriculture and agricultural journalist, Henry Wallace, the husking competitions were not just a fun event but served another purpose: he believed that farmers could learn techniques from fast huskers and therefore up the amount of corn they could harvest in a day. That is why in 1922 he announced a corn husking contest for Iowa farmers in his family's farming journal *Wallaces' Farmer*:

> "We are convinced that the average farmer in the corn belt might just as well husk 10 to 15 bushels of corn more per day than he is likely to do this year. If the spirit of athletic contests could be applied to corn husking, it is probable that we should soon become more efficient. Athletes tell us that as soon as a man breaks a record in an athletic contest, all other men show prompt improvement. Part of the improvement is from watching just how he does it and part comes from new realization of what it is possible for a human being to do.
>
> We want to see that farmers of Iowa take a great step forward in corn husking efficiency. They spend more time in husking corn than in any other work on the farm, with the possible exception of corn cultivation. In spite of this fact, improvements in corn husking have come rather slowly. […]
>
> We are willing to give $50 to the Iowa man or boy who husks the most corn in a day. […] If you are a good corn husker, by all means enter the contest. We believe that a genuinely good corn husker is entitled to more fame than the man who made the touchdown for Iowa against Yale University."[286]

[285] Ibid., 60–61.
[286] Henry A. Wallace, "Who Is Iowa's Champion Corn Husker?," *Wallaces' Farmer* vol. 47, no. 43 (1922): 4.

Frank Faltonson, a retired farmer and friend of Wallace, inspired him to create the call for husking competitions. He was also the one who gave Wallace the idea to not only check the total amount of corn that contestants could husk in a certain time, but in order to truly determine who husks best overall, to also take the following criteria into consideration: How much corn was left behind on the field? How many husks were left on the ears that had been shucked?[287]

For the husking contests, rules had to be established to standardize the requirements in order to compare the competitors from various contests with one another. In the standardized contests the participants competed against each other for a set amount of time. A farm was picked and each contestant was allotted a certain area of the corn field. The contestant's task was to pick the ears of corn off the stalk, shuck them, and throw them into a bin on the horse-pulled wagon accompanying them. Eventually, they worked their way through their section of the corn field. When the time was up they had to stop wherever they were in the field. Judges then took a 100-pound sample of their harvested ears. By looking at the sample, the judges determined the deductions for each candidate, depending on how many gleanings were picked up, the number of husks left on ears of corn, and the ears left on corn plants in their section of the field, etc. After deductions (which were always a certain amount of weight taken off their 100-pound sample), a final net weight was determined for each contestant, and the contestant with the largest remaining weight of his 100-pound sample won the contest.

After deductions, Louis Curley of Lee County won the title of best corn husker of Iowa plus the $50 promised by Wallace in the 1922 contest. The age, height, and weight of the competitors varied greatly—but it seemingly had little to no impact

[287] Leonard J. Jacobs, *Battle of the Bangboards: Complete Digest of Corn Husking Records* (Des Moines, IA: Wallace-Homestead Book Co, 1975), XVII.

on their husking performance. This was a fact that struck Wallace and seemed to prove his idea that, rather than the physical features of the husker, the right technique and the right equipment were the key features of a good "overall husker."

As farmers were very interested in the 1922 contest, Wallace decided to repeat it in 1923 and held another husking contest in Iowa. This time, he modified the rules somewhat: he introduced 80 minutes as the time period in which the contestants would compete against one another—a time frame that would remain the same in future corn husking contests. Furthermore, as Wallace was planning on having the champions of different states compete against one another, he figured that the wagons in which they collected the ears of corn should be provided by the organizers for all contestants, rather than the contestants having to provide their own. The wagons also started to be equipped with what became known as the "bangboard" or "throwboard": additionally cleated boards that were attached to the wagons and were at least four feet above the top of the box. The bangboard permitted the husker to get corn safely into the box without wasting time taking careful aim.[288] The sound of the ears of corn hitting the bangboard before falling into the bin was one of the most typical sounds of the husking contests. The best huskers were able to go at a steady pace, creating a regular "clonck, clonck, clonck" pattern every time an ear of corn hit the bangboard.

By their second year, the husking contests had already seen an increase in prize money and the number of contestants that entered. The Iowa state contest attracted a crowd of roughly 1000 people. Illinois was the second state to hold statewide husking contests. The champions of Iowa and Illinois then competed against each

[288] Ibid., XXIII.

another in November 1923 in the first interstate husking contest: John Rickelmann from Iowa won the match.[289] The media coverage of this husking contest still put great emphasis on the techniques the huskers used, as this was one of the goals proclaimed by Wallace. In later years, however, as husking contests became popular sports events, greater emphasis was put on the individual athletes rather than on their husking techniques.

Figure 11: Antique husking peg as used in early corn husking contests.
(Bot h pegs are private property of Ed Baumgartner)

Figure 12: More modern husking peg.

As the husking contests grew in popularity, they eventually turned into sponsored events to determine the county, state, and eventually the national Corn Husking Champion.[290] First, the interstate contests were called "Midwest Corn Husking Contests" but were renamed "National Corn Husking Contests" in 1927, when corn husking competitions were picked up by even more states and included Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, and Nebraska.

[289] Ibid., XXVIII.
[290] Svoboda, *Looking Back*, 164.

The first so-called "National Corn Husking Contest" was held in Minnesota on a farm near Winnebago, Faribault County, on 15 November 1927.[291] The location is around 100 miles southeast of Olivia. Unfortunately for both the contestants and the spectators, the temperatures on that day never got above freezing, and the net weight of bushels remained very low as the huskers had to deal with ice-coated ears of corn from all-night rain the night before the contest, which made husking more difficult.

In the various states across the Midwest, different farm newspapers started picking up the coverage and sponsorship of the husking contests. Henry Wallace started it in Iowa with his farm journal *Wallaces' Farmer*, but each competing state usually found a different farm magazine to sponsor and cover the husking contests. In Minnesota the *The Farmer* magazine sponsored the husking contests in 1925.[292] The first *The Farmer*-sponsored competition took place on 6 November 1925 in a field at the J.W. Courtney farm near Fairmont, Martin County.[293] When the Minnesota state husking contest was established, few counties were holding primaries; therefore, contestants could enter the state contest without necessarily having to win their own county competitions first. Albert Voltin, who would become known as the most successful corn husker from Renville County, competed in the 1925 state event and placed eighth out of 10 contestants. In 1926 Otto Mahlow, also a Renville County farmer, competed in the Minnesota husking contest and ranked tenth out of 12.

[291] Jacobs, *Battle of the Bangboards*, 30.
[292] Leonard Jacobs lists in *Battle of the Bangboards* all the magazines that sponsored these events. They are: *Kansas Farmer* for Kansas, *Missouri Ruralist* for Missouri, *Nebraska Farmer* for Nebraska, *Ohio Farmer* for Ohio, *Pennsylvania Farmer* for Pennsylvania, *Prairie Farmer* for Illinois, *The Farmer* for Minnesota, *Wallaces' Farmer* for Iowa, and *Wisconsin Agriculturist* for Wisconsin.
[293] Ibid., 10.

The heyday of cornhusking competitions were the years between 1923 and 1941. Some of the most admired American athletes of the 1920s and 1930s were corn huskers. It was common for magazines like *Life* and *Newsweek* or the *NBC* to cover the husking events.[294] It is hard to imagine this nowadays, as corn husking does not receive much attention anymore, but it was a very prestigious title to be the "husking champion" back then and the national corn husking events in the peak years drew crowds of over 100,000 spectators. The coverage of the 1936 National Corn Husking contest captures the atmosphere of the then major sports event:

> "At 12.45, when a five minute warning bomb exploded (upon signal from President Franklin D. Roosevelt in the White House) 160,000 people—more than have ever filled a football stadium—were throbbing with pre-kickoff excitement. The 18 contestants, each stationed in his own plot of land, waved aside photographers, radio announcers and reporters. Up floated an American flag, the starting bomb burst; and the 13th World Series of the Corn Belt started with a bang."[295]

The way commentators talked about the corn huskers sounds similar to the coverage of popular sports events today: "Good huskers are born, not made," Ray Oroke said, or "It's rhythm and stamina." Bill Rose believed that a good husker needed "hard work, clean living, and a fierce determination to win."[296] This goes to show that corn huskers were seen as more than just fast harvesters—they were treated as top-class athletes. The contests, which started out as a showcase event for faster and better husking techniques, had turned into a popular event whose winners became well known athletes.

[294] Clampitt, *Midwest Maize*, 170.
[295] *Newsweek*, Issue 8, 21 November 1936—cited in Fussell, *The Story of Corn*, 307.
[296] Ibid., 311.

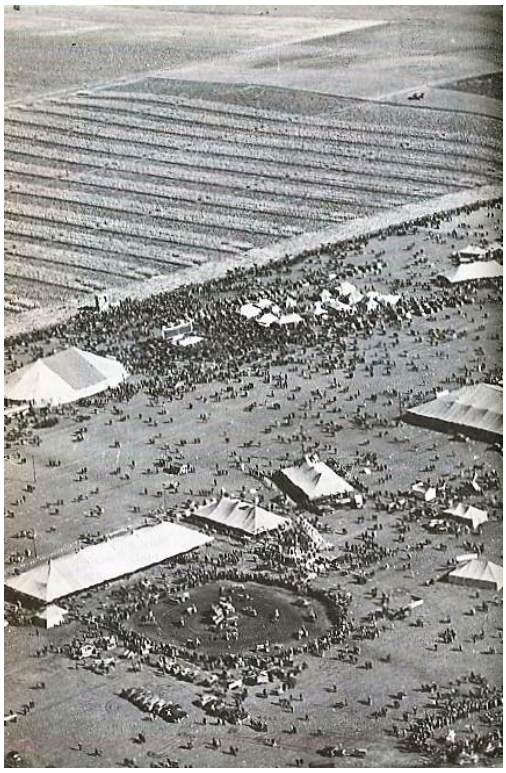

Figure 13: 1940 National Corn Husking Competition grounds[297]

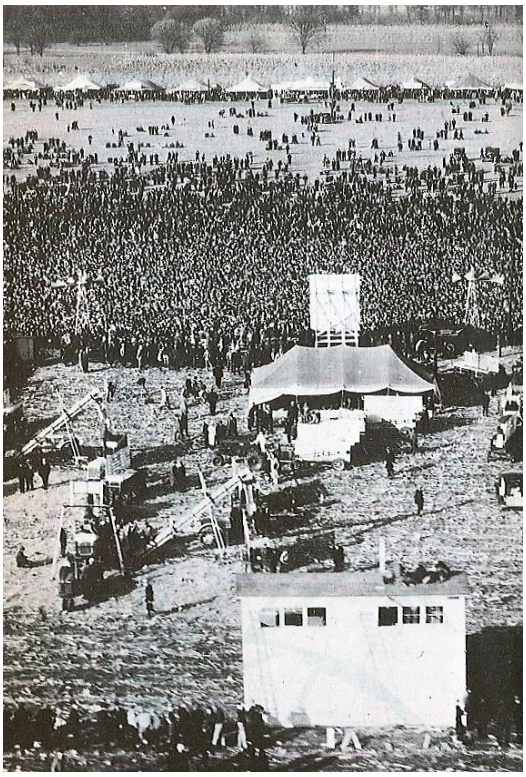

Figure 14: 1939 National Corn Husking Competition grounds[298]

To ensure fair husking contests, a lot of official staff was required. The crew of officials supporting such an event was quite large as each contestant had to be watched by a judge; there was also an official starter, a timekeeper, a gleanings judge, a crew that removed the husks from the 100-pound samples, drivers for the wagons, a tabulating crew, and a general chairman. For Renville County this meant that a total crew of around 100 men was involved just to conduct a single county husking contest.[299] Due to the larger scope of state and national championships, the number of staff required for these competitions far exceeded that of county contests.

[297] Picture from Jacobs, *Battle of the Bangboards*, 180.
[298] Picture from Ibid., 196.
[299] Svoboda, *Looking Back*, 165.

Renville County picked up the trend of corn husking contests rather late. The first official corn husking contest in Renville County was held in 1932. Albert Voltin, a farmer living in Bandon township roughly ten miles southeast of Olivia, was able to beat all the other twelve contestants and took home the title of Renville County's first corn husking champion.[300] Out of the field of participating huskers Voltin had more experience with husking competitions than the others as he was the only competitor who had already participated in the Minnesota state husking contest before.

For ten years Renville County hosted husking contests annually. After 1941, a halt was put on them due to wartime rationing and a shortage of human labor because of the recruitment of young men for World War II. In the ten-year time span of having corn husking contests in Renville County, Albert Voltin took home the majority of the victories. He won five out of the ten years ('32, '34, '35, '36, '37). Albert Voltin went on to compete in the Minnesota state husking competition multiple times and had his best result in 1936 when he came in fifth. Only two other contestants from Renville County ever competed in the Minnesota state husking championship: Otto Mahlow, who placed tenth in 1926 and Ray Moudry, who in 1941 came in eighth in the state contest. 1941 was also the last year that the state husking contests were held. They, too, ceased to exist because of the US engagement in World War II.

After the war years, an effort was made to revive the contests in both 1945 and 1946 in their old grandeur—both times it failed, due to a lack of interest and a loss of hand-husking knowledge as, by then, mechanical harvesters were being used

[300] Ibid.

on most farms and hand-husking had gone out of fashion.[301] The national corn husking competitions were continued but never regained the popularity of the pre-WWII days. In 1969, on the farm of the Jaycees, Olivia got to host the national corn husking contest, which at that point was a rather small event.[302]

Even though corn husking contests can still be found on a state and national level today, they are far less frequent and popular than they were in the 1920s and 1930s. They have turned into a folklore-like commemoration of an old tradition. The last (modified) version of a husking contest in Renville County took place during the Cornland, USA shows in 1973 and 1974. But there, the corn husking contests were less about finding the best corn husker of the area and more about "portray[ing] the art [of corn husking] to the present mechanically-minded generation."[303]

The history of the corn husking contests is a rather curious one: what was intended to be a competition to determine the best harvesting technique to increase the hand harvested yields turned into one of the most popular sporting events of the 1920s and 1930s, before fading away after 1941.

Because Size Matters: From Corn Shows to Yield Tests

Simultaneously with corn husking contests, another form of celebrating corn emerged around the turn of the twentieth century: corn shows. Like many towns in the Corn Belt, Olivia had its own corn shows in the early twentieth century. Corn shows were held from roughly 1890 to the 1930s in many areas of the Corn

[301] Ibid., 168.
[302] Jacobs, *Battle of the Bangboards*, 251.
[303] Svoboda, *Looking Back*, 168.

Belt, so that farmers could bring their ears of corn to have on display and be evaluated by judges. The most uniform and best looking ears of corn were awarded prizes. Scorecards indicated what an idealized ear of corn should look like. The scorecards go back to the Illinois Corn Breeders Association, which introduced them in their 1890 corn shows and said they had the purpose of "developing an interest in better seed corn."[304] Judges used the scorecards to evaluate the entries made by farmers on a 12-point scale. They were looking for—among other criteria—ears that were cylindrical with straight rows, kernels that were uniform in shape and color, and kernels that were wedge-shaped with straight edges. On top of these general points, the seven most prominent open-pollination varieties were also judged by whether they met a "standard of perfection" for their specific variety. Among these prominent varieties was Reid's Yellow Dent, for which the idealized shape of the kernels was slightly different than usual.[305] These corn shows happened during the time that farmers were still selling open-pollination varieties to other farmers. Having a winning ear of corn in a corn show meant farmers could sell their seed corn for a higher price and make good money.[306] That is why farmers entered their ears of corn in corn shows, eager to take home a prize-winning ear of corn.

1916 was the first year Renville County seed corn was exhibited.[307] In Olivia, the event was sponsored by the People's Bank of Olivia and, according to the author of *The History of Renville County Minnesota*, at the corn show "very liberal premiums [were] paid."[308] A newspaper article from 1930 announced the upcoming "Seed and Grain Show" that was to take place in Olivia on 22

[304] Fitzgerald, "Farmers Deskilled," 329.
[305] Ibid., 330.
[306] Kingsbury, *Hybrid: The History and Science of Plant Breeding*, 223–24.
[307] Curtiss-Wedge, *The History of Renville County Minnesota, vol. II*, 784.
[308] Ibid., 787.

November, in conjunction with the annual meeting of the Renville County Farm Bureau. "The premium list makes it attractive for exhibitors, prizes ranging up to $7 for corn, and there are many prices," the author writes. "The Seed and Grain Show last year created a very favorable expression and this year will be fully as good."[309]

The Seed and Grain Show, on top of awarding prizes to the best ears of corn etc., was also an opportunity for a social get-together for Olivians. An entertainment program, including travel lecture series and musical performances, accompanied the show. The author of the newspaper article promised that musical performances would wind "up the affair with an old time dance with old timers playing real old time music" and recommended "mak[ing] Olivia your headquarters next Saturday, November 22, and you will find that it was a day well spent."[310] The Seed and Grain Show brought together farmers from the region and provided an opportunity for farmers to draw attention to their seed corn, while enjoying themselves in a social setting.

But the era of corn shows was short-lived. Similar to his influence on corn husking competitions, Henry Wallace also affected corn shows. He was still a teenager when he helped bring corn shows to an end. Wallace believed in scientific evidence; he thought that the corn shows were mere "beauty contests"[311] and was not persuaded that the winning ears of corn would necessarily produce better yields just because of the uniformity of their looks. He persuaded his father to compare 25 prized corn varieties with 25 low-ranked varieties in a yield trial.[312]

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[309] "Corn and Grain Prizes Attractive to Exhibitors; Farm Bureau to Hold Annual Meet on Saturday," *Olivia Times-Journal.*
[310] Ibid.
[311] Rod Swoboda, "Yield Test for Corn Turns 90," *Wallaces' Farmer*, 2010.
[312] Crabb, *The Hybrid-Corn Makers*, 143–45.

They planted a small plot of corn out of each variety and the results proved that the yield had nothing to do with the look of the ear of corn. The awarding winning ears often produced worse yields than ones that had been ranked low in the corn shows.

This first experiment was then improved and standardized so that it could be used as a method to compare different corn varieties all over the Corn Belt. This technique came to be known as the Iowa Corn Yielding Contest, as Wallace and his father developed it in Iowa. When choosing which variety to plant the next season, farmers started to turn to the corn yielding contests for guidance. This led to yield contests becoming the new preferred method to determine which seed corn to purchase, and corn shows became a thing of the past.

However, the prestige that award-winning ears of corn had brought their farmers had the effect that, even after it was proven that the look of an ear of corn had nothing to do with its yield, it took a while for farmers to let go of the "beauty ideal" described on the scorecards. This is why Henry Wallace felt the need to advertise his method further, suggesting that "ordinary boys could grow for corn show appearance, but clever boys would grow for yield."[313]

Cornland, USA

After World War II, corn husking contests were unable to build up the same momentum they had had in the prewar years. Similarly, corn shows and corn yielding contests lost their appeal once hybrid seed corn was sold by companies

[313] Henry A. Wallace, "How Wallaces' Farmer Encouraged Improved Corn in Iowa," *Wallaces' Farmer* vol. 40, no. 18 (1915): 6.

(who advertised their varieties with the expected yield). The hybrid seed companies, however, introduced new forms of celebrating corn.

In Olivia, corn celebrations reached a peak in the mid-1970s with a large-scale event called "Cornland, USA," organized by the Trojan Seed Company. Dick Hagen was the main organizer for this event that took place four years in a row from 1973 to 1976. It was during the heyday of the hybrid seed industry and attracted many people to Olivia.

It was customary for the seed companies to hold annual field days to present their new varieties to their (potential) customers. The Cornland, USA show was an idea that Dick Hagen had to turn field days into a more fun event:

> "Every seed company has to put on field days when they invite in their dealers and we were doing that routinely, but that's about it. You invite your dealers, you give them the same story you give them every year. But we said 'no, there's so much more going on than just talking to our dealers, why don't we add something to bring in more people?' That was the idea. Why don't we have a field day that's open to the farming public not just to our dealers and customers? And why don't we even have some other commercial people coming in and be an exhibitor at our field day? Not seed companies, we wouldn't let seed companies in, but if you wanted to come in and display farm machinery or display feeds, or display livestock. So we even had that sort of thing going for us."[314]

The reason why the organizers would not let other seed companies in was because this event was hosted and sponsored by the local seed businesses in Olivia, first and foremost by the Trojan Seed Company, and they did not want their competitors to take over their event.

[314] Oral interview with Dick Hagen (formerly Trojan Seed), 28 July 2014.

Figure 15: Dick Hagen with poster advertising Cornland, USA.

To turn the field days into a more entertainment-centered event, Trojan Seed started to conceptualize the field as a mini-festival that would be enjoyable for the entire family. On top of hosting other agricultural supply dealers, the organizers invited entertainers to perform concerts and displayed the craftsmanship of the women of Olivia prominently in an area called "Patchwork Square": "[the] 'Patchwork Square' is what the women's program became to be known as. And it was in one of the large warehouses out of Trojan Seed Company. […] Some of the people that were there were more interested in seeing 'Patchwork Square' than they were anything else," Hagen remembers.[315] The *Lancaster Farming* newspaper reported that "some of the unique skills to be seen are: China painted jewelry, wood carving, wood burning, wooden toys, horseshoe nail jewelry, bead

[315] Oral Interview with Dick Hagen (formerly Trojan Seed), 28 July 2014.

& silver jewelry, wax sculpture and candles, leather-smithing, gemcraft, rosemaling,[316] musical instruments and restoration, weaving, pottery, quilting, charcoal portraits, needlepoint, latch hooking, stitchery, oil painting, airbrush work, silk screening, calligraphy and glassblowing."[317] The "Patchwork Square" was particularly popular among the female crowd.

The concept of trying to attract a larger crowd rather than only seed dealers and of making a festival out of the quasi-mandatory field days proved to be very successful. In 1973 about 18,000 to 20,000 people came to the first Cornland, USA show in Olivia to enjoy the entertainment. "We had a big tractor pull," Hagen recalls. "We had an ag aviation day, where we would fly some of our fuels to just demonstrate crop spraying. […] We had entertainment […] Rex Allen Jr. […] and we had a gal named Marilyn Sellars, she made a very popular song called 'One Day at a Time.' So they were doing four, five shows a day. So besides wagon tours of our nursery spot, we had all sorts of things going on." In a rural region with little entertainment options, like Renville County, an event that brings well-known artists to the area is likely to attract many visitors. Nevertheless, the original purpose of the Cornland, USA show was not forgotten: Visitors of the show could go on tours of nursery plots, and new corn seed varieties were exhibited and shown to seed dealers and interested farmers. The organizers hoped that setting up the Cornland, USA show to attract people to Olivia and the grounds of the Trojan Seed Company's headquarters might earn them some new customers—and ensure that the names "Trojan Seed Company" and "Olivia, MN" were more easily recognized and were associated with the corn seed industry.

[316] A style of Norwegian decorative painting on wood that uses stylized flower ornamentation, and geometric elements, often in flowing patterns.
[317] "Patchwork Square Featured at Cornland," *Lancaster Farming*, 30 August 1975: 6.

In its second year, Cornland, USA attracted 26,000–28,000 visitors and in the third year the organizers counted a little over 40,000 people—roughly double the number of people from the first year.[318] The *Lancaster Farming* newspaper even spoke of 70,000 people from over 20 states,[319] plus visitors from Canada and New Zealand. The number of visitors was more than ten times Olivia's population at that time, which was roughly 3,200 people.

During the fourth annual Cornland, USA show, Hubert H. Humphrey, Minnesota senator and former vice president to Lyndon B. Johnson, held a speech on 21 August 1976. "This is a splendid opportunity to pay tribute to the magnificent record of American agriculture and the special importance of corn," Humphrey started off.[320] He went on with a brief history of corn farming in the United States—framed as a success story that started with the pilgrims adopting corn and ended with the establishment of the Corn Belt:

> "This exciting story goes back to the Pilgrims at Plymouth and the earlier settlers at Jamestown who had the good sense to grow and eat Indian corn in order to survive. Corn soon became the food and feed bridge which the pioneers used to cross America from the Atlantic to the Great Plains. Then, as now, no plant captured so much of the sun's energy with so little labor in so short a time. In 100 days, a kernel of corn could multiply itself five hundredfold. The settlers ate corn in a dozen different ways and fed it to their oxen for work, cows for milk, chickens for eggs and hogs for meat. The tales of lush prairies from Indiana to Nebraska helped trigger a march of land-hungry homesteaders, resulting in the marvel that we call the Corn Belt."[321]

Knowing he was addressing an audience in a town home to many hybrid corn seed producers, Humphrey made sure to point out the yield improvements achieved through switching from open-pollinated to double-cross hybrid corns in

[318] Number provided by Dick Hagen, organizer.
[319] "Cornland, USA Show Drew 70,000 Visitors," *Lancaster Farming* 20, no. 44 (1975): 83.
[320] Hubert H. Humphrey, "Remarks of Senator Hubert H. Humphrey," Fourth Annual Cornland Show, Olivia, MN, 21 August 1976.
[321] Ibid.

the first half of the twentieth century. It is probably fair to say that it was a bit of stretch when Humphrey proclaimed "American agriculture should be added to the list of world wonders."[322] His speech talked about the greatness of American agriculture over the course of history, specifically recognizing the achievements of Midwest corn farmers, but did not touch upon any specific details of Olivia and its corn history. Nevertheless, the senator's willingness to come to Olivia and to deliver a speech shows the importance that the Cornland, USA shows had gained as a regional event.

It seems surprising that such a popular event only ran for four years, given that the crowds were growing with every consecutive year. When asked why it only ran for four years, despite its success, Hagen explains "[it was a] HUGE show, biggest show in Minnesota! And at that time Pfizer is purchasing our [Trojan Seed]. […] Things changed rapidly when you become owned by a corporate firm out of Manhattan, New York. They changed the name to Pfizer Genetics and that just took all the enthusiasm out of our people. Including they [Pfizer Genetics] no longer wanted to pick up the bill on Cornland, USA."[323] The decision of Pfizer Genetics to discontinue the Cornland, USA show was a large disappointment for the local population of Olivia. It was one of the negatively perceived consequences of a corporate takeover of a previously locally owned and operated company.

Even though this event ceased to exist after only four years, "it really put Olivia on the map even that much more," Hagen says, "because not only did we have people from Minnesota, we had people coming in from five, six, seven states, upper Midwest area. And people were very impressed when they came. All this

[322] Ibid.
[323] Oral interview with Dick Hagen (formerly Trojan Seed), 28 July 2014.

activity, this free entertainment. Everything was free."[324] Undoubtedly, Hagen as one of the main organizers of this event might seem to be a biased source when it comes to evaluating the popularity and success of the Cornland, USA show. However, the reported visitor numbers in the newspapers solidify his claim regarding the popularity of the event. "It was kind of a big carnival. It drew in thousands and thousands of people," Tom Mack also remembers. "People would come in campers. It drew in many, many people."[325]

The Cornland, USA show could not compete with the very popular Minnesota State Fair, but within the region of southwestern Minnesota, the show provided some of the same features: The focus on agricultural products (seed and equipment, exhibitions of agricultural machines) featured in a setting that provided fun and entertainment, as well as food, for the entire family.

Cornland, USA was an important step in solidifying a tradition of celebrating corn in Olivia, MN. It served as a model for other agricultural festivals beyond the borders of Olivia. Hagen says it was the incubator for the Farmfest Minnesota, which is an annual festival still celebrated today, usually in the first week of August. It takes places in Redwood Falls, which is 25 miles south of Olivia.[326] The Cornland, USA show arose during the heyday of the hybrid seed industry. Even though it only ran for four years due to the acquisition of Trojan by Pfizer Genetics, it helped to create a reputation for Olivia as an important corn seed production location and, as Dick Hagen said, it "put Olivia on the map."[327]

[324] Ibid.
[325] Oral interview with Tom Mack (formerly Trojan and Keltgen Seed), 26 July 2014.
[326] "Minnesota Farmfest," *IdeagGroup*, http://www.ideaggroup.com/farmfest.
[327] Oral interview with Dick Hagen (formerly Trojan Seed), 28 July 2014.

Corn Capital Days

"Growing up, this was the weekend of the year. It was heaven on earth,"[328] Mary Mack remembers. To this day, in Olivia the Corn Capital Days are the highlight of the year, anticipated by children and adults alike. During the last week of July, when the town is preparing for the annual Corn Capital Days, Olivia is buzzing with life. Former graduates of the local high school and grown-up children living elsewhere return to Olivia for this event. Most high school reunions are scheduled around it. "My daughter lives in London," Roger Heller says, "comes back every year [for Corn Capital Days] because her classmates tend to come back for Corn Capital Days. So she spends the month of July here just about every year. Because she knows she's going to have a good time with her friends."[329]

The Corn Capital Days, spread out over the last week of July, have become a staple feature and the largest event in the annual calendar of Olivia, with various activities taking place. They include a public corn feed, where visitors are served free sweet corn, the "Cornlympics" (or "Corn Olympics"), a 5-mile run, a kiddie parade, and a Grand Parade. The Grand Parade is one of the highlights and consists of over 100 floats. Local clubs and churches contribute to the event and some of the activities serve as fundraisers for these clubs. Each year a different motto and design is chosen for the Corn Capital Days. T-shirts are printed with the motto, which are worn proudly by many Olivians during the event. A lot of people contribute by volunteering and help organizing the Corn Capital Days. In 2014 the motto was "Make it a monumental year" as the ear of corn monument was renovated that year.

[328] Oral interview with Mary Mack, 26 July 2014.
[329] Oral Interview with Roger Heller (Farm and Land Broker) 25 July 2014.

The Corn Capital Days have been going on for over 50 years: they date back to 1968. Sander Pearson, then owner of a local grocery store, initiated them. Pearson took over the Red Owl grocery store in 1947, which was a staple among the downtown businesses.[330] According to Dick Hagen, Pearson thought: "'I like this town, maybe I could even get some more groceries sold if I did something crazy like a little carnival.' So he hired a real carnival author to come in and they had a Ferris wheel and a totter wheel and a couple of other rides. He did that two or three years. And that was kind of catching on," Hagen said.[331] In 1968, Pearson got several business owners of downtown stores and other local organizations to join efforts, and announced that from 28 to 31 July 1968 the first "Corn Capital Days" would take place. The organizers had the foresight to plan this as an annual event.[332] "Then the Chamber of Commerce and the Olivia Lions said to Sander 'you know, why don't we consider making this an even bigger event? And then we can have our own parade with it and so forth,'"[333] Hagen said, describing how the Corn Capital Days evolved.

The core idea to celebrate community and to provide business opportunities for local shops has remained the same since the beginning of the Corn Capital Days. Nevertheless, there of course have been changes to the program, and each year the Corn Capital Days are celebrated with a different motto. Up until the early 2000s, a beauty pageant for the young women of Olivia was held, called the "Junior Miss Program." The associated sports events taking place have also changed. In the last couple of years, a Corn Capital Days included a 5-mile run, but at other times

[330] "Red Owl Grocery Store," *Olivia Times-Journal*, September 1972.
[331] Oral Interview with Dick Hagen (formerly Trojan Seed), 28 July 2014.
[332] "Plans Begin for Corn Capital Days," *Olivia Times-Journal*, 29 February 1968.
[333] Oral Interview with Dick Hagen (formerly Trojan Seed), 28 July 2014.

tennis tournaments (1996)[334] or softball tournaments (1997)[335] were offered. Some years, like 1968, included pet shows, ice cream socials, pancake breakfasts, a teen dance,[336] others high school band performances and book sales at the local library. The changes in the program not only reflect different trends (e.g. what sports events are most popular in what decade), but are also a way for the volunteers who help put this event together to exercise a certain amount of creativity by adding new features or modifying exiting ones. In 1999, the Corn Days included a corn maze in the shape of Minnesota.[337] In 2001 the motto was "The sky's the limit" and the program included wrist-wrestling, a corn token hunt, and a corn capital maze.[338] The 2004 program promised "'corny' events for both adults and 'niblets,'" and that visitors could expect an "A-maizing Corn Festival," with "'corn'tages fun for all."[339]

One of the program points that has become a staple feature is the so-called "Cornlympics," a competition of various events that children participate in. One discipline is called "World Champion Corn Toss" and was first introduced in 1998. Competitors have to throw an ear of corn as far as they can, similar to long throw. The rules are simple: whoever throws the ear of corn farthest wins.[340] Other disciplines are set up as team challenges. For example, as depicted below, one team member holds an empty bucket and the other person has to throw popcorn into the bucket. Whichever team manages to collect more popcorn in the bucket within a certain time frame wins the competition. In one way or another,

[334] City of Olivia, ed., "Corn Capital Days Program: 29th Annual," 1996.
[335] City of Olivia, ed., "Corn Capital Days Program: 30th Annual," 1997.
[336] "Corn Capital Days to Feature Pageant, Parade, and Carnival," *Olivia Times-Journal*, 11 July 1968.
[337] Craig DeFrance, "It's A-maze-ing!," *Olivia Times-Journal*, 15 July 1999.
[338] Craig DeFrance, "The Corn Capital to Celebrate Its Heritage," *Olivia Times-Journal*, 19 July 2001.
[339] City of Olivia, ed., "Corn Capital Days Program: 37th Annual," 2004.
[340] "World Championship Corn Toss Results," *Olivia Times-Journal*, 1 August 2001.

all of the various disciplines include corn as a part of the challenge. Corn is used in a playful way to determine which team will win the competition. Because of the abundance of corn around Olivia, the use of corn for the competitions like the "World Champion Corn Toss" does not strike anyone as a waste of a food source. Admittedly, the quantity wasted is small, but it speaks to the wealth of corn found around Olivia that it does not seem to worry anyone when a food source is used for sheer entertainment rather than for consumption.

Figure 16: Children participating in the 2014 Cornlympics at the Corn Capital Days.

One of the main features of the Corn Capital Days is the public corn feed that takes place in Nester Park, the largest public park in Olivia. Bluegrass bands entertain the crowd, which enjoys the free sweet corn, children play, and festival goers browse the market stands selling various products ranging from artisanal honey to jewelry.. The parades are among the programme highlights. Children wear costumes, some even corn themed, during the kiddie parade. For example, as a toddler in 1994, Alison O'Neill-Hackmann sat in a cart with a sign that read:

"Around Olivia green crops grow
Corn Capital of the world, you know

Of all the growing crops you'll see
The very best are 'sprouts' like me."[341]

The mascot of the Corn Capital Days is an inflatable ear of corn whose husks hang from the side like arms. His name is "Cornelius" and during the Corn Capital Days he is prominently featured in the parade and in downtown Olivia.

In 1978 Olivia's Corn Capital Days attracted more attention than the usual festivities in late July. The reason is that they were the centennial celebration of Olivia's existence (as the town was platted in 1878), and therefore the organizers had tried to come up with a special program. They decided to invite the singer and actress Olivia Newton John as they had received many requests to "bring Olivia to Olivia." One of the head organizers for the centennial event, Dave Pedersen, said, "We in Olivia have heard too often that our town was named after Olivia Newton John." He added jokingly, after Newton John had agreed to visit Olivia, "So we have decided to give up fighting. We want to thank her for spreading our name around the world."[342] When she came to Olivia, Newton John was one of the most trending stars in the United States: just one month prior to her visit to Olivia, in June 1978, the movie "Grease" was released, an instant success for John Travolta and her. Due to her success, Newton John received many invitations and requests from all over the world, but her manager, Lee Kramer, said that "the letter we received from Dave Pederson was the most interesting request we ever had. We get requests for appearances all over the world but this one caught Olivia's eye. It was certainly not a career move," he joked.[343]

[341] "We Saw You at the Kiddie Parade," *Olivia Times-Journal*, 8 August 1994.
[342] "Olivia to Visit Olivia: Olivia Newton John Will Be Honored," *Olivia Times-Journal*, 7 June 1987.
[343] Dave Pedersen, "Rural Life Lures Olivia to Olivia: Helps Celebrate Centennial," *Olivia Times-Journal*, 24 July 1978.

Newton John was curious about a town she shared her name with but also said that she liked the rural life and therefore gladly accepted the invite. "I had this fantasy to ride a horse in a parade," Newton John said. "So when I was asked to come to Olivia it was too good an opportunity to miss."[344] This explains why she participated in the annual parade riding on horseback. The friendliness of the Olivians impressed her: "It was the only town I was in where everyone said thank you after receiving an autograph,"[345] Newton John said. The singer and actress enjoyed seeing her name on buildings all over town. "There's the Olivia body shop. Maybe I can get my body remodeled,"[346] she joked during her visit. Before Newton John left town, Olivians made sure to gift her a personal plaque saying, "Olivia Newton John, welcome to our town, and your town, Olivia, MN."

The anthropologist Robert H. Lavenda looks at how community is celebrated in his book *Corn Fests and Water Carnivals: Celebrating Community in Minnesota*[347] by observing festivities in multiple small towns all over Minnesota. Although the Corn Capital Days are not among his case studies, the core argument he makes can be applied to Olivia. Lavenda argues that through an orchestrated celebration of a reoccurring festival, the community grows together as they have a common pool of memories that unites them, and often many members of the community help organize the event. This is also the case with the Corn Capital Days, which enable Olivians to identify themselves as citizens of the Corn Capital. By coming together each year to organize and celebrate the Corn Capital Days, the community is strengthened. Corn serves as the uniting theme of the

[344] Ibid.
[345] Ibid.
[346] Ibid.
[347] Robert H. Lavenda, *Corn Fests and Water Carnivals: Celebrating Community in Minnesota,* Smithsonian Series in Ethnographic Inquiry (Washington, DC: Smithsonian Institution Press, 1997).

celebration. The Corn Capital Days are a platform that connects those whose jobs are not directly related to the corn industry, from the local librarian to the people working for the county administration or in the service industry. In many ways, the Corn Capital Days are a typical example of small town celebrations. As in comparable events, there is a parade, music entertainment, food stalls, a related sports event, as well as entertainment for children. Through the Corn Capital Days, Olivians make common memories: be it in the preparations carried out by the volunteers or the event itself, when almost all the citizens of Olivia gather in Nester Park for the corn feed. By celebrating corn together, the community of Olivia profits. The celebration serves as an occasion to bring people together, with corn acting as the social glue for the citizens of Olivia.

Conflicts of Interest?

However, one important group of Olivians was unable to attend the Corn Capital Days in 2014. Nowadays, the timing of the Corn Capital Days does not work well for the people working in the corn seed industry. As the celebration takes place during the peak pollination season, they are too busy to attend. "The people that work corn can't even go!" Ed Baumgartner says. "It's so irritating! [laughs] You try and talk to the city people and get them to move it but they don't want to do it," he says. "If you're going to have a celebration about corn—let's get it out of the peak of the pollination season, because we spend it here [on the research plots]! We hear the parade from out here!"[348] This complaint was also voiced by corn breeder Marv Boerbooom: "I always wish they would change the date of the Corn Capital Days to like a week later, because a lot of the kids in town are tied

[348] Oral interview with Ed Baumgartner (3rd Millennium Genetics), 28 July 2014.

up in the fields working. We always make sure we let them go before the parade, so they can come back and watch the parade. But it's kind of a challenge for us. We are at the heart of our work, pollinating, and it's right in the middle of Corn Capital Days."[349]

It indeed seems like poor timing to hold a corn-themed event during a time when many people working in the local seed industry cannot attend it. So why is that? One explanation why this is a problem now and was not in the past is that the date of the pollination season of corn has changed. This is due to both breeding efforts, as well as to changes in the climate. Corn is planted earlier, it grows faster, and pollination happens at an earlier date than it used to. "Knee-high by the fourth of July" is an old saying to determine whether a farmer would have a good crop. However, nowadays, corn is usually already "knee-high" in June or, in some very mild and warm regions, even in late May. This goes to show how much the corn growing season has shifted—and with it pollination season. When the Corn Capital Days started in 1968, the pollination season did not yet clash with the celebrations. It is also important to remember that the Corn Capital Days were started by a business owner in downtown Olivia, not farmers or the seed industry, for whom July traditionally is a very busy month.

The changes of the dates of the corn pollination season might be one of the reasons why the city is unwilling to change the date of the Corn Capital Days. Part of it probably also has do to with the fact that by now the date has become a fixed date for the local community, which plans events like high school reunions around it and wants to keep it that way. As many towns and cities have celebrations

[349] Oral Interview with Marvin Boerboom (Monsanto), 24 July 2014.

during the summer months, moving the date of the Corn Capital Days might lead to date clashes with other communities in the area.

Everyday Celebrations of Corn

Besides the above-mentioned event-centered ways of celebrating corn, Olivians live being the Corn Capital on an everyday basis. Visual representations of ears of corn can be found all over the town. When entering Olivia from either side, people are greeted by a large green sign ornamented with a yellow ear of corn welcoming them to the "Corn Capital of the World." Along the main street in downtown Olivia, each lamp pole is decorated with a metal ear of corn.

The largest ear of corn in Olivia can be found at a rest stop on Highway 212: a sculpture on top of a pagoda. Supposedly it is even Minnesota's largest ear of corn. It measures 40 ft (roughly 12 m), including the pagoda it stands on.[350] It is one of many curious roadside attractions that can be found along rest stops in small towns all over the United States. It was built in 1973 by Trojan Seed and has been remodeled since, last in 2014. Inside the pagoda, signs inform visitors about the history of seed companies in Olivia and list all the companies that have an Olivia presence.

[350] There is a water tower painted like an ear of corn in Rochester, MN that is taller than the Olivia pagoda with its ear of corn. Olivians argue that their ear of corn is the largest ear of corn in MN, as the one in Rochester is just a painted water tower and not an actual corn sculpture. But it is at least debatable what the tallest ear of corn in MN is.

Figure 17: Corn Monument with MN's largest ear of corn.

Figure 18: List of seed companies with an Olivia presence.

The Olivia Chamber of Commerce has released multiple items that celebrate Olivia as the Corn Capital, among them an "Olivia Chamberopoly"—a Corn-Capital-themed version of Monopoly—stickers, buttons, etc. The downtown shops sell postcards of Olivia, magnets, shot glasses, and t-shirts, all with humorous slogans, such as "Olivia de-tasseling crew." The amount of Olivia memorabilia is impressive for a small rural town the size of Olivia. There are probably few rural, agricultural towns with a population of roughly 2,500 that have that many locally themed items available for purchase. This can be explained by Oliva's status as the Corn Capital. Because of the Corn Capital Days, every year a new t-shirt is designed with a different design and slogan that is then sold all over town prior to and during the time of the festival. Many Olivians have an extensive collection of Corn Capital Days t-shirts from the various years.

Not Every Seed Sprouts: The Failed Minnesota Center for Agricultural Innovation

To give their corn celebrations a physical home in Olivia, the Corn Capital Trust, Inc. wanted to create a center which would "be a destination for agricultural leaders and visitors from around the world."[351] The Corn Capital Trust, Inc. is a public foundation that was established in 1999 to bundle the interests of Olivia as the Corn Capital. In 2000, the trust proposed its plans for a Minnesota Center for Agricultural Innovation. According to a flyer, the purpose of the center was supposed to be that "visitors from around the world come to Renville County to observe farming techniques and production, to study with leaders in agri-business, and to learn about innovative agricultural strategies and products."[352] The planned location of the center was at the intersection of the highways 212 and 71, in downtown Olivia. The center was proposed to be a 26,000 square-foot complex, including "an innovation exhibition hall, interactive education center and exhibition hall, international conference room, state-of-the-art presentation auditorium with seating for 216, office space and meeting rooms, warming kitchen, dining room and reception area for formal and education gatherings, gift shop featuring innovative products, and agricultural crop plots."[353] The Olivia city council, the Renville County administration, as well as other supraregional groups backed the plan to create this center. As the center would provide meeting rooms, office spaces, and a large auditorium, the US Department of Agriculture said it would consider it as a location for a regional office. Ridgewater College expressed interest in some offices, and the University of Minnesota's College of

[351] Mindy Davis, "Ag Innovation Is Right Here in Renville County," *Olivia Times-Journal*, 25 April 2002, 1.
[352] Corn Capital Trust Inc., ed., "Minnesota Center for Agricultural Innovation: A Tradition of Seed Innovation," 2000.
[353] Davis, "Ag Innovation is Right Here in Renville County," 1.

Agriculture also sent a letter of support.[354] In contrast to the Corn Capital Days, which take place every year but only for a couple of days and outdoors, with a focus on entertainment, the center would provide a year-round exhibition with a more educational approach to showcase Olivia as the Corn Capital.

But why should the Minnesota Center for Agricultural Innovation be located in Olivia and not elsewhere in the state? Olivia's role as the Corn Capital and its stronghold in the seed industry were among the most important reasons brought forth by the supporters of the planned building. Mindy Davis, staff writer of the Olivia Times-Journal, even said that Olivia is "the city [with] the highest concentration of seed research and processing companies per capita in the world."[355] Dick Hagen, also a supporter of the planned center, points out that Renville County agriculture generates $300 million in sales each year.[356] He does not specify what part is generated by traditional produce sales and what part is generated through the sales of the seed industry. A core argument was that among the most groundbreaking innovations in agriculture are innovations in the seed industry. And as Olivia is the heart of the seed industry in Minnesota, the Corn Capital Trust Inc. thought it should be the home of the Center for Agricultural Innovation. The stronghold of the seed industry and the "claim to fame" as the Corn Capital, combined with the potential for the center to be a tourist catalyst and an educational facility were the most frequently repeated arguments for making Olivia home to the center. "I'm excited about a Tourism and Agriculture Center like nothing else in the state, or country," Dick Hagen said, "and I'm excited about Renville County waking up to the fact that this is indeed the

[354] Ibid.
[355] Ibid., 8.
[356] Richard Hagen, "Why Do We Need Such a Thing? Letters to the Editor," *Olivia Times-Journal*, 10 February 2000.

Agricultural Innovation Center of the Universe."[357] This goes to show that the plans for the center were enthusiastically supported by locals, even though their local patriotism does go a bit overboard when claiming that Olivia is the "Agricultural Innovation Center of the Universe." The very enthusiastic language about the proposed center can partly be attributed it being "sales pitch language" as well as to Olivians being "hyper believers" in their hometown's achievements.

The Corn Capital Trust treasurer, Mike Funk, estimated that the total cost for building the center would be over $4 million. However, the trust promised the citizens of Olivia that they were not planning on using city or county taxes to build or maintain the center. The Corn Capital Trust, together with the City of Olivia, wanted to apply for state bonds (which come from state taxes) to help fund the construction.[358] To apply for the state bonds, they needed to get political allies on board—and they accomplished to do so. On Thursday, 7 February 2002, Gary W. Kubly together with Al Juhnke, both Democratic members of the Minnesota House of Representatives, introduced the bill HF 3120 to the Minnesota House of Representatives. The bill proposed creating the Minnesota Center for Agricultural Innovation and aimed to provide funding, to issue bonds, and to appropriate money. After the bill was read, it was referred to the Committee on Agriculture and Rural Development Finance.[359]

This is where the Corn Capital Trust's hopes of an Olivia-based Agricultural Innovation Center ended. The bonds were not granted as they were considered not specific enough, and the Committee on Agriculture and Rural Development

[357] Ibid.
[358] Davis, "Ag Innovation Is Right Here in Renville County," 8.
[359] Minnesota House of Representatives, "Journal of the House—63rd Day—Thursday, February 7, 2002: Top of Page 5681," State of Minnesota, http://www.house.leg.state.mn.us/cco/journals/2001-02/j0207063.htm#5681.

Finance also lamented a lack of financial pledges by local institutions.[360] Without the backing of the state legislatures, the Corn Capital Trust stopped pursuing the efforts to create an Agricultural Innovation Center without attempting to find other avenues of financial resources.

Frenemies: How Constantine Challenged Olivia for the Title of "Corn Capital"

Since the 1960s, Olivians have been calling their town "Corn Capital" due to its being the county seat of one of the highest-yielding corn-growing counties in the United States and because of the seed industry, which proved to be the most important industry branch in town. Erecting the tallest ear of corn in Minnesota in 1973 helped Olivians to solidify their self-proclaimed title. However, this title was—unsurprisingly—challenged by other towns in the Midwest, as corn is the number one field crop in the United States and others saw themselves as fit contenders for the title as well.

One town that particularly took issue with Olivia calling itself the "Corn Capital" was Constantine, MI. The reason is that Constantine is home to two large Monsanto and Pioneer facilities and, according to their city's website, "the greater Constantine area produces over 10% of the seed corn in the United States."[361] So, in 2003 the Constantine, MI Chamber of Commerce challenged the Olivia Chamber of Commerce to discuss this issue face-to-face and agreed to visit for this purpose.

[360] Info provided by Dick Hagen.
[361] "Welcome to the Village of Constantine," Village of Constantine, http://constantinemi.info/.

The 2004 Corn Capital Days offered the right setting for a visit from the Mayor of Constantine and four other city officials. Olivia's Chamber manager Gary Herman, and Olivia mayor Bill Miller had thought of a fun way to compete against their visitors from Constantine: in the "Corn Olympics" taking place during the Corn Capital Days. One of the challenges was the "World Champion Corn Toss." Each town competed with a five-headed team in the various disciplines and Herman said that, "As I recall, our 5-man crew beat the Michigan crew by at least a couple of inches."[362]

To make sure it was not just the home-turf advantage that led to Olivia's victory, Olivia also agreed to visit Constantine with a delegation. In Constantine, they had a look at the productivity of the seed corn producers in the area. However, Olivians made sure to point out that even though their total seed corn output was lower than that of Constantine (and a 50-mile radius around the town), the Minnesotan town produced more corn through farming and was home to more seed companies overall. Therefore, the two towns agreed that Olivia could keep the title of "Corn Capital" and Constantine could call itself "Seed Corn Capital."

After the 2004 visits between the two competing towns, the Minnesota state legislation made sure that the title "Corn Capital" was no longer just a self-proclaimed one. The Minnesota Senate Resolution 105 (2004) officially designated Olivia as the "Corn Capital of the World."[363] This official recognition was a boost of pride for the local population. It fueled the use of the title "Corn

[362] Dick Hagen, "The Battle for Corn Capital," *The Land* XXX, no. XV (2011), https://issuu.com/theland/docs/2011-0729.

[363] A Senate resolution recognizing Olivia, Minnesota as the corn capital of the world, SR0105, Minnesota Senate (2004), https://www.revisor.mn.gov/bills/status_result.php?body=Senate&search=basic&session=083203&location=Senate&bill=105&bill_type=resolution&rev_number=&submit_bill=GO&keyword_type=all&keyword=&keyword_field_text=1&author1%5B%5D=&author%5B%5D=&topic%5B%5D=&committee%5B%5D=&action%5B%5D=&titleword=.

Capital" and led to the erection of new entrance city signs. According to the state legislation, it is the combination of high yields plus the importance of Olivia as a seed hub that managed to get Olivia the title.

When It Gets Corny: Corn as an Icon for the Midwest in Popular Culture

The fact that ears of corn are used on Corn Capital Days t-shirts and as decorative items in Olivia is not surprising, since it is the Corn Capital. However, corn's symbolism and iconicity reaches far beyond the borders of Olivia. Much more than its crop-rotation counterpart, soybeans, corn and cornfields have become a symbol of the American Midwest. Looking mostly at movies, music, and art shows that corn is used as an icon for the Midwest across multiple cultural genres.

One of the most iconic representations that shows how closely corn is intertwined with the cultural representation of the Midwest is the Corn Palace located in Mitchell, South Dakota. The Corn Palace was first built in 1892 and in its current form serves as a multi-purpose facility. The exterior of the building it covered with murals and designs made from naturally colored corn and other grains. Each year the exterior of the Corn Palace is redecorated with a new theme.[364] The Corn Palace is a popular tourist destination, visited by up to 500,000 people per year.

The popular musical *Oklahoma!* was turned into a film in 1955.[365] In the opening scene, the camera emerges from amidst a cornfield as the music starts to play in the background. The sky up above is blue and white and the camera leaves the cornfield to zoom in on the male lead, Curly, played by Gordon MacRae. He is

[364] The World's Only Corn Palace, "Corn Palace History", Mitchell, SD, 2019. Accessed 30 May 2019. https://cornpalace.com/149/Corn-Palace-History. See also: Figure 30 in Appendix.
[365] Fred Zinnemann, *Oklahoma!*, with the assistance of Gordon MacRae, Gloria Grahame, Gene Nelson, 1955.

riding his horse alongside a tall cornfield when he bursts into the well-known song "Oh, What a Beautiful Morning." Riding past the cornfield on his way to Aunt Eller's farm, Curly sings that "the corn is as high as an elephant's eye, and it looks like it's climbing clear up to the sky, oh what a beautiful morning, oh what a beautiful day, I've got a beautiful feeling, everything's going my way." The movie nowadays is one of the American classics. The nowadays iconic opening scene did not exist in the musical and was only added to the movie version of *Oklahoma!*—potentially because a cornfield represents the Midwest, to which Oklahoma often counts itself, well.

Other movies that prominently feature corn are Steven King's thriller *Children of the Corn*[366] and the drama *Field of Dreams*,[367] in which Kevin Costner converts the cornfield in front of his farmhouse into a baseball court. Another genre in which cornfields are very prominent is science fiction. In various movies, aliens leave messages for humans by creating crop circles in cornfields. In *Interstellar*[368] the main characters are looking to find a way to build a livelihood for humankind in space, as post-apocalyptic conditions are making life on earth impossible. This symbolized with burning cornfields in the Midwest and corn seeds being flown to space in an effort to grow food in outer space.

The depiction of cornfields and farmhouses in popular culture movies and shows (outside of sci-fi) often conveys a romanticized picture of the farmer's lifestyle in the rural Midwest. In movies, the "small-town farmer's life" includes happy families, red barns, chickens running around, and a close-knit community. They

[366] Ibid.
[367] Phil Alden Robinson, *Field of Dreams*, with the assistance of Kevin Costner, James Earl Jones, and Ray Liotta, 1989.
[368] Nolan, Christopher, *Interstellar*, with the assistance of Matthew McConaughey, Anne Hathaway, Jessica Chastain, 2014.

rarely depict the worries and struggles real farmers in the Midwest experience. Farmers ask themselves: Should I buy a new harvester and go into debt? Did I pick the right variety to grow this year? Will this year's harvest earn us enough to pay for our daughter's college tuition? Who will help me out if I happen to get sick during harvest time? Everyday life on the farms can range from very long and stressful days, particularly during the planting and harvesting seasons, to more boring days during the winter time, when the days are short, cold, and gray and there is not much work to do on the fields or around the farm; the nearest town does not offer many leisure-time activities either. This is not to say that parts of what is depicted in popular movies are not true, but movies often only show one facet of what it is like to be a farmer in the Midwest.

As most American movies are shown nationwide and many even internationally, the association of the Midwest with cornfields has been carried far beyond the boundaries of the Midwest. Upon seeing cornfields and a farm setting, the audience expects a movie to play in a Midwestern setting.

Corn as a symbol of the Midwest is not only featured in movies, but also often sung about. The music genres with the most references to corn are country and folk music. It is not very surprising as many country and folk musicians come from the American heartland, and musicians are often influenced by their surroundings when writing songs. Sometimes entire songs are devoted to corn, like country musician Blake Wise's song "Cornfields":

> "Ain't nothing but cornfields
> Stretching out as far as you can see
> Up ahead behind and in between
> Ain't nothing but cornfields
> the turn road where I first tasted whiskey
> Is the same place Mary more than kissed me
> In the backyard where my folks got married

Is an oak tree where my grandpa's buried
And outside of every window of the house
Ain't nothing but cornfields […]"

The song does not judge whether it is positive or negative that there is "nothing but cornfields" all around—it is rather a description of the landscape and a depiction of small-town life. Music journalist Matt Bjorke writes that the song "describes a way of life and dreaming that a majority of country music fans will relate to, even if they grew up in a town that didn't feature cornfields."[369] It is the imagery of cornfields that helps Blake Wise to convey the feeling of rural small-town life.

Blake Wise's song is from 2010, but there are many songs from earlier decades that talk about corn as a staple feature of the Midwest. In the 1958 musical *South Pacific*, Mitzi Gaynor describes herself in the chorus of the song "I'm in Love With a Wonderful Guy" as follows: "I'm as corny as Kansas in August, I'm as normal as blueberry pie. No more a smart little girl with no heart, I have found me a wonderful guy." She chooses the phrase "as corny as Kansas in August" to describe herself, which suggests both that Kansas is indeed very corny in August and that this is a well-known fact, so people understand her play on words. Kansas was probably chosen for alliteration and rhythmic reasons (instead of "cornier" places like Iowa), but it shows that in the late 1950s corn was already a common field crop in Kansas, otherwise the lyrics would make little sense.

On top of movies and songs, corn is also featured in paintings and landscape photography. The famous American regionalism painter John Steuart Curry created the artwork "Kansas Cornfield" in 1933. The artist depicts a close-up of

[369] Matt Bjorke, "Blake Wise—Cornfields," *Roughstock*, 7 July 2010, http://roughstock.com/news/2010/07/19423-blake-wise-cornfields.

one lush green corn plant that has already reached maturity as the tassels are floating in the wind and the ears of corn are nestled into leaves along the stalk. Behind the prominently featured individual plant in the foreground, an entire cornfield stretches out. The artist has chosen a low angle so that the viewer doesn't know how large the cornfield really is. The lush green of the leaves and the thick sturdy stalks indicate the promise of a good harvest that year. The timing is curious: the 1930s, particularly the years 1934–1939 were the years of the "Dust Bowl"—a devastating time for farmers who lost most of their harvests due to drought, soil erosion, and sand storms. Kansas and Oklahoma were most affected by it, as well as parts of New Mexico, Colorado, and Texas. When Curry created the painting in 1933, he likely did not foresee the hardships that awaited farmers of his home state and surrounding areas in the next couple of years.

Figure 19: John Steuart Curry—Kansas Cornfield, 1933.[370]

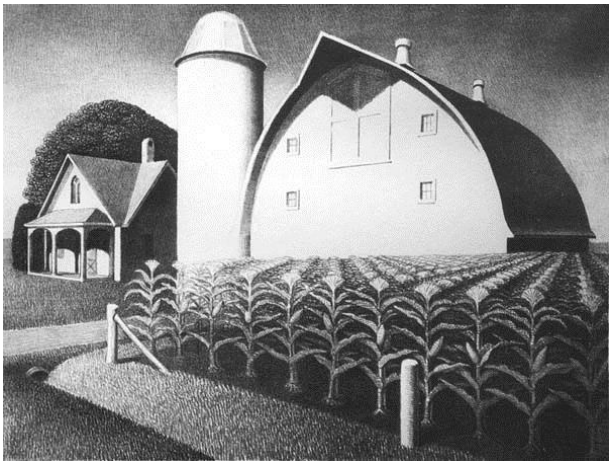


Figure 20: Grant Wood—Fertility, 1939.[371]

Another example of an artist's stereotypical depiction of a rural Midwest farm scene that is centered on corn is Grant Wood's lithograph "Fertility" from 1939.

[370] From: https://www.wikiart.org/en/john-steuart-curry/kansas-cornfield-1933.
[371] From: http://www.tfaoi.com/am/16am/16am307.jpg.

The piece of art is on display in the Dubuque Museum of Art and its description says that "with its burgeoning barn and densely packed cornfield, this stylized farmscape is a testimonial to the agricultural productivity of Iowa."[372] Wood, like Curry, was part of the regionalism art movement in the United States. Whereas Wood's most famous piece of art, "American Gothic," depicts a depressed-looking farmer couple with a pitchfork in front of a neo-gothic wood house, "Fertility" sheds a much more positive light on farming in Iowa. The barn seems large and in good condition; the corn field is stylized to look like an army of strong and sturdy corn plants. Even though there is no color in this picture, the shadow of the barn roof indicates that it is supposed to be a sunny day. Looking at this image, one gets the feeling that this farm is thriving and can expect to get a good corn harvest that year. And indeed, after years of hardship during the Dust Bowl years, 1939, when "Fertility" was created, was a year with favorable growing conditions. Interestingly, Wood chose not to depict any humans. Therefore, the viewer focuses their attention even more on the cornfield and on the barn. As Wood is from Iowa, the scene was most likely inspired by his immediate surroundings in rural Iowa. Nevertheless, this lithograph could easily depict a farm elsewhere in the Corn Belt, as it has no unique Iowa features.

Even though those selected examples of corn featured in movies, music, and art are eclectic, they serve as good examples to show how "corn" is perceived as an icon for and symbol of the Midwest and as the "All American crop" and portrays a rural lifestyle. Corn is more iconic than any other field crops grown in the Midwest. Seeing corn immediately triggers the association of the American heartland among the viewers.

[372] "Grant Wood Lithographs," Dubuque Museum of Art, http://www.tfaoi.com/aa/2aa/2aa551.htmD.

Conclusion and Outlook

The ways in which corn was and is celebrated in Olivia and the Midwest are manifold and have changed over time in their meaning and form. For the Native Americans, ceremonies like the Green Corn Dance had a spiritual component to praise the harvest gods to ensure a good corn yield. For the settlers, corn was also at the center of local community get-togethers, but these did not have a spiritual connectedness to corn.

With the seed industry's rise in Olivia, particularly it the 1960s and 1970s, two more celebrations around corn emerged, this time initiated by the seed companies and the local downtown stores. Starting in 1968, the last week of July was dedicated to the Corn Capital Days. To this day, they are a staple for Olivia community life. Shortly after the Corn Capital Days were started, between 1973 and 1976, Olivia was home to the Cornland, USA show. From corn husking contests to the Corn Capital Days, corn has served as a tool to bring together people and celebrate community in Olivia. However, particularly since the introduction of genetically modified corn in the 1990s and the strengthened role of large multinational seed, corn has become a much more controversial crop than in the days prior to the 1990s. Nowadays, it is used as the poster child for protests against "big ag" and genetic modification. It is associated with large-scale monoculture farming, governmental subsidies, and high risk of soil depletion on the production side. On the consumer end of the production chain, the reputation is often equally poor. As corn-based products are often found in cheap, not very healthy ready-made food items, it has further gotten a bad reputation as an unhealthy, low-class food product.

In Olivia, however, the locals do not perceive corn as negatively as it is often seen by the general public.[373] This can most likely be traced back to the stronghold of the seed industry and corn farming in Olivia. As the seed industry is a fruitful business and corn farmers have reliable soils that tend to result in a good corn harvest, Olivia is financially a lot better off than other small Midwestern cities. The unemployment rate is low, the municipality is doing well, and the local government can even invest in new infrastructure, such as the new hospital that was built in 2015.

Figure 21: Olivians shucking sweet corn for the Corn Capital Day public feed.

The most public positive public embracement of corn in Olivia happens during the Corn Capital Days, when Olivians come together to shuck the corn in preparation of the public sweet corn feed. In terms of corn as a food source, sweet corn and kettle corn were the only ways corn was consumed during the Corn Capital Days. No other corn-based meals, such as hominy grits or polenta, were offered. Thinking back to the diverse ways in which corn was used as a food source by the

[373] For example, for highly critical voices on corn see Pollan, *The Omnivore's Dilemma* or Aaron Woolf, *King Corn: You Are What You Eat*, with the assistance of Bob Bledsoe, Earl L. Butz, and Dawn Cheney, 2007.

settlers in the late nineteenth and early twentieth centuries, the selection of corn offered corn dishes seems rather limited. Indirectly, of course, corn was present in many of the dishes, for example in the hot dogs that were probably made out of corn-fed beef or pork, and in the syrups used for the pancake breakfast, which contained high-fructose corn syrup as a sweetener.

The often found public concerns about the omnipresence of corn in various food items, and criticism of the business practices of large seed companies have not affected the Olivians' willingness to celebrate corn. The topic of corn as an invisible, yet ever-present, food source did not arise during my participation in the 2014 and 2017 Corn Capital Days. It seemed to me that the controversial side of corn was not suppressed on purpose by the organizers—it rather appeared that Olivians did not want to discuss the controversies in this framework. The majority of Olivians work in the seed industry, or farm corn themselves; however, they seem to be less critical of the changes that took place in the corn seed industry and in the food industry. More often they came across as technocrats who praised the wonders of modern machines that facilitated and sped up the corn-farming process rather than questioning new technical innovations, such as genetic modification or seeds. It seemed that for them planting a new drought-resistant corn variety created through genetic modification is similar to adopting new technical farm equipment innovations, such as GPS-driven planter.

It made me wonder: Where are the critical voices? Are Olivians less skeptical of big agro-seed companies than other Americans (particularly in urban areas) because they work for them? It is interesting to observe that those who are employed in seed companies producing the controversial genetically modified

seed corn, and the farmers growing it—people who are working with corn on a daily basis—are among the least skeptical.

One reason why Olivians have a more positive attitude towards corn, including genetically engineered corn, is probably a very pragmatic one: it has served them. Due to the rich soil farmers were able to have good harvest yields and breeders have comparably high income in the local corn research and development facilities. Another reason could be that they feel more connected to corn than people living elsewhere. As modern *Hombres de Maíz*, they look back on a rich tradition of celebrating corn and identifying with it. From the Green Corn Dance to Corn Capital Days, America's number one cash crop has always been at the heart of community celebrations in Olivia.

Conclusion: Journey Through the Past

When driving back to the Twin Cities after my first visit to Olivia, I had a much clearer sense of what the "Corn Capital of the World" was like—including the people that live and work there. As soon as I got there, I visited the tallest ear of corn and had my picture taken with it. I stayed for about a week and participated in many of the Corn Capital Days events, including the public corn feed, the five-mile run, the pancake breakfast at the municipal airport, as well as watching the Grand Parade. Staying for a couple of days allowed me to get the feel of what life in Olivia was like—including that after almost a week I felt like I had seen it all, as there are only so many things one can do in a community of 2,500 people.

In Olivia we can trace the history of the mechanization of agriculture, the industrialization and globalization of the seed industry, and the environmental impacts caused through the creation of the Corn Belt, all in just one location. It is also a story about different social groups and their interaction with corn, ranging from Dakota Native Americans to highly qualified corn breeders. The long history of the human-corn relationship in Olivia has led to a high degree of identification of Olivians with the United States' number one field crop.

One of the reasons why the citizens of Olivia might find it easier than people elsewhere to be so proud of corn is the fact that Olivia has not experienced a full crop failure since 1988. Even in 2012, when the harvest in most parts of the United States was affected by drought, Olivia's corn grew pretty well without major losses because of the rich soils surrounding the town. This reliability allows

citizens to not have to constantly worry whether or not this year's harvest will be good enough to earn them a decent income or not, and therefore they can embrace corn as the source of something good more easily than citizens elsewhere. The connection that Olivians feel to the corn that is so dominantly grown in the area around their town today, however, has artificial roots. Prior to European settlement the area around Olivia was covered by prairie grass and marshland. Corn was specifically used as a tool to break the prairie and came to prevail on the fields around Olivia,a plant not even endemic to North America. Even though the dark rich soils around Olivia, whose origins can be found in the last ice age, are still very healthy and fertile (unlike in other areas with predominantly monoculture growing of crops), the transformation of wetland areas into cornfields has still taken its toll. Through drainage, much of the wetland prairie in Minnesota was lost (even though Minnesota remains the "land of the 10,000 lakes") and with it a habitat vital for the survival of many species. The ecosystem that supported many animals and water plants was endangered and destroyed through the loss of wetland prairies. For corn plants—which were mostly planted after wetland prairie was transformed into productive agricultural land—the introduction of hybrid corn drastically diminished the biodiversity of corn varieties found on farmland in the Midwest.

The transformation of the landscape was ultimately only possible because of the value system predominating in the late nineteenth and early twentieth centuries. Only because European settlers saw nature as commodity was the exploitation and transformation of it possible to the extent that it happened.

This exploitation and transformation of land did not only displace the various plants and animals that depended on the prairie ecosystem—it also had

consequences for the region's human inhabitants, the Dakotas. The relationship between Native Americans and settlers changed drastically when large groups of European immigrants started pouring into Minnesota. The time of mostly peaceful trades during the seventeenth and eighteenth centuries was shattered. The year 1862 played a crucial role in escalating the conflict: the passing of the Homestead Act and the promise of affordable land in the American Midwest and West encouraged many European immigrants to "go west"—either from the East Coast or directly from Europe. This partly explains why in 1862 the US-Dakota War broke out in southwestern Minnesota. Different perceptions of land treaties, combined with a food shortage among the Dakotas led them to revolt against their new neighbors. The result was the death of hundreds of settlers and Dakotas alike—and that the newcomers to the area from Europe claimed control over Minnesota lands. Like the fertile areas in the surrounding states, the lands around Olivia were converted from prairielands to cornfields that merged to form the Corn Belt.

One of the reasons why Renville County is now one of the most productive counties in the Corn Belt can be found in the seed industry. Through targeted selection processes breeders developed hybrid seeds that would yield well in the northern Corn Belt and helped expand the Corn Belt a lot further north than its original area. To make this possible, the U of M and its researchers not only played an important role in developing early hybrid seeds, but particularly pushed the development of northern varieties. The collaboration between the university and farmers through the extension service led to the founding of Olivia's first local seed company: Trojan Seed. By looking at Olivia and its seed companies, we can see the changes in breeding practices, as well as in company structures.

In the 1960s, the practice of inbreeding corn varieties in tropical countries sped up the production process for new hybrid varieties tremendously. With the passing of the PVPA in 1970, the protection of intellectual property for new seed varieties created the incentive for mergers and acquisitions in the seed industry as more expensive development costs could be offset through higher seed prices of protected varieties. In Olivia we can see how this plays out on a local level: the working conditions for corn breeders changed dramatically and resulted in a number of dissatisfied employees, who opted to either work for a smaller company or even found their own, or transitioned to another field of employment altogether.

Globally, the business practice of mergers and acquisitions in the seed industry, combined with an emerging fear of genetically modified foods, led to the rise of criticism and waves of protest against large seed companies, particularly Monsanto. Corn served as a posterchild for protests against GM seeds and multinational seed corporations. In Olivia one finds much less criticism than in other, more urban areas of the United States and many parts of the world, particularly the EU. By understanding the role Olivia plays in the global corn seed network, I argue that it can be seen as "Nature's Village." Olivia had to stay a village to become a global player in the seed industry. Like Chicago, it turns natural resources into a commodity, which is the basis of the local industry.

Besides growing corn and producing seed corn, Olivia also looks back on a long tradition of various forms of corn-centered events and celebrations. Considering the differences in the company structures between locally owned and corporate global seed producers, it is clear that local seed companies, first and foremost Trojan Seed, have engaged a lot more with the local community. The Cornland,

USA shows, organized by Dick Hagen and his colleagues from Trojan Seed, brought tens of thousands of visitors to Olivia in the 1970s. By combining the field days, a required annual even for seed companies, with entertainment activities, the organizers hoped to attract attention and business to Olivia. In 1973 the Trojan Seed company created a roadside attraction through the erection of the tallest ear of corn in Minnesota that made corn even more symbolic of Olivia. After 1976 the sponsorship of the Cornland, USA show was halted as the Trojan Seed had come under new ownership by Pfizer Genetics, who decided to stop sponsorship of this local event.

The pagoda with the ear of corn was built five years after the citizens of Olivia started to celebrate the Corn Capital Days. This annual festival in the last week of July has turned into a ritualized celebration of corn in Olivia and solidified its "claim to fame" as the Corn Capital. The core pillars have remained the same: a public corn feed, a sporting event, a kiddie and a Grand Parade take place every year. However, some years have included special features, like Olivia Newton John's visit, or seen changes in the program: the "Junior Miss" pageants were dropped and new features like the "Cornlympics" introduced. By organizing, shaping, and participating in the Corn Capital Days, Olivians have a ritualized form of celebrating their community.

Before these Olivia-specific events were started in the 1960s and 1970s, the corn celebrations and contests fell in line with corn celebrations across the wider area of the Corn Belt. In corn shows farmer exhibited their ears of corn, hoping to bring home a prize-winning ear to be able to sell it as seed corn at a higher price. With the emergence of yield trials as the preferred—and more scientific—method of selecting seed corn, the corn shows ceased to exist. Another temporary

phenomenon were the corn husking competitions. In1923 Henry Wallace came up with a structured form of hand husking competitions and helped create one of the most popular athletic competitions of the 1920s and 1930s: the corn husking championships. Contests took place at various levels from county husking contests to state and national contests. In Renville County Albert Voltin was the most successful corn husker, who also participated in the Minnesota corn husking contests three times. In 1941 the corn husking championships were put on halt due to United States' engagement in WWII—and they were never brought back after the end of WWII, as the mechanization of farms had out fashioned hand husking.

From husking competitions to Corn Capital Days: what all these events have in common is that they celebrate corn and community. Even though corn is at the base of the celebrations, none of these celebrations seek to create a spiritual connection to corn. The Native Americans who lived in the area before European settlement were the only ones who did that with their celebration of the Green Corn Dances. Yet similar to modern corn celebrations in Olivia, the Green Corn Dances were an important element in the social life of the local community.

Combing aspects of the transformation of the landscape, the emergence of the corn seed industry in Olivia, and the various forms of celebrating corn—without corn Olivia would not be what it is today. Corn played a crucial part in converting the prairie and it is the most popular field crop found in the fields around Olivia today. The corn seed industry is the backbone of Olivia's industry and, through pollination and de-tasseling jobs, most citizens of Olivia engage with the seed industry during their youth. Olivians are part of the development and production process of new corn seeds that end up being planted all around the world and the seed companies in return shape the everyday life of Olivia as their revenue partly

flows back into the local economy and they impact who works and lives in Olivia. The town of roughly 2,500 people is an important hub in the global corn seed market. Through the combination of high corn yields, a large number of seed companies in town and various form of celebrating corn in Olivia, the town transformed itself into “the Corn Capital of the World.” One could say that corn shaped Olivia—and Olivia helped to shape corn.

Appendix

Transformation of Landscape

Figure 22: Original cover of prairie grassland in the Midwest:

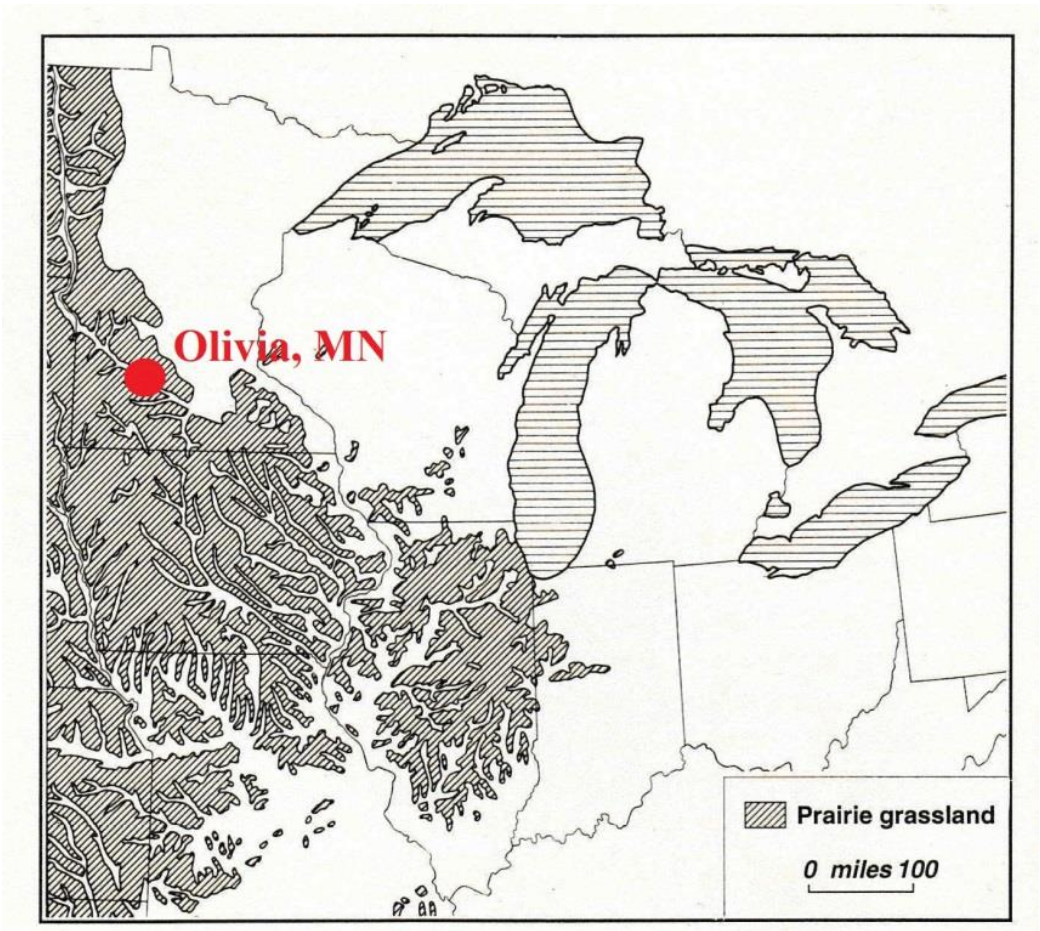
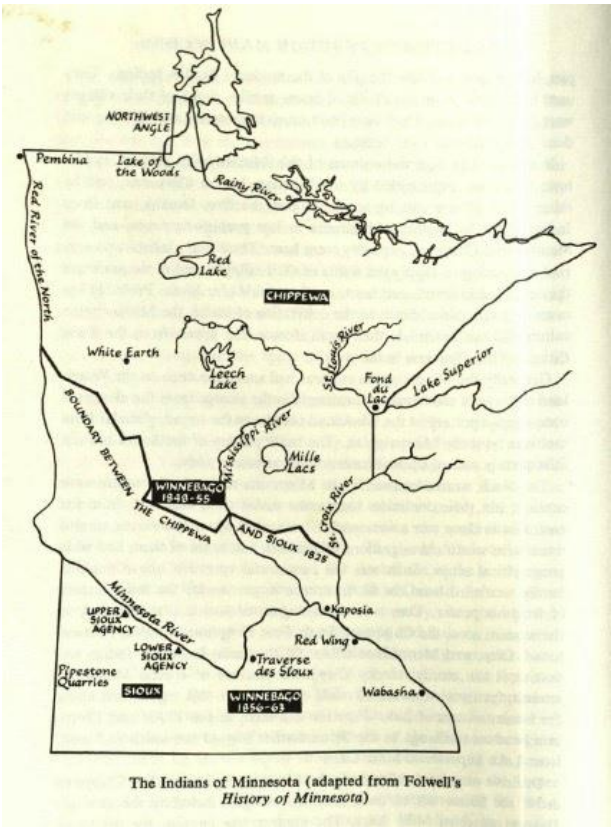


Figure 2.4 Prairie grassland in the Midwest

Source: H. L. Shantz and Raphael Zon, Natural vegetation, in *Atlas of American agriculture* (U.S. Department of Agriculture, Washington, D.C. 1923) figure 2.

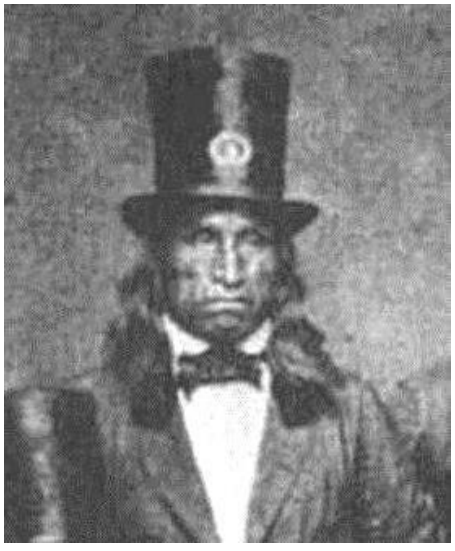
Source: Prince, Hugh. *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes* (Chicago: University of Chicago Press, 1997), 48.

Figure 23: Native Americans of Minnesota:



Source: Blegen, Theodore and Russell Fridley. *Minnesota: A History of the State* (Minneapolis: University of Minnesota Press, 1985), 22.

Figure 24: Joseph Renville, fur trader, son of a French-Dakota marriage and namesake of Renville County:



Source: https://www.wikitree.com/wiki/Renville-3

Figure 25: Corn production in the United States 1879:

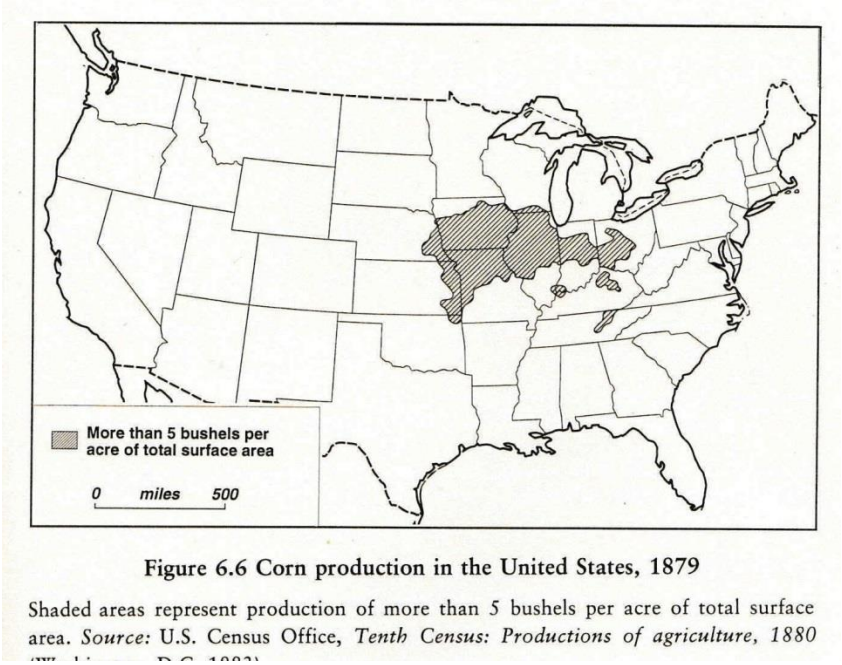


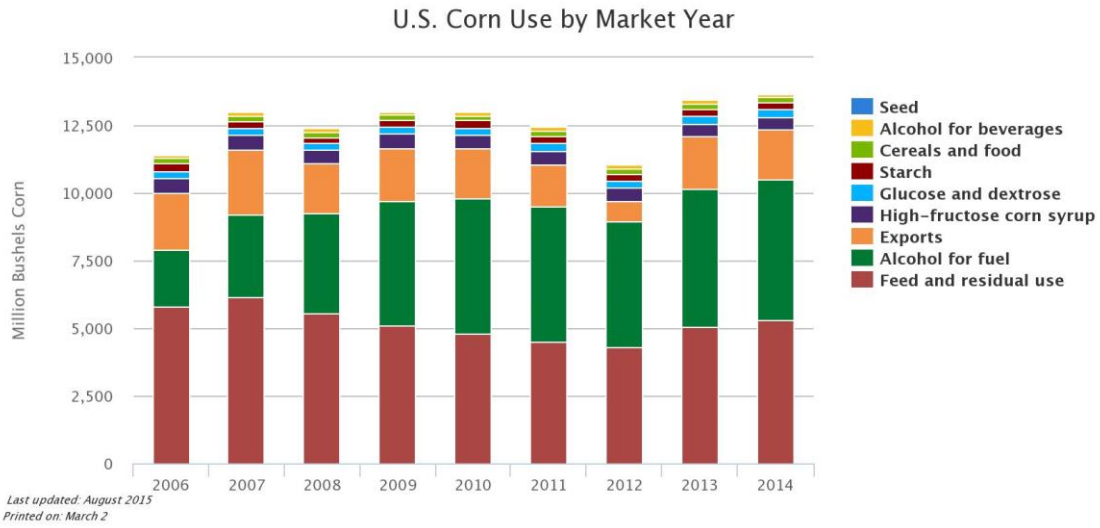
Figure 6.6 Corn production in the United States, 1879

Shaded areas represent production of more than 5 bushels per acre of total surface area. *Source:* U.S. Census Office, *Tenth Census: Productions of agriculture, 1880*

Source: Prince, Hugh. *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes* (Chicago: University of Chicago Press, 1997), p. 225.

Globalizing Corn

Figure 26: US corn use by market year:



Source: USDA Economic Research Service—Feed Grains: 2015 Yearbook (Tables #4 and #31)

Figure 27: Seed price development from 1972–1997:

	Corn			
Year	Average rate per acre	Average cost per acre	Acres with purchased seed	Seed price per bushel
	Kernels	*Dollars*	*Percent*	*Dollars*
1972	20,955	4.90	NA	21.50
1973	20,955	5.03	NA	22.20
1974	20,955	5.66	NA	25.00
1975	22,110	8.74	NA	36.50
1976	22,110	8.74	NA	36.50
1977	22,110	9.57	NA	40.00
1978	22,110	10.29	NA	43.00
1979	22,110	10.88	NA	45.50
1980	21,945	12.46	NA	52.50
1981	21,945	14.23	NA	60.00
1982	21,879	15.12	NA	63.70
1983	21,896	15.26	NA	64.60
1984	21,900	16.67	NA	70.20
1985	21,912	16.96	NA	71.80
1986	23,800	19.09	100	65.60
1987	24,000	18.30	100	64.90
1988	24,100	18.64	100	64.20
1989	24,100	20.40	100	71.40
1990	24,700	20.50	100	69.90
1991	24,906	20.79	100	70.20
1992	25,304	21.35	100	71.80
1993	25,564	22.72	100	72.70
1994*	25,824	23.54	100	73.40
1995*	26,588	24.50	100	77.10
1996**	27,500	25.97	100	77.70
1997**	27,665	NA	100	83.50

Source: Fernandez-Cornejo, Jorge. *The Seed Industry in U.S. Agriculture: An Exploration of Data and Information on Crop Seed Markets, Regulation, Industry Structure, and Research and Development.* (Washington DC: USDA Economic Research Service, 2004), 11.

Figure 28: Selection of Seed Companies and Parent Firms:

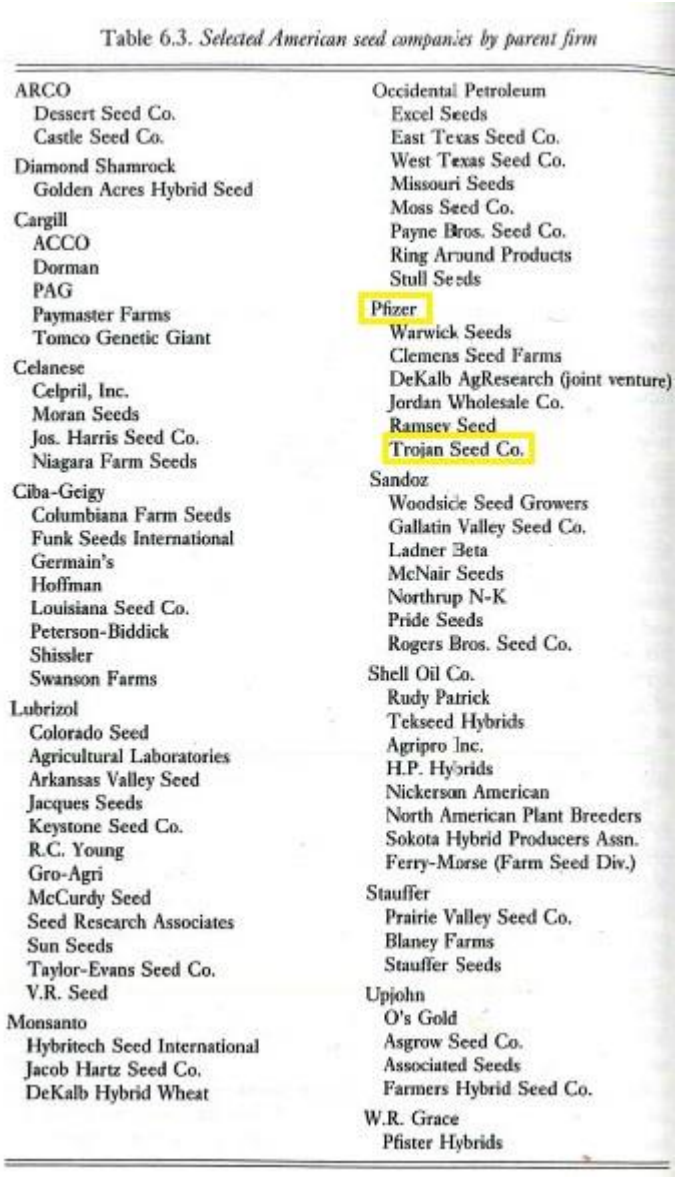


Table 6.3. *Selected American seed companies by parent firm*

ARCO
- Dessert Seed Co.
- Castle Seed Co.

Diamond Shamrock
- Golden Acres Hybrid Seed

Cargill
- ACCO
- Dorman
- PAG
- Paymaster Farms
- Tomco Genetic Giant

Celanese
- Celpril, Inc.
- Moran Seeds
- Jos. Harris Seed Co.
- Niagara Farm Seeds

Ciba-Geigy
- Columbiana Farm Seeds
- Funk Seeds International
- Germain's
- Hoffman
- Louisiana Seed Co.
- Peterson-Biddick
- Shissler
- Swanson Farms

Lubrizol
- Colorado Seed
- Agricultural Laboratories
- Arkansas Valley Seed
- Jacques Seeds
- Keystone Seed Co.
- R.C. Young
- Gro-Agri
- McCurdy Seed
- Seed Research Associates
- Sun Seeds
- Taylor-Evans Seed Co.
- V.R. Seed

Monsanto
- Hybritech Seed International
- Jacob Hartz Seed Co.
- DeKalb Hybrid Wheat

Occidental Petroleum
- Excel Seeds
- East Texas Seed Co.
- West Texas Seed Co.
- Missouri Seeds
- Moss Seed Co.
- Payne Bros. Seed Co.
- Ring Around Products
- Stull Seeds

Pfizer
- Warwick Seeds
- Clemens Seed Farms
- DeKalb AgResearch (joint venture)
- Jordan Wholesale Co.
- Ramsey Seed
- Trojan Seed Co.

Sandoz
- Woodside Seed Growers
- Gallatin Valley Seed Co.
- Ladner Beta
- McNair Seeds
- Northrup N-K
- Pride Seeds
- Rogers Bros. Seed Co.

Shell Oil Co.
- Rudy Patrick
- Tekseed Hybrids
- Agripro Inc.
- H.P. Hybrids
- Nickerson American
- North American Plant Breeders
- Sokota Hybrid Producers Assn.
- Ferry-Morse (Farm Seed Div.)

Stauffer
- Prairie Valley Seed Co.
- Blaney Farms
- Stauffer Seeds

Upjohn
- O's Gold
- Asgrow Seed Co.
- Associated Seeds
- Farmers Hybrid Seed Co.

W.R. Grace
- Pfister Hybrids

Source: Kloppenburg, Jack Ralph. *First the Seed: The Political Economy of Plant Biotechnology, 1492–2000* (Madison: University of Wisconsin Press, 2004), 148.

Figure 29: US market shares by seed companies between 1973 and 1983:

Table 15—-U.S. market shares of corn seed by company[1]

Company	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
						Percent					
Pioneer	23.8	25.5	24.6	27.3	30.9	26.2	32.9	36.9	34.8	38.8	38.1
DeKalb[2]	21.0	18.8	18.8	19.5	15.8	17.9	13.3	13.0	15.9	12.2	10.3
Asgrow	0	0	0	0	0	0	0	0	0	0	0
Funk[3]	8.8	9.4	8.9	9.2	6.4	8.1	6.7	5.7	5.4	5.2	3.9
Trojan[4]	5.9	5.1	6.8	5.6	4.2	5.4	3.8	2.0	0	0	0
Northrup-King[5]	6.1	4.5	4.7	3.4	3.8	3.3	3.8	4.9	3.4	2.6	2.5
Zeneca/ICI	0	0	0	0	0	0	0	0	0	0	0
Cargill/PAG[6]	4.8	6.8	3.9	3.5	4.1	4.6	3.3	4.7	5.6	5.4	4.2
Golden Harvest	0	0	1.8	2.4	2.5	3.1	2.9	1.3	3.2	2.3	2.6
Dow/Mycogen	0	0	0	0	0	0	0	0	0	0	0
Jacques/Agrigenetics[7]	0	1.3	1.7	2	1.9	2.1	2.7	2.2	0	0	0
Other	29.6	28.6	29.8	27.1	30.4	29.3	30.6	29.3	31.7	33.6	38.4
Largest 8 firms	72.5	70.7	69.8	71.2	68.1	67.0	69.7	69.4	70.0	68.3	64.0
Largest 4 firms	59.7	58.8	59.1	61.6	57.3	55.6	56.7	60.5	59.5	59.1	54.9
Herfindahl index	0.1171	0.1159	0.112	0.1269	0.1049	0.1138	0.1354	0.1609	0.1501	0.1723	0.1604

Note: Due to the sample size of the surveys, the shares are estimates that may vary plus or minus two percentage points.
[1] Market shares are based on percentage of acres sown with respective firm's seed.
[2] Merged with Pfizer in 1982.
[3] Aquired by Ciba-Geigy in 1974.
[4] Aquired by Pfizer in 1975.
[5] Aquired by Sandoz in 1976.
[6] Acquired by Cargill in 1971.
[7] Acquired by Agrigenetics in 1980.

Sources: 1973-80: Butler & Marion (1985), p. 90; 1981-83: McMullen (1987), p. 96.

Source: Fernandez-Cornejo, Jorge. *The Seed Industry in U.S. Agriculture: An Exploration of Data and Information on Crop Seed Markets, Regulation, Industry Structure, and Research and Development.* (Washington DC: USDA Economic Research Service, 2004), 31.

Celebrating Corn:

Figure 30: Corn Palace, Mitchell, SD mural of 1963:

Source: The World's Only Corn Palace, "Photo Gallery", Mitchell, SD, 2019. Accessed 30 May 2019. https://cornpalace.com/PhotoViewScreen.aspx?PID=7&FullSize=true.

Jeffrey Posch, Dow AgroSciences

Steve O'Neill, Corn Capital Innovations

Ed Baumgartner at 3MG's Olivia seed nursery

Marvin Boerboom, Monsanto

Raechel Baumgartner in the 3MG North office

Tom and Mary Mack

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