This thesis presents an ethnographic and ecological study of local food culture at the Oxford Uptown Farmers’ Market in Southwest Ohio. Using a mixed methods approach incorporating historical research, surveys, unstructured interviews and participant observation, the food ideologies and values of producer and consumer participants at the Farmers’ Market are identified. These findings are then coupled with an investigation into the farming practices of participating producers, with an emphasis on the methods farmers employ in response to consumer interest. Soil samples were taken from farm fields of producers in the Farmers’ Market to quantify soil organic carbon as a measure of soil quality and compared based on tillage and general management practice. Conclusions are presented, drawing connections between consumer and producer interactions and beliefs and their relation to on-farm agroecosystem health. Limitations of this study are presented with suggestions for future interdisciplinary research.
# TABLE OF CONTENTS

Abstract......................................................................................................................i
Title Page....................................................................................................................ii
List of Figures............................................................................................................iii
List of Tables...............................................................................................................iv
Acknowledgements...................................................................................................v

**Part I**

Introduction................................................................................................................1
A Brief History of Agriculture and Food Ideologies in America..............................2
The Oxford Uptown Farmers’ Market: A Case Study.................................................6
The Oxford Farmers’ Market: Conclusions...............................................................21

**Part II**

Agriculture and the Environment..........................................................................22
Soil Analysis..............................................................................................................36

Conclusions..............................................................................................................39

Appendices..............................................................................................................41
References..............................................................................................................46
LIST OF TABLES

Table 1: Total pesticides (lbs.) applied to selected crops in U.S. 1996-2004…………………24

Table 2: Procedure for soil sample collection in farm fields of varying size, tillage and fertilization regime…………………………………………………………………………………………………………………………………………….37

Table 3: Mean Proportions of Soil Organic Carbon (SOC) in Samples from each farm at depth of 0-15 cm……………………………………………………………………………………………………………………………………………..37
LIST OF FIGURES

Figure 1: Most Important Reasons for Shopping at the Uptown Farmers’ Market, as Reported by Shoppers........................................................................................................................................10

Figure 2: Photograph of the Oxford Uptown Farmers’ Market...........................................................11
ACKNOWLEDGEMENTS

I would like to thank my advisors Dr. Charles Stevens and Dr. Thomas Crist for guiding me in this research, as well as Dr. Neringa Klumbyte for contributing her expertise in the study of food ideology. I would also like to thank my soil samplers, John Herman and Petr Podkopaev, without whom I would have spent hours in the rain and mud by myself. Finally, I owe many thanks to my partner, Dan Stephenson, for his support and gentle reminders that my research was worthwhile.
Part I

Introduction

Everybody eats. Everybody eats every single day, every few hours just to stay alive. So with over 7 billion humans on Earth needing food, what they eat and how they choose to acquire it has tremendous environmental, political and social impact. Industrialized means of crop production have focused on feeding the world with high yields of product, but degradation of the environment, barriers to food procurement, and loss of biodiversity and cultural heritage through globalized food production have resulted from the production methods used (Pimentel and Pimentel 2008, Pimentel et al. 1991, Paoletti et al. 1992).

Cognizance of the social, environmental and human health issues surrounding food production has increased tremendously in the past 50 years. Back-to-the-land movements of the 60s and 70s brought with them an awareness of industrialized agriculture and consequent response in organic agriculture. Advancements in nutrition science in the 1980s and early 1990s coincided with the naissance of Slow Food International. Further concern for food security, quality and safety was evidenced with the establishment of the USDA organic guidelines and growing numbers of registered farmers’ markets. These events and ideas have coalesced into the current conversations taking place surrounding American food ideologies.

What are those conversations? Concerns of the modern American eater are miles away from what even the back-to-the-land hippies of the 1960s could have imagined. Increased use and persisting skepticism of genetically modified organisms (GMOs) in agriculture and their incorporation into the everyday diets of Americans are a perennial divisive topic of producers and consumers around the world (Philpott 2014, Barlcay 2014, Bittman 2013, Fox News 2013, Charles 2014). A new awareness of limited accessibility to fresh, healthful foods and initiatives to overcome food deserts are on the agendas of local and state governments across the country (Associated Press 2014, Huffington Post 2011). Other concerns about social justice issues brought about Fair Trade practices and labeling which has been on the rise since its debut in 1988 (Stecklow 2004, Associated Press 2007, Fairtrade International 2011).

A growing awareness of the plight of small farmers in the face of corporate agriculture has led to an explosive increase in the popularity of local foods (Koch 2012). “Locavore” was winner of the Oxford Word of the Year Award in 2007 (Oxford University Press 2007), underscoring not just the desire to support local economies, but also a growing appreciation for the environmental consequences associated with the production, processing and transport of what ends up on the dinner table (Butler 2014). Grocers, restaurants, hospitals, schools, community gardens, and businesses of all sizes have jumped at the opportunity to tout the social, economic and environmental sustainability of their food offerings in response to rising interest. And then, of course, the ongoing search for the perfect diet for optimum health has been a favorite since the advent of the 20th century (Levenstein 1993).
Something as simple and fundamentally important to human survival as food has developed into a topic of social and environmental justice. As living breathing creatures, all Americans have a vested interest in food production, but an understanding of the evolution of the current agricultural system is essential to comprehend the state of the Nation’s plate.

A Brief History of Agriculture and Food Ideologies in America

The word term “organic” carries with it today a much different connotation than it has in the past. Most notably, the word as commonly used today carries with it a specific definition of a set of agricultural practices, comprising what is now known as an “ecological” agriculture. The United States Department of Agriculture (USDA) defines organic agriculture as an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity (USDA 2013). Organic farming methods are actually the oldest methods in existence, and while they may seem the “alternative” practice of the moment, before the 1940s, organic methods of raising crops and livestock was the standard.

World War II had accelerated the United States’ and other nations’ research into chemicals that could be useful in warfare, and when the fighting ended, these new technologies found civilian application (Leigh 2004, Cunningham and Cunningham 2010). Chemical discoveries were used in the development of the first synthetic fertilizers, new insecticides and powerful herbicides. The new availability and affordability of such chemicals encouraged their widespread use, and soon their effects were evidenced in the increase of yield per acre. The cultural adage of “better living through chemistry” was extending to every aspect of life, and food production was no different. The utilization of chemicals to control pests made it possible for farmers to manage more crops with less effort. Consequently, farmers expanded the size of their fields, creating monocultures of their most profitable crops. Ease of management of large tracts of land allowed for consolidation of agricultural fields and larger farms were created (Leigh 2004, Coleman 2005).

In addition to the arrival of agricultural chemicals on the scene, this revolution in agriculture - what has come to be known as the “Green Revolution”- brought new varieties of high yielding crops to be grown on large, consolidated farms. State-driven efforts of the late 1960s encouraged national self-sufficiency by promoting research and development in high yielding grain and staple varieties and countries invested heavily in the selective breeding of more efficient crop varieties (Coleman 2005, Darity 2008). Over a period of several years, the Green Revolution was ushered in by over 500 national agricultural research systems and was supported by eight international agricultural research centers. In an effort to gain food security, the latter half of the twentieth century saw record levels in the global production of grain, (Darity 2008, Cunningham and Cunningham 2010) and the “Green Revolution Modern Varieties” (GRMVs) of rice, wheat, and other crops had become established international favorites and were well on their way to becoming the new standard.

Amid these exciting new developments in food production, there remained reason for skepticism among some scientists and policy makers. The second half of the 20th century produced food at rates that far outstripped those of world population, but approximately 15% of humans on Earth were starving or malnourished. Claims that efficient food production would eradicate world
hunger proved to be overly simplistic (Coleman 2005, Darity 2008). In addition, the arrival of large corporate agribusinesses threatened small-scale family farms and the new agricultural methods being implemented by these large farms were beginning to show negative impacts on the natural environment, raising questions about the safety of agrichemicals and sustainability of domesticated crop varieties (Cunningham and Cunningham 2010).

Before the ideologies of “slow food” had even been conceived in the United States, a growing dissatisfaction with the increasingly industrialized American food system had long been brewing. A “back-to-the-land” movement surfaced in United States and Canada in the 1960s and 1970s, with young adults heading back to rural areas with the dream of growing their own food, living simply, and casting off the shackles of consumer culture. This back-to-the-land movement was rooted in broad political, social and cultural changes in the two decades after the Second World War.

The end of WWII, in addition to providing the beginnings of modern industrial technologies, also initiated an economic boom in North America, initiated by pent up consumer demand in reaction to the economic depression of the 1930s. Wages increased significantly, the baby-boom created a multitude of young parents and new families that would move out to newly created suburbs in their newly purchased cars to drive on the newly expanded expressways. A rapid expansion of advertising, the creation of new markets and new consumer demand were instrumental in generating and sustaining a perception of a society of abundance. The advent of television and the cultural integration it provided acted as a catalyst for a consumer revolution and a society of social and political conformity (Weaver 2002).

By the early 1960s, the pervasive image of material betterment, and the “better living through chemistry” ethos began to be challenged by the growing evidence of a marginalized and an underprivileged class of Americans largely ignored by the larger society. The Civil Rights movement and the unpopular Vietnam War paved the way for a broader re-examination of American consumer society, including the negative impact of the increasingly urban industrial society on the environment (Halfacree 2001). Rachel Carson’s (1962) work Silent Spring increased public awareness of pesticides and their impact on human health and the environment. Public pressure helped to bring about environmental policy acts (Clean Air acts, Clean Water acts) throughout the 1960s, culminating in Earth Day in the spring of 1970 (Halfacree 2001, Weaver 2002).

This political and social climate inspired many with a spontaneous desire for greater control over quality of life –to have a “slow” life. No longer appealing was the nine-to-five job, the daily commute, a house in the suburbs. Many decided to move out of cities, into the quiet rural landscape, valuing quality of life over material acquisition. They wanted greater control over their food, air and water quality, rejecting the material prosperity of their parents’ generation for slow living (Halfacree 2001).

Rejection of consumer culture went in and out of fashion in the following decades, waning in the climate of conspicuous consumption of the 1980s, but desires for clean food and a healthy environment continued to be a part of the cultural consciousness. Small farmers tapped into a niche market with products grown without pesticides, but the definition of “organic” remained
elusive. Finally, the Organic Food Production Act of 1990 required that the United States Department of Agriculture (USDA) develop national standards for organic products. The National Organic Program Final Rule was first published in the Federal Register in 2000, establishing national criteria for organic products and providing a standardized certification for producers (USDA Agricultural Marketing Service 2013).

The language of the Slow Food Movement was brought to the popular discussion when it was popularized by Alice Waters, proprietor of Chez Panisse Restaurant in Berkeley, California. After studying in Europe, Waters wanted to bring the slow food philosophy to her restaurant in America. She has since promoted her culinary philosophy of simple food with local ingredients and advocated for a food economy that is “good, clean and fair.” In 1996 Waters’ commitment to education led her to create the Edible Schoolyard Project as a model of public education, spreading the message of slow food to children and adults across the nation. With a growing interest in her teachings Americans began to seek out those local foods (Chez Panisse 2012).

An entire market demanding an alternative to the Green Revolution product slowly developed alongside ideas such as these. In the early 1980s, organic and other alternative methods of raising food (permaculture, agroforestry, edible landscaping, and the French intensive method, just to name a few) had begun to find a niche. By the latter part of the decade, interest had reached a level of public awareness that prompted the United States Congress to pass the Food Production Act of 1990 (Leigh 2004, Cunningham and Cunningham 2010). This act recognized the organic movement as a permanent fixture by establishing a National Organic Standards Board under the USDA, to regulate the growing and handling of all products labeled “organic,” (Leigh 2004). Since the 1990s, the market for organic food has mushroomed, swelling from the production of primarily fruits and vegetables, to include organically produced animal products and convenience foods. As they have grown in popularity, organic goods have also become more accessible to more consumers, with every U.S. state containing certified organic farmland by 2005 (Davidson 2008).

**Slow Food Philosophy**

Proponents of alternative agricultural methods have differing opinions about how to better the U.S. food system. Suggestions range from minor changes in infrastructure, to major overhauls of how food is produced and consumed. While no consensus has been reached, an underlying philosophy for guiding good practice is important to the development of a unified and proactive resistance to the conventional American food system. In the 1980s, European countries were experiencing the same awakening to the detriments of the new industrial agriculture system. In order to protect treasured food culture, maintain economic viability of local farmers and to protect the environment, founders developed what’s become known as the Slow Food philosophy. This way of thinking developed into an organized movement in Italy, where its founders resided, and quickly spread to other nations in Europe, before finally making its way to the United States. Slow Food ideologies gave a means for articulating the desires of Americans so dissatisfied with modern agriculture. It professed a desire for food that was all at once “good,” “clean” and “fair,” identifying the shortcomings of the industrialized food system and suggesting ways to overcome those faults.
“Good” food is healthy and flavorful. “Good” food is not standardized, but is situated in place, part of a local culture (Miele and Murdock 2002, Slow Food 2013). “Clean” food, according to Slow Food, refers to food produced in a way that does not cause undue harm to the environment, usually locally cultivated and are not genetically modified (Slow Food 2013). This principle encompasses concerns for animal welfare in the production goods, as well as the health of agricultural workers. “Clean” food also poses no threats to consumer health. Finally, slow food is meant to be “fair” food. “Fair” foods are those accessible to consumers at prices they can afford. Additionally, producers must be afforded fair working conditions and fair pay for their work (Slow Food 2013). Ideally, conditions for both affordable food and fair-paid work should not be mutually exclusive. Through these principles, Slow Food functions as a politically-aware reevaluation of the role of food, conviviality and localized culinary tradition, encompassing a broad spectrum of ecological, culinary and social justice concerns surrounding food production and consumption. Specifically, the movement targets issues of sustainability, loss of culinary tradition, unethical rural development and vanishing biodiversity (Horner Brackett 2011).

Slow Food gives producers access to educational materials, monetary resources and a social platform upon which there is support for the protection of their traditional livelihood and food culture of their products. Much of the emphasis of rhetoric in Slow Food publications, however, emphasizes the ethical and social dimensions of eating habits. There exists a long history of socially and economically conscious consumerism and awareness of purchasing power to bring about change (Webster 1975, Roberts 1993) but tremendous attention is given to the creation of a “new kind of ecologically aware consumerism,” (Slow Food 2013) as a means of embodying the Slow Food ideology.

In 2008, Slow Food introduced the concept of the co-producer- a “responsible consumer who chooses to enjoy quality food produced in harmony with the environment and local cultures.” The most recent Slow Food Manifesto elaborates with the claims:

“[If] eating is an agricultural act, it follows that producing food must be considered a ‘gastronomic act.’ The consumer orients the market and production with his or her choices and, growing aware of these processes, he or she assumes a new role. Consumption becomes part of the productive act and the consumer thus becomes a co-producer. The producer plays a key role in this process, working to achieve quality, making his or her experience available and welcoming the knowledge and knowhow of others”

-Slow Food International, 2010

In this sense, the producer bears the responsibility for making quality foods available and for educating consumers. The consumer, or co-producer, shoulders the responsibility of a potentially powerful political and social actor in the marketplace, throwing support behind those producers who create good, clean and fair products.

This rhetoric is especially powerful in industrialized nations where consumers are removed from the production processes. The ideal short supply chain and connection with the producer allows for consumers to feel “reconnected with agriculture” (Curry 2002). The consumer is reconnected socially, through dialogue and sharing between the parties involved, economically, through the management of agricultural resources aimed at obtaining profits, and environmentally through the maintenance of public goods. Furthermore, participation in Slow Food as a co-producer
provides an opportunity for consumers to “do” environmentalism and social justice work within their own home places (Alkon 2008). Locally grown organic foods can become symbols through which urban eaters can connect to nature, a framing which provides an urban corollary to the wilderness narrative. Additionally, Slow Food venues can be likened to social justice efforts, with participating consumers acting as contributors to a thriving rural culture and local economy.

The Local Food Movement

In 1994, the U.S. Department of Agriculture (USDA) began publishing the National Directory of Farmers’ Markets which list farmers’ markets known to operate in the United States (USDA 2013). Between 1994 to 2013 the number of farmers’ markets known to be in operation has grown from less than 1,800 to over 8,000. The growing number of farmers’ markets has been associated with an increased awareness of and emphasis on “local food” and has arisen from a complex combination of political, economic and socio-cultural conditions (Morris and Buller 2003). Producers and consumers alike have become increasingly aware of the industrial food systems which mass-produce trans-national goods. In response to the increasing distances food must travel and the disconnection between its production and consumption, farmers and eaters have sought and created alternatives, such as the farmers’ market. The aim of these alternatives is focused on creating localized food systems in which both producers and consumers circumvent the industrial, transnational food system and make informed decisions.

Slow Food USA, the USDA’s “Know Your Farmer, Know Your Food” initiative, and other organizations that promote local agriculture generally have centralized governing bodies and clear organizational structure through which the organization mission and philosophy may be dispersed. The farmers’ markets that pop up all around the USA, however, have no central organization, and in some cases, little –if any- leadership. As a consequence, markets across the country take many forms, have different rules and attract different kinds of people. Some markets mandate that producers may participate only if their farms are within a specified distance from the market, in order to maintain a “local” status. Other markets require producers to have made or grown all goods they bring for sale, while others allow for the resale of supermarket produce. Some require organic certifications, or ask that producers maintain some level of “sustainable” status.

Oxford Uptown Farmers’ Market: A Case Study

Over the course of four months, I immersed myself in one of these alterative systems. From August 2013 to March 2014, I conducted research at the Uptown Farmers’ Market in Oxford, Ohio, with the goal of gaining perspective on what motivates it participants. Farmers’ markets are first and foremost communities of people, gathering to participate in an activity. And while those participating in a farmers’ market are actively engaged in an alternative food system, the motivations of the many producers and consumers taking part can be highly variable. Indeed, the various markets I have been to in the past have each had their own unique dynamic, with different atmospheres, rules, and personalities. I hoped that through participant observation, interviews and surveys, I could characterize the Uptown Farmers’ Market and discern the major motivations of its producers and consumers.
What I found was an atmosphere of conviviality. A crowd of shoppers and farmers, each with different belief systems, were brought together with the common goal of intentionally circumventing the supermarket experience. The strong belief that the Market is an important venue was evident in every conversation I had, despite the varied reasons people gave for participating. Both farmers and shoppers felt that they had opportunities at the Farmers’ Market not afforded to them elsewhere and each was conscious of the impact made by the Market in fostering a localized food system.

Methods

For this research, I used a mixed method approach, in order to gain a more holistic view of the Market. I conducted unstructured interviews with Market vendors, farmers and members of the Market Council. I administered paper surveys of shoppers and vendors, giving them the opportunity to express their motivation for participating in the Market. I conducted a spatial analysis of the Market space and considered the history of the Market’s development. The largest portion of my research was gathered through participant observation, going to the Market every Saturday from around 8 am to 12 pm, doing my shopping, chatting with Market participants and even helping out a vendor in their stall.

Through participant observation, I was able to gain insights into the typical behaviors of Market participants, build a rapport with participants, and gain a sense of the atmosphere of the marketplace. In addition, I observed what products were offered, how they were advertised, how they were received by shoppers, and how farmers talked about them. I also did my shopping there.

My field notes were taken in a small notebook and later transcribed and analyzed using Dedoose software. I made audio recordings with participant consent, also uploaded to Dedoose for analysis. All participants contributing to my research were over 18 years of age and were required to sign an IRB- approved consent form.

The Farmers’ Market as a Political Space

Anthropologists have produced many studies attempting to identify and characterize the marketplace through which farmers sell their goods, ideologies and values to the consuming public. Research on the farmers’ market has focused primarily on the motivations of producers and consumers participating (Alonso and O’Neill 2010, Carey et al. 2010, Farmer 2011, Feagan and Morris 2009, McEachern et al. 2010, Wolf et al. 2005, Zepeda 2009) and the characterization of the typical market participant, through both demographics and professed values. Deep description of early farmers’ markets in America helped to interpret the role of retail institutions, such as the farmers’ market, in the social construction of community (McGrath, Sherry and Heinsley 1993).

What I discovered in my study of the Oxford Uptown Farmers’ Market was a politically-charged space. Acting under a capitalist ideology, consumers exercised their purchasing power, using their dollars to support people and practices that meet their approval. Producers and consumers alike were consciously participating in an alternative food system, subverting the monopoly that
the supermarket holds on food purchases, with the intention of acting on their values about food and commerce. The Market is a place where producers can reject big business and corporate food systems while continuing their livelihood. Producers express their value for biodiversity when they advertise their heirloom produce and for environmental stewardship when they display their organic certifications. Consumers reward such behaviors with their economic support, and both parties are empowered in their abilities to operate outside of traditional corporate structures.

“That’s Anuenue. It’s an heirloom from Hawaii. Its name means “rainbow,”’ one farmer explained to me, even giving me tips on how to pronounce it (“Ah-new-ee-new-ee”). I spoke with a vendor about the blue and warty-looking cantaloupes she had on offer, and she told me, “Yeah. I grow some heirlooms. I just grow whatever sounds interesting. Like these solid green ones here are Siberian gold watermelons.” Some farmers told me that they don’t even know what the plants are going to look like once they come up. “I had to cut one open to be sure,” the melon grower told me, “[...] but I knew it wasn’t a watermelon.” Even if they’ve never grown some varieties before, farmers told me that they’re always interesting to grow and to share with customers.

Consumers are free to ask how their purchases were grown, to influence what and how vendors produce. They are afforded a direct agency in this marketplace not seen so strongly elsewhere. They circumvent the supermarket shopping experience, able to socialize with the farmers who grow their food and the other shoppers who eat it. One of the Market Managers offered me an analogy to explain the difference between the supermarket experience and the Farmers’ Market:

“Suppose you and I were going swimming. We’re in our bathing suits and we come to the Market. We’d get some funny looks. We might feel uncomfortable. The social and cultural mores we’ve developed dictate that wearing a swimming suit in that context isn’t acceptable. Now imagine we’re on the beach. It’s totally acceptable to wear your bathing suit there. It’s also acceptable to be dressed in regular clothes. That’s what the Farmers’ Market is like, and that’s why we behave differently there, than we do at the grocery store.”

Not only are shoppers free to “wear their bathing suits,” in the context of the Market, they are choosing to spend their money in a local economy and exercise their purchasing power as informed shoppers. Though all respondents in a survey of shoppers at the Market indicated that they do have to shop at a grocery store for some items, over 30% claimed to be members of a local food co-op, again evidencing that consumers are conscious actors in their food system and that they take deliberate steps to act upon their values.

In an environment where participants act upon a set of personal values, there is potential for a clash of viewpoints. Disagreements over the importance of an organic certification, over how far food can travel and still be considered “local,” or over the expectations for producer and consumer behavior can be volatile and divisive. In addition, I also found the Uptown Oxford Farmers’ Market to have a history of organizational disagreements. These issues had to be overcome and a friendly and forgiving space created for the Market to survive.
Consumers

The Oxford Farmers’ Market sets up in a municipal parking lot in the center of town every Saturday from May through November, the week before Thanksgiving. After that, the Market sets up only on the third Saturday of the month throughout the winter. Showing up in the early morning, when vendors are still setting up their tables and tents, it’s interesting to see the change in customers throughout the day. Enthusiastic shoppers show up early, wanting to get the first of the best product on offer. As the sun comes out later in the day, shoppers who sleep in on Saturdays show up and the Market becomes increasingly crowded. By 11 am, people who’ve been out at one of the local restaurants for a weekend breakfast begin to wander over to check out what’s going on at the Market. Some come to get a bite to eat from one of the pastry vendors, while others come equipped with their own canvas bags and rolling baskets to do their grocery shopping for the week. Children run around playing tag while their parents shop. Shoppers stop to chat with friends they run into and vendors they’ve come to know. The pace is slow, the crowd made up of mostly upper middle class families, but also students and staff from the local university, and seniors from the nearby retirement community.

In a survey of over 100 Farmers’ Market shoppers (see Appendix A), 100% of respondents claimed that they believed that shopping at the Market was an important activity. Why they thought it was important, however, varied. The most frequent reason why respondents claimed to shop at the Farmers’ Market was to support the local economy (36%), followed closely by the opportunity to get better tasting/fresher food (27%). This came as no surprise, as many of the conversations among shoppers centered on what the vendors were or were not selling that day, which has the best product and what the shoppers were going to cook with it. About 18% of respondents reported shopping at the Market because they believe it helps to enrich the community, and only 7% of respondents claim to shop at the Market because it’s better for the environment (see Figure 1). The remaining respondents gave reasons of their own, including that they value connecting with and learning from farmers and that it’s just a fun experience overall.

Survey respondents most frequently attempted to select more than one answer from this question, despite the instructions to select only one most important reason to shop at the Market (these responses were omitted from much of the survey data analysis). Their comments written in the margins alongside this question indicated that they felt so strongly about all of these motivating factors that they couldn’t choose just one over the others. To illustrate, one respondent wrote a bold “ALL OF THEM!!!” after selecting all of the reasons listed above for this question.
A chi-square test for independence revealed a positive association between a willingness to pay a higher price for products that were raised/grown organically and a willingness to pay more for items that were produced locally \((\text{chi square}=36.9, p<0.001, N=114)\). This was not surprising, since a majority of respondents claimed that their number one reason for shopping at the Market was to support the local economy. A common site at the market was a customer using a credit card to purchase $50 worth of framers’ market vouchers or more, to be used at any stall. This group was also more likely to use freshness as a major criterion for selecting items at the Farmers’ Market \((\text{chi-square}=12.6, p=0.050, N=114)\) and such behavior appears to mirror the Slow Food principles of good food (priority given to freshness), clean food (preference for local and organic) and fair food (a willingness to pay more to support growers whose livelihoods and practices they value); (Slow Food International 2013). Many of my conversations with shoppers about food and farmers’ markets seemed to reveal ideologies very closely aligned with Slow Food principles, if consumers didn’t always explicitly say so.

A positive association was observed between the frequency with which respondents claimed to cook with fresh ingredients and the frequency with which they reported shopping at the Market \((\text{chi-square}=25.7, p=0.002)\). Half of all respondents claimed to cook with fresh ingredients 4 or more times per week. This suggests that the Slow Food ethic of becoming involved with fresh, wholesome foods and culinary traditions can be found at the Farmers’ Market, and is supported by research suggesting that farmers’ market shoppers are more interested and aware of food and nutrition (Webber et al. 2013). When I attempted to give out free cookies as a gesture of thanks for shoppers who completed my survey, I was astounded by the number of shoppers who forwent the treat, claiming to be on gluten-free diets or avoiding sugars. Instances of shoppers posing questions to farmers about farming methods were infrequent, but usually included inquiries about organic certification or use of hormones in meat or eggs for reasons of consumer health, rather than environmental concern. I overheard more than once the sharing of recipes and

![Image of bar chart showing the most important reasons for shopping at the Uptown Farmers' Market, as reported by shoppers.](image)
cooking methods for fresh foods and consumers may very well be inspired by the cooking
demonstrations held at the Market most weeks, and the free samples that accompany them.

The results of my shopper survey seem to suggest that shoppers at the Uptown Farmers’ Market
are acutely aware of the power of their purchases. Supporting the local economy is the number
one reason respondents gave to shop at the Market, and many of these respondents would also
pay extra for items produced locally and organically. Shoppers quite strongly exhibit the
behaviors that Slow Food International assigns to co-producers, or the “responsible consumer
who chooses to enjoy quality food produced in harmony with the environment and local
cultures,” (Slow Food International 2013). Shoppers recognize their purchasing power and
exercise this power by owning their responsibility to choose quality products and support the
producers that provide them. Over 30% of respondents reported to be active members of a food
coop-operative, further evidencing an active engagement with fresh food and localized food
systems.

The results of this survey and my observations also suggest that respondents are very interested
in their food and food system, with a majority actively shopping and cooking for fresh
ingredients, believing that the ingredients they’re using are unique and special (unable to be
purchased in the supermarket and they’re fresher and tastier) and even braving the cold in the
winter to get their locally produced items.

Figure 2: Shoppers at the Oxford Uptown Farmers’ Market have a large variety of products to choose from and many believe that the locally produced goods at the Market are fresher and taste better than those found at the local supermarket.

Producers

The needs of such educated and highly motivated consumers could not be met if there were no
farmers willing to provide products for purchase. The farmers and vendors I met were just as
diverse as their customers, all with different backgrounds and experiences, and bringing with
them their own personal ideologies about what makes food good, clean a fair. Some of them sold
their products exclusively at the Oxford Uptown Farmers’ Market, while others frequently took
their goods to other Markets in the area. Some vendors had taken advantage of additional means
of getting their products to consumers, including community supported agriculture (CSA)
arrangements, supplying local grocers, direct deliveries, and on-farm produce stands. Whatever
vendors were selling, it was clear that they were passionate about their products and enjoyed interacting with their customers and other vendors at the Market.

“I think there’s a vibrancy to farmers’ markets,” a baker told me, when I asked what the experience of selling at the Market has been like for her. “The people who are there are excited to be there, and they’re excited about whatever they’re selling. They’re excited about those things. And so, you get this group of people who are just really excited to be there, and I think it’s a really healthy environment. It’s a lot of fun.” Kim Coffee had just completed her first year selling her artisan, handmade breads at the Oxford Market when she invited me to her home. After learning that I was interested in her thoughts about local food, and her experiences as a vendor, and she responded with an invitation to come over and have coffee.

Kim had begun making breads using natural fermentation methods, and had started taking orders and making deliveries to her customers. She’d had some familiarity with the Oxford Market, and decided to become a vendor as a way to reach more customers. Shortly after beginning to sell her product at the Market, Kim decided to survey her customers as a means to determine what they would like to see in her product. “I get a pretty good idea of [what people want] through what people are ordering and what they’re not ordering— that kind of stuff. But it’s just fun to see, like, ‘are there other breads out there that people would appreciate?’ or ‘how important is organic to my population of people who are buying the breads?’ Things like that.”

Kim’s findings were similar to my own survey results. “I was curious about the organic versus non-organic thing, because it would be a lot more expensive for me to go completely organic. ‘Cause some of my stuff is organic, but I was curious to see if that was worth it for people to pay, probably 50 cents more a loaf, for me to turn it all organics” she explained to me. “And I was surprised to find that most people didn’t really care. They just want handmade, with decent ingredients, most of the people. I think people are just looking for an artisan and local quality product, and I guess people aren’t as on-board with [organic] as I thought maybe they would be.” Kim also discovered that about 50% of her customers thought she was charging fair prices, and that near 50% would be willing to pay more. Upon finding that her customers were so supportive, Kim was encouraged. “People feel like they’re getting something that worth what they’re paying. So that was good.” Kim’s experiences with her customers are consistent with research from Ohio State University, which found that Ohio consumers are generally willing to pay a higher price for what they perceive as high quality foods (Ohio State University 2005).

She also values the social aspect of direct marketing. When she does her deliveries, she said, “people will invite me into their house and if I have time, sometimes we’ll sit down and have tea and chat, and whatever. I’ve built some really good friendships with people that I otherwise wouldn’t have even known probably, had I not been doing this.” She also feels that her customers benefit from knowing who is producing the food they eat. “People see a face. They know who they’re supporting.” In addition to building relationships, she’s also had the opportunity to educate her customers about her baking methods, which she feels very strongly about.

“It’s not the ingredients; it’s the process of how you make the breads. I mean there’s definitely something to be said about ingredients. Bleached and bromated flours, like I don’t use those. But I think a lot of people who are on gluten-free diets, can actually eat gluten. The process just needs
to be proper. […] I think there’s something about the long fermentation, and the natural leavening—not some processed commercial yeast that was made in a laboratory, or whatever— I do think that there’s something to that.”

Kim’s comment reflects the sentiments not just of her customers, but of many of the other shoppers and vendors I met at the Oxford Market. The sense that there is a quality product that can be obtained at the Market that shoppers couldn’t get anywhere else is in the forefront of many consumers’ minds. This also makes the Market an ideal place for producers of high-quality, perhaps labor-intensive products to find shoppers who appreciate their efforts and pay a price that reflects this value. Kim stated, from her own experiences as a Market shopper, “At the Oxford Market, if I’m going up there to buy stuff, I’m not going up there because it’s cheaper to buy it there, than at the grocery store most of the time.”

Producers like Kim are highly attuned to the needs and desires of their customers, but they also frequently hold strong convictions about their products and their productions methods. For Kim, she makes a lot of decisions about her product based on what she thinks is better for her customers’ health, even if she doesn’t always advertise this. She uses olive oil to coat her bread pans, rather than cheaper oils from spray-cans. She buys brands of flour that aren’t bleached or bromated. She stays away from unnecessary processed sugars, using instead maple syrup and honey in her breads. She also frequently buys rye and wheat berries to grind her own flour. “The less, processed things are, then I feel that it’s better,” she told me. “I market these things a little bit, but I don’t think it’s as important to most other people as it is to me.”

Kim’s desires to meet the needs of her consumers while staying true to her own values are not unique. Every producer I spoke with brought with them their own values and beliefs about what constitutes good production methods. Each of these producers must then decide where to draw the line between their personal desires for their business and their overall profitability.

“I mean there’s a lot of things that, if I wanted to compromise my own values, I feel that I could be making a lot more bread, and probably a lot more money, but… I don’t want to use commercial yeast. Like, people like focaccia, but focaccia’s very hard to make with just sourdough, because it’s a light, fluffy bread. So, I’m just kind of like, ‘well I’m probably just not going to make focaccia,’ unless I find a way to do it with wild yeast. So, there’s a lot of things, - I’ve had a lot of customers and family members who are like “why don’t you make this?” or “why don’t you sell this?” or whatever, and I’m just like, this doesn’t really fit my philosophy of what I value and what I feel is good for people.”

I wanted to delve deeper into this connection between what consumers value, how producers respond to consumer sentiment, and ultimately how producers balance consumer demands with their own philosophies. I was interested in the decisions made by farmers, in particular, because much of the discussion surrounding local food is one of preserving environmental quality. Consumers are increasingly interested in environmentally-sensitive production methods, and whether or not farmers choose to implement them could have broader, ecological implications. On the other hand, if consumers neglect to insist on agricultural methods that protect natural ecosystems in favor of other product qualities, whether or not farmers choose to implement such methods anyway is also important to maintaining environmental quality.
Farmer Diversity

The Oxford Uptown Farmers’ Market is home to a variety of vendors. Many of the farmers come from small farms, some from large home gardens, and most travel less than 10 miles to get to Market. About 20% of the farmers I spoke with come exclusively to the Oxford Market to sell their wares, while others frequent a handful of other markets regularly, and some even have their products sold in local stores. Farmers at the Oxford Market seem to come from all backgrounds, all ages, and with various levels of farming experience. Through my many conversations with producers, numerous shopping trips and some farm visits, I was able to get a sense of the general types of farmers one encounters at a small market like the one in Oxford.

While all attempts to categorize individuals are arbitrary to some degree, I found it helpful to think of the farmers as falling into one or a combination of four types. This way, I could better understand what considerations might motivate both a farmers’ worldview and business decisions, based on their personal circumstances.

Katie and Mike: The Legacy Farmers

Formerly full-time farmers, Katie and Mike have since had to supplement their farm income with other employment. While they told me they’d never stop growing things, Mike and Katie are very judicious when making decisions about their farm, doing research before they make any changes and always considering the costs and benefits. With several small children at home to look after, as Mike explained, “sometimes it just comes down to dollars and cents.” They represent a larger community of modern small farmers, encountering the common challenges of small farms struggling to compete with large corporate agriculture.

I’d originally arranged with Katie to meet her at her home one morning, but she insisted that her husband, Mike wanted to meet me, too. I found myself pulling into the gravel driveway later that evening, after Mike had come home from work. Katie and Mike live in an old, two-story farmhouse, the porch cluttered with tools and furniture and an old rusty pickup truck in the front yard. From the driveway I could see the vegetable beds and some hoop house structures next to a children’s playhouse. Katie greeted me as she attempted to let me inside without letting her cats inside the house. As the kids played in the living room, Katie, Mike and I sat at the family dinner table to talk.

I learned that Mike and Katie both came from farming families and had been farming together since they’d been married. They used to grow vegetables and raise chickens full time, but not anymore. Mike had taken a job selling agricultural equipment. They continue to farm part time, growing vegetables at their current home for about 14 years now, enjoying the produce themselves, and always managing to sell at markets. I asked them why they continue to grow things, even though income is not their main motivator anymore. “It runs in the blood,” Katie told me.

And indeed farming and selling at farmers’ markets seems to go back as far as Katie and Mike can remember. “Yeah, my family’s actually done it for… –I’m a fourth generation. I don’t know if it goes back further than this, but my great grandparents went to the Hamilton Market. And
we’ve got pictures of my grandma and her brother, who had a stand and we had a lot of family there. And so, I grew up around it, doing it. It was like a rite of passage-type deal.”

It’s the fact that farming runs in the family that also influences Mike and Katie’s decisions about their farming business. While they’re very responsive to their customer needs and preferences, and conduct meticulous cost-benefit analyses before trying out new things, ultimately they value maintaining a certain degree of what they called “authenticity.”

“When I sit and think about it,” Mike tells me, “expansion really excites me, but once we identify and brand [ourselves], how do you not lose your identity by expansion? You want to stay authentic to who you are.” Staying authentic, however, has not held them back in their creativity to reach their customers. Mike had recently enlisted the help of a graphic design student to create a logo for the farm. He and Katie have created a website, Facebook page and brochures to hand out to customers. Through these media they spread the message of their family farming roots and they’re enthusiastic about sharing pictures of their parents and grandparents to show their pride. Mike explained:

“I have pictures of my great grandparents, and they are the stereotypical, old fashioned-looking farmers. I mean, it’s perfect. They got the old truck, and Grandma’s got the old mumu on, and the hat, and Grandpa’s in bibs. I mean it’s like what you would imagine, and that’s what they were! And then, my grandparents, and my mom and uncle were there, and there’s us, and if you count the kids it’s fifth generation. Just a little history. I have all the old family pictures. So it’s kind of to give ‘em an idea of what we’re doing, who we are, and that we didn’t just read this online or in a book and tried to make a living at it. This is something we’ve been doing for a long time. Probably well over 100 years. I have equipment out there that was my great grandpa’s, so things have been handed down over the years. So we want to push that a little bit, and it’s a bit of different spin on the marketing side of stuff.”

In addition to reaching their customers in new and innovative ways, Mike and I talked at length about his marketing strategies in the works to increase sales. Loyalty cards, recipe cards, and reusable egg cartons are among some of the many tricks he’s considering to get people to come back to their stall at the Market. They’ve also branched out to growing new and different things. “We started raising weird stuff, like fava beans and different colored things. Something nobody else raises. So, if you have something kind of niche-y, people will remember you, and maybe come back to buy other things,” Mike told me. “We have our set standards of what we always do, but we’re trying to throw in some new things and trying it out, and seeing how people like it, so it all depends.”

I asked them if their customers ever question them about their farming practices. “It’s about fifty-fifty,” said Steph, and Mike added that people seem to ask now more than they used to. “Yeah, it runs in streaks. Some people could care less, but it’s starting that more and more people are asking and wanting to know a lot.”

Mike noted, “the first thing out of people’s mouth is ‘are you organic?’ And we say no, but we grow as naturally as possible. […] I think that ‘organic’ is the big ‘in the news’ thing, so that’s like the first thing people go right to. It’s easy to say ‘are you organic?’ and that means something.” Even though they are not certified organic, and don’t currently plan to certify their
farm, citing to the cost, paperwork and time involved, Katie and Mike insist that much of what they do is driven by customer demand. “They want as natural or organic as possible,” Mike says, and in response to consumer preferences, Katie and Mike have ventured into raising non-GMO chicken, eggs and hogs. They also raise heritage breeds in addition to their “weird” vegetables. “What I’m interested in is the point where it’s cost-effective too.” This is why Mike and Katie spray very little and try to farm generally the “way their grandparents did.”

“My farming practices are as much customer-driven as they are by personal beliefs. I mean, do I think that non-antibiotic, non-GMO-fed chicken is better for you? Sure. Why wouldn’t it be? Now, will I go out to Kentucky Fried Chicken and eat chicken? Yeah. Is that stuff probably filled with that stuff? Yeah. Am I going to say ‘Ah! No more KFC!’? No, I like chicken,” Mike laughs. “But do I think the other’s better? Sure. But I know a lot of my customers do too, so that’s why I gear up for that.”

**John: The Retirement Farmer**

John is an example of a type of farmer that has become more and more common with the growing opportunities for local producers at farmers’ markets. He came to farming later in life, and really started up his operation after retirement. He doesn’t need to rely on his farm as his only source of income, but takes pleasure in investing himself in his small business. Farmers like John frequently have the luxury of exploring new and different farming approaches that other farmers would avoid taking a risk on. Sometimes dismissed as naïve hobby producers by full time, lifelong farmers, these producers can make major contributions to the local food scene. Indeed, freed from the constraints of having to “make a living,” hobby farmers can often more successfully deliver the specialty products that consumers desire, without having to overhaul a longstanding farming operation.

I met John at a local coffee shop to talk about his experience at the Oxford Farmers’ Market and his general beliefs about farming. He was enthusiastic about helping me in my research and had already invited me to come to his farm for a visit anytime. After greeting some friends of his in the coffee shop and offering to pay for my coffee, we sat down and I asked him about his involvement with the Oxford Market.

John is a retired teacher, and while he tended a small vegetable garden while he was working, it was only after retirement that he became more interested and dedicated more time to growing vegetables. That said, he’s been growing and selling vegetables since the 80s, when he had some good and bad experiences with different markets he’d been to. He recalled an early experience at a farmers’ market in Cincinnati when he was “blown out of the water” by farmers he wasn’t prepared to compete with.

“We had just a dinghy little bit of stuff and, oh man, they had everything in half-bushels and big, big trucks, big panel trucks and box trucks! We had a van and a picnic bench that we used as a display table, and we had little dish strainers that we put vegetables in to show. It was embarrassing! So we never went back to that market, until several years later. When we did, we’d learned how to do it. We could compete with ‘em. We were big also.”
John went on to learn more about farming, became involved with the Ohio Ecological Food and Farming Association (OEFFA) and played a leading role in bringing the Oxford Uptown Farmers’ Market to its current location. He expanded his collection of raised garden beds to be able to grow more and more produce over the years and grows mostly lettuce at the moment. Sometimes he has to end his season early, when lettuces bolt in the warm summer weather. Sometimes he doesn’t even get all 80 of his small raised beds planted, but since he’s not dependent on his farm income to pay the bills, these are losses he can afford. This also affords him the time to work on other projects, such as his current collaboration with a local nonprofit to breed new lettuce varieties.

John also decided to get his farm certified organic. “That’s what I believe in and what I follow, and I do this because I think it’s the correct way of farming,” he told me. “I want to use nature, instead of fighting against it. I want things to be raised the way they evolved.” He told me about a documentary he had recently seen, that showed evidence for a fundamental difference in organic and conventionally grown produce. “Organic practices show differences in the product and also a difference in the people involved in the operation. They’re generally happier, they aren’t sick from pesticides –the people and the food!” he told me. His opinion of farmers who are daunted by the certification process is generally that they make mountains out of molehills. If farmers are keeping good records -and all farmers should be keeping records, whether they’re organic or not, according to John- then it’s not hard. “I really wish farmers would become certified organic because it makes a statement,” he lamented. “Most farmers probably don’t know enough about certification to know how easy it is to follow the rules and keep records. If you can’t keep records you’re doing it wrong.”

When I asked John what he thought of the difference between a small, local non-organic farm and a large, corporate organic farm, he was adamant about the superiority of organic practices. “I think the large organic farms are good, ‘cause they’re doing organic, but I don’t think they’re as good as they could be. I think there are a lot of things they could do better, but then there are a lot of things they could be doing worse,” he insisted. I pressed about his opinion of the importance of local farms, whether organic or not, and he replied, “Penny, you know I’m going to pick organic every time, but I’d like to see both [local and non-local organic farms].

John is obviously not beholden to the whims of his customers in order to make a living, but I was curious as to what his interactions with customers were like, considering his firm stance on the subject of organic agriculture. When I asked John if his interactions with customers influenced his choices about his farming methods, he conceded that talking with his customers gives him an idea of what varieties of vegetables they’d like to see, but that we wishes more customers valued his organic certification more. “I’m a bit disappointed that more people don’t insist on organics. Unfortunately, the consumer just hasn’t been taught that way. The consumer hasn’t been taught to care about organic.”

**Dana: The Second Career Farmer**

When I pulled into Dana’s driveway, I was greeted by four cats- no five… or maybe six. I found out from a friend who had been doing research on the cats at Dana’s farm that most of them were feral, wondering onto the property and then staying when Dana didn’t run them off. It
seemed that Dana had never run an animal off. Her small 10 acre farm, where she’d been for only a year when I met her, is home to four rescued horses, a rescued pot-bellied pig, two goats, a small flock of sheep, some chickens and three dogs. In addition to caring for her animals, Dana raises a variety of fruits and vegetables, and plans to expand, as she writes on her website, “into grains, herbs, flowers, mushrooms, nut trees, baked goods and cheeses.” She runs this place all by herself.

Dana represents a growing group of producers who’ve come to farming as a second career. Dana told me she worked as an accountant for a while, did some work in food service, and then trained horses and gave riding lessons. Now in her late 40s, she told me she decided it was time for her to do something she thought would be “worthwhile.” That something involved spending 5 years working on another farmers’ land while she waited for organic certification at her current location, where the landlord only gives her a monthly lease. The farmhouse on the property didn’t have heat when I visited in February, and had just recently had water turned on, though Dana had been there since the previous year’s spring. When I asked if having her own farm was worth all the trouble, Dana replied, “Absolutely.”

That isn’t to say life is without its troubles. With all her animals to care for, her farm in its infancy and having to do all the work herself, she gets discouraged.

“Sometimes I ask myself, ‘why am I doing this?’ but what else am I going to do? Go back into accounting where I sit inside at a desk, looking outside all day long, wishing I was outside? Do I go back to working at a restaurant where I used to be paid $22 an hour, and now I’d be lucky to make $8? No! I don’t what to do that. I went to school to be a nurse, and I hated nursing! So what would I do? At my age, what would I do if I had to go get a job? I guess I could be a greeter at Walmart, but would I enjoy that? I would always have animals, so I might as well do something with that.”

She says she sometimes has people ask her if she ever takes a day off. She tells them, no, because even if she did, she’d want to spend her time working on the farm anyway. It’s clear that she loves her animals. She walked me around and introduced me to all of them, petting them and talking to them. She told me she’s not a vegetarian, but that she couldn’t ever slaughter an animal.

The mission statement of the farm, as posted on Dana’s website, claims that she is “dedicated to sustainability, stewardship of the land, raising the finest produce & animals possible & preserving the small independent family farm.” Visitors to the website are provided with a seven point definition of what organic agriculture is (and is not) and are told that “Organic food takes time—there are few shortcuts and is labor intensive. Time and labor are money, but there are many benefits to the soil, to the food, to the community and to the farmer.” This sort of education about what organic certified produce is and why it is important is something that has caused Dana much frustration. “If everyone would be into the whole organic thing, I’d feel like it meant something, but most people don’t.” she told me. “They don’t know what it means, they don’t really care, and I don’t know why they come to framers’ markets. I really don’t.”

It’s not really the perceived ignorance of Dana’s customers that bothers her, though. What bothers Dana is that she feels like she’s going through a whole lot of trouble to do everything
“right,” and isn’t seeing the returns she expects. The organic certification process Dana completes through OEFFA can be very pricey, and if she can’t sell her produce at a premium, then she won’t be able to justify the costs of certification.

“The organic certification cost is $850 and 20 pages of questions about your farm. Can’t I just put a seed in the ground and grow stuff? But nobody wants you to do that. Once certification jumps to $1000, I can’t be certified anymore, because I can’t justify paying $1000. They’re trying to raise it to $900 and I’m like, you know, ‘what am I getting for 900 dollars?’ I do a lot of paperwork, I do all the work, I pay all the money, but nobody is promoting my farm. No one is saying ‘Dana is certified organic, so let’s everybody go to Dana’s.’ Nobody’s saying that.

“OEFFA isn’t doing any promoting for me, and when I go to markets, nobody knows what OEFFA is. They don’t even know what it means to be certified organic. It seems to me that I have enough work to do promoting myself, but then I have to tell people what OEFFA is and explain to them what ‘organic’ is, and to me, part of the $850 I give them is to pay them to say ‘this is what organic means, here’s a list of the people who are organic, and here’s where you can find them.’ That would be all I would ask for that $850, because I don’t know what you get for $850 dollars. I get an un-laminated piece of paper. The least they could do is laminate it for me. And that’s all I get!”

Dana was perhaps feeling more bitter than usual because she had just purchased a special box truck with refrigeration and water hookups in order to comply with health code regulations, which are enforced differently from county to county. “That’s $40,000 I put into a $2,000 van and hopefully it will appease the organic certifiers and the board of health. I’m not going to make that money back in a year, but I don’t know what else to do,” she told me. What’s more is that Dana frequently encounters framers at markets who do not comply with standards set by OEFFA or the board of health, making her “the only one at the market who’s doing it right, meaning I just wasted by money and everyone else is coasting.”

I asked her why she values her organic certification, if it just causes her undue frustration and her consumers don’t seem to require it. She replied that she understood why other farmers wouldn’t be certified organic, because of the hoops farmers are required to jump through and the cost, but that it was a matter of principle to her. She told me:

“I believe in being certified organic, because I don’t think people should put poison down on their food. I don’t think people should do strange hybrids and GMO-type things. If your body is your temple and you’re putting in garbage, what do you think the temple’s like? It seems to me that if I want to put the best food on the table I can, then I should be the organic farmer. And I shouldn’t just say I’m organic, I should be organic. If you’re going to talk the talk, then walk the walk. That means a lot of money and a lot of hassle. Is it worth it? I’m beginning to say no – which is sad, because the organic program should be behind me and helping me, and I feel like I have to fight them just so I can just put the produce on the table. The bottom line is I’m not going to make any more money than anybody else.”
Peter: The “Large” Local Farmer

I never talked to Peter much when I saw him at the Oxford Market. I’d bought his certified
organic spelt flour, but his stall almost always had a line of customers that kept him busy. Some
days, he wasn’t even there, having sent his son to run his market stall for him. So when he
approached me one day, as I was administering my survey of shoppers at the Market, I jumped at
the opportunity to talk. I’d contacted him by phone prior and introduced myself and my project
and he asked if I would like to help him sell his products at a market the coming week. That way,
I could see what his experiences at markets were like, and we’d have the opportunity to talk.
Peter and his wife both come from a long line of family farmers—a fact he is proud to point out
and makes sure to tell his customers. He raises pastured beef, hogs, chickens and grains on about
300 acres 20 miles from Oxford with the help of his brothers.

When he told me how many acres he farms, and he asked me “do you think that’s big?” I told
him it was larger than the farms of the other producers I’d met at the Oxford Market, but that I
knew of other farms that were much larger. “Oh, good,” he replied with a smile. “Lots of people,
when they find that out, become disappointed. They’ll say ‘I thought I was buying from a small,
local farmer!’ when, in reality, we aren’t that big. I’ve just got a family to support.”

One of the ways to support his family was to load up a van with 6 coolers of frozen chicken,
sausages and stew beef, two cases of eggs and a box of assorted flours, and drive over to the one
of six farmers’ markets Peter sells his products each week. He also sells his eggs at
Whole Foods. He told me he’d grown up on a dairy farm and worked with his father and brother
for over 30 years before he moved to his own farm with his wife in the 80s. They’ve been
certified organic since 1995. Peter is part of a large group of small farmers who have adapted to
competition from corporate farms by carving out a niche in the market and finding the customer
who values their products. By finding the farmers’ markets and groceries whose consumers value
his organic meat, eggs and grains Peter has worked hard to find shoppers who will pay the high
price for his product, ensuring his farm’s success.

I asked Peter about the decision to become organic certified, and he replied that “When I grew
up, we farmed conventionally. That’s all we knew. We didn’t know chemicals were bad. We
used them. Then I remember going to a talk in 1982 and started learning that chemicals were
bad, that the fertilizers were bad. And so we started learning how to change that.” He assured
me, however, that there were some very good practices his father taught him. “There were things
that my dad always did, that I really appreciate a lot. He always rotated his crops. He never put
corn after corn. He didn’t use certain insecticides, because of problems with his rotation. And
then back then, GMOs weren’t even on the scene.” Peter says, “I’ve never put out a GMO crop
and I never will.”

He told me a story about how his decision to change his farming practices from conventional to
organic was largely driven by the desire to grow more healthful food. His mother became ill
when he was a teenager, and the family responded with changing their diet. Soon they
determined that using chemicals on the food they grew wasn’t good for peoples’ health either.
His decision to seek organic certification, Peter says, was driven more by practical economic
need. “If you’re doing row crops,” he said, “you need to be certified in order to find a buyer at farmers’ markets or grocery stores.” Not only does this attract the customer, but it also allows Peter to supply animal feed to other farmers who raise organic livestock.

Ultimately, however, Peter was insistent that his organic methods are all about raising nutritious food. “Being organic isn’t just about getting away from pesticides and fertilizers. It’s a part of it, but it’s really about growing nutritious, nutrient-rich foods.” This was something he was obviously passionate about, and Peter was always ready to talk with customers about the healthfulness of his products, as I saw during my time at market with him. Even the lard he sells, he contends is healthy. When I asked if he’d encountered any customers who are skeptical of his claims, he replied that one of the reasons he prefers to sell his products at farmers’ markets is because he gets to talk with and educate the customer.

In addition to talking with his customers, Peter has created a flyer he hands out. It has information about his farm and his products, advertising that his family has farmed for many years and that anyone is welcome to visit. It describes his organic farming practices and states that his goals as a farmer include “rais[ing] products that not only taste better but are nutritionally superior” and to produce “whole foods that are safe and healthy and has history on our side. Not just raised a certain way because it is popular.” Also, in big letters at the bottom of the page, he’s written:

NOT ALL ORGANICALLY RAISED PRODUCTS ARE OF THE SAME QUALITY
NOT ALL LOCAL PRODUCTS ARE OF THE SAME QUALITY
QUALITY DEPENDS ON THE COMMITMENT & INTEGRITY OF THE PRODUCER

Peter spends a lot of time telling his customers that not all organic foods are created equal. “When someone walks into a grocery store and sees two products and they’re both labeled organic and that’s all they know, well, they’re going to choose the one that’s cheaper. They can’t tell the difference,” he told me emphatically. Building a rapport with customers at markets is a much better way for him to convey to the consumer the quality of his product and the hard work that goes into producing it. “For a large corporate farm, it’s easy to do organic because you can have lots of people working for you. Not only is it the farm work, but the paperwork. We have to work very hard to bring our organic products to market, and no one’s going to see that if we only sold our products at a grocery store.”

The Farmers’ Market: Conclusions

The Oxford Uptown Farmers’ Market hosts a variety of farmers from different backgrounds, with different business strategies and different guiding principles. Each of these producers, no matter their “type,” as described above, must find a balance between their personal values and the demands of their consumer. The degree to which farmers are willing to respond to consumer demands is largely dependent on the strength of the farmers’ conviction about their methods, and their need or desire to be profitable. Most farmers I spoke with acknowledged that the customer does not always have the knowledge or experience to appreciate the work that goes into producing the products they desire, be it non-GMO eggs or certified organic lettuce.
Consequently, producers seem to know their own limitations, and use their personal values to guide the decisions they make concerning their business.

Consumers, at least at the Oxford market, tend to be supportive of farmers and are satisfied with the quality and quantity of the products available. The farmers’ market consumer is interested in food, health and cooking, and tends to believe products at the Market are superior. Most are willing to support a farmer’s efforts by paying more for products that are raised organically, but overwhelmingly the most support comes from consumers desiring to support local producers. Consumers value the market experience not only for the products available but for the atmosphere and experience of interacting with vendors and fellow shoppers. As observation and survey has demonstrated, the prime motivations for consumers coming to the Market can be varied, but the welcoming and congenial atmosphere promoted by Market organizers.

In a survey of vegetable farmers participating in the Oxford Uptown Farmers’ Market (see Appendix B), 100% of respondents (N=18) stated that they valued direct interaction with consumers and that these interactions influence what products they provide. Just over 60% of respondents reported that they are asked by consumers about their farming practices and organic certification status, while 22% of farmers reported being asked this frequently. This suggests that the consumer, acting as a “co-producer” of the Slow Food movement is exercising influence in demanding quality food produced in a consumer-approved way. Only 44% of respondents claimed that they were certified organic.

In the end, farming is a business, as all the farmers’ I encountered recognized. However, success in the business of farming is interpreted differently, as I learned, depending on whether or not you have a family to support, debts to pay off, a family tradition to carry on or a hobby to explore. None of the farmers I met were in the business for the profits, but rather for a way of life they desired. All of the producers I spoke with were attentive to customer needs, but aware of their physical, financial and ideological limits. Finally, all of the farmers at the Oxford Uptown Farmers’ Market, whether they used conventional, organic or “natural” agricultural methods, expressed a desire to protect the natural environment. As one farmer put it, “You don’t want to kill the land.”

Part II

Agriculture and the Environment

There remain those who question the legitimacy of organic and alternative production and distribution methods, maintaining that such methods are less efficient and more expensive than conventional means (De Ponti et al. 2012, Seufert et al. 2012, Biello 2012); however with long-term sustainability in mind, exploration of alternative agricultural methods begins to appear very sensible (WorldWatch Institute 2006, Badgley et al. 2007, De Schutter 2010, Feyder 2013, DeShutter 2013). Agriculture in its very nature is intrusive. It is inherently destructive, requiring humans to disrupt natural ecosystems in order to produce food in one place. Agricultural land conversion and intensification alters the biotic interactions and resource availability in ecosystems, having serious local, regional, and even global environmental consequences (Altieri
1998; Matson et al. 1997), yet in the world today, societies have developed around the security provided by agriculture. It has allowed humans to live in sedentary communities and become established in many ways otherwise impossible were we constrained to a nomadic, hunter-gatherer societies (Cunningham and Cunningham 2010).

The impact of agriculture on native biodiversity and ecosystem function varies considerably among crop types and production methods. There are many ways that farmers across the globe negatively impact the natural environment, but methods exist to mitigate these harmful effects. The merits of alternative agricultural methods, and perhaps the reason they are so highly advocated by the environmentally concerned, lie in the creation of a system of production proven to yield sufficient output without incurring superfluous damages to local ecosystems. This juxtaposed with the various harmful excesses inherent in conventional methods of agriculture, makes clear that organic and alternative methods are a viable, sustainable, and ecologically-sensitive alternatives to modern conventional methods of production (Horrigan et al. 2002). This section will provide a brief overview of the development of modern conventional agriculture and the emergence of organic and alternative methods in the late twentieth century. It will then examine the negative impacts of conventional agriculture on the environment, in addition to those impacts inherent in any farming practice. Organic and alternative methods of agriculture will be explored and offered as means to mitigate these harmful effects while remaining economically viable for the farmer.

The Effects of Agriculture on the Natural Environment

The expansion of agricultural land has become necessary with the exponential growth of the human population if sedentary community structures are to be maintained. This has made the conversion of natural habitat to productive farmland the most significant human alteration to the global environment. From 1700 to 1998, the total area of cultivated land worldwide increased 466% to meet human demands (Matson et al. 1997) and continues to encompass the majority of land use in many countries. For example, 76% of Great Britain is used for agriculture today (Wickramasinghe et al. 2003). As more sophisticated farming techniques have developed, efforts have been made to get the most out of acreage, leading to a slight decline in the rates of expansion of farmland in the past three decades. Food production per area of land has increased dramatically, even to the point of outpacing global human population growth. For example, long-term yield patterns of corn in eastern Colorado have increased by 400-500% since 1940 and wheat yield have exhibited increases of 100% (Matson et al. 1997). Such yield increases, and their consequential requirements for less space, are only made possible through agricultural intensification.

Methods of intensification were perfected in the United States during the Green Revolution of the 1950s and 1960s. First, the advent of new, commercially available, synthetically produced pesticides and fertilizers eliminated the need for much of the physical labor previously involved in pest and soil management (Davidson 2008). In addition, decisions that required farmers to judiciously determine which crops to plant in which rotation to maximize soil fertility and yield, while minimizing the risks of pests and weeds, were essentially unneeded when there were chemicals available that could compensate. Today, 5 million tons of pesticides are applied
annually to crops worldwide (Kleijn et al. 2001). **Table 1** illustrates how much pesticide alone is used on just three common crops in America annually.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres Planted 1996-2004</th>
<th>Pounds of Herbicides and Insecticides applied annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>716,241,000</td>
<td>1,743,593,040</td>
</tr>
<tr>
<td>Soybeans</td>
<td>653,725,000</td>
<td>746,226,410</td>
</tr>
<tr>
<td>Upland Cotton</td>
<td>127,878,000</td>
<td>421,586,580</td>
</tr>
<tr>
<td><strong>Total: All Three Crops</strong></td>
<td><strong>1,497,844,000</strong></td>
<td><strong>2,957,137,030</strong></td>
</tr>
</tbody>
</table>

A second major characterization of agricultural intensification was the wide implementation of methods of irrigation across nations, which allowed farmers to circumvent the ceiling that nature had placed on farmers’ yields with limitations of rainfall. The development of irrigated land increased at a rate of 2.2% per year between 1961 and 1973 and 40% of the world’s crop production now comes from the 16% of agricultural lands that have been irrigated (Matson et al. 1997), making evident the improvements that irrigation systems can make on crop yields.

A third major development made possible by the green revolution was the development of high yielding varieties of crops. By selectively breeding plants to have those characteristics most desirable to farmers, agronomists have developed new strains of crops that can maximize production per area while giving increased pest resistance. This also often means that more food can be grown in a smaller space (Coleman 2005). The national agricultural research systems that emerged during the 1960s are credited with the production of roughly 60% of the GRMVs produced, while international agriculture research centers are said to be responsible for the development of 35% of these varieties, including remarkably productive strains of rice and wheat (Darity 2008). Rather than be at the mercy of a good season, farmers were now able to select seeds that would dramatically increase their chances for a good harvest and decrease the risks involved.

Today, scientists are on the edge of a new frontier with technologies in genetic engineering that allow the phrase “selective breeding” to take on an entirely different connotation. While formerly constrained to traits preexisting within the crop’s gene pool, scientists are now able to insert genes into the chromosomes of crop species that will produce desirable traits in the adult plant. Such traits include the production of endogenous pesticides, frost-resistance, and the production of extra vitamins and minerals. The use of genetically modified organisms (GMOs) and the acreage devoted to their production has increased rapidly since the conception of the biotechnology. Between 1990 and 2006 more than 11,373 field tests for 750 different genetically engineered crop varieties were carried out in the United States (Cunningham and Cunningham 2010). Worldwide, about 25 percent of all cultivated land was planted with GMOs in 2006, with the United States accounting for 56 percent of that acreage (Benbrook 2004). Though not as ubiquitous as popular conventional varieties, some GMOs have reached a mainstream status, at least in the United States. Currently, about 82 percent of all soybeans, 71% of all cotton, and 25% of all corn grown in America are genetically engineered varieties and
estimates are that at least 60 percent of all processed food in the U.S. contains GMO ingredients (Coleman 2005). The use of GMOs has allowed farmers to not only constrain themselves to specific domesticated varieties, but also allows them to favor custom-tailored, designer varieties of crops.

Agricultural intensification has made possible the exponential rise in production without a reciprocal rise in land use (Cunningham and Cunningham 2010). It has allowed for farmers and agribusiness the ability to decrease the risks of an enterprise formerly at the mercy of the whims of nature, providing an insurance of sorts. Special seeds maximize yield per acre, fertilizers ensure a rich growing medium, irrigation ensures adequate water, no matter the weather, and pesticides, herbicides and fungicides minimize losses (Coleman 2005). However, intensification, like all other things, hasn’t occurred in a vacuum, and these practices upon which conventional farmers have come to depend have been shown to have consequences not only in their fields, but also at the landscape level (Medley et al. 1995, Tscharntke et al. 2005, Gabriel et al. 2010). Agriculture can have wide ranging impacts on local and regional community resilience and stability on a large scale, and may be positive or negative, depending on land management practice. Ecosystem services to agriculture (pollination, natural pest predation, soil renewal and fertility), can be either enhanced or greatly hindered by the characteristics of the agricultural landscape (Tscharntke et al. 2005).

Problems with Conventional Methods of Agriculture

The Drawbacks of Synthetic Pesticides and Fertilizers

In the years following the boom in agricultural chemicals, it became evident that the benefits reaped from their use came with costs, and the frequencies and proportions with which these chemicals were applied only served to magnify their effects. A 2003 study conducted by the National Science Foundation’s Center for Integrated Pest Management on trends in agricultural pesticide use alone, found that 1.46 billion lbs. of active pesticide ingredients were being used per year in 1979, compared to just 127 million lbs. in 2007 (Ritter 2009).

Consider the energy requirements for the production, distribution and application of agricultural chemicals. First, they must be manufactured. This simple starting point poses its own environmental implications. The nitrogen required by all plants and, thus, supplied by all synthetic fertilizers, is produced via a fossil-fuel consuming industrial process that works to convert abundant atmospheric nitrogen into a form available to plant life. The phosphorous, common in synthetic fertilizers must be mined from phosphorous-rich deposits in rock, bringing into question the disruption of ecosystems required for the extraction of the mineral. Likewise, synthetic pesticides are almost all petroleum-based and require use of fuel and resources for their manufacture, and according to the EPA, 38% of pesticide ingredients have undergone no testing regarding their potential threat to the safety of the environment or human health, and only 10% have been subject to complete testing (Coleman 2005).

After chemicals have been applied, runoff of excess chemicals is another issue. When crops are watered or when it rains, chemical residues are washed off of the plants and from the soil into nearby streams, creeks, rivers, and eventually even oceans. This can especially be an issue in areas that experience intense dry seasons followed by wet, rainy seasons (Ntow et al. 2008). The
presence of such agrochemicals has been found to pose threats to the immediate aquatic ecosystems downstream. Many of the pesticides used in the Mississippi River Basin, for example, are present in the Mississippi River and its tributaries. A regional-scale study of a 10-State area in the upper Midwest showed that large amounts of herbicides are flushed into streams during storm runoff in late spring and summer each year, following application of herbicides to cropland (Thurman et al. 1992).

Storm runoff produces high concentrations of many herbicides in streams across the upper Midwest from Nebraska to Ohio for extended periods and concentrations of herbicides in some small streams may exceed 100 micrograms per liter (µg/L) for short periods. Flow from these streams, in turn, transports significant amounts of herbicides into large rivers such as the Missouri, Ohio, and Mississippi, and eventually to the Gulf of Mexico (Pereira and Rostad 1990, Goolsby et al. 1991, Pereira and Hostettler 1993). In addition, results of multiple studies have revealed that sediments can act as sinks for the persistent contaminants allowing for their resuspension at the sediment-water interface and perhaps increasing bioavailability of the pesticide compounds and promoting their accumulation in the food chain (Kasozi et al. 2006, Ntow et al. 2008).

Agricultural chemicals introduced to water sources via runoff need not bioaccumulate to pose a threat to aquatic ecosystems. Oxygen budgets of many major coastal ecosystems have been adversely affected mainly through the process of eutrophication (the production of excess organic matter). Fertilizers and carbon-based pesticides washed into water systems catalyze algal blooms and fuel the fuels the development of hypoxia and anoxia when combined with water column stratification. The resulting loss of oxygen creates an environment that is inhabitable by most—if not all—aquatic organisms (Diaz 2001, Kasozi et al. 2006) and since the 1960s, increasing hypoxia and anoxia have been blamed for the loss of fisheries, biodiversity, alteration of food webs and replacement of the highly valued demersal fish species with less desirable planktonic omnivores. In fact, of the 26 commercial species fished in the 1960s only six still support a fishery (Diaz 2001). The Mississippi estuary at the mouth of the Gulf of Mexico is perhaps the most well-known and largest case of hypoxic conditions in US waters (Osterman et al. 2009, Turner and Rabalais 2013).

Robert J. Diaz (2001) conducted research presenting an overview of the effects of hypoxia on large coastal ecosystems around the world. His findings show that many ecosystems have reported some type of monotonic decline in dissolved oxygen levels through time with a strong correlation between human activities and declining dissolved oxygen. Key areas where waters come together such as the Gulf of Mexico, Texas-Louisiana, Northern Adriatic Sea, Italy-Croatia, Kattegat, and Sweden-Denmark are typical of most severely stressed ecosystems that are currently burdened with severe seasonal hypoxia, with highly affected benthic invertebrate communities (Diaz 2001). A large area at the mouth of the Gulf of Mexico has actually come to be known as the “Dead Zone,” as it is characterized by this hypoxic condition, being fed all of the agricultural runoff that has traveled down the Mississippi River (Leigh 2004).

Often these effects of agricultural runoff are exacerbated by the overuse of such chemicals. Waste, due to the excess application of fertilizers and pesticides, is common, and reasonable estimates suggest that five million tons of agrochemicals are applied annually to crops
worldwide. Their inexpensive price and broad dispersal mechanisms make waste a common occurrence (Matson et al. 1997, Kasozi et al. 2006), and many farmers simply lack the knowledge to know that more is not always better. For instance, only 40-60% of the nitrogen applied to crops is utilized by the plants, while the rest left in the soil or lost. Many of the nutrients in fertilizers are, in fact, not synchronized to plant demand due to the timing of nutrient application. Such fertilizers are therefore superfluous, as they are unable to be used (Leigh 2004).

The reduced content of soil organic matter in fields commonly sprayed with fertilizer and disruption of the soil biological community result in a reduced ability to retain and mediate the transfer of excess nutrients (Matson et al. 1997, Hienze et al. 2010). Excess nutrients can also result in increases in plant pathogen and pest insect populations, requiring the use of even more pest control chemicals (Matson et al. 1997, Bengtsson et al. 2005). When farmers do not use pesticides judiciously, negative impacts can also be seen on species not intentionally targeted. Pollinators, insect predators or otherwise benign insect species, for example, can become casualties of pesticide use (Kremen et al. 2007). A significant fraction of pesticide applied fails to reach target pests at all, and instead finds its way into adjacent ecosystems via aerial drift (Matson et al. 1997, Banken 1998), or runoff, in some cases.

Finally, in addition to posing multiple threats to the environment, liberal use of agrochemicals has been found to be a danger to human health. Traces of the most commonly used agricultural chemicals have been confirmed in the groundwaters and aquifers of the United States, and since 53% of potable water is sourced from groundwater, this poses a serious threat to human health and requires that drinking water be heavily regulated and purified (Spalding 2003). In a study conducted by Steele et al. (2008), 89% of the groundwater in Maryland tested positive for the presence of one or more detectable pesticides and 86% of groundwater in Nebraska tested positive. Pesticide residues on produce also pose a threat to humans, as they tend to be especially difficult to wash off of some foods, and accumulate in the liver and fatty tissues of consumers. To raise awareness, the USDA has even released a list of the “dirty dozen” outlining the top 12 most commonly and heavily contaminated foods. Finally, heavy use of chemicals on crops also poses serious threats to agricultural workers. Recent studies suggest that heavy or long-term exposure to agricultural pesticides can contribute to the development of certain cancers and can even cause birth defects in infants and developmental effects in young children (Coleman 2005, Kasozi et al. 2006).

Drawbacks to Modern Irrigation Practices

The development of modern methods of irrigation has had major impacts on the productivity of agricultural lands, but the diversion of water to fields has made for problems elsewhere. While the farms included in my region of study do not generally irrigate their fields, conservation of water remains a serious environmental issue, particularly in years of drought. Overpumping continues to be a serious concern as old reservoirs lose capacity due to siltation and new ones become difficult or impractical to site. In many areas of the world, water is a precious commodity and scarcity of water can only be expected to increase with human population growth (Coleman 2005). Aside from diverting water from other human use, irrigation siphons away water from natural ecosystems. Irrigation return-flows typically carry more salt and minerals
than the groundwater or surface source that supplied it, affecting systems downstream. It can also leave downstream systems so depleted of water that riparian systems and fish and wildlife populations are irreversibly damaged. Continued long-term irrigation can even have negative long term effects on the very land to which water is being supplied. In arid regions, irrigated agricultural lands are continuously degraded by salination and waterlogging. In developing countries, approximately 15 million farmers have experienced reduced yields due to salt build-up and supersaturated soils (Matson et al. 1997).

Loss of Diversity

The human selection of one plant or animal species over another has had far reaching effects for centuries, and this continues to prove true today as farmers artificially select for species based on consumer demands. Heavy use of insecticides has not only decreased the numbers and diversity of target pest insects, but also adversely affects the populations of predatory insects, birds and bats that prey upon those target species (Chamberlain et al. 1998, Hutton and Giller 2003, Jeffries et al. 2013). As a result, diversity is lost not only directly through the eradication of pests, but abundance and diversity of species in agricultural areas is also lost due to eradication of a food source. Bats preying on nocturnal insects, for example, rely upon 18 insect families that are important components of the bat diet. Bats are resource limited, so a reduction in prey availability has an adverse effect on bat populations, therefore loss of insect prey through intended extermination or as nontarget effects has a profound impact on bat abundance and diversity (Wickramasinghe et al. 2003). The same holds true for many species of insectivorous birds (Benton et al. 2002) for similar reasons. Through the extermination of pest species, or even nontarget insects, the food webs to which they are connected are also affected.

The spraying of weeds has similar effects. Though farmers see certain plants as undesirable in their fields, many insects and herbivorous animals may depend on those plants as a food source. As discussed earlier, the various chemicals sprayed onto fields not only hit the fields, but also make their way into adjacent hedgerows and wooded areas, where they can damage vegetation. Studies have shown that abundance and diversity of vegetation near agricultural ecosystems is negatively impacted by the use of herbicides (Aude et al. 2003). In addition, it follows that a decrease in plant diversity is followed by a decrease in pollinator diversity (Breeze et al. 2014, Buri et al. 2014) herbivorous animal diversity, and a consequent indirect decrease in animals that interact closely with plants in the area.

The decline in species diversity accompanying conventional agricultural methods also reaches into a loss of genetic diversity as farmers continue to select from only a handful of domesticated crop varieties. The very nature of agriculture as it is practiced today decreases crop diversity as new technologies have facilitated the move from small farms to large scale corporate farms. Farming on a large scale for profit encourages farmers to plant monocultures, that is, one crop for the large expanse of an entire field or two (Darity 2008). Most often, these farmers will plant only the most desirable variety of the one crop, essentially eliminating any genetic variation, putting faith in the ability of fertilizer and pesticides to keep all their eggs safe in one basket. The development of Green Revolution Modern Varieties (GRMVs) and now GMOs makes the selection of only several custom varieties even more attractive, but many farmers don’t understand that monocultures come with their own problems (Coleman 2005).
Biodiversity in the field influences the diversity of other species in the immediate area and beyond, including pests and their predators, microorganisms and the species that rely upon them. Conventional farmers likely aren’t concerned with species diversity in the larger agroecosystem, as long as these species don’t affect their operation, but in the long run, this lack of diversity will negatively impact the farmer. Low diversity often results in greater crop losses from an insect pest complex because the cropland is less diverse and the crop more abundant (Matson et al. 1997, Shah et al. 2003). In monocultures, the trend tends to be for higher insect pest densities, forcing farmers to rely even more heavily upon chemical controls. By contrast, polycultures, in which crop species and variety are varied, often exhibit lower insect pest densities, as a result of the fostering of natural systems.

Lower insect pest densities are the outcome of higher predation and parasitism rates and higher ratios of natural enemies to insect pests (Matson et al. 1997, Landis et al. 2000, Snyder and Ives 2003, Bianchi et al. 2006). Low biodiversity also makes crops more susceptible to microbial pests, and crop diversification can encourage or prohibit pathogen growth (Matson et al. 1997, Mader et al. 2002). This can prove disastrous on a large scale as witnessed in the 1950s, when a fungus causing “stem rust” began to destroy wheat fields in the United States and Canada. Disaster was only staved off when plant breeders cross-bred five Mexican wheat varieties with twelve imported ones, to create a strain resistant to the fungus (Coleman 2005). In addition, low crop diversity inhibits beneficial microbes responsible for soil nutrient cycling and other services, requiring farmers to rely ever more heavily on soil amenders and crop fertilizers (Mader et al. 2002).

Loss of Soil Integrity

Soil health is critical no matter what crops farmers decide to plant; that is, it was a priority before manmade methods promised to provide all the services that the soil once did for free. A fertile soil provides essential nutrients for crop plant growth, supports a diverse and active biotic community, exhibits a typical soil structure, and allows for an undisturbed decomposition. This is to say that soil is inherently alive and allows for mutualistic, symbiotic relationships to form between plants and beneficial bacteria and fungi. Organic matter in the soil has a profound impact on overall soil quality, acting as a substrate for nutrient release, and therefore increases nutrient supply (West and Post 2002; Berg 2009). It encourages granulation for effective drainage, increases soil organism activity, improves soil fertility and productivity and increases water storage capacity, minimizing the amount of rainfall or irrigated water needed for crops. Most importantly, it minimizes loss of topsoil by erosion (Matson et al. 1997, Mader et al. 2002).

In conventional agricultural operations in the temperate zone, soil organic matter losses are most rapid during the first 25 years of cultivation, with losses of up to 50% the original carbon (Reganold et al. 1987, Lal 2004). Loss of topsoil by erosion has been shown to reduce organic matter, fine clays, available water-holding capacity, plant rooting depth, soil productivity and overall crop yields. At current rates of erosion for typical conventional systems, it has been projected that all topsoil will be lost in as soon as 50 years, exposing denser, less fertile subsoils. Uncontrolled erosion can substantially decrease the benefits from improved plant varieties and synthetic fertilizers, which have the greatest potential for increasing production on deep, relatively uneroded topsoils. It is believed that, at some point, the increasing yield reduction from erosion may even exceed the diminishing yield increase due to the technological progress made
in agricultural methods (Reganold et al. 1987, Mader et al. 2002). At present, approximately 75 billion tons of topsoil is lost to erosion worldwide, and in the United States, about 6.9 billion tons is lost each year (Pimentel 2000). India’s intensive rice-wheat systems, for example, are beginning to show signs of serious decline associated with the loss of soil quality and increased plant health problems (Matson et al. 1997).

Common soil amenders, such as sewage sludge and fish emulsions, do not adequately serve as replacements for topsoils and organic matter, regardless of the adequacy of the nutrients they supply to crops (Gonzalez-Ubierna et al. 2012). As discussed earlier, not all nutrients applied to plants can be utilized and, in addition, the application of fertilizers leads to increased emissions of gases that play critical roles in tropospheric and stratospheric chemistry and air pollution. Denitrification of nitrogen fertilizers into nitrous oxides, for example, results in worldwide emissions from agricultural soils at estimated rates of up to 25% of the global fossil fuel combustion sources. These nitrous oxides are a critical regulator of tropospheric ozone, and important component of smog. In addition, agricultural emissions are also a critical source of several greenhouse gasses, including carbon dioxide, nitrous oxides, and methane (Matson et al. 1997, Mader et al. 2002).

**Alternative Methods of Agriculture**

In answer to these problems introduced by conventional agricultural methods, organic and alternative methods of crop production work to mitigate the effects of agriculture on the natural environment. “Organic agriculture” as mentioned earlier, is defined by the USDA (2010) National Organic Standards Board (NOSB), as an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain, and enhance ecological harmony.” The NOSB also states that “the primary goal of organic agriculture is to optimize the health and productivity of interdependent communities of soil life, plants, animals and people.”

Organic certified agriculture is not the only set of alternative practices that espouse a holistic approach to raising crops in the natural environment. Many of the farmers I met incorporated alternative practices to varying extents, with the aim of mitigating harm to the environment. I use organic agriculture here as an example (in part because it has a standard definition and formal standards) representing a collection of practices attempting to circumvent the ecological harm associated with conventional methods.

The issues raised by the excessive use of chemicals in conventional methods of production are directly addressed in the requirements for organic certification. Those operations qualifying for the organic label include those raising crops “without using most conventional pesticides, petroleum-based fertilizers, or sewage sludge-based fertilizers.” In addition, the US National Organic Program “prohibits the use of genetic engineering, ionizing radiation, and sewage sludge in organic production and handling. As a general rule, all-natural (non-synthetic) substances are allowed in organic production and all synthetic substances are prohibited” (USDA 2010).

Unable to utilize the chemical pest management regimens of conventional farmers, organic farmers must instead use mechanical methods and biological controls, which are generally more
labor intensive. This includes physically pulling weeds and removing pests and the use of biological controls, such as the release of insect predators into fields. Many farmers seeking to mitigate their use of chemicals implement what’s known as integrated pest management (IPM) techniques, which advocate a combination of varied natural pest controls and is shown to be quite effective (Hutton and Giller 2003). These alternative methods of pest control mitigate, if not eliminate some of the negative impacts associated with the use of these chemicals, including water and soil contamination, threats to ecosystem health, and threats to human health, while controlling pests effectively.

Alternative agricultural management has been shown to promote abundance and biodiversity of species both within and surrounding the agroecosystem, a key factor in mitigating the adverse effects of agriculture on the landscape. A meta-analysis performed using research prior to December 2002 at the Department of Ecology and Crop Production Science in Sweden revealed that organic farming systems usually have 30% higher species richness than comparable conventional farming systems, with 53 of the 63 pairs of farms (one conventional and one neighboring organic) showing a higher species richness in organic systems (Bengtsson et. al. 2005). On average, birds, insects and plants were found to be 50% more abundant in both number of individuals and number of species. Soil organisms and predatory insects in particular were also found to respond positively to organic farming. Even when studies were done at three different spatial scales, organic farms were consistently more species rich than conventional, though the effect was found to be greatest at the plot scale. In addition to species richness, positive effects were also seen on species abundance, with 96 of 117 studies revealing organic farms to be more abundant in soil microorganisms, earthworms, microarthropods, fungi, beneficial predatory insects (Bengtsson et al. 2005).

Research studies on the impacts that organic and conventional farms have on select species have also been conducted. Various studies on bat populations near agricultural operations find that organic farms tend to support a higher moth and nocturnal insect diversity and abundance, thereby supporting important components of the bat diet. Consequently, bat activity is found to be, in some cases, as much as 61% higher on organic farms, than on conventional ones, with foraging being 84% higher (Wickramasinghe et al. 2003). Similar studies (Benton et al 2002, Chamberlain et al. 1998) have been performed that focus on bird populations showing that birds respond in much the same way as bats with regards to insect populations. However, research in Scotland tends to show a much stronger relationship between insectivorous bird population and agricultural intensity, rather than prey insect populations, as the greatest determining factor (Benton et al. 2002). Regardless, positive effects on both bird and bat populations are consistently seen when organic agriculture is incorporated into the landscape.

High plant abundance and diversity, and consequently accompanying overall species diversity, is also seen in the hedgerows and margins of organic agricultural fields (Aude et al. 2003, Bengtsson et al. 2005). Studies comparing the spontaneous vegetation of comparable hedgerows in the same areas of Denmark show that when farms are identical in terms of landscape, age, soil type, nutrient status and width, organic farms always have a significantly reduced impact on surrounding vegetation and associated animal species (Aude et al. 2003).
In addition to the naturally occurring plant and animal diversity, planned diversity is also encouraged and often seen on organic farms. Farmers have incentive to diversify crops, because polycultures have been found to decrease the incidence of plant pathogens and insect pests. Farmers who want to reduce their dependence on chemicals can choose crop rotations to preserve soil nutrients and to prevent pests. Such practices keep variety in plant functional types, and encourage the selection of several varieties of a single crop. This creates genetic diversity to serve as insurance of sorts, should one part of the harvest be lost. In addition, though high yielding domesticated varieties are common, organic farmers are not permitted to use GMOs, thus further discouraging the reliance upon a single, designer variety of plant (and a single plant management system) and encouraging crop diversity (Matson et al. 1997, USDA 2010).

Finally, alternative tillage and fertilization practices have been shown to alleviate many of the problems associated with conventionally managed agricultural soils (Lal et al. 1997, West and Post 2002). The soils of organic farms have been found to have enhanced soil fertility, and this is thought to be because soil maintenance is a priority for farmers who cannot fall back upon synthetic fertilizers. Researchers at the Institute of Organic Agriculture and the Swiss Federal Research Station for Agroecology and Agriculture have determined that inputs of energy and approved fertilizers are reduced 34 to 53% on organic farms when compared to their conventional counterparts (Mader et al. 2002). This is believed to be due to a higher soil fertility and higher biodiversity on organic farms that render these systems less dependent upon external inputs (Mader et al. 2002, Van Dipeningen et al. 2006). Methods of low-till and no-till cultivation, crop rotation and the use of cover crops are found to increase soil aggregate stability, making soils on farms using these methods as much as 10 to 60% more stable than soils on farms using conventional tillage practices. A positive correlation between aggregate stability and microbial biomass and between stability and earthworm biomass is often observed, and mycorrhizae colonization in plant roots on organic farms has been measured as much as 40% higher than their conventional counterparts (Reganold et al. 1987).

In a study by the Department of Agronomy and Soils at Washington State University, scientists found that organically farmed soils had consistently higher organic matter content, thicker topsoil depth (16 cm greater) and less soil erosion than conventionally farmed soils (Reganold et al. 1987). Protection against erosion is often enhanced on farms using cover crops and low/no-tillage methods, but also via intercropping and agroforestry methods (Matson et al. 1997, Van Diepeningen et al. 2006). In a study of two adjacent winter wheat fields from two farms, one organically managed and the other conventionally managed, it was also found that moisture contents were consistently higher in the organically farmed soils (Reganold et al. 1987) suggesting a decreased need for external water inputs and the potential to relieve stress placed on reservoirs used for irrigation.

Are Alternatives Competitive?

There are many alternatives to conventional agricultural methods which aim to reduce or eliminate the environmental and human health repercussions of conventional practices. Polycropping, crop rotation, agroforestry, IPM and companion planting are methods by which farmers can reduce dependence on sprays. No-till and conservation tillage regimes, as well as the use of compost additions to soil can mitigate concerns of soil erosion, topsoil loss and excessive
Evidence exists to contend that alternative agricultural practices can make food production more ecologically beneficial.

However, concerns remain as to whether practices which are environmentally sensitive can be profitable to farmers and supply adequate, affordable food for consumers. Major arguments against the widespread implementation of alternative methods center around their inability to be profitably used on a large scale. Without chemical means of fertilization and pest control, farm work becomes more time consuming and laborious. Depending on the farm age, size and crops grown, overall yields may be lower for a period of time. As a consequence, prices will have to rise and farmers and consumers alike worry that they won’t be able to afford it. It is widely believed that alternative methods are not more widely implemented due to limited acceptance stemming from economically attractive pricing and policies that encourage the use of pesticides. Implementation of alternative methods, and particularly integrated pest management, also requires intensive knowledge that intimidates many farmers (Matson et al. 1997).

A lack of resources and education for both producers and consumers about alternative methods, and increasing pressures on small farmers to compete with large corporate producers, and a dearth of governmental support makes a switch to unfamiliar alternative methods daunting and unpredictable. Growth in consumer interest in organic and alternative practices, however, is making the market for this sort of production more appealing to farmers. If farmers are sure that they can pass the higher price of production onto consumers who will willingly pay it, then the transition is easier. In addition, organizations have appeared throughout the country to educate and provide resources to farmers wanting to incorporate alternative methods. About half of the farmers at the Oxford Uptown Farmers’ Market were familiar with the Ohio Ecological Food and Farming Association (OEFFA) a statewide organization that provides education and resources to farmers seeking to learn more about environmentally sustainable methods of agriculture and local food marketing and even provides organic certification for those farmers interested. Two of the farmers I spoke with at the Oxford Market were working with a local seed saving non-profit to develop landraces of favorite crops, creating biodiversity and preserving farmer agency (Huerta, 2013).

As organic agriculture, for example, gained popularity in the 1990s and 2000s, the argument that organic farms produce yields smaller than their conventional counterparts was trumpeted as a warning against alternative methods. Many studies have indicated that, depending on crop type and farm age, yields from organic farms can be 20% less than their conventional counterparts (De Ponti et al. 2012). Other research has demonstrated that this claim fails to be a hard and fast rule and is affected by many variables (WorldWatch 2006, Seufert 2012). A long-standing argument that alternative farming, if widely implemented, would yield only one-third to one-half of conventional yields has been used to deterred farmers and policy makers, but such claims have been disputed (WorldWatch 2006). The Research Institute for Organic Agriculture in Switzerland conducted research that showed organic farms were only 20% less productive than conventional plots over a 21-year period (Halweil 2006). And similar research conducted by Per Andersen and colleagues confirmed that organic plots were, on average, 80% as productive as conventional ones, in an analysis that assessed 200 studies in North America and Europe (Cunningham and Cunningham 2010). Other researchers have uncovered and even narrower gap and some have found no difference at all, over time (Pimentel 2000).
Projections into the future of food production under alternative methods have been limited by a dearth of reliable data, variation in many contributing factors and the narrowness of their scope. The argument that without chemical fertilizers, farmers can’t possibly supply enough nutrients to the soil for adequate crop yields is one such example, and relies on broad assumptions about the sources of nutrients and the varieties of crop grown. A study conducted by the U.S. Department of Agriculture showed that all the manure in the United States would yield only one-quarter of the nation’s fertilizer needs (Halweil 2006), leading many to believe that food production without use of synthetic fertilizer would yield only one-quarter of the crop. This assumption fails to consider that farmers have other means of supplying nitrogen and other nutrients to the soil. Looking at 77 studies from temperate areas and the tropics, University of Michigan scientists found that greater use of nitrogen-fixing crops in the world’s major regions could result in 58 metric tons more nitrogen than the amount of synthetic nitrogen used annually, and Washington wheat farmers have matched conventional wheat yields using a rotation of green manures such as pigeon peas and groundnuts (Halweil 2006). It is clear that more research needs to be conducted before definitive claims about the efficacy of alternative methods and accurate projections across time and space can be useful.

There remains the fear that environmentally sensitive methods of agriculture require high risk and investment that fails to give satisfactory economic returns. Like other fears about the use of alternative methods, the economic viability of such systems is subject to a variety of factors and circumstance. In a study conducted by the Soil Association, for example, researchers found that a switch to organic methods actually proved more cost effective for farmers—especially those in poor developing areas (Sams 1998, Soil Association 1998). Establishment of organic agricultural operations in rural South America has consistently brought a stronger, self-reliant local economy and a greater income security for farmers. Small farmers, without sufficient funds for large initial investment, have greatly benefitted from a switch to organic farming, because, since organic methods minimize off-farm inputs, a reduced cash investment is required (Sams 1998). The practice of alternative methods, therefore, may be most appropriate to small farmers in the United States with similar financial concerns.

Additionally, the yield gaps witnessed between conventional farms and farms using alternative methods (organic operations, specifically) grow consistently narrower in developing countries, with some instances showing organic methods to be even more effective than conventional means (Pimentel et al. 2005, Halweil 2006). This consequentially minimizes risk involved, as well as makes the agricultural business accessible to farmers for whom a high initial outlay is beyond their reach. On a national scale, seeds, fertilizers, and sprays required for conventional production may not be available to farmers due to a weak economy or political turmoil. This makes organic methods an even more appealing option for small farmers in rural communities (Sams 1998, Soil Association 1998). Implementation of alternative methods, therefore, seems most feasible and beneficial to small farmers, for whom capital is limited and land area is small enough to make labor-intensive methods practical.

Increasingly large farmers and multi-national farm operations are seeing organic production as a good commercial proposition (Soil Association 1998) and as consumer demand for produce free of chemical residue grows, so does the opportunity for profit. Large corporations have taken
advantage of this opportunity and incentivizing large scale farmers to become certified organic. Bolthouse Farms, a vertically integrated organic farm company, for example is owned by the Campbell Soup Company, and Cascadian Farm is the organic arm of General Mills. Support from state and local governments has come in the form of financial incentives to farmers who implement conservation tillage and conservation easements. Government funding rewards farmers who participate in wildlife conservation programs, grassland conservation programs and a variety of others that encourage sustainable and management and environmentally sensitive development.

The Farmer as a Steward of the Land

Recent research considers organic and “sustainable” systems as alternative forms of agriculture which may reduce detrimental impacts on natural communities and enhance overall agrobiodiversity. Biodiversity in agroecosystems has been established as highly valuable for both agricultural production and food security, and biologists have recommended a variety of ways that this diversity can be enhanced and entire agricultural operations made more environmentally sustainable (Bandyopadhyay and Contractor 2012, Love and Spaner 2007, Thrupp 2000). Investigations into the political economy of the development of sustainable agriculture programs and initiatives in the United States have revealed, however, that the idea of what is “sustainable” is highly malleable (Constance 2010). As sustainability in agriculture becomes more desirable (and more profitable), the definition of what is “sustainable” has broadened.

The social role of the farmer is complex and beliefs and attitudes about conservation have been found to be contradictory (Comito et al. 2013). There is a perennial tension between two conflicting components of farmers’ roles as stewards and as business persons. My experiences with farmers at the Oxford Uptown Farmers’ Market revealed the requirement that farmers reconcile their needs to be profitable, their desires to uphold family tradition and their wishes to live lightly on the planet. In this way, farmers serve a critical role in translating the demands of the customer to environmental impact.

First to consider is what customers are demanding. If the demand is that farming be environmentally sustainable, regardless of cost to the consumer, then the farmer’s decision is easy. In this scenario, the farmer does all she can to not harm the environment. If the customer doesn’t require that a farmer use methods that protect the natural environment, then the farmer must assess the value of implementing alternative practices knowing that the customer may not reward her efforts. If the customer doesn’t value ecologically sound methods of farming, then it is unlikely they will pay the higher costs associated with such production, leaving the farmer to balance her role as a steward and her need to stay in business. Fortunately for farmers at the Oxford Uptown Farmers’ Market, conscientious shoppers generally value the extra effort put forth by farmers to raise their crops without harm to the environment, and in most cases is willing to pay the price to support a local producer.

Little research has attempted to tie together the dynamic between consumer and producer ideologies and their possible indirect effects on the agroecosystem. Though the connection between agrobiodiversity, cultural memory, conservation and farmers’ decision making has been
touched upon (Reimer et al. 2012), study on this area is lacking. “Agricultural anthropology” has been suggested as a potential holistic subdiscipline for incorporating anthropological studies of agroecology, which currently have no unifying theoretical framework (Veteto and Skarbo 2009). It is clear, then, that an “anthropological agrosience” may also be in order, to incorporate agricultural studies which go so far as to connect environmental biology and consumer and producer ideologies.

**Soil Analysis**

There are many ways to assess the environmental impact of an agricultural system and many ways to measure agroecosystem health. The health of the environment on a farm can be influenced by both farm history and by farming practice, and I was particularly interested in whether the farming practices of producers at the Oxford Uptown Farmers’ Market would have any noticeable impact on the agroecosystem. Various methods for measuring agroecosystem health on farms include assessments of diversity and abundance of plants, animals and microorganisms. Air quality, soil erosion and water quality of nearby waterways can also help to understand the impacts of a farmer’s practices in the natural environment.

I chose to measure soil quality, with a focus on soil organic carbon in cultivated farm fields. The proportion of soil organic matter in agricultural soils contributes positively to soil fertility, soil tilth, crops production and overall soil sustainability (Bauer and Black 1994, Lal et al. 1997, Reeves 1997, West and Post 2002, Berg 2009). It also helps to retain soil moisture, provide sufficient drainage, and fosters a healthy soil microbial community. It follows, then, that a soil with high levels of organic matter may require fewer inputs of water, nutrients and soil amenders (Doran and Zeiss 2000, Doran 2002). Significant research has also indicated that building soil organic carbon on farm fields serves to combat rising levels of atmospheric carbon dioxide by serving as a carbon sink (West and Post 2002, Fuentes et al. 2012).

**Methodology**

In March of 2013, sampling grids were set up in agricultural fields on four different farms, ranging in size from 5 acres to 300 acres. The farms sampled represented varying tillage practices and fertilization regimes, but each belonged to a farmer associated with the Oxford Uptown Farmers’ Market. Samples were taken from soils that had produced crops the season prior. Five randomly selected soil samples were taken in each cell of the grids, in order to ensure that soil samples were representative of the entire field. One field (on Farm B) was not divided into a grid, as all cultivated areas were composed of raised beds. In this case, soil samples were taken from each bed at random, for a total of 20 samples. Soil cores from a depth of 0-15 cm were collected for laboratory testing and stored in airtight plastic bags. Table 2 details the sampling procedure for each farm.
Table 2: Procedure for Soil Sample Collection in Farm Fields of Varying Size, Tillage and Fertilization Regime; CT- conventional tillage, RT- reduced-till, NT- no till

<table>
<thead>
<tr>
<th>Site</th>
<th>Sampling Area</th>
<th>Number of Cells</th>
<th>Number of Samples</th>
<th>Fertilization Method</th>
<th>Tillage Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.323 ha</td>
<td>6</td>
<td>30</td>
<td>Cover Crops</td>
<td>CT</td>
</tr>
<tr>
<td>B</td>
<td>0.105 ha</td>
<td>N/A*</td>
<td>20</td>
<td>Organic Compost/Manure</td>
<td>NT</td>
</tr>
<tr>
<td>C</td>
<td>0.202 ha</td>
<td>4</td>
<td>20</td>
<td>Compost/Manure</td>
<td>CT</td>
</tr>
<tr>
<td>D</td>
<td>0.138 ha</td>
<td>4</td>
<td>20</td>
<td>Organic Compost/Manure</td>
<td>RT</td>
</tr>
</tbody>
</table>

*Farm B was composed entirely of raised beds, so cells were not created

In the lab all the soils samples were homogenized by hand before being weighed. The mass of the sample was recorded and the sample then placed in a drying oven for approximately 48 hrs. at 65°C to remove all moisture. After the samples were thoroughly dried, their mass was again recorded. The dry samples were then placed in a muffle furnace at 450°C for 6 hrs. on two consecutive nights (for a total of 12 hours) to combust all organic matter. The ashed soil samples were then cooled and their mass recorded once more. The difference in pre- and post-furnace mass recordings indicated the loss of organic matter from the soil sample.

**Results**

Descriptive statistics were used to evaluate the differences in the proportions of organic matter from soil samples at each farm site. The base package of the R programming language was used for all statistical analysis (R Development Core Team 2013). The mean organic matter content varied between 2.9-7.2% across the four farms (Table 3).

Table 3: Mean Proportions of Soil Organic Carbon (SOC) in Samples from each farm at depth of 0-15 cm

<table>
<thead>
<tr>
<th>Site</th>
<th>Tillage Practice</th>
<th>Fertilization Method</th>
<th>Mean % SOC</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CT</td>
<td>Cover Crops</td>
<td>4.12%</td>
<td>+/- 0.90%</td>
</tr>
<tr>
<td>B</td>
<td>NT</td>
<td>Organic Compost/Manure</td>
<td>7.23%*</td>
<td>+/- 6.66%</td>
</tr>
<tr>
<td>C</td>
<td>CT</td>
<td>Compost/Manure</td>
<td>2.89%</td>
<td>+/- 0.064%</td>
</tr>
<tr>
<td>D</td>
<td>RT</td>
<td>Organic Compost/Manure</td>
<td>4.12%</td>
<td>+/- 1.18%</td>
</tr>
</tbody>
</table>

* mean % SOC after removal of outliers was 5.43%

Comparison of the mean proportions of organic matter suggests a distinctness of soil character from each farm. The two most outlying points were removed from the dataset of site B, changing the mean proportion of soil organic carbon (SOC) to 5.43% for this site. This alteration indicates that while the differences in SOC between sites exist, the variance of SOC between sites is not large.
Discussion

Only small differences were found between the proportions of soil organic carbon at each sample site. It is possible that differences in farm age, soil type, land use history and the frequency/quantity of organic carbon additions via compost or cover crops have a significant effect on the proportions of organic matter in soil samples and the rates at which soil organic carbon decomposes. Soil types at each location were identified, and found to be of types MuB, FdB, FcA and WyC2 for Farms A, B, C and D, respectively. Each of these soils is a type of silt loam, each provides comparable drainage and possesses no significant quality that would prevent sites from being compared without modification.

Though difference in soil organic carbon levels was not significant, Farm B, practicing NT methods, along with additions of composted manure contained the highest mean proportion of organic matter in it soil, as expected. Farm D, implementing RT methods would be expected to have the next highest, however the average soil organic carbon proportion was comparable to that of Farm A, where CT practices are used. Farm D was the youngest of all the farms sampled, and had previously been a dairy farm. Further testing is needed to measure the long-term effects of tillage and fertilization practices on these farms, as well as more detailed data on the frequency, quantity and quality of organic fertilizer additions.

Farms A, B and D are all certified organic, while the managers of Farm C profess to raise their crops “as naturally as possible” with few applications of chemicals. It is possible that the attitude of farmers toward their soils biases the dataset toward higher levels of soil organic carbon. None of the farm managers claims to rely heavily on synthetic fertilizers or chemical pest control, making soil stewardship an important component of their farms’ success. Soil samples of CT fields from conventional growers of commodity crops in Coshocton, Hoytville and Delaware, Ohio have been found to have organic carbon levels of 0.092%, 2.32% and 1.42%, respectively (Mishra 2008). When compared to the proportions of SOC from the farms in this study, these values are much lower suggesting that all farms tested had higher levels of soil organic carbon than their conventional, commodity crop counterparts.

While no conclusions can be made correlating participating farmers’ tillage and fertilization regimes to enhanced or depressed soil organic carbon, fertile soils have around 4.00% soil organic carbon (Pimentel 2008). This suggests that each of the farms, despite their differences in management, possess healthy fertile soils. The small sample size of just four farms in one season, combined with each farmers’ positive attitudes toward soil stewardship provide limited insights into the effects of farmer attitudes and practice on soil health. Further research is required, most notably the incorporation of a greater number of sites from farms growing commodity crops and not associated with local food systems. The results of this study, however, illuminates the possibility that farmers involved in local food systems, and who interact directly with consumers, are more likely to implement management practices which build soil health.
Conclusions

Participants in the Oxford Uptown Farmers’ Market, be they vendors, shoppers, management or members of the Market Council, are all highly motivated by strongly held values and opinions about local food. Priorities differ, and actors come to the Market for different reasons, but all seem to be in agreement that the Market is an important space for the exercise and expression of these varied beliefs. In order to make a place of differing opinions a success, the administrators of the Market have intentionally cultivated an atmosphere that welcomes all participants. Disagreements over participant motivations can be tempered with a focus on what all can agree on: that the Market be a fun, open and friendly place to be. As one farmer explained to me, “You got to be nice and make friends with people, and not only does it help your business, but it makes the Market a nice place to be for everybody.”

Consumer focus was generally supportive of local farmers, regardless of agricultural practice. While most shoppers might value and pay a higher price for foods raised using alternative or environmentally sensitive, emphasis was on supporting the local farmer and the local economy. Despite consumers having a tepid attitude toward agricultural method, farmers consistently chose methods of production that they perceived as having minimal environmental impact, as a combination of personal ethics and a perceived need to provide a product of superior quality to supermarket goods. Generally, farmers valued direct marketing strategies, using face time with consumers to educate about the importance of their farming methods and the healthfulness of their products. All farmers at the Oxford Uptown Farmers’ Market practiced balancing of consumer desire and personal ideologies with farm profitability, and this equilibrium was heavily influenced by farmer reliance on their products for primary income.

This dynamic of value communication appeared to be a strong influence on the agricultural methods chosen and implemented by farmers, with all producers valuing environmentally sensitive methods to varying degrees. Though soil analysis was unable to discern any empirical evidence correlating improved soil quality with degree of environmental commitment, it is possible that the values and practices of farmers participating were not different enough to return any significant difference. Future research comparing the attitudes, ideologies and methods of farmers not involved in a local food system is suggested, to truly determine if there is a difference in soil quality among farmers of different attitudes toward the environment.

Additional research beyond soils health is also recommended as a means of discerning a manifestation of farmer attitudes and practice correlated with agroecology. Monitoring of pollinators on farm property, for instance, plant or animal diversity studies or air and water quality tests might reveal significant results. A comprehensive investigation into the professed beliefs of farmers about the environment and a detailed catalog of agricultural practices could also reveal significant findings about the connection between ideologies of consumers, farmers and their environmental effects.

What is clear is that the interaction of producers and consumers at the Oxford Uptown Farmers’ Market informs both parties’ beliefs about food and food production. Participants come to the Market for a variety of reasons, but the education provided to consumers by farmers and the demands made of farmers by consumers contributes to the development of a culture of local
food. This culture, while undoubtedly different from market to market, can drive both producer and consumer attitudes toward environmentally sensitive production methods. If on-farm agroecology can be found to benefit from alternative agricultural methods, then a marketplace and food culture that values and encourages those behaviors could have positive implications for environmental health on the farm.
Appendices

Appendix A: Oxford Uptown Farmer’s Market Shopper Survey

The Uptown Farmers’ Market Shopper Survey

1. How often do you shop at the Oxford Uptown Farmers’ Market? (please circle one)

<table>
<thead>
<tr>
<th>Every Week</th>
<th>Twice a Month</th>
<th>Once a Month</th>
<th>Infrequently</th>
<th>Never</th>
</tr>
</thead>
</table>

2. Do you shop at the Market in the Winter?

☐ Yes  ☐ No

3. How often do you shop at other farmers’ markets or roadside stands? (please circle one)

<table>
<thead>
<tr>
<th>Every week</th>
<th>Twice a month</th>
<th>Once a month</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
</table>

4. Do you think shopping at the Uptown Farmers’ Market is important?

☐ Yes  ☐ No

5. If you had to pick one reason to shop at the Uptown Farmers’ Market, what would it be?

☐ It supports the local economy
☐ It helps to enrich community
☐ It’s better for the environment
☐ The food is fresher/tastes better
☐ Other (please specify) ________________________________________________

6. Does the Oxford Uptown Farmers’ Market supply a sufficient variety of items?

☐ Yes  ☐ No

7. Would you like to see more or less variety in items sold at the Uptown Farmers’ Market?

☐ More  ☐ Less  ☐ The Farmers’ Market has just the right amount of variety

8. Do you think farmers’ markets give you the opportunity to purchase varieties of products not found in local supermarkets?

☐ Yes  ☐ No
9. Do you shop for produce, bakery items, or fresh meat/dairy/eggs at a supermarket or grocery store?

☐ Yes ☐ No

10. What criteria best helps you to decide what purchases to make when shopping for food at the Farmers’ Market? (please check one)
☐ Price
☐ Freshness
☐ Production methods (organic, free-range, union-produced)
☐ Other (please specify) ________________________________

11. What criteria best helps you to decide what purchases to make when shopping for food elsewhere?
(please check one)
☐ Price
☐ Freshness
☐ Production methods (organic, free-range, union-produced)
☐ Other (please specify) ________________________________

12. Would you pay a higher price for fresh food that was **locally produced**?

☐ Yes ☐ No ☐ Maybe

13. Would you pay a higher price for fresh food that was raised/grown **organically**?

☐ Yes ☐ No ☐ Maybe

14. Do you think farmers’ markets give you the opportunity to purchase varieties of products not found in local supermarkets?

☐ Yes ☐ No

15. Do you participate in community supported agriculture?

☐ Yes ☐ No ☐ I don’t know what a CSA is.

16. Do you belong to a food co-operative?

☐ Yes ☐ No ☐ I don’t know what a food cooperative is.

17. How often do you cook using fresh ingredients? (please circle one)
<table>
<thead>
<tr>
<th>Never</th>
<th>Once per week or less</th>
<th>Two or three times per week</th>
<th>4 times per week or more</th>
</tr>
</thead>
</table>
Appendix B: Oxford Uptown Farmers’ Market Vendor Survey

The Uptown Farmers’ Market Vendor Survey

1. How many acres do you farm/operate? (please circle one)

<table>
<thead>
<tr>
<th></th>
<th>4 or less</th>
<th>5-10</th>
<th>11-20</th>
<th>21-50</th>
<th>51-100</th>
<th>100 or more</th>
</tr>
</thead>
</table>

2. How frequently do you use the following machinery?

<table>
<thead>
<tr>
<th></th>
<th>Very Frequently</th>
<th>Frequently</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden Tiller (gas):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garden Tiller (electric):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driven Rotary Tiller:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractor:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvester:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. What do you grow/raise on your farm? _____________________________________________

4. How do you decide what to grow/raise each season? (check all that apply)
   - I choose what grows reliably well
   - I choose what sells best
   - I choose what shoppers tell me they’d like to see
   - I choose what I think is interesting/fun
   - Other (please specify)__________________________________________________________

5. Do your interactions with shoppers influence what you decide to produce?
   - Yes
   - No

6. Where do you obtain your seeds/livestock? (breed your own, order from catalogues, a trusted provider, etc.)
   ____________________________________________________________

7. What agricultural methods do you use?
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

8. How frequently do shoppers at the Oxford Uptown Farmers’ Market ask about your agricultural/production methods? (please circle one)

   - Very Frequently
   - Frequently
   - Sometimes
   - Never
9. Are your certified organic?

☐ Yes          ☐ No          ☐ No, but seeking certification.

10. How frequently do shoppers at the Oxford Uptown Farmers’ Market ask if you are certified organic? (please circle one)

<table>
<thead>
<tr>
<th>Very Frequently</th>
<th>Frequently</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
</table>

11. How long have you been a vendor at the Oxford Uptown Farmers’ Market? (please circle one)

☐ This is my first season                     ☐ For less than 5 years   ☐ For over five years

12. Do you sell your goods at other farmers’ markets?

☐ Yes          ☐ No

13. How far do you travel from your farm to the Oxford Uptown Farmers’ Market? (please circle one)

<table>
<thead>
<tr>
<th>Less than 5 miles</th>
<th>5-10 miles</th>
<th>11-20 miles</th>
<th>21-50 miles</th>
<th>More than 50 miles</th>
</tr>
</thead>
</table>

14. What’s the furthest distance you regularly travel to bring your goods to a market?

<table>
<thead>
<tr>
<th>Less than 5 miles</th>
<th>5-10 miles</th>
<th>11-20 miles</th>
<th>21-50 miles</th>
<th>More than 50 miles</th>
</tr>
</thead>
</table>

15. What’s the average distance you regularly travel to bring your goods to a market?

<table>
<thead>
<tr>
<th>Less than 5 miles</th>
<th>5-10 miles</th>
<th>11-20 miles</th>
<th>21-50 miles</th>
<th>More than 50 miles</th>
</tr>
</thead>
</table>
References


