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The Expanding Ecology of a Hot Commodity: A Century of Changes in the New Mexican Chile Pepper

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THESIS

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ABSTRACT

Over the past century, the New Mexican chile pepper transformed from a principally local and regional crop grown by many, small scale growers into an industrial commodity on a global market. With this transformation, the ecology of the chile pepper has shifted and expanded. The actors in this ecology- the growers, the research scientists, the manufacturers of equipment, chemicals, and seeds, government legislatures, the consumers, and even the genome of the chile itself- became increasingly global with little or no ties to the local watersheds, ecosystems, and communities within the state. Driving this ecological expansion has been a close public-private collaboration between the state's land-grant institution, NMSU, and private industry.

This paper begins with an examination of Dr. Fabian Garcia, NMSU's first chile breeder. Garcia made significant efforts to disseminate his research to large and small farmers throughout the state. Yet even during Garcia's tenure, the seeds of a major agricultural and ecological shift in the state were beginning to sprout. This shift, part of the larger Green Revolution transforming industrial agriculture throughout the nation and the world, made satisfying the needs and goals of both small farmer and large commodity producer increasingly difficult. By the 1970s, the pepper had become a mild, uniform,

and high-tech commodity that would no longer be grown primarily by small scale New Mexican farmers mainly for New Mexicans.

In the years after NAFTA, when the industry began to face decline and increasing global competition, the chile's ecology both expanded into new realms of corporate control, but also contracted. As large producers vertically integrated moved their operations across national borders, jobs for Mexican workers in New Mexican chile fields became scarcer, and smaller New Mexican growers were outcompeted by larger ones. All the while, industrial monocultures and the new potential for lawsuits to discourage seed saving have decreased, and threaten to further decrease, biodiversity in New Mexican chile fields. A public-private collaboration between NMSU and private corporations has shifted the emphasis of university research away from the empowerment and benefit of local growers, consumers, and small businesses, towards increasing markets across the globe for the profit of a smaller set of elite New Mexican growers and processors, and corporations based far beyond any local watershed.

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Introduction

I first heard about the genetically engineered (GE) chile at the Albuquerque growers market in the fall of 2009. I arrived an hour early to begin setting up my produce stand. As I piled kale on the table my mind was slow to wake but something seemed vaguely different from previous markets. Was it the crisp air or maybe the way the speckled light of the early morning filtered through the cottonwoods at a slightly lower angle? Perhaps it was the new vendor, the man in the safari hat selling peaches? No, there was something else. It was in the air. Eventually I noticed a smoking black roaster spinning the first green chile of the season. As any New Mexican will tell you, this is a happy sight. This morning, though, that warm smell of green chile roasting- as much a harbinger of fall here as the yellowing of the cottonwoods or the chimneys blowing piñon smoke- portended more than just a fiery, delicious snack and the oncoming autumn.

It was New Mexico Native Chile Week and the roaster spun eight varieties of green chile from different parts of the state. I eventually walked over and sampled some of the chile. A worker explained to me as she handed me a chile sample that GE chile will soon be commercially available in New Mexico, and that each of these varieties will be threatened by contamination through genetic drift. She urged me to sign a post card to the governor to support an upcoming bill to protect farmers from being sued for inadvertently planting contaminated seeds.

After that market, and for the past two years, the GE chile issue stuck with me. As a market grower, I wondered how this cross-pollinating and unwelcome guest would

affect my farm. Was is it really true that a seed company would actually sue a small grower, or even a home gardener, for unintentionally having or growing a pepper with this unsolicited genome? How has such a pepper come to be, I wondered, and who asked for it? My questions mounted and I began to talk to other farmers, interviewed food and seed activists, visited the archives at NMSU and the Center for Southwest Research in Albuquerque, and read as many different books on agricultural history, chile peppers, and biotechnology as I could get my hands on. I have turned these two years of research into an one hundred year narrative that examines how and why the chile pepper has changed in New Mexico.

I borrow frameworks from several scholars to help guide the story. The notion of industrial agriculture as an ecology of power that Christopher Henke puts forth in *Cultivating Science, Harvesting Power* is a helpful starting point. Henke conceptualizes an ecology of power as:

> A broad system of social and material production that forms the larger playing field where growers and agricultural scientists work to turn products created from local contexts- food, commodities, data, knowledge- into capital that is transferrable to other institutions. These forms of economic and social capital are made valuable through this process of exchange and, in turn, can provide actors with control and influence over the very places and practices that serve as the basis for this capital.

Henke argues that ultimate product of this ecology- consisting of growers, agricultural scientists, farmworkers, land, plants, universities, and state legislatures- is power. To Henke the metaphor of ecology gives agency to all actors in the formulation of power. The history of industrial agriculture does not resemble an "irresistible treadmill" of technological innovation and capital consolidation, but rather acts as a complex system of

exchanges where the various ecological actors affect development of agriculture's ultimate product: power.[1]

With this framework in mind, the ecology of the chile pepper in New Mexico has grown considerably in the past century. The physical geography of the chile's social and material ecosystem has expanded far beyond its local confines of the early 20th century, and with that expansion the net worth of the industry and the cumulative power it produces has grown significantly. The actors in this ecology- the growers, the research scientists, the manufacturers of equipment, chemicals, and seeds, government legislatures, the consumers, and even the genome of the chile itself- have become global. As the ecology expanded, the actors driving the ecosystem the most have increasingly had little or no ties to the local watersheds, ecosystems, and communities within the state.

To describe this ecological shift towards non-local actors, I borrow language from historian Louis Warren. In *The Hunter's Game*, Warren describes the shift in Western public lands from a local commons controlled by local elites to one where more distant— *extra-local*— elites gain control. The industrial chile's ecological expansion has often involved a shift towards extra-local control of a commons. From the industrial influence in the state's publicly funded land-grant institution to the genetically engineered chile and commons of a gene pool it threatens to privatize, the trend of a previously public commons being controlled by and for extra-local elites is a critical element to the chile pepper's history in New Mexico. This paper offers a hundred year context for the reduction of local control over the New Mexican chile's ecosystem and its commons. [2]

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[1] Christopher Henke. *Cultivating Science, Harvesting Power: Science and Industrial Agriculture in California*. MIT Press: Cambridge, 2008. 6.

[2] Louis Warren. *The Hunter's Game: Poachers and Conservationists in Twentieth-Century America*. Yale University Press: New Haven, 1997. 179.

A central force driving the changes in the chile pepper has been the public-private collaboration between the university and private industry, coined "the academic-industrial complex" by several critics and scholars. The notion of a public institution, and especially a land-grant university, aiding private business interests is hardly new. Indeed, the public land-grant university system was designed in 1862 with a goal, as Stephan Jones argues, to aid small farmers in their private businesses and "to develop varieties of plants and animals that would benefit farmers and consumers both financially and nutritionally, and ultimately benefit society at large."[3] The question, however, of which type of farmer should primarily benefit from this institution has been debated with varying intensity for over a century. By the 1970s, critics openly questioned whether the public-interest facet of the land-grant university mission had been lost as the universities moved towards a complete melding with corporate interests. Former Texas agricultural commissioner and outspoken populist, Jim Hightower, put the relationship in no uncertain terms. "Although the land grant college complex was created to be the people's university, to reach out to serve the various needs of a broad rural constituency," Hightower begins his 1973 *Hard Tomatoes, Hard Times*, "the system has, in fact, become a sidekick and frequent servant of agriculture's industrialized elite." Hightower goes on to argue that while the university focus on scientific and business efficiency has led to

[3] Jones, Stephen. *In (Seed) Bed Together: Are Agro-Giants Taking Over University Research?* Feb 13 2002 accessed at http://www.tompaine.com/feature.cfm/ID/5116. At the time he published this work, Jones was a wheat breeder at Washington State University who appeared in headlines for refusing to work with corporations to develop a herbicide resistant wheat.

more (and over) production, it has enriched relatively few and has caused rural America to "crumble."[4]

Other scholars have more recently taken less sweeping attacks on the complex from a variety of angles. While the corporate contracts certainly add a source for much needed university funding, scholars have pointed out this academic-corporate bond creates "potential conflicts of interest, redirection of research from basic to applied areas, erosion of openness of scientific communication, and detrimental effect on graduate training."[5] The history I present here points to another possible consequence: a shift in university resources and focus from the local to the extra-local.

To explain the ecological shifts of the New Mexican chile pepper, I begin roughly a hundred years ago and break the story into three chapters. The first chapter focuses on the first chile breeder at NMSU, Dr. Fabian Garcia, who served at NMSU for nearly the entire first half of the 20th century. Garcia made significant efforts to disseminate his research to large and small farmers throughout the state. He traveled to rural communities throughout the state with the university's first improved chile variety, the number 9 chile, which was popular among growers from northern New Mexico to the Mesilla Valley near the Mexican border. Yet even during Garcia's tenure, the seeds of a major agricultural and ecological shift in the state were beginning to sprout. This shift, part of the larger Green Revolution transforming industrial agriculture throughout the nation and the

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[4] Jim Hightower. *Hard Tomatoes, Hard Times: The Original Hightower Report- and Other Recent Reports- On Problems and Prospects of American Agriculture*. Cambridge, Massachusetts: Schenkman Publishing Company, 1978. 1,2.

[5] Sheldon Krimsky, James G. Ennis, and Robert Weissman. "Academic-Corporate Ties in Biotechnology: A Quantitative Study," *Science, Technology, & Human Values*, Vol. 16, No. 3 (Summer, 1991), 276.; Mark Clayton, "Corporate Cash and Campus Labs" in *The Christian Science Monitor*, Tuesday, June 19, 2001.

world, made satisfying the needs and goals of both small farmer and large commodity producer increasingly difficult.

By the time of Garcia's death in 1948, the chile industry in southern New Mexico was beginning to take form. By the mid 1970s, chile production in the southern part of the state had begun to skyrocket. As production surged, the nature of the chile changed and its ecology expanded to include extra-local corporations, investors, and markets. The second chapter charts these changes and examines how various private sectors merged with the university to develop, grow, promote, and sell chile, transforming the chile from a local, regional crop into an international commodity.

The third chapter, spanning from the early 1990s through the present, covers a period of decline in chile production from its high water mark in 1992. The North American Free Trade Agreement (NAFTA), which took effect January 1, 1994, restructured the industry and added immense competition to New Mexican growers. Imports from foreign countries such as Mexico, China, and Peru surged, and many growers had to invest more in expensive technologies and tried to integrate vertically to compete. The industrial chile's ecology of power further consolidated into corporations based out of state, shifted across borders, and entered the previously public commons of the chile's genome. As the ecology expanded in these ways, it also contracted in others. Large producers supplanted smaller producers, machines supplanted workers, and genetic patents emerged to threaten the genetic diversity of the New Mexican chile. Thus, as the New Mexican chile's ecology has expanded geographically in recent decades, it has also become more consolidated and less diversified.

I finish this paper with the GE chile and the recent debate surrounding it. This

controversial biotech development points both to the dominant trend of an ecological expansion of New Mexico's industrial chile into extra-local territory, but also illustrates how this expansion has not been unilateral, teleological, or uncontested. The recent debate surrounding the GE chile demonstrates how some New Mexicans have resisted the extra-local shift in New Mexican agriculture and have tried to re-center New Mexico's chile pepper within a more local and locally diverse ecology.

Chapter 1
Roots

When Dr. Fabian Garcia began his seed trials in 1907 at the New Mexico College of Agriculture and Mechanic Arts (Later NMSU), horses pulled the plows, the Rio Grande wreaked havoc on the floodplain in spring, and the fresh fruit and vegetables grown in the valley were grown primarily with local and regional markets in mind. Food production was spread out throughout the valleys of New Mexico on small, diversified farms. Many farmers planted seeds that had passed through their families and communities for generations. Cotton was the state's chief export crop and chile, reserved almost entirely for local and regional fresh consumption, remained a minor crop. By the end of Garcia's tenure at mid century, however, both the chile and its agricultural landscape were in the midst of a profound transformation.

In the most general terms, this transformation was part of the Green Revolution affecting agriculture across the nation and planet. Tractors slowly overtook horses, synthetic herbicides, pesticides, and fertilizers became prevalent, and high yielding, university bred hybrid seed varieties began to replace older seed stock. In New Mexico, as in many other states, the land grant institution played a major role in facilitating this revolution and paving the way for a future industrial chile empire. As the 20th century approached its midway point, the land grant university's commitment to the emergent Green Revolution meant the university could no longer easily satisfy the needs of small and large farmer alike. Its focus had begun to shift away from a relatively large set of small-scale producers with local markets and towards a much smaller set of large-scale growers and processors competing in national and international markets.

The Early Years of New Mexico's Land Grant Institution

The Morrill Land Grant Act of 1862 provided land and funds for each state to develop an agricultural college at a time when 80% of the U.S. population lived in rural communities and 59% of the total labor force worked in agriculture. The colleges aimed to provide agricultural knowledge to the country's many small farmers, especially in the West. In 1888, Congress added a research arm of the land grant schools with the Hatch Act, which was to "have for their purpose the development and improvement of the rural home and rural life and the maximum contribution by agriculture to the welfare of the consumer." Advocates of the Hatch Act argued the legislation should primarily support small farmers and not larger businesses. "The farmer's work is not big business," they argued, "and he needs the assistance of the government where business and commerce do not." Almost from the inception of the agricultural research institutions, however, the land grant research stations disseminated information most often to "the largest farms and the best-educated farmers," while the average, more isolated farmer did not have access to the land grant information. In 1914, Progressives in Congress addressed this issue by formally allocating funds through the Smith-Lever Act to create an extension service that would disseminate the university research to the rural countryside.[6]

In the first few decades after Hiram Hadley founded the New Mexico College of Agriculture and Mechanic Arts in 1888, the land grant university took various measures

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[6] Jim Hightower. *Hard Tomatoes, Hard Times: The Original Hightower Report- and Other Recent Reports- On Problems and Prospects of American Agriculture*. Schenkman Publishing Company: Cambridge, Massachusetts, 1978. 9-14. Also, Paul Conkin. *A Revolution Down on the Farm: The Transformation of American Agriculture since 1929.* University of Kentucky Press: Lexington, 2008.

to reach out to rural farmers. Only five years after the small college was founded, the New Mexico Legislative Assembly passed acts to establish branch agricultural experiment stations in various New Mexican counties that reflected the territory's wide variety of soils and climatic conditions. The school's annual report of 1905-6 claimed that "not only is it endeavor to supply information sought, but to impart it in such a way as to insure its adoption, at least, experimentally. Every farmer should be an experimenter."[7] At least in rhetoric, the school not only aspired to extend the results of its research to the rural farmer, but also considered the rural farmer an integral part of that research process. In the first decades of the university, with only the glimpses of industrial agriculture peaking over the horizon, this was a reasonable aspiration. The goals of small and large producers in New Mexico were similar enough for the land grant school's research to benefit both.

The sprouts of a future agro-industry, however, were emerging across the landscape during the first decades of the 20th century. The construction of the Elephant Butte dam in southern New Mexico in 1916 transformed the once swampy and semi-wild riparian zones of the Rio Grande into large swaths of reliable and controllable fertile farmland. Under the terms of the Newlands Act, farmers in the area bought shares to help fund dam construction with each share corresponding to acre-feet of water access once the dam was completed.[8] The Elephant Butte dam instigated an agricultural boom in the

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[7] "NMSU Annual Report, 1905-6." Taken from *Agricultural Research at New Mexico State University Since 1889* (las Cruces, nm: March 1969) A76-85 Box 5 (Agr. Services) Rio Grande Collection. NMSU Archives. Las Cruces, New Mexico, page 28.

[8] Ira Clark. *Water in New Mexico.* Albuquerque: UNM Press, 1987. 195.

valley, with many farmers growing on relatively small tracts of land that, according to the university president of the time, H.L Kent, were roughly "10 to 30 acres."[9]

Early food processing enterprises also emerged during this time. The Mesilla Canning Company, founded in the late 19th century by Theodore Rouault, won a prize for its canned chile at the Louisiana Purchase Exhibition in St. Louis in 1904. Yet the company's processing levels remained small, and the company was not enough to transform the chile from a local and regional crop into a national or global one. By the 1930s, the growing canning industry in the region, still dwarfed by California businesses, produced roughly 100,000 cans of green chile for consumers in El Paso and southern New Mexico.[10]

On farms, the new technological order came slowly but steadily. Tractor use increased significantly on New Mexico farms between 1920 and 1950. The 1920 census reported 457 farms using tractors in New Mexico; by 1950 the number had risen to 10, 526.[11] Yet even on large farms, horses continued to work the fields as late as the 1940s. Fertilizer was rare, with some farmers relying simply on the richness of the floodplain soil, the water from the ditch, and manure from the teams of horses.[12] Yet even before the introduction of synthetic pesticides, the concept of spraying poisons on commercial produce was well underway and encouraged by agricultural experts. Fabian Garcia published a 1902 bulletin that advocated spraying, deeming it an inevitable technology for New Mexican apple growers. "The time is coming when our apple growers will have

[9] Kent Paterson. *The Hot Empire of Chile*. Tempe: Bilingual Press, 2000. 41, 83.
[10] Ibid, 106.
[11] Census of Agriculture, 1950. vol. 1 Part 30 New Mexico. U.S. Government Printing Office, 1952. 6.
[12] Ed Remondini interview in the "POW in New Mexico Agriculture Oral History Project." Rio Grande Historical Collections, NMSU Archives. Las Cruces, New Mexico.

to spray," he insisted, spraying "seems to be the best and most economical way of fighting the insect."[13]

All these technological improvements required more capital investment from the farmer. Whether it was investment shares in the dam construction, tractors and implements, or chemical pesticides, the upfront cost of farming was increasing with the promise of greater yields. Despite these foreboding elements of industrial agriculture, however, the transformations of the landscape were slight compared to those to come.

Throughout this time the chile pepper remained a minor commercial crop. The chile's small commercial value stemmed from its lack of popularity among non-Hispanic populations in the U.S., the fact that it was not conducive to mechanical growing, harvesting, or processing, and that it had succumbed to diseases that made it difficult to grow in commercial numbers at all. Yet for several reasons New Mexico, and especially southern New Mexico, was ripe for large-scale chile production. Unlike California and Texas, where early commercial production had already begun, southern New Mexico had disease-free soil. It also had lots of sun and a long enough growing season. The construction of the Elephant butte dam ensured that the area would have enough water for commercial agriculture, and last but certainly not least, its proximity to Mexico ensured access to cheap labor from across the border.[14]

The Number 9

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[13] Fabian Garcia. *Spraying Orchards for the Coddling Moth*. Santa Fe: New Mexican Printing Company, 1902. 12, 13.
[14] Paterson, *Empire*. 42.

Fabian Garcia understood the potential of commercial chile and set out to develop a pepper that could scale up and be profitable to New Mexican farmers. At the time of his chile trials, local growers preferred several types of native chiles, including the *pasilla* (dark brown), *colorado* (red), and *negro* (black). Garcia used seed from all three types, which included both New Mexican and Chihuahuan strains.[15] Garcia chose to maintain the redness of the *Colorado*, and within thirteen years had developed a red chile that resisted the wilt better than many native strains. And although it was bred for the southern new Mexican climate, it did well up north and helped farmers pull in record yields. Small farmers throughout the agricultural valleys of the state had found a disease resistant chile that offered higher yields and grew well in their climate. [16]

Garcia worked hard to promote his research and improved seed varieties to farmers throughout the state. Perhaps no one at NMSU better embodied the land grant university's early spirit of outreach to rural farmers than Garcia. He toured widely as an extension specialist in horticulture, offering his latest research findings to the countryside in both English and Spanish. In 1916, the superintendent of the Institute of Indian School Workers wrote to Garcia's boss at the extension service in regard to one of Garcia's recent trips. "Professor Garcia's work was of a high standard," the superintendent wrote, "and was much appreciated by the large numbers who attended his instruction periods. We feel that his practical talks were of great benefit and I am sure that all who heard him felt amply repaid for coming to our institute."[17] In 1930, Garcia joined the "New Mexico

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[15] Danise Coon, Eric Votava, and Paul W. Bosland, "The Chile Cultivars of New Mexico State University Released from 1913 to 2008," Research report 763. Las Cruces, November 2008.
[16] Paterson. *Empire*. 17, 18.

[17] Letter from the superintendent of the institute of Indian school workers to A.C. Cooley, director of extension. BOX 4- Folder 5- Professional Correspondence, 1885-1919. Fabian Garcia Papers, NMSU

Farm and Home Special," a train that traveled throughout the New Mexican country side making 52 stops in two weeks. Garcia gave talks in Spanish and English on matters such as "Crop Improvement with Special Reference to Chili and Wheat."[18] On the radio station KOB, Garcia's staff aired 44 radio talks in 1933, 15 in 1934, and 8 in 1935.[19] Garcia believed his research could genuinely help the small farmers across the state and worked hard to get information to them.

Yet as important as the small grower was to him, Garcia bred the number 9 primarily with processors, not small growers, in mind. The chief goal of the chile research was to help New Mexican chile growers scale up. As he explained in his official summation of his research, his new variety was "larger, smoother, fleshier, more tapering and included a shoulder-less pod for canning purposes." Perhaps its most important trait was its mildness, which Garcia believed would help increase its popularity among the Anglo population.[20] By breeding for traits that would transform chile into an export crop, the number 9 represents an important shift away from local tastes.

The number 9 represented a step towards an industrialized chile, one that was mild, larger, and easier to process, yet it was only a step. The number 9 did not fundamentally transform the chile pepper or the industry. Farmers continued to grow several different land race varieties through the forties. Photographs in a 1947 department of tourism collection, for example, show Mesilla Valley chile pickers in fields of small pasilla-type peppers. Throughout Garcia's tenure, the chile remained a minor commercial crop in the

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Archives, Las Cruces, New Mexico.

[18] Paterson. *Empire.* 18, 19.

[19] *Agricultural Research at New Mexico State University Since 1889* (las Cruces, nm: march 1969) A76-85 Box 5 (Agr. Services), NMSU Archives, Las Cruces, New Mexico, 29.

[20] Danise Coon, Eric Votava, and Paul W. Bosland, "The Chile Cultivars of New Mexico State University Released from 1913 to 2008," Research report 763. Las Cruces, November 2008.

state, and he focused much of his energy on a variety of other crops, such as apples, pecans, peaches, grapes, onions, garlic, spinach, and cotton, the main commercial crop in southern New Mexico.[21]

Garcia acknowledged the limitations of his number 9 chile and called on the farmers themselves to help further improve it. "There are always some plants in the field which tend to revert back," Garcia wrote in his bulletin on the pepper in 1921, "consequently, it is very necessary to select seed in the field."[22] Garcia's comment not only points to the inconsistency of the number 9, but also harkens back to the college's statement in its annual report fifteen years earlier when it called on all farmers to be experimenters and share in the research process. Garcia's comment illustrates that during this period farmers maintained a degree of responsibility in the breeding process.

While the number 9 represents an important early step towards developing the chile as a non-local export commodity, the lines between local and non-local were not yet as clearly drawn on industrial lines as they would later become. Garcia was able to satisfy both small growers and processors alike because ultimately their goals did not diverge drastically. There was still a reasonable expectation that if chile became a valuable export crop, the demand for it would benefit chile farmers, large and small, throughout the state. The time of large scale, consolidated, mechanized and pesticide-laden monocultures grown under contract to processors with distant headquarters was simply not yet a reality.

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[21] Worker, chile fields" New Mexico State Archives, Collection 1987-066 - New Mexico Department of Tourism photograph collection, item 065408, Box 18244, Folder 292; For the lack of impact of the no.9 on pre-WWII chile production, I gathered information from various interviews in the "POWs in New Mexico Agriculture Oral History Project" from the Rio Grande Historical Collections at the archives in NMSU library. Interviewees I looked at included Rose Mitamura Ed Remondini, Clara Jo (Jody) McSherry, G.X. McSherry, and Roy Nakayama's sister-in-law, Toshi Nakayama, all of whom described various vegetables, but not the chile, as their main market crops in years during and directly following WWII. Furthermore, the majority of papers in Fabian Garcia's collection deal with crops other than chile.

[22] Danise Coon, Eric Votava, and Paul W. Bosland, "The Chile Cultivars of New Mexico State University Released from 1913 to 2008," Research report 763. Las Cruces, November 2008.

Garcia's personal financial investment in local industry illustrates the degree it was still possible to concurrently support industry and the local economy. Garcia was a frugal steward of the wealth he married into, and invested in a diversity of local businesses. Among his many investments, Garcia invested heavily in the local Mesilla valley green chile canning company, the Mesilla Valley Fruit Association and in the Dona Ana county fair association. Even Garcia's numerous investments in various Texas and New Mexico based petroleum companies demonstrate a commitment to both industry and local and regional businesses. Garcia's investments in industry, both in his professional work and his personal finances, were not wholly inconsistent with his commitment to New Mexican small farmers.[23]

Fabian Garcia and his number 9 chile are significant in the history of the New Mexican chile industry. Later revered as the "patron saint of chile," by industry marketers, Garcia was the first to steer University research and resources towards developing a chile conducive to industry. While the number 9 itself contained too many imperfections to become the industry standard, it nonetheless represents the beginnings of a university mentality to work towards an industry friendly, export crop. Yet equally significant to this chapter of New Mexican agricultural history is the extent to which developing such an export crop could benefit growers of different sizes across the state. The number 9 was popular statewide and offered promise to a majority of growers, large and small. Garcia aspired to spread his research to all farmers, and believed his work could benefit a great many of them. Yet the time was fast emerging in New Mexico, and

[23]Fabian Garcia Papers. BOX 4- Folder 5- Professional Correspondence, 1885-1919. Between 1913 and 1914, Garcia bought ten shares of the Mesilla Valley Canning Company, seventy shares of the Mesilla Valley Fruit Association, five shares of the Dona Ana County Fair Association, and in 1919, bought oil shares in the Texas Crude Oil Company (Ft. Worth), Ossenbeck Oil (Wichita Falls), W.W. Cox Oil Company (New Mexico), and the Southwestern Oil Development Company (El Paso)

the rest of the country and world, when the goals of small farmer and larger agro-commodity producer would become too opposed to make Garcia's aspiration attainable.

Chapter 2

Commodity Expansion and the Academic Industrial Complex

In the three decades after World War II, chile grew from a relatively small and local crop to southern New Mexico's chief export commodity crop. In Doña Ana county,

which lies in the irrigated southern New Mexico where the industry's growth was most concentrated, the number of acres in chile jumped sixteen fold over between 1945 and 1975. The Green Revolution- the broad term for the introduction of agricultural innovations such as advanced mechanization, synthetic fertilizers and pesticides, and improved seed varieties that stimulated post war industrial agricultural growth worldwide- was in full bloom in southern New Mexico.

The chile pepper gained its preeminent role in southern New Mexico's industrialized agricultural landscape through a collaborative public-private effort among chile producers, processors and NMSU. This collaboration illustrates a dramatic shift in publicly funded land grant attention away from the local and towards the extra-local. What is remarkable in this story is not that the University aided research for the chile industry, but rather that the University aided the industry- not just in plant research but also in marketing and promotion- to such an extent that the goals of the University and those of the industry were nearly identical.

Scholars generally mark the 1973 discovery of recombinant DNA (rDNA), and the surge of biotechnology firms that emerged to patent the genetic engineering made possible through the discovery, as the beginning of a new era in the academic-industrial complex. In 1980, the Bayh-Dole Act sped up the patenting process for university research and caused a large increase in the number of biotech companies pursuing university contracts. Prior to the Act, in the 1970s, only a few hundred patents were issued each year from university research, while by the end of the century the number had grown roughly thirty five fold. This process has proven quite lucrative for universities and corporations alike. Universities have reportedly generated $641 million in gross

income through industry licenses and created an estimated $40 billion of total economic activity.[24]

This chapter demonstrates that this intertwined public-corporate relationship was well established in New Mexico by the time the Bayh-Dole Act eased the way for biotech companies to patent the genetically modified organisms developed at land-grant institutions. Indeed, by 2009, when the GE chile was debated on the floor of the New Mexican legislature and its opponents challenged whether the relationship between the chile processors, University, and major seed corporations were good for New Mexican farmers and consumers, this tight-knit corporate-academic relationship surrounding New Mexican chile research was already well into its fourth decade. The chile has bore the effects of this relationship for just as long.

Genetic Changes

Central to the industry's growth were changes to the chile pepper itself. Fabian Garcia's successors at NMSU continued the trend to breed chile specifically for industry. Unlike Garcia's number 9, the post war NMSU chile varieties no longer relied on small farmers to help in the breeding process. The characteristics of the newer varieties, focusing on mildness for an export market and shape, color, and ripening uniformity for mechanization and processing, no longer overlapped with the traits a small grower for local or regional sales would look for. By the 1970s, the chile pepper had taken on far

[24] Krimsky, Ennis, and Weissman. 276.

different characteristics than the landrace varieties grown in the first part of the century or even the number 9.

The pepper variety that facilitated a significantly scaled-up industry came in 1950, when NMSU breeder Roy Harper came out with the New Mexico no. 6. This pepper, derived from a local landrace variety, was milder, higher yielding, shorter, more uniform in color, and faster maturing than the no. 9. As a 2008 NMSU extension bulletin puts it, this pepper was thus "particularly well-suited for the processing industry and for producing green chile for the fresh market." Certain qualities, such as concurrent maturation and easy de-stemming, were valuable because they were more labor efficient to harvest and process. The no. 6 was made milder and renamed the no. 6-4 in 1957, and has remained a staple variety for the industry since. Roy Nakayama, who seceded Harper as chief breeder at NMSU, explained the significance of this new cultivar in a 1976 interview with *New Mexico Magazine*. "The big difference, actually, way back then- even prior to 1955- was that about the only variety available here was a real hot chile. Too doggone hot for most," Nakayama recalled, "most of it was native chile, with some New Mexico No. 9. That No. 9 was larger-bodied, but it was too hot... We couldn't sell it outside the state."[25]

As Nakayama suggests, the transition from a statewide to national market began with these new varieties. A 1981 NMSU extension pamphlet explains "by the 1960s chile production had begun the transition from a small-farm, cash crop to a high value crop attractive for large and small farms alike." Chile researcher, Donald Cotter, puts this the transition in starker terms with no mention of future small farms, writing that the

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[25] Coon, Botava, Bosland; John Crenshaw, "Chile Man- Roy Nakayama". *New Mexico Magazine.* Vol. 54 May 1976, No. 5 page 37.

6-4 marked a "transition from a cash crop for producers with small acreages to an attractive, high income crop in modern irrigated agriculture."[26]

The industry thus owes part of its growth to a chile capable of being grown and harvested in a much more efficient, less labor-intensive way, and capable of appealing to a larger, national market. The success of these varieties led many farmers to plant chile in the same fields year after year, greatly increasing the plant's susceptibility to virulent pathogenic diseases.[27] Such diseases led not to a fundamental redress of monocultures, crop rotations, and other industrial farming methods, but rather to more research on disease resistant varieties and chemical herbicides and pesticides. Throughout the growth of the industry in the second half of the 20th century, the growing chile agribusiness prompted more research into developing a more fit chile for industrial production and processing. The resulting chile varieties increasingly embodied a shift from the local to the non-local. These chiles, bred no longer by various farmers in their fields but by university researchers, represented a move away from decentralized and localized expertise for the purposes of local sales and consumption towards a centralized university project for an industrial export crop for a national and international market.

Mountain Pass and the Connoisseurs

Although instrumental in the industry's rise, the new chile varieties could not alone

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[26] See "Chile is 'Hot' on the National Market" from Agri-Search pamphlet by the NMSU Agricultural Experiment Station winter 1981, page 2 and "A Review of Studies on Chile" by Donald Cotter. NMSU agricultural experiment station, bulletin 673. page 4.

[27] Cotter, Donald J. "The Scientific Contribution of New Mexico to the Chile Pepper," in *Southwestern Agriculture: Pre-Columbian to Modern*. Edited by Henry C. Dethloff and Irvin M. May, Jr. College Station: Texas A&M Press, 1982 page 25, 26.

facilitate the chile industry's boom. As late as 1968, it was still unclear how well the chile could do for growers. An article in a Clovis newspaper headlined: "chile could be good crop for farmers in New Mexico." This article detailed how to grow commercial chile for a farming audience that presumably did not have much experience with the crop. By the mid-1970s, newspapers were singing a different tune. An article in 1976 Las Cruces *Sun-News* reads: "Chile Growing Booms, Future Bright." Census data reflects this boom clearly. Whereas in 1959, Doña Ana county growers grew roughly 500 acres of chile, they were growing over 5000 acres by the end of the 1970s.[28] Two key players in the chile industry help explain how and why this rise in chile production occurred: processors such as Mountain Pass cannery; and the NMSU chile promotion group, the International Connoisseurs of Red and Green.

After World War II, processors eager to convert a seasonal crop into a yearlong product for consumption emerged in greater numbers and began to drive the industry. While the growers themselves were significant players, they increasingly began to grow under a contract of the processors. In 1959, for example, a local cannery bought all the available seed of the newly developed 6-4 variety.[29] The development of more easily peeled varieties, along with emergence of widespread refrigeration, also gave rise to a wholly new product, frozen green chile, the specialty of processors such as Encanto Foods (Later Bueno Foods). By 1977, there were at least 17 major processors in the southwest. While the cumulative role of the processors was certainly significant and

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28 "Chile Could Be Good Crop for Farmers in New Mexico" Clovis News-Journal, 1968 april 21 page 6; "Chile Growing Booms, Future Bright" Las Cruces Sun 1976 feb 22, page 4, section f; 1959 Census of Agriculture, vol. 1 Counties Part 42 New Mexico, p.14; 1978 Census of Agriculture, vol. 1, state and county data, part 31 New Mexico. p 145.

29 Cotter, Donald J. "The Scientific Contribution of New Mexico to the Chile Pepper," in *Southwestern Agriculture: Pre-Columbian to Modern*. Edited by Henry C. Dethloff and Irvin M. May, Jr. College Station: Texas A&M Press, 1982 page 20.

several processors were prominent (Biad Chile Products of Rincon, NM and the red chile giant, Cal Compac, of Santa Ana, California, for example), perhaps no processor played a bigger role in this decade in the promotion of the chile than Mountain Pass Cannery. Mountain Pass offers an important view into the interlocking relationship between corporations, growers, and the university throughout the 1970s.[30]

Mountain Pass Cannery, the maker of the famous Old El Paso salsa, had been in business in Anthony, TX, just twenty five miles from Las Cruces, since 1918. In 1968, a transnational food conglomerate, Pet Food, Inc, bought Mountain Pass and subsequently fueled the marketing blitz on the chile that helped the industry boom in the following decade.[31] The relationship between the university and processor became increasingly intertwined along the way.

Seeking to spur developments of a chile variety more conducive to industrial processing and widespread marketing, Mountain Pass took a major step towards a merged academic-corporate chile agenda when it began underwriting chile research itself. They delivered a $5884 grant to NMSU for chile research in 1976, for example, and even wrote a $1000 personal check to Roy Nakayama in 1974. For all sides, it seems, this was a happy relationship. Upon receiving his check, Nakayama simply expressed his gratitude of the "industry's interest in chile research and that extra money has been added beyond

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[30] "Chile Growing Booms, Future Bright" Las Cruces Sun 1976 feb 22, page 4, section f; 1959 Census of Agriculture, vol. 1 Counties Part 42 New Mexico, p.14; International Connoisseurs of Green and Red Chile Advertisement. Las Cruces Sun-News July 29, 1977.

[31] To see a brief history of Pet, Inc, visit Harvard's Lehman Brothers Collection archive online at http://www.library.hbs.edu/hc/lehman/chrono.html?company=pet_incorporated. Also, see the United Nations document, "Transnational Corporations in Food and Beverage Processing" that refers to Pet, Inc as a transnational corporation and as "a smaller but sectorally important firm [that had] established or expanded canning activities by Latin American affiliates."

state appropriations as incentives for researchers."[32]

Mountain Pass's involvement with the University did not stop there. While the ability to grow much more chile and process it efficiently was paramount to the industry's growth, equally important was the ability to sell it. There needed to be an increased market with the increased crop, and thus promotion was critical. While events such as the Hatch Chile Festivals, which began in 1971, or Governor Bruce King's proclamation of "Chile Week" in 1974 played meaningful roles in promoting the crop, the industry often took promotion into their own hands by sponsoring events such as a "green chile recipe fiesta" and green chile cook-off at NMSU in 1972.

In 1973, however, the university relieved the industry of some of its promotional work by funding their own chile promotional group. Officially known as the International Connoisseurs of Green and Red Chile, the group soon became the biggest promotional actor for the chile in the state.[33] Instead of each processor doing their own promotional work, the university group consolidated that effort. Mountain Pass, like several processors, simply gave money to the group to do promotions for them. They wrote a check to the group for $3000 in 1974 and a $4000 check in 1977.[34] By taking on the promotional work of the industry, then, the connoisseurs represent a university collaboration with the industry that extended from seed to sales.

The brief history of the connoisseurs (the group disbanded in the early eighties) illustrates how closely the interests of NMSU and those of the industry had become during this period. The group began after Gene Elliot, NMSU's director of Alumni

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[32] For $5884 check see, "Grant Aids Chile Production," Las Cruces Sun-News March 4, 1976 page 19; For Nakayama see "Society Given Promotion Check" Las Cruces Sun-News December 25, 1977, page 32.

[33] "This Week is Hatch Third Chile Festival" Las Cruces Sun-News August 25, 1974, page 9.

[34] For $4,000 check, see, "Society Given Promotion Check" Las Cruces Sun-News December 25, 1977, page 32.

Relations and David Roswell, the university's director of Information Services, convinced NMSU president Gerald Thomas that a "promotional stint involving the chile might be good for the university." The group had 187 members by the end of its first year and grew to over 3000 by 1977. Their members included all the major processors throughout the southwest, large chile growers, area restaurants, the Las Cruces Chamber of Commerce, and even such far-flung celebrities as Bob Hope, Vickie Carr, Paul Harvey, and Lawrence Welk. Gerald Thomas, whom the group's event coordinator referred to as the "top chile ambassador," succinctly framed the group's purpose as an effort to get "growers, processors, and researchers [to] work together to promote one particular product: chile."[35]

The group's name alone says a lot. By calling themselves international, they were clearly moving away from a local market and promoting an expansion of the chile far beyond New Mexico. By calling themselves Connoisseurs, they were invoking a sense that the chile was a high-class vegetable. The promotional tactic of up-classing the chile, complete with global celebrities on their membership role, illustrates the extra-local aims of the group to expand markets and even increase prices while at it. This tactic seemed to work for chile farmers such as Ray Enriquez. In 1976, Enriquez was growing over 600 acres of chile and attributed the growing chile industry not only to an increased number of processors, but also for an expanding taste for New Mexican food beyond New Mexico. Part of this newfound appreciation for the chile, he explained, was in how it was perceived. "When I was a kid this kind of food was considered poor Mexican dishes. People would get together and plant one acre of chile that would take care of four or five

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[35] "Last of the Red Hot Lovers? No Such Thing..." Las Cruces Sun-News August 11 1977, page 17; "Society Given Promotion Check" Las Cruces Sun-News December 25, 1977, page 32.

families. Now chile dishes are considered gourmet food."[36]

The connoisseurs took on various venues for chile promotion. They published cookbooks, staged chile cook-offs, sent "care packages" of chile seeds to far corners of the globe, and put on conferences. They even helped escalate a "Great Chile War" in the U.S. Congress in 1974, by providing New Mexican chile products and an NMSU cookbook to seven non-New Mexican congressional members who had reportedly claimed the superiority of their state's chile. In addition to the chile products they sent, they also offered to stage a chile cook-off in New Mexico with none other than Roy Nakayama as presiding judge. While the light-hearted spirit of the group is evident here, so too is their concerted effort to promote not just chile, but specifically NMSU's brand of chile.[37]

The International Chile Conferences, which began in 1977, kept the Connoisseurs especially busy. Their first conference included discussions on new developments in the green chile industry, a presentation by a New Mexico Department of Agriculture marketing specialist, an engineering specialist sharing new mechanical advances in chile production, a panel of processors speaking to growers on how to most efficiently produce chile for processing, and a panel of producers discussing growing techniques. These conferences, perhaps better than any other single event, reflect the growing industry and its push to expand its markets, and the connoisseur's (and thus NMSU's) efforts to aid in that effort.[38]

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[36] "Chile Growing Booms, Future Bright" Las Cruces Sun 1976 feb 22, page 4, section f; 1959 Census of Agriculture, vol. 1 Counties Part 42 New Mexico, p.14

[37] International Connoisseurs of Green and Red Chile Advertisement. Las Cruces Sun-News July 29, 1977; "Last of the Red Hot Lovers? No Such Thing..." Las Cruces Sun-News August 11 1977, page 17; "Society enters 'Great Chile War' Albuquerque Journal, Feb 27, 1974 page 22.

[38] "Chile Conference Schedule Set" Las Cruces Sun-News. Dec 3 1976.

NMSU's increased commitment to the chile industry was further demonstrated through their breeding program. The effort to craft an industrial chile, with roots in Fabian Garcia's number 9, continued in earnest throughout the 1970s and took on a new look. This new look was shaped heavily by NMSU's head chile researcher at the time, Roy Nakayama.

In 1974, Nakayama released the NuMex Big Jim, which grew nearly a foot long and was by most accounts the largest chile variety known. While Nakayama certainly wanted a chile with nice flavor, the characteristics he bred for were, as John Crenshaw reported, pods that "mature concurrently, making machine picking- and thus greater acreage- possible." Like the other industrial varieties before it, this variety incorporated genetics from various landrace chiles. It culminated a decade-long effort to cross a small Peruvian variety with an Anaheim, native Chimayó and other New Mexican varieties and initially received quite favorable reviews.[39] "There's no comparison between chile now and 20 years ago," remarked Jerry Phillips, director of marketing for Mountain Pass, to the Albuquerque *Journal*. "Before Roy developed the large 'Big Jim' variety grown around here now, it was just hit and miss. Then, we paid workers 25¢ and 50¢ per hour, and now we pay them $2.20 an hour, and we still come out better because the large new variety can be peeled faster."[40] Just as previous varieties were developed to improve industrial efficiency, this variety was similarly touted by Mountain Pass (Nakayama's personal benefactor) in terms of efficiency in labor.

Yet despite the exuberant language of reviewers such as Mountain Pass, more recent recollections downplay the variety's significance. Cotter writes that the NuMex

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[39] "Chile Man- Roy Nakayama" by John Crenshaw. *New Mexico Magazine.* Vol. 54 may 1976, No. 5 page 37.

[40] "NMSU Receives $5884 Gift for Chile Research Project," Albuquerque Journal Feb 26, 1976.

Big Jim's "impact on the processing industries has been mixed" and the official NMSU bulletin on historical chile cultivars describes its significance not in terms of its impact on the industry but rather for its novel length, mentioning its listing in the Guinness Book of Records, and as a "a favorite of home gardeners and chefs for making chile rellenos." By most recent accounts, other chile cultivars, such as the 6-4, have shaped the industry more.[41]

What's significant about Nakayama's NuMex Big Jim, then, is not so much how it revolutionized the chile industry. The chile's significance, instead, is that it highlights the university's ongoing quest during this time for a more perfect chile that was better suited to vast acreages of mechanical production. Equally significant is the promotional reaction to Roy Nakayama and the NuMex Big Jim. Unlike previous breeders, who arguably shaped the chile's genetics more, Nakayama was the first breeder to achieve celebrity status. In addition to articles profiling him as "Mr. Chile," Nakayama was often enlisted as the official judge at chile cook-offs and competitions and became a local celebrity as part of a larger campaign to promote the chile. In a sense he became an icon when the industry, increasingly becoming non-local and faceless, needed a face. With the NuMex Big Jim, the personal check from Mountain Pass, and his position as a local celebrity, Nakayama thus embodies the merged interests of the industry and the University.

What it important to take away here is that the University- through both its breeding program and its promotional group- played a pivotal role in shaping the growth of the chile industry. Equally true, the growing industry increasingly shaped NMSU's agenda.

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[41] Cotter, Donald J. "The Scientific Contribution of New Mexico to the Chile Pepper," in *Southwestern Agriculture: Pre-Columbian to Modern*. Edited by Henry C. Dethloff and Irvin M. May, Jr. College Station: Texas A&M Press, 1982 page 21; Danise Coon, Eric Votava, and Paul W. Bosland, "The Chile Cultivars of New Mexico State University Released from 1913 to 2008," Research report 763. November 2008, Las Cruces.

This relationship had a significant impact on the chile itself. The types of chiles grown in Dona Ana county went from a diverse set of landrace and open-pollinated varieties, bred over centuries for local use, to a small handful of NMSU cultivars specifically bred to be processed and shipped elsewhere. All the while, the University aided the project not only by providing industry-conducive seeds, but also by promoting the chile abroad to potential new markets. The overall result was a university-corporate collaborative effort that helped shift the chile away from the local market and the relatively small fields of the farmers who once played a role breeding it, towards large, industrial agribusiness acreages whose farmers, under processor contract, grew a crop destined for more distant global markets.

The chile industry continued to flourish throughout the 1980s and early 1990s. During this time, the discussion surrounding the growth of the chile industry centered on breeding an ultra-mild chile for paprika processing. In a sense, this represents a further turn from the local- a shift from the fiery chiles that non-locals could not handle towards a virtually tasteless chile designed for food coloring in global food industry products from ketchup, to hot dogs, to anything else that needs a red tint. Also during this period, NMSU came out with their first of many ornamental chile varieties. Again, like paprika breeding, the university focus on peppers not even meant for human consumption speaks to how far the program had changed since the days Fabian Garcia toured the countryside with his number 9 chile.

Indeed, many of the trends evident in this chapter continued during this time. The industry's processors supplied bigger checks for university research and put on larger conferences. The Connoisseurs, limited by funding, disbanded and many members re-

organized under legislative funding as the New Mexico Chile Commodity Commission in 1985.[42]Today then it should not be surprising that the major backers of the GE chile not only include the major biotech seed company, Syngenta, but also the major chile processors that have been working with the university for decades.

As the chile took its extra-local turn and began to gain popularity in new markets, it became a local source of pride for many New Mexicans. Yet somewhat ironically, this "traditional" New Mexican vegetable that distant consumers were becoming acquainted with was actually quite new due to drastic changes in appearance, taste, and presentation. As Ana Baca of Bueno Foods mentions in her 1992 cookbook, the chile processors had to adopt "more lenient traditions" as they expanded beyond the seasons and locales that had previously bound them.[43] The industrial chile illustrates that the chile and its traditions are ever changing. The following chapter examines how in recent decades, as the industry has faced decline and New Mexican growers have looked to reclaim the glory days with newer technologies that include a GE chile, the question of who drives those changes has become all the more pressing.

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[42] "Improving the Chile Industry of New Mexico Through Industry, Agriculture Experiment Station, and Cooperative Extension Service Collaboration: A Case Study" Journal of Extension. February 2009 Volume 47 Number 1. see, too, "Chili Group Donates $10,000 NMSU Research," Santa Fe New Mexican, Oct. 7, 1981, page 26.

[43] Ana Baca. "Bueno Presents: The Seasons, A Cookbook for Life" 1992. published by El Encanto, Inc. Albuquerque, NM. from the NMSU special collections. page 1.

Chapter 3
NAFTA, Labor, and the Technological Divide

NAFTA shook up the structure of the U.S.-Mexico border and sent the industry reeling and the workers scrambling. Producers could not compete with Mexico, where laborers made roughly five times less. Mexican imports, which had already been rising, surged. In the first five years after NAFTA, chile imports passing through New Mexican ports of entry rose from less than 5,000 metric tons to well over 50,000 metric tons.[44] Acreage dropped from its peak in New Mexico at 34,500 in 1992 to 11,100 acres

[44] Chile imports passing through New Mexican ports of entry surged after NAFTA, from less than 5000 metric tons in 1994 to well over 50000 metric tons in 1999. See http://aces.nmsu.edu/pubs/research/horticulture/ctf8.pdf

harvested in 2008.[45] The bigger New Mexican producers vertically integrated their operations to include primary processing and contracting chile from Mexican growers. All the while, the producers increased their pressure on university and corporate researchers to develop technological solutions and effectively offset the Mexican labor advantage with the New Mexican advantage of having technology and the available capital to afford it. The post NAFTA surge in mechanization exacerbated the tenuous position of many workers, as jobs became scarcer and incomes dropped by as much as two-thirds since the onset of widespread farm mechanization. The most recent development in the public-private collaborative search for more a capital-intensive technological solution- the GE chile- has further expanded the ecology of the chile into the realm of a transnational seed corporation.

A Reshaped Border

In the decade preceding NAFTA, Mexican chile imports were slowly increasing. Within the first four years of NAFTA these imports skyrocketed and the vast majority of New Mexican green jalapeño and red cayenne production went south. It became common to see semi trucks with Mexican plates docked at the processing plants around Hatch, NM.[46]

At first, many New Mexican growers, viewed Mexico's comparatively cheap and abundant labor supply with competitive dismay. More recently, threats of Mexican

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[45] New Mexico Chile Grower's Association website. Accessed April 1, 2011. (http://www.nmchileassociation.com/)

[46] Paterson, Kent. "Where's that Chile From? These Days a Surprising and Increasing Amount of it is from Mexico," *Crosswinds,* November, 1997.

competition have been muted by the larger threat of other foreign producers, mainly China. By 2005, an agricultural engineer at NMSU could claim that it's not "us against Mexico," but rather, "the big worry is China and Africa." China is a huge competitor, and Africa grows a tremendous amount of chile. As early as 1998, the majority of global chile production took place in Asia and fewer than ten percent took place in North America. In the face of this larger global competition, the chile producing border region began to merge.[47]

The degree to which New Mexican and Chihuahuan producers have merged since NAFTA highlights the new order. Chihuahuan producers have long taken advantage of their proximity to NMSU, soliciting university advice, seeds, and technological expertise. Yet a recent study involving ten chile producers in Chihuahua points to a degree of merging with the U.S. beyond such solicitations. The authors observed that every Chihuahuan chile farmer spoke English, used U.S. mailing addresses, maintained checking accounts in U.S. banks, deposited checks written by U.S. processors denominated in dollars into their U.S. bank accounts, purchased U.S. inputs with U.S. funds, and quoted prices in dollars per U.S. unit for virtually all purchased inputs including machinery, fertilizer, chemicals and seed. In addition, most Chihuahuan producers carry cell phones with a U.S. telephone number. These observations, perhaps even more than the numbers, highlight the interconnections of the chile's ecology along the border.[48]

For many small chile growers in New Mexico, however, navigating this merged border has been difficult. The post-NAFTA New Mexican chile grower has had little

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[47] Marjorie Lilly. "NM Chile: Facing Extinction?" Crosswinds Weekly, Jan 20-27, 2005.

[48] Jerry Hawkes, James D. Libbin, and Brandon A. Jones. "Chile Production in New Mexico and Northern Mexico" *Journal of the ASFMRA*, 2008, 83.

choice but to merge, which for many growers means shifting the decimal point on their investments a few spaces to the right. Growers not only had to grow in larger numbers, but also integrate vertically. As the long time reporter on the chile industry, Kent Paterson, explained, "the [post-NAFTA] modern chile farmer would have to be simultaneously a grower, contractor, middleman, and primary processor, like it or not." A trend developed that, as Paterson wrote at the time, thinned "the ranks of chile farmers, leaving a few with one foot in New Mexico, the other in Old Mexico."[49] The Vado, NM based Cervantes Enterprises Inc., which uses cayenne peppers to make spicy mash for Cajun-style hot sauces, exemplifies this trend. Managing Vice President, Dino Cervantes, told the New Mexico *Business Weekly* in 2008 that "ten years ago, we bought about one-third of our chile from Mexico, but now we get about two-thirds of it from there." Cervantes went on to explain that "a lot of our competitors are looking at setting up operations in Mexico, the Caribbean and Central and South America…we're committed to the state, but eventually it might make economic sense to move our operation or sell it off."[50]

For the small growers, the industry trend of expanding operations across international borders has meant that their increased competition was not as much from Mexican growers but rather from those U.S. growers who had expanded. Paterson explains the effect of NAFTA on small New Mexican growers as follows:

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[49] Paterson, Kent. "Where's that Chile From? These Days a Surprising and Increasing Amount of it is from Mexico," *Crosswinds,* November, 1997; Kent Paterson. *The Hot Empire of Chile*. Tempe: Bilingual Press, 2000. 185.

[50] Kevin Robinson. "Imports Scorch New Mexico Chile Producers." New Mexico Business Weekly, September 20, 2009.

> In essence, however, what U.S. growers were really faced with was not the prospect of competing with Mexicans per se, many of whom ran small farms that paled in technological comparison, but with U.S.-based corporations and farmers who were gradually assuming increased control over Mexican agricultural production.[51]

NAFTA compelled producers and processors to get bigger, outcompete smaller New Mexican growers, and consolidate the industry in part by sourcing production south of the border. In this sense, NAFTA has closed the distance between the two by allowing product to move more cheaply. Yet, this opening of the border resulted partly from a closing on another front, i.e. labor. New Mexican producers routinely complain that the tightening of border security has hurt their workforce. NAFTA refashioned the border from being porous with workers but not chile, to one porous with chile but not workers.

Labor

The chile industry was built on the reliability of cheap, mostly Mexican, labor and has benefitted from its close proximity to the border for that reason. The first wave of chile laborers in the fledgling industry were braceros. The Bracero program brought in nearly 5 million Mexican-born guest farm workers from 1942 to 1964. After the bracero program ended abruptly in 1964, some growers had to scale back chile production but many producers continued to grow by hiring illegal workers.[52]

The primarily Mexican, post-Bracero chile workers endured the type of notoriously

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51 Paterson. *Empire,* 185.

52 Ray Lopez. "Migrant Farm Workers Alternative to 'Wets,'" *Las Cruces Sun-News,* August 1, 1974. accessed http://access.newspaperarchive.com.libproxy.unm.edu/Viewer.aspx?img=50597191&firstvisit=true&src=search&currentResult=2. This 1974 article mentions how the Bracero program was a "godsend" to farmers and that inter-governmental "fumbling" and strong opposition from organized labor on "both sides of the border" had caused its downfall.

harsh working conditions that Cesar Chavez and the UFW brought to the world's attention. Their wages were low (the going rate for a chile picker in 1974 was between $1 and $1.25 per hour compared to the $2.00 per hour minimum wage at the time), their housing was often over packed and substandard, their benefits were nonexistent, and their living environment was insulting.[53] A 1974 article from the Las Cruces Sun-News, for example, used both paternalistic and derisive language when describing the migrants as hardworking and obliging while at the same time prone to prostitution, STDs, shoplifting, and stressing local medical care.[54]

The farmworkers began to organize themselves in the late 1970s. By 1984, one hundred farmworkers from the U.S. and Mexico had formed La Union de Trabajadores Agricolas Fronterizos (The Border Agricultural Workers Union), and in the same year organized 500 chile pickers to strike throughout the Mesilla Valley. The strike was broken and the workers, many of whom were afraid to return to work, had gained a small increase in piece rates per bucket of harvested chile. After years of sustained activism, New Mexican chile pickers again struck in 1992, this time against the biggest chile grower in the southern Rio Grande valley, Loyad Anderson. The police and border patrol came onto the farm and, according to some workers gassed them with, ironically enough, pepper gas. The workers wound up negotiating with Anderson, but like the strike in 1984,

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[53] For chile worker wages in 1974, see Ray Lopez. "Alien Problem Has Possible Solutions," *Las Cruces Sun-News*, August 5, 1974. accessed http://access.newspaperarchive.com.libproxy.unm.edu/Viewer.aspx?img=50597261&firstvisit=true&src=search&currentResult=1 For history of Federal minimum wages, see United States Department of Labor. Wage and Hour Division (WHD): History of Changes to the Minimum Wage Law (Adapted from Minimum Wage and Maximum Hours Standards Under the Fair Labor Standards Act, 1988 Report to the Congress under Section 4(d)(1) of the FLSA). Accessed http://www.dol.gov/whd/minwage/coverage.htm

[54] Ray Lopez, "Illegal Aliens Stream Across Border for Agricultural Work" *Las Cruces Sun-News*, July 31, 1974. Accessed http://access.newspaperarchive.com.libproxy.unm.edu/Viewer.aspx?img=55080539&firstvisit=true&src=search&currentResult=3.

they again fell short of many of their demands and only achieved a small increase in the piece rate. [55] Despite these actions and sustained efforts by workers and activists, farm workers in New Mexico saw few improvements in their working conditions. In the nearly two decades since NAFTA, workers have faced increasing competition not from other workers but from machines. The jobs that remain are often part time. Currently one of the biggest issues the farmworkers are fighting for is mandated workers compensation. The agricultural industry remains exempt despite being a multi-billion dollar a year industry in New Mexico. [56]

The industry has responded to NAFTA and the increased labor disadvantage it poses by searching for a technological solution. Growers and processors have continually resisted increasing wages or benefits to workers, instead lobbying for public support of a technological answer to "save the industry." The New Mexico Chile Growers Association website states their position clearly: "automation is the only solution." If growers could take advantage of better access to capital, then they could offset the disadvantage of not having cheap, abundant labor. Capital-intensive technological solutions to the industry's decline have taken the form of mechanization, chemicals, and, most recently, genetic engineering.

The Technological Solution

Within a decade of NAFTA, the effort to create a technological solution to the labor problem began to bear some fruit. Industry leaders unveiled new thinning technologies in

[55] Kent Paterson. *Empire,* 142, 143.

[56] For more on current chile worker issues and conditions, see: http://www.workingimmigrants.com/2010/12/will_new_mexico_farm_workers_f.html

2003, and then de-stemmers in 2008. Several types of mechanical harvesters for red chile have been developed over the past two decades, though the price tag has yet to drop below six figures.[57] The dream of mechanized green chile production has not yet been realized, and industry leaders are taking other steps to try to stay competitive.

Part of the technological solution has been to increase pesticide use. Pesticides have been used on chile since the advent of the Green Revolution. Yet pesticide use on chile remained low compared to other commodity vegetables until the 1990s, when the notorious pepper weevil appeared throughout southern New Mexican fields. Since then, pesticide use on chile peppers has risen significantly. While national levels of pesticide use actually decreased slightly between 2002 and 2007, total acres treated with pesticides in New Mexico increased 41% and total acres treated with herbicides increased by 62%.[58] Despite the increase in pesticide use, chile production has continued to decline in New Mexico.

The use of pesticides leads to the most controversial technological solution to the chile industry's decline, the genetically engineered chile. The GE chile is a Round-Up Ready (glyphosate resistant) variety, which means engineers have injected pesticide resistant genes into the chile genome so that Round-Up can be applied to the plant without killing it. The industry hopes that the biotech seed variety might succeed where mechanization, synthetic chemicals, and vertical integration have fallen short and will turn the industry around. By offering a competitive advantage to those farmers who can afford the expensive seed and pesticide, the industry hopes to shift production away from

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[57] Carmen Padilla. *The Chile Chronicles: Tales of a New Mexico Harvest.* Santa Fe: Museum of New Mexico Press, 1997. page 103-105.

[58] U.S. Census data retrieved from: http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/New_Mexico/st35_1_044_045.pdf

areas like Mexico, whose main advantage is cheap, low-tech labor.

The GE chile is a relatively recent development. Although discussions surrounding the genetically modified chile in New Mexico go back nearly a decade, there was no full-blown public discourse about the chile until 2008 when state representative Bernadette Sanchez introduced Senate Bill 60 (SB60) in the New Mexico legislature that explicitly earmarked funding for GE chile research. In the early 2000s, any industry talk surrounding GE chile was dismissive. NMSU's head breeder, Paul Bosland, for example, "promised" the Albuquerque *Journal* in 2001 that no GE chile was being developed. Bosland took pride in breeding the chile the "old fashioned way," explaining that "'chile can't be transformed... Labs in Europe, America, and Asia have spent billions of dollars trying to transform the chile genes.'"[59] Yet a year later NMSU seemed far more willing to partake in GMO research than Bosland had earlier implied. A 2009 report published by various NMSU researchers, including Bosland, writes that legislative funding amounting to $240,000, a reference to HB 324 in 2002, had earmarked 8% of the funds for research into a Round-Up Ready chile. This is the first explicit mention of the GE chile as a Round-Up Ready variety.[60] According to a NMSU representative statement from a September 2010 Economic and Rural Development Committee meeting, NMSU will own the patents to the GE chile.[61]

On several levels the GE chile represents an ecological expansion driven by a university-corporate collaboration. On one level, the university patent on the GE chile

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[59] Davenport, Kristen. "Curmudgeon chile changes for the better- the old way" Albuquerque Tribune, December 8 2001, C1.

[60] Theodore W. Sammis, Paul W. Bosland, Manoj K. Shukla, John G. Mexal, LeRoy A. Daugherty, "Improving the Chile Industry of New Mexico Through Industry, Agriculture Experiment Station, and Cooperative Extension Service Collaboration: A Case Study," *Extension Journal, Inc.* Volume 47, Number 1. February 2009.

[61] See the Save New Mexico Seeds website, Savenmseeds.org.

merges the university and the industry into a nearly indistinguishable enterprise, where both gain financially from increased use. On another level, transnational (the ultimate non-local) seed corporations will profit from a process that potentially restricts local seed saving through prosecution of any grower whose chile was contaminated with patented genes through cross-pollination (a near certainty given the nature of cross-pollination and the impossibility of breeding out genes once they are present). Far from the days when Fabian Garcia encouraged farmers to improve the NMSU variety through their own field observations and seed saving abilities, farmers will now rely not only on an extra-local entity for seeds, but also for the Round-Up pesticide the seeds are bred to withstand (Syngenta, unsurprisingly, manufactures Round-Up). And finally, the GE chile- bred with an emphasis on industrial production and not local consumption- will not necessarily be tasty or healthy to consume.[62] The GE chile will be extra-local in ways no chile has yet been.

The GE Chile Debate and the Local Turn

Various groups have emerged to contest the GE chile. They have argued that it would perpetuate the harmful, unsustainable farming practices that were partially responsible for the low yields plaguing New Mexico producers and would further damage our soil and water systems. Further, they argue, it would threaten farmers' livelihoods through loss of seed and potential lawsuits. A common thread to New Mexican GE chile opposition has been a post-colonial critique.

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[62] For a very recent discussion on the potential health impacts of Round-Up GMOS, see an open letter by Don M. Huber, Professor Emeritus of Purdue University, to USDA Secretary Vilsack at http://www.savenmseeds.org/.

The New Mexico Food & Seed Sovereignty Alliance, consisting of the Traditional Native American Farmers' Association (TNAFA) and the New Mexico Acequia Association (NMAA), emerged as the first and most outspoken group to contest GM chile research in New Mexico. The Food and Seed Alliance issued a House Memorial in 2006 that offered a multifaceted critique of GMOs as a threat to the livelihood and culture of historically marginalized and exploited groups in an ongoing colonization project by corporate powers. Their proclamation of seed sovereignty described "genetic modification and the potential contamination of our landraces by GE technology [as] a continuation of genocide upon indigenous people and as malicious and sacrilegious acts toward our ancestry, culture, and future generations."[63]

Isaura Andaluz, director of Cuatro Puertas, an Albuquerque based group that spearheaded legislation to protect farmers from GE contamination lawsuits, framed a post-colonial critique in more squarely economic terms. She admits she is usually hesitant to bring up colonization, but nonetheless views the issue in such terms. "'Get over it,' I usually think, 'but in this case this really is colonization. Its colonization by corporations... They think we are stupid, dumb. We have no money... But we've done this work against the GE chile with no money, its very grassroots." One of her chief concerns is that only NMSU, Syngenta, and a few local elite processors stand to gain from GE chile, while the majority of farmers will likely have to pay for a product they don't want. Andaluz summed up the economic colonization of the farmer in New Mexico in a rhetorical question at the end of our interview. "The most important question people are starting to ask," she remarked, "is why are the processors, and not the farmers, being

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[63] New Mexico Food & Seed Sovereignty Alliance, "A Declaration of Seed Sovereignty: A living document for New Mexico" March 11, 2006. retrieved from http://www.lasacequias.org/programs/seed-alliance/seed-declaration/ on May 10, 2010.

supported?"[64]

In 2009 Cuatro Puertas, forwarded the Farmer Protection Act (FPA) with the goal of protecting farmers who had inadvertently grown seed that had contaminated their fields. The legislation drove at the issue of whether the state should solidify a corporation's right to control a seed stock or whether to allow the new commodity to revert back to the commons. The biotech industry heavily lobbied the legislature and the FPA was shot down in the state Congress in 2009, 2010, and 2011 (renamed the Farmer Liability Act in 2011).[65]

The industry has fought back to counter the growing public awareness and hostility among New Mexicans to the Round-up Ready chile. They began publicizing the industry's flagging production and insinuated that drastic measures (without referring directly to GE chile) were necessary. They opened a website called "savenmchile.com" and one major processor launched a "New Mexican Grown" campaign, which encouraged consumers to only buy chile grown in New Mexico (despite the fact that this processor sold other products, without the NM grown label, made with Mexican chile). Thus, the industry both worked with Mexico to compete globally and antagonized Mexico publicly to compete locally.

Ultimately, the GE chile debate represents a fight over control of a commons. Less than a century ago, Fabian Garcia urged farmers to be active, diligent seed savers and improve the seed themselves. The chile's gene pool was a commons where every farmer and gardener could improve the chile to fit their own local climatic conditions and tastes. With the right to legally prosecute anyone who saves seed from a chile with patented

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[64] Personal interview with Isaura Andaluz, Oct. 11, 2009.

[65] Save New Mexico Seeds, savenmseeds.org.

genes, however, this immense public, local, and long taken for granted commons, has been privatized by an extra-local transnational corporation.

The history of the New Mexican industrial chile pepper is full of such ecological shifts. Often, these shifts have expanded the ecology from local, diversified power centers towards consolidated, extra local ones. The roots of these shifts go back well before the industry took off, when Dr. Fabian Garcia issued a chile variety that he believed would, with the help of various individual farmers selecting and saving seed, help chile growers scale up and appeal to a national market. Despite his earnest efforts to disseminate his research to a wide swath of growers- large and small, north and south- the export-based industry to come required a scale that only larger growers, primarily in the south, could successfully engage in. By the 1970s, the pepper had become a mild, uniform, and high-tech commodity that would no longer be grown primarily by small scale New Mexican farmers mainly for New Mexicans.

In the years after NAFTA, when the industry began to face decline and increasing global competition, the chile's ecology both expanded into new realms of corporate control, but also contracted. As large producers vertically integrated moved their operations across national borders, jobs for Mexican workers in New Mexican chile fields became scarcer, and smaller New Mexican growers were outcompeted by larger ones. All the while, industrial monocultures and the new potential for lawsuits to discourage seed saving have decreased, and threaten to further decrease, biodiversity in New Mexican chile fields. A public-private collaboration between NMSU and private corporations- from Old El Paso to Syngenta- has driven this change. This collaboration has shifted the emphasis of university research away from the empowerment and benefit

of local growers, consumers, and small businesses, towards increasing markets across the globe for the profit of a smaller set of elite New Mexican growers and processors, and corporations based far beyond any local watershed.

Epilogue

Around a decade ago, growers and NMSU researchers began to notice that the taste of the industry's chile just wasn't what it used to be. In 2002, NMSU scientists obtained original seed stock, stored in liquid nitrogen, at the U.S. Department of Agriculture's National Seed Storage Lab in Fort Collins, Co. By 2008, the researchers had developed a chile from that stock that they felt carried the original flavor of the 6-4 and NuMex Big Jim, and released them as the "Heritage NuMex Big Jim," and the "Heritage 6-4."

The decline of taste in the 6-4 and NuMex Big Jim indicates the extent to which many farmers over the years have either selected only for yield or disease resistance, for example, or did not select at all and simply saved seed from their crop indiscriminately. Head breeder at NMSU, Paul Bosland, recently remarked, "Over the years [the chiles] lost their identity. They're not true to type anymore," he said, "The chile the farmers were growing had a great look and disease resistance, but no taste."[66] Just as the seed "lost its identity" over the years, the chile growers have, to some extent, lost their place as seed breeders in the industrial chile's ecology. To get that great taste these days, the research scientists pull it out of liquid nitrogen storage, do the seed trials and breeding themselves, and distribute it to the growers.

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[66] "New chile varieties have more flavor and aroma" *High Plains Journal. December, 2008.* http://www.hpj.com/archives/2008/dec08/dec29/Newchilevarietieshavemorefl.cfm

In the history of New Mexico's industrial chile, the shift away from local control has often mirrored a diminished role of New Mexican growers to select and save seed. Whereas Fabian Garcia encouraged, even relied on seed savers, the industrial varieties that followed did not. While some varieties, such as the NuMex Big Jim, whose namesake, Jim Lytle, was a large grower who also helped select for and breed this variety, the overall trend led towards a small group of scientific experts to take over the role of seed selection and breeding.[67] Never has that been more evident than with the GE chile.

A recent trip I took to a farmer in Monticello, NM illustrates a counter narrative. Joshua Craven, seed saver and director of the Arid Crop Seed Cache, represents one of many possible examples of alternative growers in New Mexico today. [68] Joshua and his wife, Lolynn, live in Monticello where they grow many of the rare and drought-tolerant seeds for the cache at their farm.

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[67] Padilla, *Chile Chronicles,* 79.

[68] In the midst of my research, I found alternative, counter narratives enmeshed within the dominant story of the chile's expanding ecology. From the Smith-Lever Act to the current legislative debates concerning the GE chile and the Farmer Liability Act here in New Mexico, the dominant trend has been resisted to varying degrees over the past century.

One particularly noteworthy countertrend is NMSU's sustainable agriculture wing at their Alcalde Research Station. Founded in 1952 to address agricultural conditions particular to the agricultural valleys of northern New Mexico (there are eight research stations across the state, the first established near Aztec, NM in the late 19th century, designed to address the various climatic differences of New Mexico), the Alcalde station has in recent years become a center for sustainable agriculture in the state. NMSU has plans to create a similar branch location with a small farming focus in the middle Rio Grande Valley, as well. While the allocation of funds diverted to such projects pales to those going to agribusiness research, the sustainable agriculture wing of NMSU nonetheless testifies to an alternative- though hardly dominant- trend that has emerged recent decades at NMSU.

The growth of the organic farming movement in recent decades has no doubt driven this alternative trend at NMSU. Organic agriculture, which directly opposes the use of any genetically engineered crop, has taken hold on small farms (and some large ones) throughout New Mexico. Between 2006 and 2008, the number of certified acres in organic production jumped nearly six fold. This trend has developed despite the bulk of NMSU's research going towards conventional agribusiness and industrial farming methods. Thus, farmers have exhibited a degree of agency and independence from the dominant agenda of the land-grant university.

I drove thirty miles northwest from Truth or Consequences, through vast desert, until the tiny town of Monticello appeared like a mirage. Its historic plaza was in a morning nap and the church, post office, and tidy, unoccupied second homes were as quiet as the surrounding mesas. And just as quickly I had entered town, I had already passed it. Skinny cows lined the road as asphalt became dirt. Dust flew up in my rearview as I bumped towards the seed farm that, as far as I could tell, lay on the edge of civilization.

The first thing I noticed when I stepped out of my truck were the trees. Apples, pomegranates, and peaches basked in the sun near the Craven's house. A dry breeze swept across the panoramic desert beyond. I heard the screen door slam. Joshua appeared in khaki pants and an old tee shirt; his long blond hair braided into a pony tail. He approached me with a welcoming smile. I remarked on the trees and he explained that he used the gray water from his house to irrigate them. He pointed to trees at the base of a mesa where he irrigates from run-off after big rains. He then looked down a steep slope to a green canopy of leaves. Most of his trees were down below, in the four acre food forest he had begun to convert from an abandoned peach orchard ten years ago.

We walked down the rocky slope. Along the way a dead sapling stood in the center of a pile of stones designed to help catch water. "Sometimes the experiments don't work," he said with a sad shrug. With only four inches of rain, it has been a hard year for a new tree depending solely on irrigation from run-off rain. I walked down the rest of the slope with a fresh reminder of the thin line that water can draw between life and death.

As we descended into the shade of the garden, the tangy smell of ripe and rotting apples immediately filled my nostrils. Distant bee buzzes and the light chatter of leaves in

the autumn breeze were the only sounds beside our footsteps. Above us was cloudless sky; below us dark, irrigated mud stuck to our boots as we walked.

Fruit trees grew in all directions. Saplings grew in untidy clumps near the base of their parent tree. Ubiquitous weed cover painted the floor shades of brown and green. From one vantage point, Joshua pointed out apples, pears, peaches, apricots, pomegranates, jujubes, quince, plums, walnuts, pistachios, pecans, elderberry, raspberry, grapes, and blackberry. It seemed if he had squinted a little harder he would have seen even more. There were often many different varieties within nearly every species of tree. In the south end of the field, for instance, grew a softball size peach that splits upon ripening ("terrible for market," Joshua explained, "but unbelievably delicious") and on the west end grew a rare, ancient relative of the apple, native to Kazakhstan.

We walked through the shade toward his small vegetable plot, where crops and weeds intermingled in nearly half an acre of semi-straight rows. Joshua stresses his crops through weed competition and lack of water, or "intentional neglect," as he calls it. "I want to wean out the strongest, most drought tolerant trees and vegetables," he explained, "plus, when the weeds become too much I can pull them and use them as mulch." He pulled an amaranth plant and placed it between two lettuce plants as a demonstration.

Joshua grows over twenty types of vegetables, including the chile. He plants enough of every species to get a diverse genetic sample. He only takes seeds from the ones that thrive in the hard conditions. If he sees curly top virus on a tomato plant, for example, instead of pulling the plant like a well-trained gardener, he will rub the leaves all over his hands and then rub the other plants. I examined his tomato plants closely. Some had wilted, faded leaves, but most had a robust green sheen and abundant, healthy

fruit.

Many of the seeds Joshua grows are from arid regions where plants have been bred to withstand drought. The tomato plants were from Iraq. Wars and large seed companies are threatening the loss of old, drought resistant varieties, Joshua explained, just as climatic changes are making those vanishing varieties most needed. Undoubtedly, his concerned look derived partly from the GE threat that extends even to his remote garden. "It is crucial to save these important varieties. They can help save us," his distant gaze became focused. He picked up a knife and a recycled yogurt container. He sliced a ripe tomato and squeezed its seeds into the container, handing me a piece of the remaining seedless flesh to taste. Its sweet, non-waterlogged flavor rivaled the best tomatoes I have eaten all year. He grabbed a few more tomatoes. The tour was over; it was lunchtime.

The line between the wild and the cultivated blurs at the Jardin del Alma. Some plants are difficult to distinguish as cultivars or weeds. As I walked through this seemingly chaotic garden over the course of a few morning hours, however, the order within this design came into focus. No plant was coddled and yet the garden was healthy. Thousands of generations of genetic knowledge had come together through the sheer degree of biodiversity of these wild, semi-wild, and cultivated plants. The seeds were strong. This wild looking garden on the edge of civilization is calculated in its simplicity and carefully crafted to help save the society it seems so far from.

Sources

Andaluz, Isaura. Personal Interview. 11 Oct. 2009.

Andrews, Jean. *Peppers: The Domesticated Capsicums*. Austin: University of Texas Press, 1984.

Baca, Ana. *Bueno Presents: The Seasons, A Cookbook for Life.* Albuquerque: El Encanto Press, Inc., 1992. Accesed from the NMSU special collections.

Baltazar Martinez, Sandra. "Chile Growers Fight for Survival: Foreign Competition, Labor Costs Cut into Crop," Santa Fe New Mexican, August 9, 2009. Accessed http://access.newspaperarchive.com/Viewer.aspx?img=153252114&firstvisit=true&src=search&currentResult=14

Borjas, George. *Mexican Immigration to the United States.* Chicago: University of Chicago Press, 2007.

Census of Agriculture.1959, vol. 1 Counties-Part 42 New Mexico.

"Chile is 'Hot' on the National Market" from Agri-Search pamphlet by the NMSU Agricultural Experiment Station winter 1981, accessed at the Center for Southwest Research, vertical files, "Chile Agriculture."

"Chile Growing Booms, Future Bright." *Las Cruces Sun-News* 22 February 1976: F-4.

"Chili Group Donates $10,000 NMSU Research," *Santa Fe New Mexican,* 7 October 1981: 26.

Clark, Ira. *Water in New Mexico.* Albuquerque: UNM Press, 1987.

Clayton, Mark. "Corporate Cash and Campus Labs." *The Christian Science Monitor* 19 June 2001.

Conkin, Paul. *A Revolution Down on the Farm: The Transformation of American Agriculture since 1929.* Lexington: University of Kentucky Press, 2008.

Coon, Denise, Eric Votava, and Paul W. Bosland, "The Chile Cultivars of New Mexico

State University Released from 1913 to 2008." Las Cruces: Research report 763, November 2008.

Cotter, Donald J. *A Review of Studies on the Chile*. Las Cruces: NMSU, Agricultural Experiment Station, 1980.

Cotter, Donald J. "The Scientific Contribution of New Mexico to the Chile Pepper," in *Southwestern Agriculture: Pre-Columbian to Modern*. Edited by Henry C. Dethloff and Irvin M. May, Jr. College Station: Texas A&M Press, 1982.

Crenshaw, John. "Chile Man: Roy Nakayama," *New Mexico Magazine*. Vol. 54 May 1976.

Daniel, Charles. *Lords of the Harvest: Biotech, Big Money, and the Future of Food*. (Cambridge: Perseus, 2001).

Davenport, Kristen. "Curmudgeon chile changes for the better- the old way" Albuquerque Tribune, December 8 2001, C1.

Dewitt, Dave. "The Legacy of Chile According to New Mexico's Chief Chilehead." *New Mexico Resources.* Issue 27 Spring 2000.

Dewitt, Dave. *Authentic recipes from Santa Fe.* North Clarendon, VT: Tuttle, 2006.

Dewitt, Dave and Nancy Gerlach. *The food of Santa Fe : authentic recipes from the American Southwest.* North Clarendon, VT: Tuttle, 1998.

Fabian Garcia Papers, NMSU Archives, Las Cruces, New Mexico.

Garcia, Fabian. *Spraying Orchards for the Coddling Moth*. Santa Fe: New Mexican Printing Company, 1902.

Gonzalez, Carmen. "Genetically Modified Organisms and Justice: The International Environmental Justice Implications of Biotechnology," *Georgetown international Environmental Law Review*, 19. 2006-2007, 583-608.

"Grant Aids Chile Production." *Las Cruces Sun-News* 4 March 1976: 19.

Hawkes, Jerry, James D. Libbin, and Brandon A. Jones. "Chile Production in New Mexico and Northern Mexico" *Journal of the ASFMRA*, 2008, 83.

Henke, Christopher. *Cultivating Science, Harvesting Power: Science and Industrial Agriculture in California*. Cambridge: MIT Press, 2008.

Hightower, Jim. *Hard Tomatoes, Hard Times: The Original Hightower Report- and*

Other Recent Reports- On Problems and Prospects of American Agriculture. Schenkman Publishing Company: Cambridge, Massachusetts, 1978.

International Connoisseurs of Green and Red Chile Advertisement. *Las Cruces Sun-News* 29 July 1977: 27

Jones, Stephen. "In (Seed) Bed Together: Are Agro-Giants Taking Over University Research?" *Tom Paine.* 13 February 2002.

Kenney, Martin. *Biotechnology: The University Industrial Complex.* New Haven: Yale University Press, 1986.

"Last of the Red Hot Lovers? No Such Thing..." *Las Cruces Sun-News* 11 August 1977: 17.

Lilly, Marjorie. "Borderlines: Mechanical Monsters," *Desert Exposure*, May 2010.

Lilly, Marjorie. "NM Chile: Facing Extinction?" Crosswinds Weekly, Jan 20-27, 2005.

Lopez, Ray. "Alien Problem Has Possible Solutions," Las Cruces Sun-News, August 5, 1974. Accessed http://access.newspaperarchive.com.libproxy.unm.edu/Viewer.aspx?img=50597261&firstvisit=true&src=search&currentResult=1

Lopez, Ray. "Illegal Aliens Stream Across Border for Agricultural Work, " Las Cruces Sun-News, July 31, 1974, accessed http://access.newspaperarchive.com.libproxy.unm.edu/Viewer.aspx?img=55080539&firstvisit=true&src=search&currentResult=3

Lopez, Ray. "Migrant Farm Workers Alternative to 'Wets,'" Las Cruces Sun-News, August 1, 1974. accessed http://access.newspaperarchive.com.libproxy.unm.edu/Viewer.aspx?img=50597191&firstvisit=true&src=search&currentResult=2

Moorman, Jane. "NMSU Machine Destems Chile," Albuquerque Journal, October 20, 2008.

Nabhan, Gary, and Gary Braasch. "Why Chilies are Hot" *Natural History*: Vol. 106 Issue 5 (1997) 24-29.

Nabhan, Gary. *Why Some Like it Hot: Food, Genes, and Cultural Diversity.* (Washington: Island Press, 2004.)

The New Mexico Chile Association at http://www.nmchileassociation.com/. retrieved May 10, 2010.

New Mexico Food & Seed Sovereignty Alliance, "A Declaration of Seed Sovereignty: A living document for New Mexico" March 11, 2006. retrieved from http://www.lasacequias.org/ programs/seed-alliance/seed-declaration/ on May 10, 2010.

New Mexico House Memorial 84, "INDIGENOUS AGRICULTURE & NATIVE SEEDS," 2007 Regular Session. http://legis.state.nm.us/lcs/_session.aspx Chamber=H&LegType=M&LegNo=84&year=07.

New Mexico State Archives, Collection 1987-066 - New Mexico Department of Tourism photograph collection.

New Mexico Senate Bill 60 "NMSU CHILE HARVESTING & GENETIC RESEARCH," 2008 Regular Session. http://legis.state.nm.us/lcs/_session.aspx?Chamber=S&LegType=B&LegNo=60&year=08.

New Mexico Senate Bill 560, "FARMER PROTECTION ACT," 2009 Regular Session. http://legis.state.nm.us/Sessions/09%20Regular/bills/senate/SB0560.html

"NMSU Receives $5884 Gift for Chile Research Project," *Albuquerque Journal* 26 February 1976.

Padilla, Carmen. The Chile Chronicles: Tales of a New Mexico Harvest. Santa Fe: Museum of New Mexico Press, 1997.

Paterson, Kent. *The Hot Empire of Chile*. Tempe: Bilingual Press, 2000.

Paterson, Kent. "Where's that Chile From? These Days a Surprising and Increasing Amount of it is from Mexico," *Crosswinds*, November, 1997.

Pilcher, Jeffrey. *¡Que Vivan Los Tomales!: Food and the Making of Mexican Identity.* Albuquerque: UNM Press, 1998.

Pilcher, Jeffrey. *Tex-Mex, Cal-Mex, New Mex, or Whose Mex? Notes on the Historical Geography of Southwestern Cuisine. Journal of the Southwest*, Vol. 43, No. 4, Border Cities and Culture, Winter, 2001: 659-679.

POW in New Mexico Agriculture Oral History Project. Rio Grande Historical Collections, NMSU Archives. Las Cruces, New Mexico.

Rivera, José A. *Acequia Culture: Water, Land, and Community in the Southwest*. Albuquerque: University of New Mexico Press, 1998.

Robbins, Ted. "Farmers May Switch Crops Due to Labor Shortage," NPR Morning Edition, October 22, 2007.

Robinson, Kevin. "Imports Scorch New Mexico Chile Producers." *New Mexico Business Weekly*, September 20, 2009.

Sammis, Theodore, and Paul W. Bosland, Manoj K. Shukla, John G. Mexal, LeRoy A. Daugherty. "Improving the Chile Industry of New Mexico Through Industry, Agriculture Experiment Station, and Cooperative Extension Service Collaboration: A Case Study," *Extension Journal, Inc.* Volume 47, Number 1. February 2009.

Sheldon Krimsky, James G. Ennis, and Robert Weissman. "Academic-Corporate Ties in Biotechnology: A Quantitative Study," *Science, Technology, & Human Values*, Vol. 16, No. 3, Summer, 1991.

"Society Given Promotion Check." *Las Cruces Sun-News* 25 December 1977: 32.

"This Week is Hatch Third Chile Festival." *Las Cruces Sun-News* 25 August 1974: 9.

Votava, Eric J., Jit B. Baral, and Paul W. Bosland. "Genetic Diversity of Chile (Capsicum annuum var. annuum L.) Landraces from Northern New Mexico, Colorado, and Mexico" *Economic Botany*, Vol. 59, No. 1 (Spring, 2005), pp. 8-17.

Warren, Louis. *The Hunter's Game: Poachers and Conservationists in Twentieth-Century America.* Yale University Press: New Haven, 1997.