LOCAL FARE —

FOSTERING AGRICULTURAL RESEARCH & ENTERPRISE

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LOCAL FARE RESEARCH TEAM

JUSTIN BENEDICT

Justin Benedict worked as an assistant woodworker to help construct FARE's season extenders and monitored their growth throughout the testing period. He is a senior Environmental Studies student focusing in Sustainable Agriculture at NAU and hopes to attend New Mexico State next year to pursue another degree dealing with agriculture education and local food systems.

ROM COLES

Dr. Rom Coles is the Principal Investigator for Local FARE. Director of the Program in Community, Culture, and the Environment, he teaches and writes on grassroots democracy and community building, political economy, and action research.

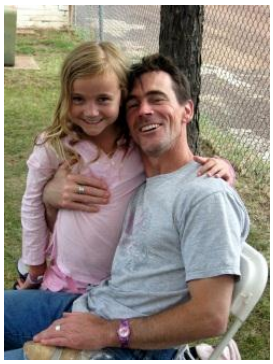
KIMBERLEY FOSTER CURTIS

Dr. Kim Curtis is a Co-Principal Investigator for Local FARE. She mentored graduate student Regan Emmons on the Production Needs Assessment and worked with others on report writing and editing. She teaches at Northern Arizona University in the First Year Seminar Program and in the Masters Program in Sustainable Communities. Her teaching and research occur at the intersection of engaged pedagogy, grassroots democracy and localization of food systems.

REGAN EMMONS

Regan Emmons served as researcher for the Production Needs Assessment. She is currently completing her thesis on the affordability of home food cultivation for her Masters of Arts in Sustainable Communities at Northern Arizona University. Upon graduation, Regan can't wait to learn how to grow food at 7000 feet, while helping to further advance the development of local food production in Flagstaff.

JOHN GORDON



John Gordon, woodworker and owner of With the Grain Woodworks, led the design and construction of the season extender portion of the Infrastructure Research. John is learning to balance the challenges of fathering, woodworking, and assisting in the classrooms of an area high school. John was so dedicated to the project that he sacrificed part of his left thumb in the construction of the season extenders.

JOANNA HALE

Joanna Hale acted as Project Coordinator for the overall Local FARE project. She earned her Masters in Sustainable Communities degree from Northern Arizona University. In the Fall of 2011, Jo began a PhD program in the Sociology Department at the University of California, Davis where she will continue her research in Food Justice.

ELIZABETH KRUG

Liz Krug served as Researcher for the Market Demand and Feasibility Study. She is currently working on her thesis in the Masters of Arts in Sustainable Communities program at Northern Arizona University which will focus on perceptions and values of land use for food production.

PHILIP PATTERSON

Philip Patterson is the Lead Researcher for the Greenhouse Vegetable Production Study for Local FARE. He has been the Plant Production Manager at the Northern Arizona Research Greenhouse since 2003. He also makes excellent pizza.

PATRICK PYNES

Dr. Patrick Pynes has been a professional organic gardener and backyard beekeeper for more than twenty years. He teaches environmental studies, sustainable communities, applied indigenous studies, and other courses at NAU, and has been the Gardens Manager for La Posada Hotel and Organic Gardens in Winslow, Arizona, since 2000. On the Local FARE project, he served as co-Principal Investigator and as primary advisor to both Liz Krug and Justin Benedict.

JOHN TAYLOR

John Taylor worked as business consultant & liaison to youth agriculture education in the public schools. John has a Masters Degree in Business Administration, which he does not tend to use in his small garden and landscape business, or in his work as an ecological restoration contractor. John's current primary focus is in providing land stewardship and gardening experiential education to northern Arizona youth.

EXECUTIVE SUMMARY

INTRODUCTION

In spite of a history that involves substantial agricultural productivity, northern Arizona currently imports from vast distances nearly all (95%) of the food we consume. This fact is implicated in unsustainable practices of energy consumption and greenhouse gas emissions, creates a situation that is highly vulnerable to instabilities in the global political economy of energy and food, and represents a foregone opportunity for agricultural and agriculture-related economic development in our region.

Rapid growth in regional farmers' markets, in restaurants sourcing locally, and in consumer demand more generally suggests that the local and regional food economy provides a dynamic growth opportunity. At the same time, small direct farmers struggle to meet this demand in the difficult economic and ecological conditions of our region, as do backyard growers who might enhance their production and coordination in order to bring their produce to market. Both kinds of producers need knowledge, networks, and locally adapted infrastructure to support and expand production to meet the growing demand. All season greenhouse-growing may be an additional fruitful means of responding to consumer demand. Studies show that a dollar spent on locally owned enterprises generates more than three times the local economic activity as a dollar spent in a nationally or internationally owned business. Strategically targeted research can catalyze a vibrant regional food economy with substantial opportunities for sustainable local and regional food-related enterprises.

THE RESEARCH

Phase I of our research consisted of four interrelated projects designed to develop the local and regional food economy and related enterprises. The aim of the **Market Demand and Feasibility Study** was to refine our understanding of the demand for locally sourced food by restaurants, supermarkets and grocery stores, large institutions, and farmers' markets. The **Productions Needs Assessment** assessed the needs and possibilities for expansion of both regional direct market farmers, and of backyard growers seeking to bring their produce to market. Our **Infrastructure Research** studied and tested optimal designs for three kinds of season extenders crucial to successful growing in the high altitude Flagstaff region. And our **Greenhouse Production to Market** research sought to identify key crop varieties, most effective production methods, and the customer base for greenhouse-to-market or other season extender-to-market production.

RESULTS

The **Market Demand and Feasibility Study** shows that demand for local and regional foods in northern Arizona is both extremely strong and unfulfilled. Over the last five years, vendor participation at six area farmers' markets has grown 43%. Moreover, our study suggests there is room for continued growth. Five out of six

farmers' market organizers indicate that their market needs more producers, and half believe that bringing in more producers and produce to the market will naturally lead to more customers. These findings suggest that market organizers believe that there is an elasticity of demand that will support continued market expansion. Likewise, demand among restaurants and institutions already sourcing some of their food locally is growing, with 90% reporting they would substantially alter their menus to feature local/regional food as it becomes available. Produce managers at area grocery stores and supermarkets also indicate high interest in sourcing more food locally. 88% wish to increase sales of locally grown foods, and would do so if several conditions could be met. Up to date information on producers, growing standards, and weekly availability of produce with thresholds for volume and quality are needed. Moreover, most produce managers prefer not to deal directly with small area farmers, indicating that a cooperative farming enterprise to coordinate standards, sourcing, and distribution could catalyze significant market growth.

The **Production Needs Assessment** indicates that both backyard gardeners and small direct farmers have substantial interest in collaborative and cooperative enterprises to help sustain and expand their operations. Two thirds of regional direct market producers desire to expand their operations in the next five years. Top challenges to doing so are costs of labor, land and equipment, distribution, and access to new markets. At the same time, interest in collaborative ventures among farmers is high, with 64% interested in participating in a CSA, 57% interested in a food cooperative, 54% interested in an online grower's network, and 79% interested in a list of businesses buying local. In addition, 83% of farmers in Yavapai County are interested in an institutional procurement program. For their part, over one third of backyard growers would like to form a backyard growers' collaborative to coordinate and efficiently bring their produce to market. Moreover, to increase productivity, 73% report they would buy a locally researched and manufactured season extender. And while 96% report using compost and manure, most indicate they cannot produce enough for their own use.

Our **Infrastructure Research** shows that the most successful designs for season extenders as measured by vigor of plant growth had the following properties. 1) They were insulated in some way, creating warmer low temperatures, thus increasing plant growth of both cool and warm season plants. 2) They had opaque, insulated lids that provided abundant sunlight for plants without burning their leaves with excessive intense light (as with clear, un-insulated tops). 3) They were sufficiently ventilated to allow the plants to breathe and grow, rather than "cooking" them or stunting their growth with excessive heat. We also found that plants in the northwest corners of the cold frames grew more vigorously, suggesting that future cold frame designs might include a clear wall on the east side to allow for more morning sunlight to reach the plants. While we have yet to observe plant growth through the fall, winter and spring seasons, our preliminary findings suggest some specific, successful design parameters for cold frames, solar pods, and hoop-houses for the high altitude Southwest.

Our **Greenhouse Production to Market** research shows the hydrostacking system to be an efficient method best suited for growing herbs and leafy greens. In addition, basil production grown in hydrostackers was an unqualified success. The modified hydroponic bucket system is best for tomatoes and sweet upright peppers, while the traditional method is best for hot bush peppers. The determination of whether the research greenhouse can cost effectively grow produce for the local market has not been conclusively demonstrated. A fledgling local market network of five restaurants and caterers has been established, but as the Greenhouse ramps up to full production of a select number of vegetables to increase production efficiencies, we will be in a

better position to learn the strength of the market for these crops and whether this could be a cost effective microenterprise for a greenhouse-to-market or other season extender-to-market enterprise.

These findings from our Phase I research support the development of five enterprises and market tools we will bring to fruition in 2012. These include: 1) the development of a **Woodworkers' Cooperative** with a specialty focus on the production of locally adapted and tested season extenders necessary for small scale food production in the high desert. 2) an **All-Seasons Food Production Microenterprise** that will grow specialty crops in greenhouses or in other season extenders for the local market, 3) a **Cooperative Farming Enterprise** to help small direct market farmers identify business opportunities best realized through cooperative endeavor, 4) an updated direct farmers' marketing tool, **Canyon Country Fresh**, giving individual, business and institutional consumers a comprehensive directory of farm products from their region, and 5) a **Backyard Growers' Market Collaborative** so that surplus production for marketing and sales is a viable microenterprise for backyard growers.

In sum, Local FARE's research suggests there are opportunities for substantial development of our regional food economy. As the great recession lingers, energy costs rise, and the threat of climate change grows, communities across the region have a great need to develop stronger, more resilient, diverse and just economies. Food production and food related enterprises are fundamental to those ends and purposes.

MARKET DEMAND AND FEASIBILITY STUDY

Rapid growth in regional farmers' markets, in restaurants sourcing locally, and in consumer demand suggests that the local and regional food economy is a dynamic growth opportunity. The purpose of this study is to refine our understanding of the demand for locally and regionally sourced food by restaurants, supermarkets and grocery stores, large institutions, and farmers' markets.

DEFINING "LOCAL" AND "REGIONAL"

Definitions for "local" and "regional" continue to be fluid, with the USDA defining both as less than 400 miles of transportation[1]. Yet many locavores define them more narrowly. Local FARE researchers circumvented this lack of standardization by offering actual mileage intervals and/or locations on the survey instruments. In addition, as this project evaluated food sourcing from four different groups, we also adjusted our survey instruments to ensure they were appropriate to each distinct set of respondents.

Thus, for regional farmers' markets, which all have relatively narrow guidelines for food sourcing, we standardized our survey by utilizing intervals from 0-60, 61-100, 101-200, and more than 200 miles. In the case of restaurants and institutions, we standardized sourcing definitions by offering intervals, as well as example cities at those distances to promote accuracy in responses. The survey listed: "0-60 miles (includes Camp Verde, Cottonwood, Winslow, Ash Fork)," "61-100 miles (includes Prescott, Chino Valley)," "101-200 miles (includes Phoenix, Kingman, Show Low)", and "more than 200 miles (includes Tucson, Yuma, Willcox)." (Note that all the restaurants and institutions were in the City of Flagstaff, whereas the farmers' markets were regional, which made identifying cities at relative distances possible for the former, but not the latter.) In contrast, grocery stores and supermarkets source food from a more diverse range of distances, and researchers adjusted the survey instrument to reflect that, using the following designations: "Local - within 200 miles of Flagstaff," "Western U.S. Region - AZ, CA, WA, OR, NV, CO, UT, NM, ID, WY," "U.S. - contiguous 48 states, non-Western region," and "Outside the U.S. and HI and AK."

Researchers were thus able to gather and analyze relevant data from each distinct group.

Figure 1: Researchers Liz Krug and Regan Emmons with Erin Lingo of Prescott Farmers' Market

[1]Martinez, Steve, et al. *Local Food Systems: Concepts, Impacts, and Issues.* U.S. Department of Agriculture Economic Research Service Report Summary. May 2010. Accessed 10 August 2011. Web.

FARMERS' MARKETS

INTRODUCTION

Farmers' markets have expanded across the United States over the last decade, reaching into more communities and providing opportunities for producers to connect directly to eaters. According to the *USDA National Farmers Market Manager Survey 2006*, the number of farmers' markets in the United States increased 43 percent between 2000 and the end of 2005, from 2,863 to 4,093, an average growth rate of 8.6 percent a year.[2] Northern Arizona has contributed to that expansion, and results from this Market Demand and Feasibility Study (MDFS) show the popularity among producers in utilizing farmers' markets. The broad purpose of this study was to assess northern Arizona farmers' markets' contributions to and potential for growth in the local food economy. Specifically researchers sought to: 1) ascertain the current economic contributions of farmers' markets; 2) survey markets' current capacity; 3) determine challenges and areas of opportunity for market growth; and 4) investigate market support for a Backyard Growers' Market Collaborative. The farmers' market organizers interviewed for this survey offer insight into the recent explosion of farmers' markets, including valuable information for vendors regarding customer preference and visions for backyard growers' opportunities at market.

SUMMARY

Researchers surveyed six area farmers' markets in northern Arizona, discovering the combined economic contribution of over one million dollars with markets operating an average of 18 weeks per year.[3] This figure includes six markets within a 100-mile radius of Flagstaff.[4] Moreover, market organizers estimate a 42.5 percent increase in vendor participation in the last five years, and maintain that as the variety of produce offered at the market expands, so too will the market customer base.

The farmers' market research shows considerable areas of need in the realm of collaboration among growers, policy work, and education. This study confirms that the market organizers (83%) would like to expand the number of vendors, as well as attract more customers (83%). Meanwhile, 66 percent of respondents require 100 percent of product to be Arizona-grown, and rate "Regionally grown" and "Grown by the vendor" as very

[2] Ragland, Edward and Debra Tropp. *USDA National Farmers Market Manager Survey 2006*. USDA Agricultural Marketing Service, Marketing Services Division, May 2009. Accessed 31 July 2011. Web.

[3] The only year-round farmers' market did not participate in the survey. Had they responded, this $1million figure would have been higher.

[4] MDFS researchers elected to interview only the largest markets within 100 miles of Flagstaff. Researchers would like to interview the smaller markets of Cottonwood, Cornville, Dewey-Humboldt, and Tuba City in a second round of surveys.

important to their customers. The premium placed on those characteristics by markets and customers provides a significant opportunity for Arizona growers in these times of economic hardship.

All surveyed farmers' markets provide space for backyard growers to sell their produce and welcome the participation of a Backyard Growers' Market Collaborative (BGMC) at their markets. Although respondents offered support, they acknowledged that if backyard growers were attending more than several times, they would be charged the same fee as other vendors and 10 percent of sales, and would be required to bring their own table and shelter. These conditions suggest the usefulness of a backyard growers' cooperative in which members could evenly distribute the costs of a sign, table, and shelter, as well as share the task of attending a multi-hour market.

METHODS

Research staff contacted farmers' market organizers from eight local and regional farmers' markets by telephone or email between May and July 2011 to complete a survey on farmers' market characteristics, trends, capacity, and customer preferences. MDFS researchers selected farmers' markets within a one hundred mile radius of Flagstaff. Six farmers' market organizers completed the survey, and two did not return the survey, yielding a response rate of 75 percent.

The following farmers' market organizers participated in the survey: Chino Valley Farmers' Market, Flagstaff Community Market – East Side, Flagstaff Community Market – Westside City Hall, Prescott Farmers' Market, Prescott Valley Farmers' Market, and Verde Valley Farmers' Market. All surveys were completed in person lasting approximately one hour each.

The survey instrument consists of a mix of open, closed and multiple-response questions, with one question utilizing a 3-point Likert scale. Survey results were analyzed using descriptive statistics in SPSS software, and open-ended responses were coded and sorted according to themes.

RESULTS AND ANALYSIS

FARMERS' MARKET CHARACTERISTICS

Of the farmers' markets represented in this study, 100 percent are seasonal, operating an average of 18 weeks primarily between the months of June and October. (See Appendix A for complete survey results.) The range for market operating seasons varies from 11 weeks to 25 weeks. Two of the six markets operate on Saturdays, while the other markets operate on Sundays, Tuesdays, Wednesdays, and Thursdays. Average sales for all the markets are $9,458 per week and $171,667 per year. However, market sales vary widely. The range of weekly

sales among these markets is between $1,250 and $22,500, and the range of yearly sales is between $10,000 and $450,000.

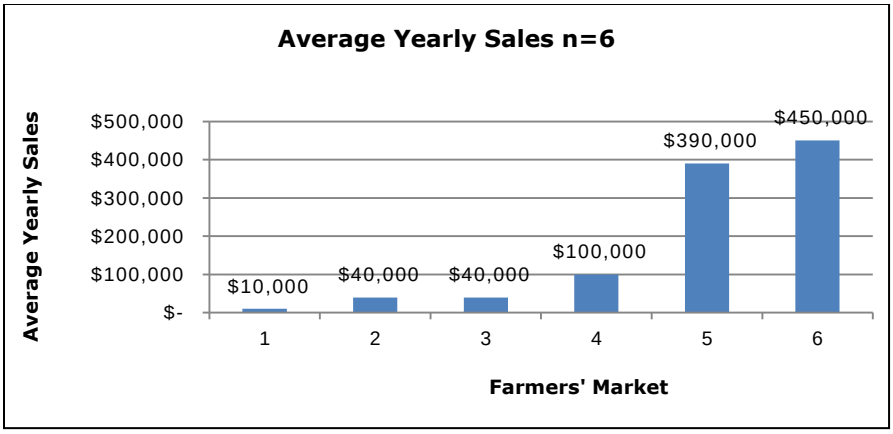


Figure 2: Farmers' Markets - Average Yearly Sales

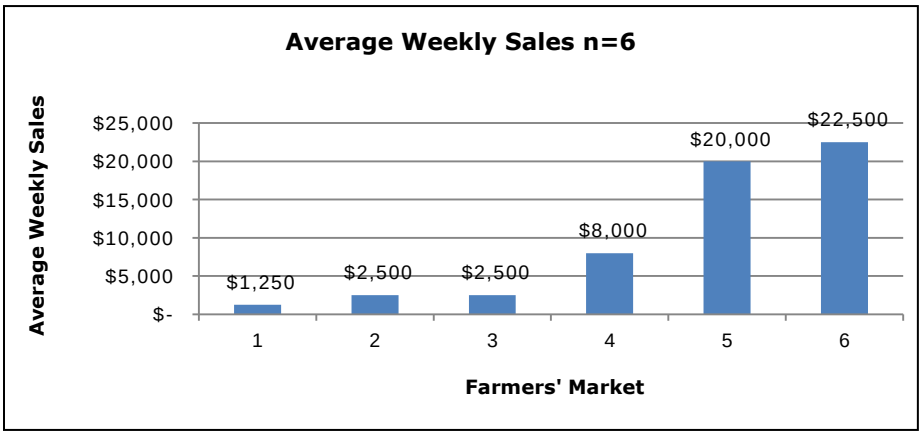


Figure 3: Farmers' Markets - Average Weekly Sales

Four (66%) of the six markets require that all produce sold in the market be Arizona-grown. Five (83%) of the six markets require that 100 percent of the product sold be grown or produced by the vendor. Participating market organizers state that producers pay a seasonal fee (average $3.26/market).[5] In addition to the seasonal fee, producers at five of the six markets (83%) pay, on average, 10 percent of their sales from each market day.

[5] The market fee structures are such that one seasonal fee might be valid at multiple markets managed by the same entity/person. Therefore, the above average price is not a precise per market price representation that producers pay over the course of a season. Survey limitations do not allow us to obtain that number, as we did not ask about producer reoccurrence at multiple markets.

PRODUCERS CHARACTERISTICS

The average number of producers participating in a farmers' market per week is 20.3, and the average number per season is 32.7. Again, there is great variability in the number of producers across the markets, with a range between 7 and 45 for the number of producers per week, and between 7 and 70 for the number of producers per season.

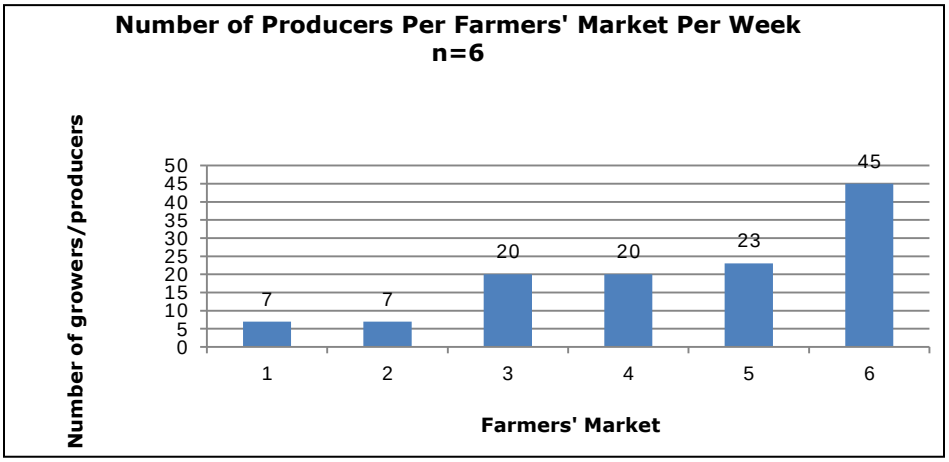


Figure 4: Number of Producers per Farmers' Market per Week

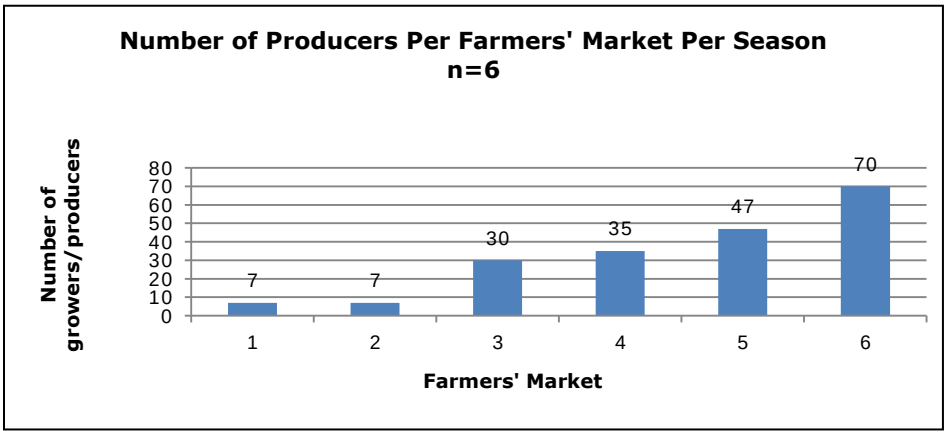


Figure 5: Number of Producers per Farmers' Market per Season

All of the farmers' market organizers have noticed a change in vendor participation over the years. When asked to estimate the percent change in the number of producers over the years, they estimate an average 13 percent increase since last year, an average 23 percent increase in the last three years, an average 43 percent increase in the last five years, and an average 98 percent increase in the last ten years.

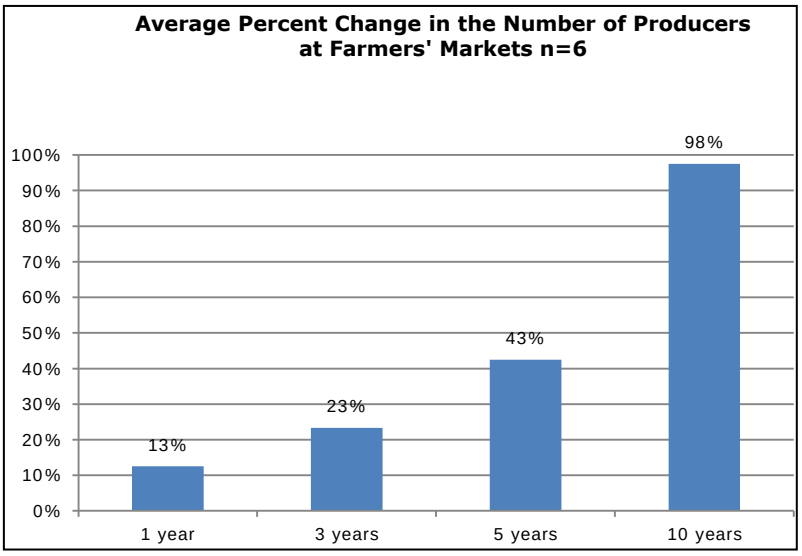


Figure 6: Average Percent Change in the Number of Producers at Markets

When asked about the number of producers who participated in their market in 2010 and the distance they traveled, the organizers estimate, on average, 27.7 producers traveled within 0-60 miles. Further, they estimate that an average of nine producers traveled to their market from within 61-100 miles, and an average of 1.5 producers from within 101-200 miles. No respondents indicated that growers traveled more than 200 miles to market.

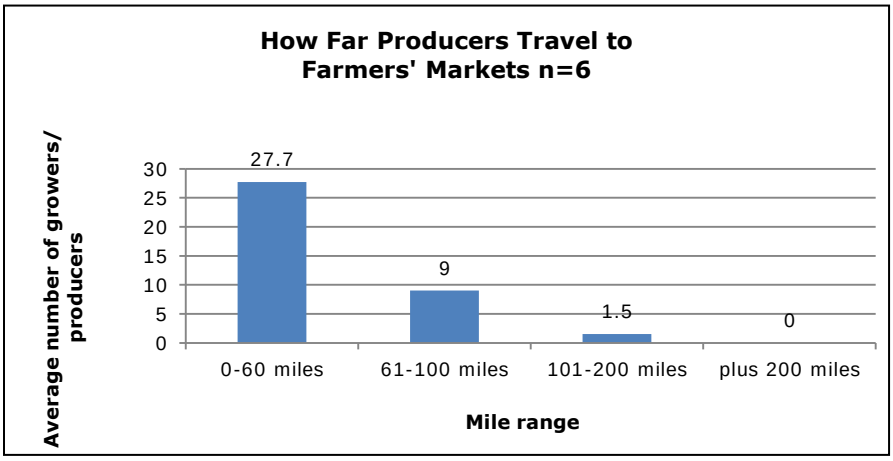


Figure 7: How Far Producers Travel to Farmers' Markets

When all six respondents were asked why there have been changes in producer participation over the years, all selected “WIC (Women, Infants, and Children) availability,” and five of six (83%) selected “Customer demand” and “SNAP (Supplemental Nutrition Assistance Program) availability.”

Change in Grower/Producer Participation at Farmers' Markets n=6	Percent
WIC (Women's Infants, and Children) Availability	100%
Customer Demand	83.3%
SNAP (Supplemental Nutrition Assistance Program) Availability	83.3%
Senior Farmers' Market Nutrition Program	67%
Meat sales available	67%
EBT (Electronic Benefit Transfer) Availability	50%
Other (Two market organizers noted economic viability of small growers)	33%

Figure 8: Change in Grower/Producer Participation at Farmers' Markets

Respondents were asked to select food items found at the market during the peak of the season. The wide-ranging list included eighteen items, twelve of which were selected by 100 percent of the respondents. These items include: vegetables, fresh herbs, cut flowers, eggs, tree fruits, crafts, honey, processed foods, meat, jams/jellies/preserves, nuts, and nursery plants. Respondents said they also carried berries, cheese and soaps (83% each), and baked goods, dried herbs and vegetable plants (67% each).

MARKET CAPACITY

The survey asked each farmers' market organizer to choose between two capacity statements: "My market needs more produce" (17%) or "My market needs more customers" (83%). Another capacity statement asked whether the market organizer felt their market needs more growers/producers. Five (83%) of six respondents said they do need more growers/producers. In additional comments, three market organizers predicted that when more and varied producers and produce are at the market, more customers will attend. In terms of capacity, farmers' market organizers would like more customers and more producers at their markets.

All of the respondents state their market provides space for backyard gardeners to sell their produce, and all respondents said they would support a Backyard Growers' Market Collaborative (BGMC) at their market. When asked to explain what such a cooperative might look like or entail, one (17%) suggested that the BGMC could help support local interest in growing more local food, and that the cooperative would be treated as any other grower at the market in terms of being asked to provide their own materials or encouraging them to have informational signage about their produce.

Market organizers were asked about the biggest challenge to the long-term viability of their market. All of the responses dealt with a regulatory or policy issue, notably USDA food-related issues or requirements, or county health department rules and interpretations. (County may refer to Coconino County or Yavapai County based on the respondents who participated in this survey.)

When asked what would help increase local food production in their area, five of six responses relate to education, either to new farmers who might see the benefit of local food production and sustainable agriculture

or to backyard growers and non-profit groups. One response references the market demand side of food purchasing, specifically that restaurants commit to local food purchasing.

CUSTOMERS AT FARMERS' MARKETS

Respondents were asked to rate importance of certain characteristics to their market customers using a scale of 1-3, with 1 = "not important," 2 = "somewhat important" and 3 = "very important." Items ranked with a mean score of 3.00, or "very important," include "Regionally grown," "Grown or made by the vendor," "In season produce," and "Product quality."

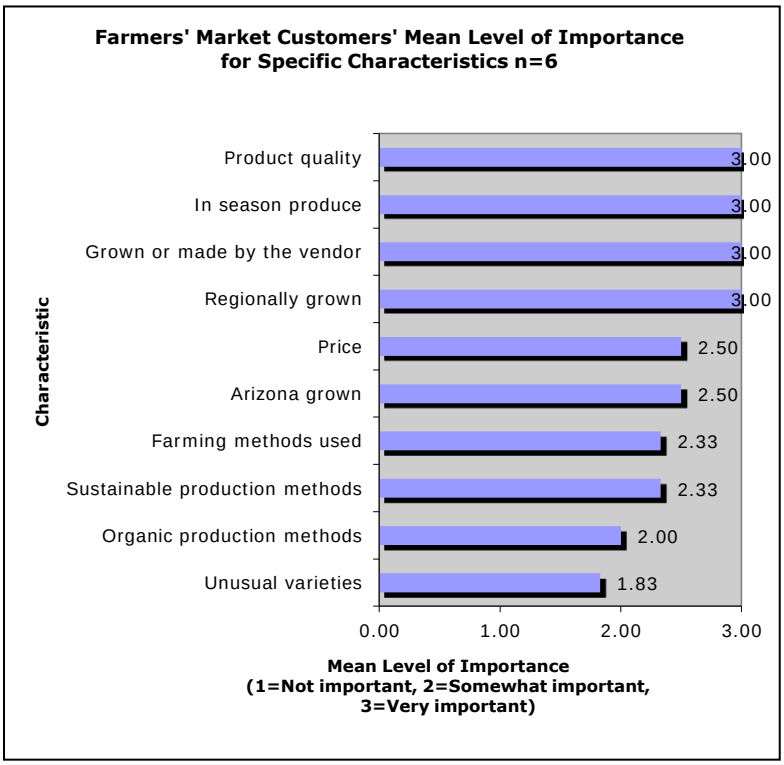


Figure 9: Farmers' Market Customers' Mean Level of Importance for Specific Characteristics

ADDITIONAL COMMENTS FROM SURVEY RESPONDENTS

Four of the six respondents provided additional comments. Three of the comments relate to county health department policies or fees. Specifically, policies are not standardized and may be confusing to farmers, and fees may not be conducive to small-scale vendors trying to break into the farmers' market scene. One comment states that price is the most important factor to some customers when visiting farmers' markets. Another comment notes how the informal local economy has been increasing over the last decade. Additionally, one comment clarifies farmers' market policy regarding backyard gardeners, namely that they can show up and

participate in the market four times per season without paying the seasonal fee, but that they must still pay ten percent of their gross sales to the market.

CONCLUSIONS

Farmers' markets are increasing in popularity across the nation. With a growth rate in vendors at area markets of 43% over the last five years, our findings show that farmers' markets are a growth economy in our region as well. Moreover, our study suggests there is room for continued growth. Five out of six farmers' market organizers indicate that their market needs both more customers and more producers, and half believe that bringing in more producers and produce to the market will naturally lead to more customers. These findings suggest that market organizers believe that there is an elasticity to customer demand that will support continued market expansion. In addition, market organizers suggest that increases in grower/producer participation at the markets is a result of policy, specifically in WIC and SNAP availability at the market, as well as of customer demand more generally. Federal and county policy were also mentioned by several farmers' market organizers as challenges to their long-term market viability, findings that suggest that policy research and advocacy are important components of farmers' markets success.

RECOMMENDATIONS FOR FURTHER RESEARCH

1. **Policy and Regulations**: This study clearly shows the need for further networking between market organizers and growers, as both groups articulated the need for education on multiple issues. Weighing on all respondents' minds was the issue of policy, which they rate as the most significant challenge to market viability. Organizers noted both their own and growers' concerns about USDA regulations or requirements and county health department rules. This study suggests the need for additional research to determine the impact on small growers of recent federal, state, and county policy and regulation changes.

GROCERY STORES AND SUPERMARKETS

INTRODUCTION

Americans are currently offered a dizzying array of produce and food items in grocery stores and supermarkets across the country. Changes in labeling laws, like COOL (Country of Origin Labeling) in 2009, allow Americans to have a better sense of where their food originates. The purpose of this survey is to determine to what extent grocery stores and supermarkets in Flagstaff, Arizona, source "local" produce, defined as within 200 miles of Flagstaff. Additional goals of the survey include identifying: a) reasons why stores source local food and how; b) challenges local-sourcing stores experience; c) reasons why stores do not source locally and their perceptions of the barriers to doing so; and d) stores' perceptions of how important customers rate certain characteristics relevant to local sourcing, such as Arizona grown produce.

SUMMARY

Although not all of the nine participating grocery stores/supermarkets currently source food locally, the six who source locally cite supporting local farmers as their primary reason for doing so, while four are focused on contributing to the local economy and ensuring product quality/taste/freshness. Fifty percent of the local-food sourcing stores have factored decreased environmental impact and customer demand into their choice to source locally. In addition, 83 percent of those sourcing locally, and two out of the three stores that are not, are interested in sourcing more food locally. This clearly indicates an upward trend of local food sourcing by both small grocers and large supermarkets (with a revenue range of $40,000 to $4,500,000), as well as room for growth in the local food economy.

The study indicates that produce managers are interested in purchasing food locally if several conditions are met. These conditions include information from producers such as a list of local growers in the area, actual growing standards like organic certification, and a list of current produce available. Although 83 percent of those stores sourcing locally are currently sourcing directly from the growers, 56 percent indicated they would prefer not to be contacted directly by growers/producers. They indicated instead that a collaborative effort could be developed that streamlines distribution among multiple producers.

METHODS

Research staff contacted grocery stores and supermarkets in the Flagstaff area of northern Arizona during June and July 2011 to complete a survey on grocery store and supermarket characteristics, sourcing patterns, and challenges relating to local and regional produce sourcing. Nine stores completed the survey and one store refused, yielding a response rate of 90 percent. The low number of grocery stores and supermarkets considered for this survey represents all of the stores in the study region without duplicating stores in terms of ownership.

The research team chose to limit the sample and not include convenience stores. The following list represents seven of the nine grocery stores and supermarkets which identified themselves for the purposes of this survey: Albertson's, Flagstaff CSA, New Frontiers Natural Marketplace, Safeway, Sam's Club, Target, and Wal-Mart #4252. Research staff contacted the store by telephone or email requesting to meet either the produce manager or store manager. All surveys were completed in person in July 2011, and lasted approximately one hour each. Interest in researching local and regional sourcing for meat and other food items such as dairy was postponed due to time constraints.

Research staff developed and pre-tested the survey on one grocery store at the beginning of the interview process, and as a result of the interview, questions were modified or added to the survey. The pre-test survey was re-coded and included in the final results. The survey instrument consists of a mix of open, closed and multiple-response questions, with one question utilizing a 3-point Likert scale. Survey results were analyzed using descriptive statistics in SPSS software, and open-ended responses were coded and sorted according to themes.

RESULTS AND ANALYSIS

GROCERY STORE AND SUPERMARKET CHARACTERISTICS

Of the grocery stores and supermarkets participating in this study, three describe their store as a national chain supermarket, three describe their store as a national chain store, two describe their store as an independently owned grocery store, and one describes their store in the "Other" category. (See Appendix B for complete survey results.) On average, the stores have been in business in Flagstaff for 16.6 years, with a range of one to 28 years. Only two stores listed their total annual revenues for the purposes of this survey, and the mean is $2,270,000 with a range of $40,000 to $4,500,000.

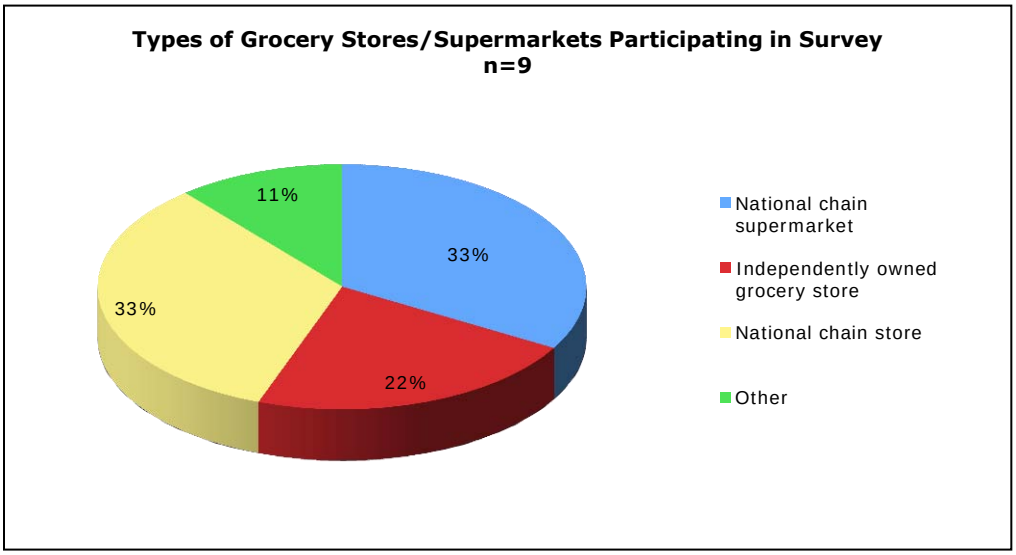


Figure 10: Types of Grocery Stores/Supermarkets Participating in Survey

Surveys were conducted with the produce manager at individual stores. On average, the person completing the survey has been in their position at the store for 7.7 years, with a range of one to 22 years. When asked if they are responsible for sourcing/purchasing their store's produce, seven (78%) of nine respondents said yes and two (22%) said no. However, as the survey progressed and later questions again referenced purchasing authority, several respondents indicated they source/purchase their store's produce from a pre-approved produce list generated at a corporate level. When this finding is taken into account, only two (22%) of the nine stores have no corporate oversight of their individual store's sourcing/purchasing produce.

SOURCING LOCAL/REGIONAL PRODUCE

Survey respondents were asked to estimate what percent of their store's volume of yearly produce sales comes from within different mileage ranges. Many survey respondents indicated verbally that produce availability depends upon weather and stressed that different percentages would apply depending on the season (winter or summer). The information below is an estimate from survey respondents and takes into account produce seasonality.

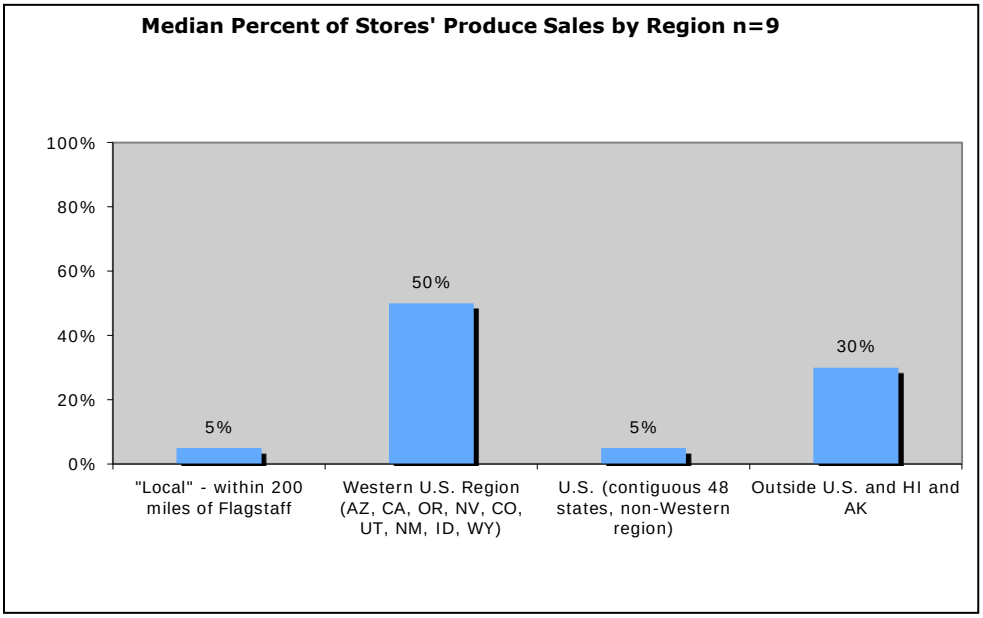


Figure 11: Median Percent of Stores' Produce Sales by Region

Eight out of nine stores estimate that a median five percent of their store's yearly volume of produce sales comes from within 200 miles of Flagstaff, or "local" as defined by this survey. Additionally, stores estimate (in terms of median) that 50 percent of their store's yearly volume of produce sales comes from within the Western U.S. Region, or the states of Arizona (beyond 200 miles from Flagstaff), California, Washington, Oregon, Nevada, Colorado, Utah, New Mexico, Idaho, and Wyoming; five percent of the store's yearly volume of produce sales comes from within the U.S. (the contiguous 48 states, not including the Western region), and 30 percent outside the U.S., including Hawaii and Alaska.

The percentage ranges associated with the above estimates vary by store. For example, there is an estimated percentage range of 0-95 percent for one store's yearly volume of produce sales within 200 miles of Flagstaff, an estimated range of 5-80 percent for the Western U.S. Region, an estimated range of 0-10 percent for the remainder of the U.S., and an estimated range of 0-50 percent for outside the U.S. and Hawaii and Alaska.

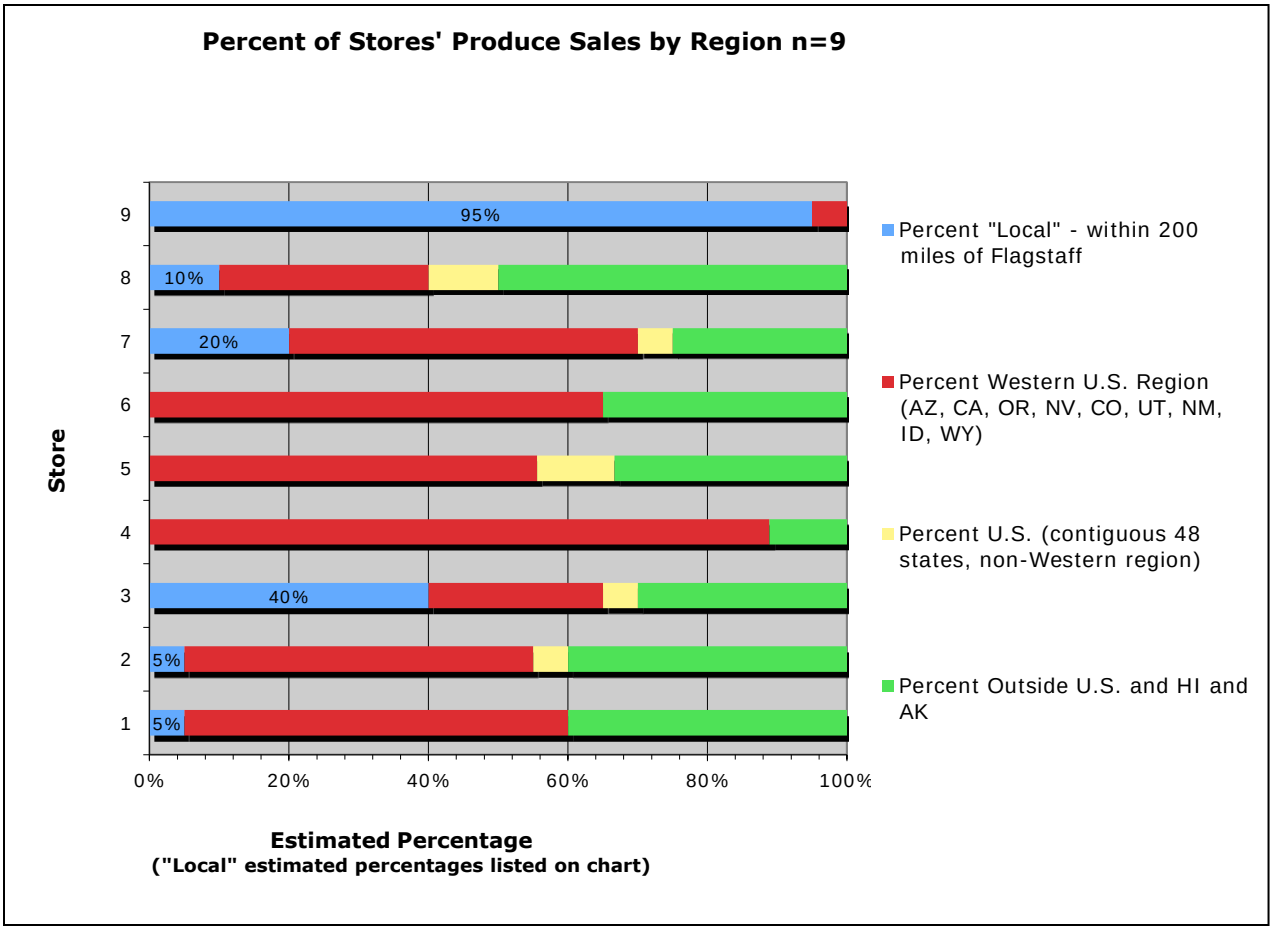


Figure 12: Percent of Stores' Produce Sales by Region

Six (67%) of the nine respondents state they have sold local produce in their store for an average of 21.8 years. Regarding why they sell local produce, state "To support local farmers," and four (67%) state "Product quality/taste/freshness" and "To support local economy." Additional reasons are listed in the chart below. Six (67%) of the nine respondents answered the question of how they source local produce, with five (83%) of the six selecting "Direct from producers," three (50%) selecting "Distributors," and one (17%) selecting "Brokers." Three provided "Other" comments that include "Customer word of mouth" and "Central or corporate purchasing office."

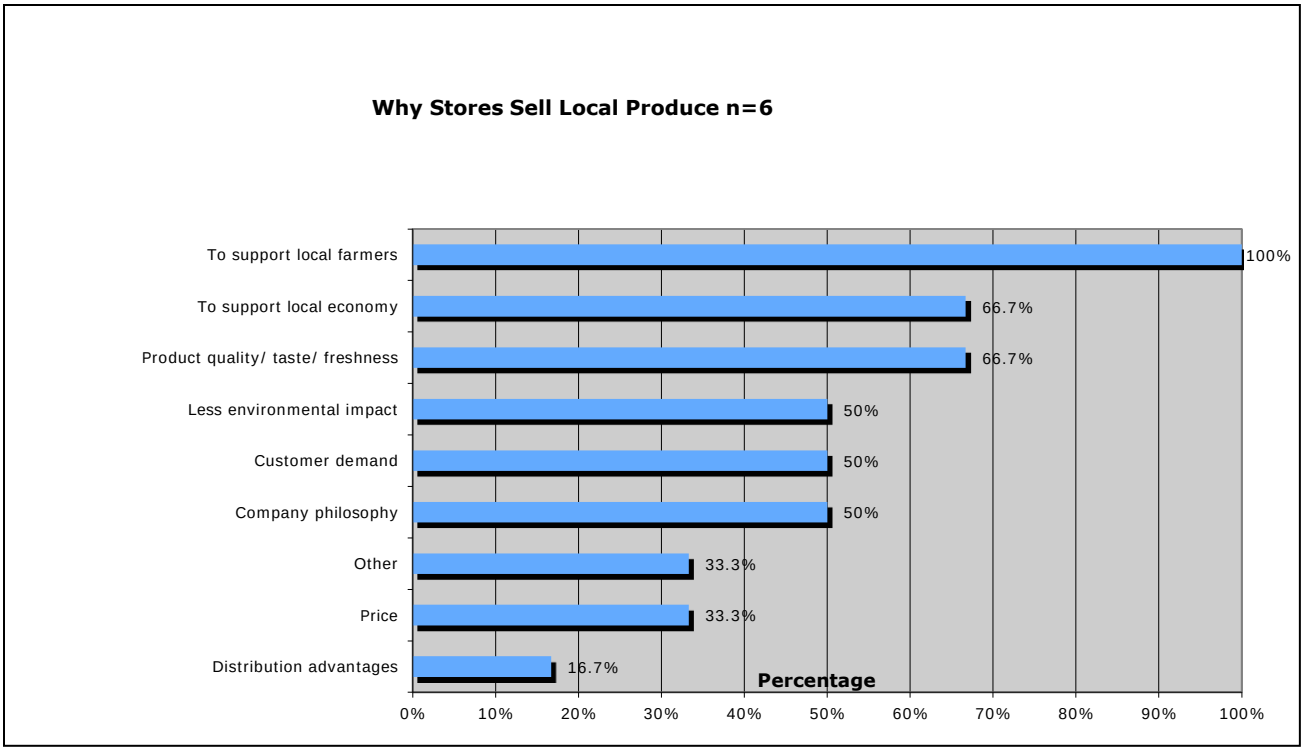


Figure 13: Why Stores Sell Local Produce

To let their customers know the produce is "local," six of the six respondents said they provide "In-store signage" and four "Talk with customers directly." Two (stated they provide information in a "Newsletter/flyer" and two provided "Other" responses, like COOL (Country of Origin Labeling), emails, or reputation.

All nine respondents answered a question about challenges to sourcing local produce. The chart below lists the percentages associated with a specific challenge. "Insufficient volume" topped the list of challenges experienced by grocery stores and supermarkets in the Flagstaff area. When asked to select the single most important challenge, three respondents selected "Insufficient volume," and two selected "Distribution or transportation," "Local growing conditions," and "Lack of specific product/variety" each.

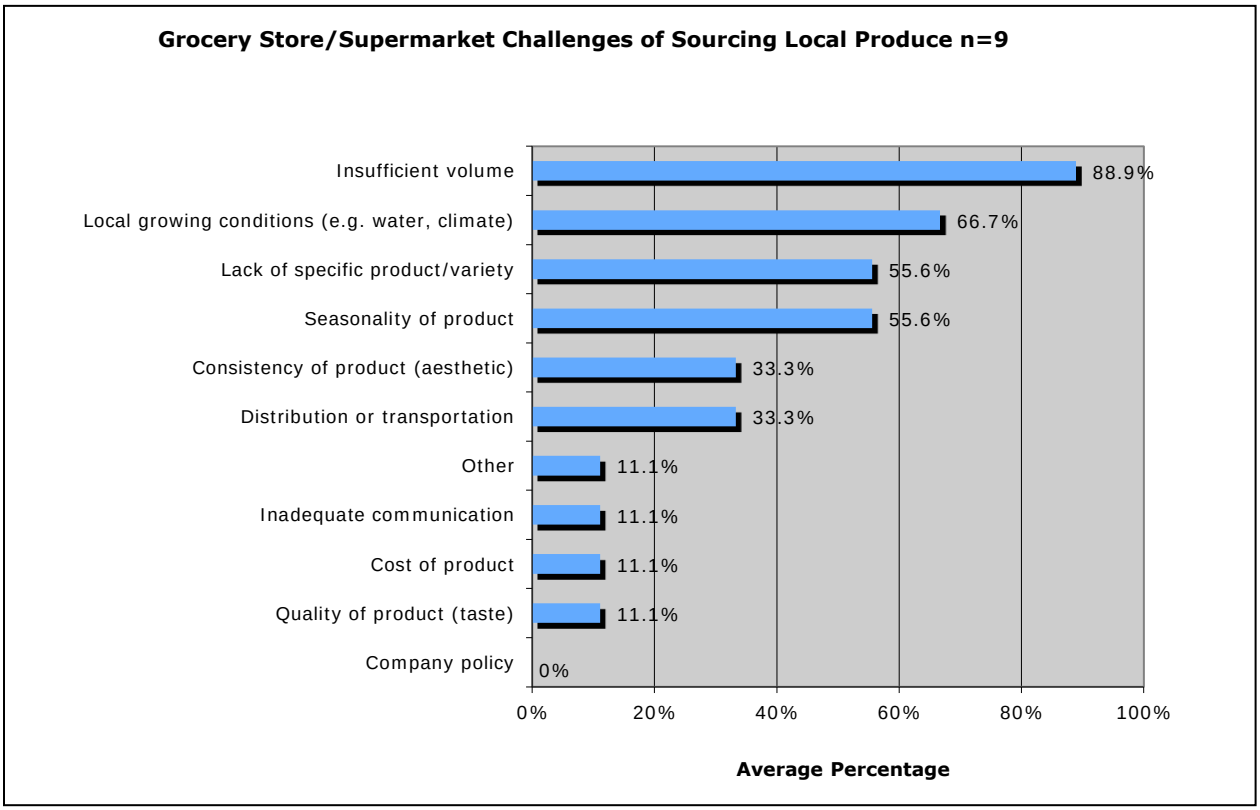


Figure 14: Grocery Store/Supermarket Challenges of Sourcing Local Produce

Three (33%) of the nine respondents state they do not source local food at their stores (they listed 0% in the 200 miles from Flagstaff range), and provide the following reasons: three - "Produce availability," two - "Contracts with other suppliers," and two - "Other," specifically "Climate" and "Seasonality of produce." Seven (88%) of eight respondents said they are interested in sourcing more local produce. Four (44%) of nine respondents said they prefer to be contacted directly by producers for produce sales. Information needed from producers include items that pertain to actual growing conditions at the farm, like organic certification or crop plan, a list of current produce available, or business-related items like licenses or accounts. In lieu of going through the store's produce manager to obtain sales, five respondents suggested alternatives ways producers can contact the store for produce sales: contact the store's corporate office or distribution center.

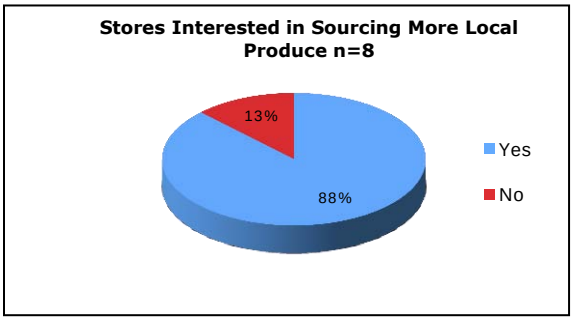


Figure 15: Number of Stores Interested in Sourcing More Local Produce

Six respondents offered suggestions as to what processes or factors contribute to a successful business relationship with producers. Two responses relate to preferring consistency in terms of supply/volume, quality, and communication, and two responses relate to requirements for quality of product. One response mentions needing price points, and one response mentions the need for open communication.

Respondents were asked to rate how important certain characteristics are to their store customers using a scale of 1-3, with 1 being "not important," 2 being "somewhat important," and 3 being "very important." The chart below shows all the responses and their mean ratings.

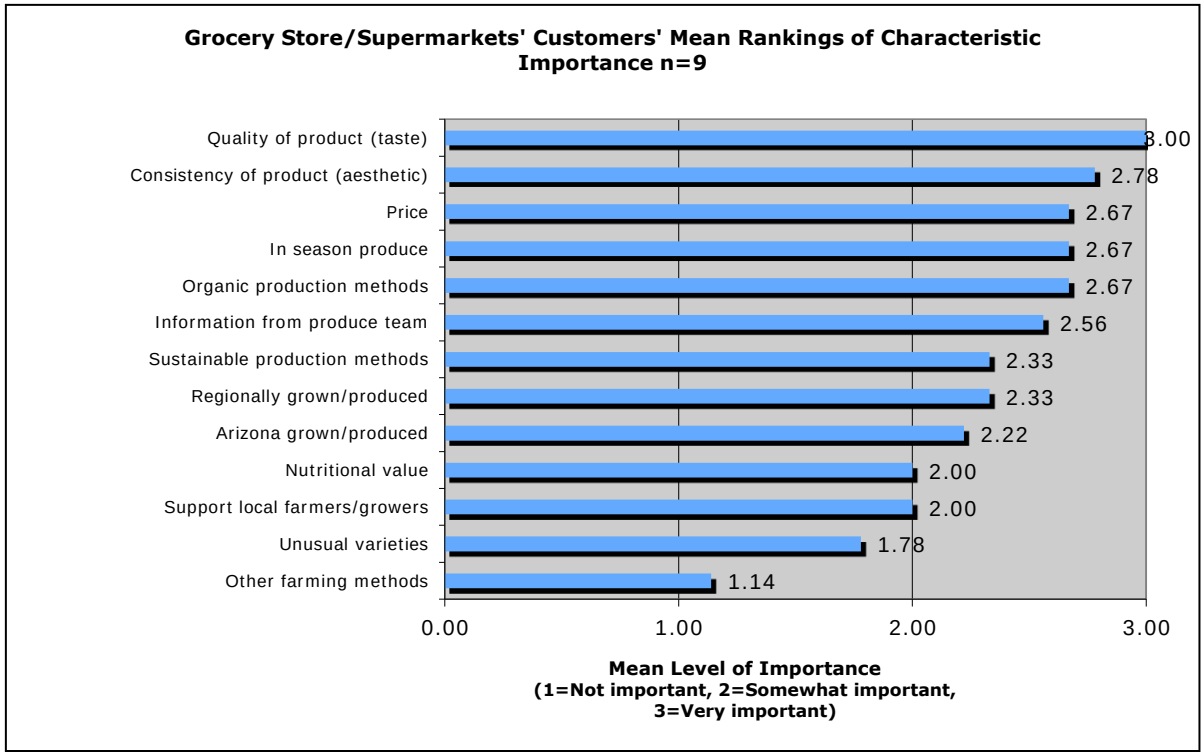


Figure 16: Grocery Store/Supermarkets' Customers' Mean Rankings of Characteristic Importance

ADDITIONAL COMMENTS FROM SURVEY RESPONDENTS

Eight of the nine respondents provided additional comments on the survey. Two responses pertain to farming production methods, whether organic, sustainable, pesticide-free, or certified naturally grown, and the importance their customers place on knowing what method is used in the produce they are buying. One response indicates organic or sustainable production methods are important only to certain customers, while another response takes the entire customer base in mind and expresses the need for customers having peace of mind in what they are buying.

Additional responses relate to satisfying customer needs in the way of keeping the "staple items" always on hand, or the store participating in local events that allow them to connect to the community. The community

connection comes full circle in another response that indicates the need for the local community to provide more support to local farmers because that support will ultimately impact produce quality and pricing.

Additional comments include financial challenges relating to produce delivery and fuel charges, ultimately affecting produce quality; the need for a list of local growers in the area; procurement preferences by state and then region; and challenging weather conditions.

CONCLUSIONS

The Market Demand and Feasibility Study indicates that grocery store/supermarket produce managers are interested in purchasing food locally if several conditions are met. For example, in order for local sourcing to be efficient, managers need information from producers such as a list of local growers in the area, actual growing standards, like organic certification, and a list of current produce available. Although 83 percent of those stores sourcing locally are currently sourcing directly from the growers, 56 percent indicated they would prefer to not be contacted directly by growers/producers, indicating a need for a collaborative effort in local sourcing and distributing. Our findings support the development of a Cooperative Farming Enterprise to meet these conditions.

RECOMMENDATIONS FOR FURTHER RESEARCH

1. **Distribution and Affordability**: This study shows the need for additional research to: a) establish best practices for connecting a Cooperative Farming Enterprise to the local and regional market; b) expand Canyon Country Fresh to meet the needs of producers *and* grocery/supermarkets; and c) research best practices for a locally/regionally owned and operated distribution system that connects local/regional producers to grocery stores and supermarkets to promote the accessibility and affordability of healthy, fresh produce, dairy, eggs, and meat to northern Arizona residents.

2. **Corporate Policy**: Further research should be conducted with corporate level produce managers for a more detailed assessment of local produce purchasing and the associated challenges. Additionally, there should be an examination of corporate grocery store missions and policies regarding local and regional food sourcing to identify requirements that might be barriers to future sourcing.

3. **Composting**: Finally, a couple of Flagstaff grocery stores said they currently compost unsold produce. Local FARE could conduct additional research into grocery stores' waste stream policies and initiatives, and determine if there is an opportunity for stores to contribute to Local FARE's Phase II proposal for a Compost Enterprise.

RESTAURANT AND INSTITUTION SURVEY

INTRODUCTION

Americans spent $594 billion dollars in 2010 on food away from home, an estimated 53 percent increase in the last ten years.[6] What are Americans spending their money on when they go out to eat? The National Restaurant Association, in a survey of 1,500 chefs, found the top three trends in 2011 are locally sourced meats and seafood, locally sourced produce, and sustainability.[7] A significant proportion of Flagstaff's restaurant scene reflects these trends. Eighteen of the nineteen restaurants and institutions surveyed source some of their food locally/regionally, despite facing considerable challenges.[8] This study sought to: 1) determine how much produce is currently being sourced locally/regionally by the sample of Flagstaff restaurants and institutions surveyed; 2) why and how they source local and regional food; and 3) the challenges associated with the process. Additionally, this study evaluates restaurant and institutions' perceptions of customer demand across several variables, including preference for produce that is Arizona grown, regionally grown and in season.

SUMMARY

The Market Demand and Feasibility Study revealed that although 90 percent of participating restaurants/institutions estimate an average of 62 percent of their food comes from within 200 miles of Flagstaff, 100 percent of those said they would alter their menu to feature local/regional food as it becomes available, with 71 percent stating they would alter their menu on average 31 percent. Locally sourced food items that respondents noted interest in purchasing more frequently include: meat (other than beef and chicken) (10 responses), fruit (8), chilies (8), tomatoes (7), herbs (6), chicken (6), greens (5), and vegetables (5), many of which can be grown in greenhouses or season extenders as shown in the Greenhouse to Market portion of this study.

[6] USDA, Economic Research Service, Briefing Rooms. http://www.ers.usda.gov/Briefing/CPIFoodAndExpenditures/ Data/ Expenditures_tables/table3.htm. Web. Accessed 10 August 2011.

[7] National Restaurant Association. "Chef's Survey: What's Hot in 2011." http://www.restaurant.org/pressroom/ social-media-releases/release/?page=social_media_whats_hot_2011.cfm. Web. Accessed 7 September 2011.

[8] One restaurant did not answer this question.

METHODS

Research staff contacted twenty-three restaurants and three institutions in the Flagstaff area of northern Arizona between May and August 2011 to complete a survey on restaurant and institution characteristics, local and regional food sourcing patterns and challenges, and customer preferences. Eighteen restaurants and two institutions completed the survey. One restaurant declined, and five (four restaurants and one institution) did not respond, yielding a response rate of 77 percent. The research team chose to limit the sample and not include chain restaurants. Restaurants were selected based on the research staff's knowledge of current local and regional food use, as the goal of the survey was to investigate potential areas of growth in local/regional food sourcing (versus determining the actual proportion of Flagstaff restaurants sourcing locally). The results for restaurants and institutions are combined in this section of the report in order to retain respondent confidentiality and to analyze a larger sample.

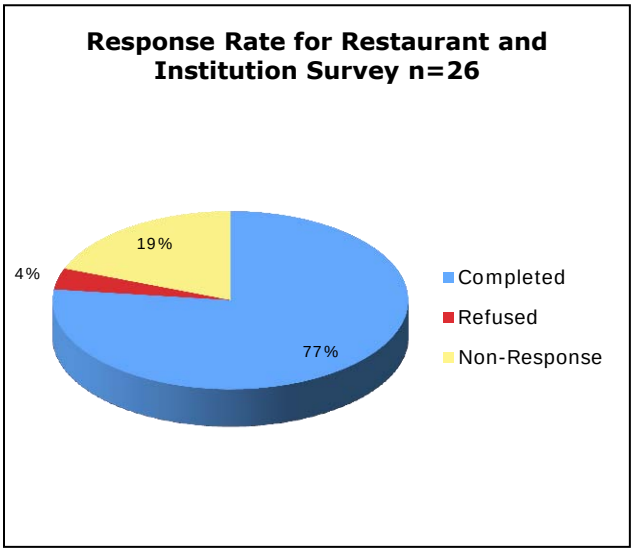


Figure 17: Response Rate for Restaurant and Institution Survey

Research staff contacted restaurants and institutions in person, by telephone or email with a request to meet the owner, chef or manager knowledgeable about food procurement (this could encompass produce, meat, dairy, bread, honey, and various other items) and complete the survey in person. Two surveys that were dropped off with the contact were subsequently picked up already completed, one survey was completed and returned via email, and the remainder of the surveys (17) were completed in person from May through July 2011 lasting approximately forty-five minutes each. The survey instrument consists of a mix of open, closed and multiple-choice questions, with two questions utilizing Likert scales. Survey results were analyzed using descriptive statistics in SPSS software, and open-ended responses were coded and sorted according to themes.

The following list represents seventeen of the twenty restaurants/institutions which identified themselves for the purposes of this survey: Brix Restaurant and Wine Bar, Buster's, Campus Coffee Bean, Criollo Latin Kitchen, Diablo Burger, Flagstaff Medical Center, Josephine's Bistro, La Fonda Mexican Restaurant, Local Alternative Catering, Louie's Chicken Shack, Morning Glory Café, Mountain Oasis, New Jersey Pizza, Salsa Brava, Satchmo's, The Cottage Place, and The Peaks Assisted Living.

RESTAURANT AND INSTITUTION CHARACTERISTICS

Research staff met with the owner (71%), chef (77%) or the manager (65%) to complete the survey; individuals could select more than one role so there is overlap. (See Appendix C for complete survey results.) On average, 19 (95%) restaurants/institutions serve 363 customers per day, with a range of 3 - 2,600 customers. Ten (50%) restaurants/institutions provided total annual revenue for the purposes of this survey, with a mean of $770,600, and a range of $6,000-$3,100,000. The wide range of customers and annual revenue is indicative of the varying sizes of restaurants/institutions surveyed. Some are catering businesses with a weekly customer base, others are restaurants that may be open several days a week, and others are health-care restaurant facilities open a wide range of hours.

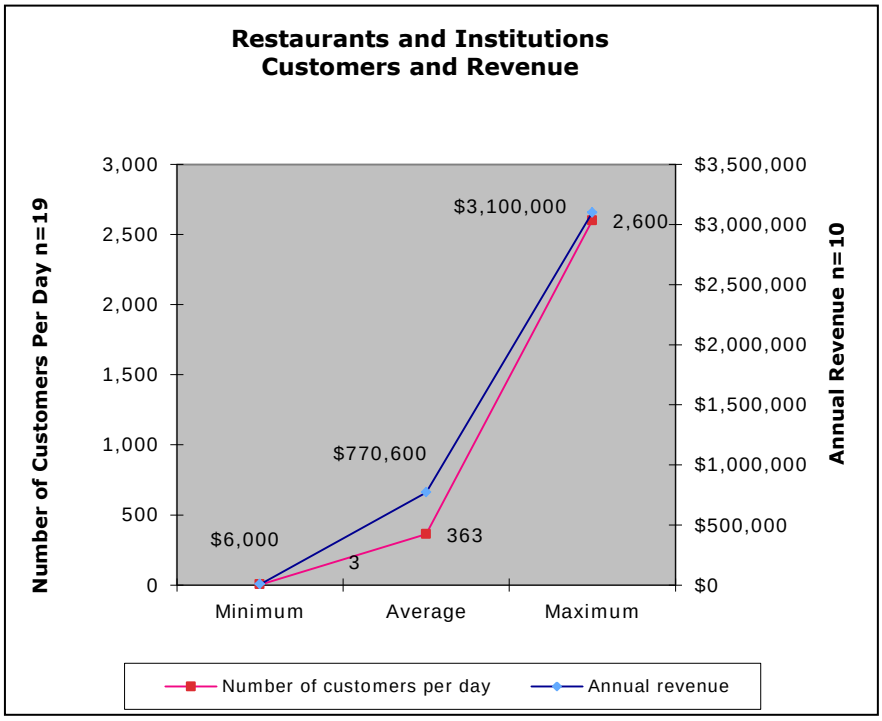


Figure 18: Restaurants and Institutions Customers and Revenue

Twenty restaurants/institutions in this survey have been in business for an average of 15.7 years in Flagstaff. 45% of restaurants/institutions serve breakfast; 90% serve lunch; and all serve dinner. When asked to define their establishment, 30% selected “Upscale full-service restaurant,” 45% chose “Casual/family full-service restaurant,” 55% chose “Caterer,” and 40% selected “Other,” with many respondents selecting multiple categories.

SOURCING LOCAL/REGIONAL FOOD

Restaurants/institutions were asked to estimate what percent of their food comes from four varying mileages. Restaurants/institutions estimate an average of 14.7 percent of their food comes from within 0-60 miles of Flagstaff, 10 percent from within 61-100 miles, 36.5 percent from within 101-200 miles, and 36.3 percent greater than 200 miles. The percentage ranges associated with the above estimates are varied. For example, there is an estimated percentage range of 0-80 percent for 0-60 miles, an estimated range of 0-40 percent for 61-100 miles, an estimated range of 0-98 percent for 101-200 miles, and an estimated range of 0-100 percent for greater than 200 miles.

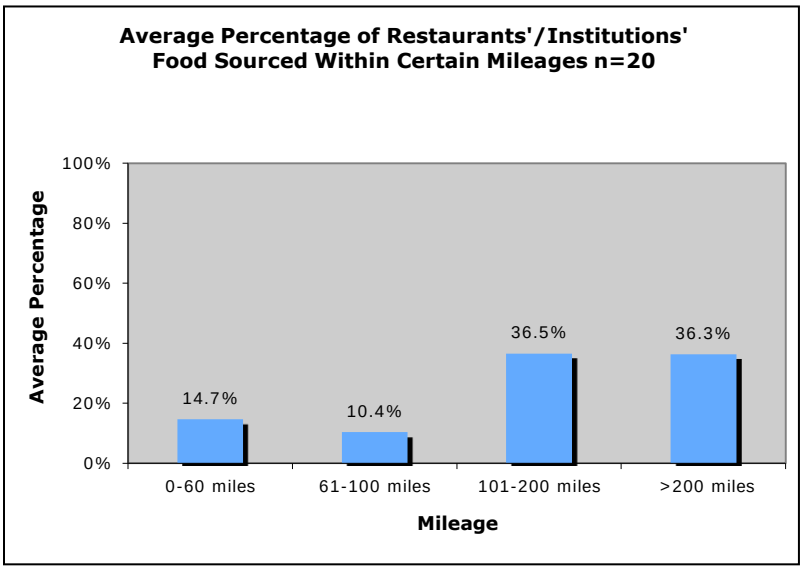


Figure 19: Restaurants'/Institutions' Percent of Food Sourced within Certain Mileages

Eighteen (95%) of 19 participating restaurants/institutions use local/regional food. 17 (85%) restaurants/institutions estimate an average of 42.5 percent purchases are local/regional food. If this survey were to define local within 200 miles of Flagstaff as the Grocery Store and Supermarket Survey did, an estimated 61.6% of food sourced by restaurants/institutions would be considered local, a much larger percentage than defined by the restaurant/institution respondents themselves. Eighteen (90%) restaurants/institutions have been using local/regional food on average 7.6 years, with a range of one year to 26 years.

Nineteen (95%) restaurants/institutions provided insight into the challenges of sourcing local/regional food. The chart below lists the percentages associated with a specific challenge. "Year-round availability" (78.9%) topped the list experienced by restaurants/institutions, with "Delivery" (63.2%) and "High price" (57.9%) in the top three. "Other" (31.6%) responses reference specific food selections based on what farmers will grow and the weather allows, and a number of varying responses.

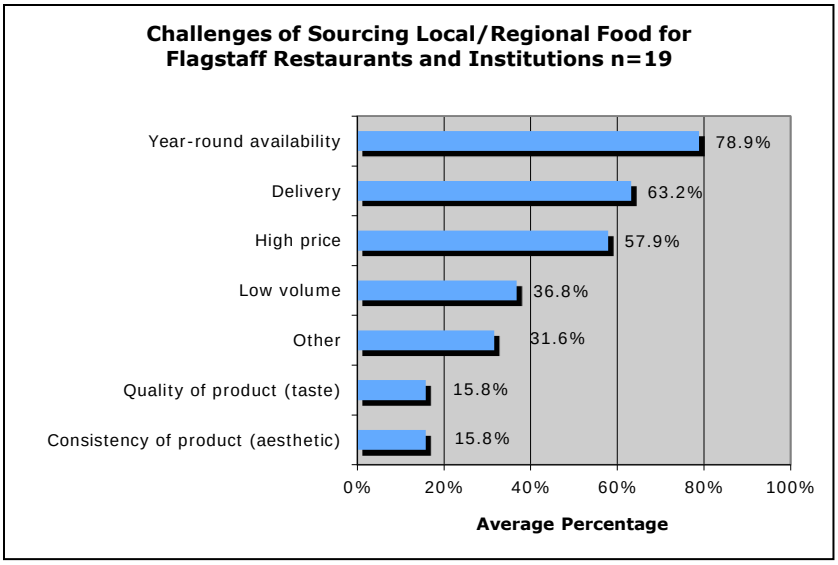


Figure 20: Challenges of Sourcing Local/Regional Food

Regarding why they source local/regional food, 15 (83%) of 18 respondents said they source local/regional food to "Support local farmers," 14 (78%) selected "Quality," and 11 (61%) selected "Taste." Restaurants/institutions are primarily sourcing local/regional food "Direct from growers or producers" (13 of 19 respondents, 68%), "Foodservice distributors" (12 of 19 respondents, 63%), and through "Farmers' markets" (10 of 19 respondents, 536%).

Respondents were asked to rate how important certain characteristics are to their customers using a scale of 1-3, with 1 being "not important," 2 being "somewhat important" and 3 being "very important." Respondents ranked "Product quality" (mean 2.95) highest, with "Price" (mean 2.55) and "In season produce" (mean 2.37) in the top three. The chart below shows all the characteristics and their mean rating. Respondents could also select "Other," and six (30%) of twenty provided "Other" responses with the majority referencing health and environmental concerns such as food safety, toxicity on vegetables and fruits, and farm stewardship issues.

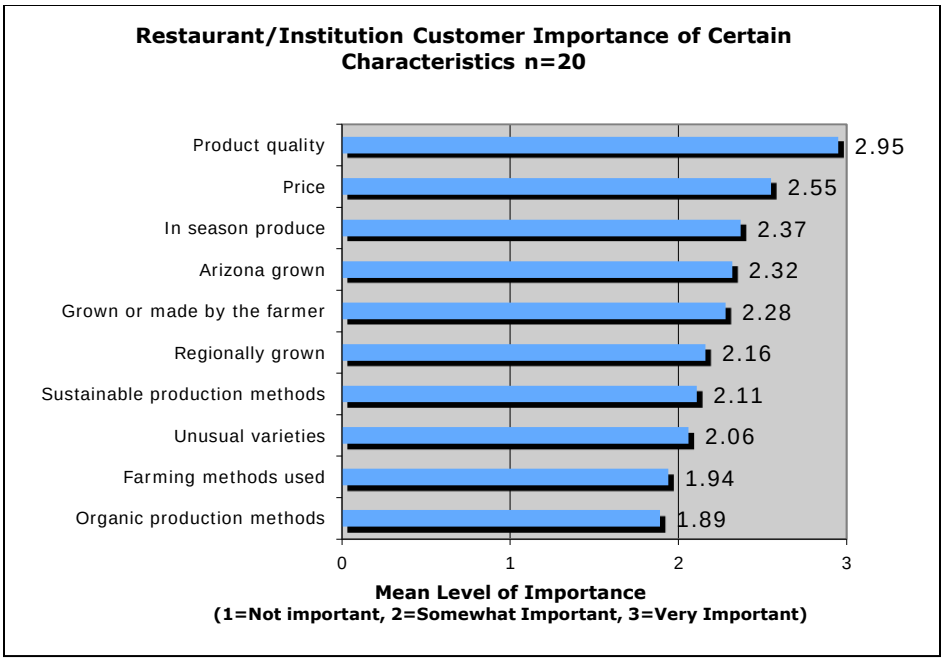


Figure 21: Restaurant/Institution Customers Importance of Certain Characteristics

Of the 17 (85%) respondents who answered whether their customers demand more local/regional food, seven (41%) answered yes. Similar to the question on customer importance of certain characteristics, several respondents said verbally that it depends on the customer; for some customers it is very important to have organic food, for example, while it is not important to others.

How are restaurants/institutions letting their customers know their food is local or regional? Seventeen (85%) respondents provided more detailed information in response to an open-ended question. Ten use word of mouth or verbal communication with customers, and eight utilize signage in the restaurant, including information listed on menus. Several responses (3 responses) explain that sourcing local/regional food is a part of their reputation, and several responses (7 responses) mention advertising via social media like email and Facebook. Advertising is mentioned in several responses (3 responses) as well.

All seventeen respondents said they would alter their menu to feature local/regional food as it becomes available, with twelve (71%) stating they would alter their menu on average 31 percent (range of 10-75%). In conducting the survey with the respondents, several stated they already change their menu to take advantage of produce seasonality; one would like their establishment to be 100 percent local/regional; and one said that organic is more important than local.

When asked what features would help in increasing local/regional food purchasing in the future, 15 (75%) of 20 respondents selected “Competitive pricing,” 13 (65%) chose “Consistency of volume,” and 11 (55%) chose “Consistency of product.” Nine (45%) chose “Other” and provided responses relating to infrastructure issues like a meat processing facility in Coconino County, cold storage and distribution or transportation solutions; and better availability of product from growers/producers, especially from those who have worked through government regulations and certifications.

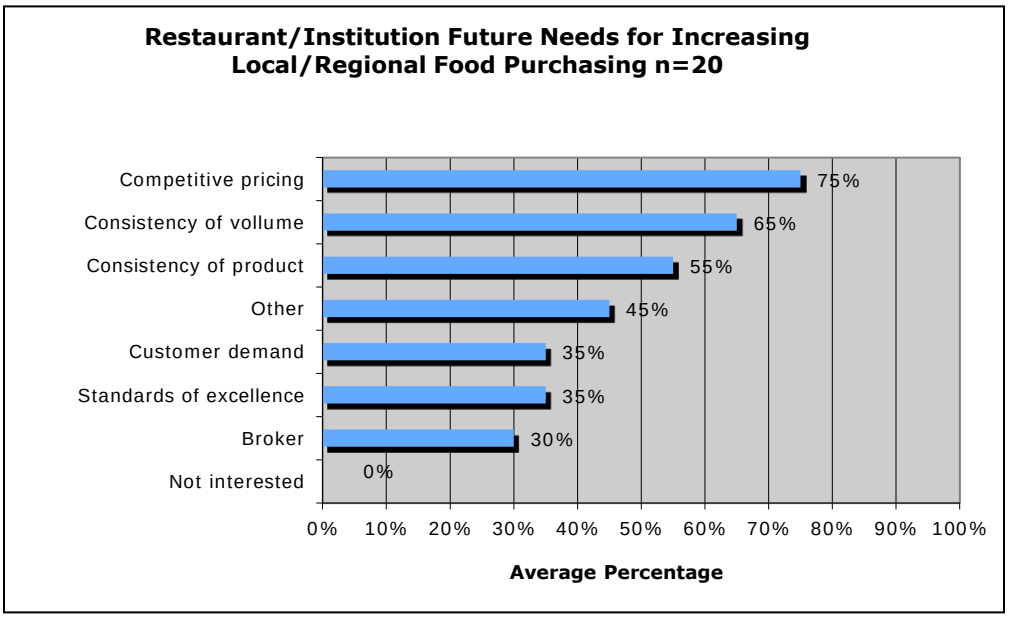


Figure 22: Restaurant/Institution Needs for Sourcing Local/Regional Food

This survey sought to determine current and future local/regional food purchasing demand for specific items from restaurants/institutions. However, respondents did not share precise enough information to do so. Thus, while 17 (85%) of the respondents provided information about the specific types of local/regional food they currently use and gave information about the likelihood of purchasing a specific food item in the future, they did not indicate current and future volume associated with the products. (See Appendix C for responses to the survey.) What this survey obtained instead is a snapshot of the variety of local/regional food the respondents do source, various locations and names of producers across the state from whom they source, and the respondents' interest in securing local/regional food in the future. Of the variety of food items currently used and listed by the respondents, the most frequently listed items include: tomatoes (14 responses), beef (10), greens (10), chiles (8), herbs (7), cheese (6), chicken (4), fruit (4), eggs (3), onions (3), and other meat (other than beef or chicken) (3). Respondents listed many food items for potential use in their establishment should those local/regional food items become available in the future. The most frequently listed items for future use include: other meat (other than beef or chicken) (10 responses), fruit (8), chiles (8), tomatoes (7), herbs (6), chicken (6), greens (5), vegetables (5), eggs (5), cheese (4), and beef (4).

ADDITIONAL COMMENTS FROM SURVEY RESPONDENTS

Fourteen (70%) respondents provided additional comments on the survey. Five responses mention customers in some aspect. These included comments on conveying information about farming methods, packaging or knowing where food comes from; providing healthier menu options for customers; organic expectations of local/regional food; expectations once local/regional food is offered on a menu; and providing affordable menu options for lower income customers. Four responses note quality and freshness as being an important issue in

sourcing food, three responses explain the need for volume and availability, and two responses pertain to the economics associated with local/regional food. A large number of responses dealt with food sourcing overall, and many stressed other issues that affect local/regional food sourcing, specifically packaging, shipping methods, pricing, organic certification, and freshness.

CONCLUSIONS

This study found that there is a definite ethic alive and well among participating restaurants and institutions as to where they purchase their foods. Restaurants/institutions that are sourcing food locally/regionally do so in order to support local farmers, and because of the quality and taste of the produce purchased. That being said, for an increase in local/regional food sourcing, restaurants and institutions must consider factors of customer demand and supply and distribution infrastructure, while also balancing their "bottom lines." Significantly, restaurateurs who are sourcing locally/regionally estimate they would alter their menu on average 31% to incorporate more local/regional food should some of the challenges they identify be met.

The MDFS study shows that the majority of respondents, whether or not they currently source food locally/regionally, are most challenged by obtaining local/regional food year round, followed by delivery and high price. Most of these challenges could be efficiently handled through a Cooperative Farming Enterprise which could focus on the development of shared distribution networks, cooperative growing strategies to ensure required volume, and supply contracts with institutional consumers that allow for more competitive pricing. "Farm to Chef," "Farm to Hospital," and "Farm to School" programs are widely growing in popularity, and could be organized by a Cooperative Farming Enterprise to bring benefits to all participants, customers, clients and farmers alike.

By dint of sheer numbers, restaurant/institutions have a great capacity to stimulate growth in the local food economy. Restaurants in this survey have a mean annual revenue of $770,600 and a range of $6,000 to $3,100,000, facts which suggest that the effect of restaurant/institution food sourcing on the local food economy could be significant. Moreover, the high volume of customers served each day gives restaurants/institutions a profound opportunity to raise awareness about local food production.

RECOMMENDATIONS FOR FURTHER RESEARCH

1. **Distribution and Affordability**: Because 95% of participating restaurants/institutions have both an interest in sourcing food locally and the capacity to catalyze an explosion of growth in our local food system, researchers have closely examined the challenges noted by respondents that are barriers to that expansion. 79% of respondents note year-round availability is a challenge to sourcing food locally, and many stress that packaging, shipping methods and pricing are issues. Thus, this piece of the larger project is aligned with the Production Needs Assessment in indicating the need for further research to:

a. Evaluate best practices of other similarly sized communities with respect to efficient, low carbon footprint distribution methods that could take efficient advantage of longer growing seasons at lower elevations thus addressing the need for year-round availability;
b. Investigate ways to provide fresh produce as affordable menu options for lower income customers.

2. **Cooperative Farming Enterprise**: Identify and assess the potential for developing Farm to Chef and Farm to Institution (e.g. school or hospital) programs between a Cooperative Farming Enterprise and local restaurants and institutions.
3. **Costs**: Analyze price lists of local and regional food supply/distributing companies, such as McClendon's Select, to gather price range information for select produce. The selected produce could correspond with the results of this study's top ten current and future sourced produce among the restaurants interviewed to determine the price points that local/regional producers would have to match (whether dollar for dollar or with intangibles).
4. **Economic Impact**: Generate an economic impact study for in-state effects on production, transportation, and sales if we project an increase of local food sourcing by restaurants of five percent, ten percent, etc.
5. **Managing waste streams**: Determine the level of interest among restaurants and institutions in a composting project, including requirements needed at the restaurant and institution level such as pick up and separation of materials, health codes, etc. Research into grocery stores' waste stream policies and initiatives could determine the opportunities for stores to contribute to Local FARE's Phase II proposal for a Composting Cooperative.

MARKET DEMAND AND FEASIBILITY STUDY CONCLUSION

Flagstaff appears to be at the edge of initiating a food system that is conscious of accessibility, affordability, "foodprint" education, and promoting health through food choices. Restaurants, institutions, farmers' market organizers, grocers, and producers almost all share these interests, yet cite a lack of time or knowledge to close the existing gaps. Local FARE proposes that with a focus on research and an eye toward cooperative enterprise development, northern Arizona has the capacity to support a thriving regional food economy.

PRODUCTION NEEDS ASSESSMENT

Figure 23: Experimenting with Vegetable Production at Flying M Ranch

While our Market Demand and Feasibility Study shows that demand for locally and regionally produced food has been rising quickly and has not yet peaked, supply has not been growing apace. In this study we assess the challenges both backyard growers and regional direct farmers in our region face, and how their production can be supported and increased.

BACKYARD GROWERS

INTRODUCTION

During World War II, victory gardens at homes and in public spaces across the United States contributed more than 40% of the vegetables grown.[9] Many had a kitchen garden, and excess produce was often sold to local markets or in roadside stands. Despite the difficult growing conditions, this was true in Flagstaff as well. Today, the contribution of backyard gardening to household food consumption and to the local food economy has dropped precipitously. There are, however, long-time successful backyard growers in Flagstaff as well as many newcomers who endeavor to grow or raise fresh food in a sustainable manner.

The broad purpose of this study is to assess the potential for growth in the local food economy among backyard growers. The study has two specific objectives: 1) to ascertain whether there is sufficient interest and production among backyard gardeners to support a Backyard Growers' Market Collaborative that would better facilitate getting produce to market; and 2) to determine the need for and interest in purchasing locally researched and locally manufactured season extenders and other infrastructure to support both growers' success and the expansion of local businesses. To those ends, we sought to understand *best practices* used by expert backyard gardeners, and to assess *the needs* of expert and non-expert gardeners as they attempt to strengthen and expand the productivity of their gardens and the marketability of their produce.

SUMMARY

This study confirms that there are significant opportunities for growth in the local food economy among backyard growers. First, interest in a Backyard Growers' Market Collaborative is very strong and initial organizing has already begun. Second, the study shows very significant demand for locally researched and manufactured season extenders.

This study also shows the need for additional research a) to explore the feasibility of a composting business or a municipal composting service; b) to develop and create opportunities to exchange locally adapted seeds; c) to develop a strong home gardener network; d) to carry out a backyard growers baseline production audit; and e) to expand knowledge of best practices for enhancing soil in Flagstaff.

[9] USDA, *Extension.* http:// http://www.csrees.usda.gov/qlinks/extension.html (April 2011). Web. Accessed 10 August 2011.

METHODS

A survey was developed to answer questions related to production, growing methods, and interests (see Appendix A). The survey instrument consists of a mix of open, closed and multiple-response questions, and all participants were surveyed in person. This allowed conversation that deepened the understanding of participants' survey responses. Thus, qualitative data was also collected. Survey results were analyzed using descriptive statistics in SPSS software, and open-ended responses were coded and sorted according to themes.

Two groups of Flagstaff gardeners were surveyed for this study: expert gardeners (*n=11),* and non-expert gardeners (*n=15).* The two samples were administered the same survey and are differentiated by "expert" and "non-expert." Participants were identified primarily through members of Flagstaff Foodlink and the Coconino County Master Gardener program. Participants were also identified upon recommendation of other participants. The differentiation between expert and non-expert was determined after the interview based on several factors, including self-identification, success in growing food, estimated quantity of food produced, and depth of knowledge of growing food. Significant differences in responses between the two groups are discussed separately. Unless otherwise noted, tables show combined responses. Finally, attention was paid to the distribution of survey respondents within Flagstaff's many microclimates (see Appendix B).

Due to the small sample of this study, the results should be understood as preliminary only. Based on this data, however, it is possible to make recommendations for action and future research.

RESULTS

LOCALLY PRODUCED FOOD IN THE FOOD SYSTEM

Participants were asked what they do with the food they produce in their home gardens. Responses indicate that, in addition to home consumption, more than half of those surveyed give away food to friends and neighbors, and that there is substantial trading and selling of produce among those sampled.

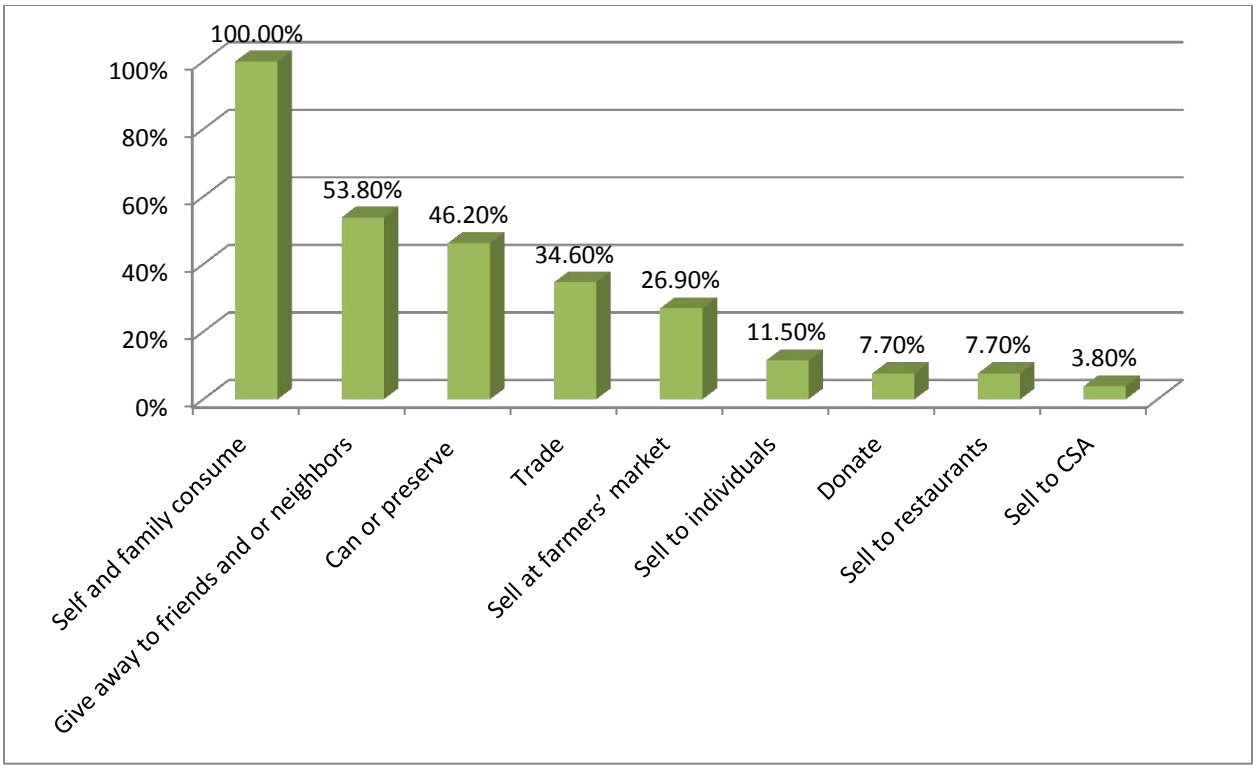


Figure 24: Distribution of Food Produced in Home Gardens

FOOD PRODUCTION

Respondents were asked to estimate the quantity, in any metric, of each type of food crop they produced in a season. Due to productivity variations from year to year and constant experimentation with varieties and crops, many respondents could not estimate quantities. Some expert respondents did, however, estimate the quantities of tomatoes and squash, two of the most common crops grown by respondents. Of those respondents, the total average yield per season for tomatoes is 115 lbs., with a range of 7 lbs. to 300 lbs. The total average yield for squash is nearly identical to that of tomatoes. With few exceptions, non-experts declined to estimate their total yield for specific crops, but the most common estimates ranged from 5 lbs. to 50 lbs.

Some comments made by expert gardeners in regard to their yield are not only noteworthy, but exemplify the possible productivity of gardening in Flagstaff. One expert grows many different food crops on 2100 square feet where he harvests several varieties of beans, melons and cucumbers. He noted, "I get a lot; it's too much to estimate." In fact, when encouraged to do so, he estimated that he gets about 40-50 lbs. of green beans and roughly 200 lbs. of tomatoes per season and further stated, "I save a lot of money, at least a $1000 a year."

Two other expert gardeners with large growing areas (3000 sq ft. and 2000 sq ft.) also grow multiple food crops and, unlike the expert discussed above, have livestock for meat and eggs. One of them stated that she grows "way more than five people can eat in a year." The other grower, who currently sells lettuce at the Flagstaff

Community Market, stated that she does not buy vegetables until November, and that because she grows greens all year round, she hasn't purchased greens in over three years.

CURRENT GARDENING SPACE

The survey asked respondents to note the size of their current gardening space and whether availability of land was a limiting factor. Nearly 27 percent cite that limited land is one of the reasons they are unable to expand their home gardens.

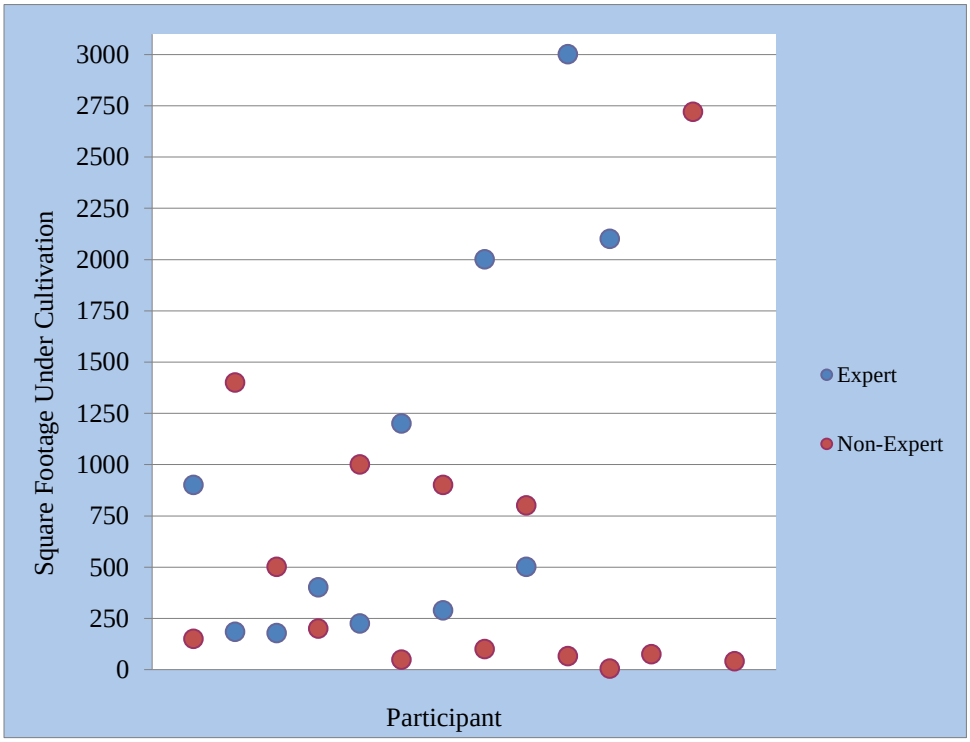


Figure 25: Scatterplot of Square Footage under Cultivation of Expert v. Non-Expert Gardeners

SEEDS AND STARTS

Due to myriad climatic conditions unfavorable to growing food in Flagstaff, the use of appropriate crop varieties and locally adapted seeds are important elements of successful gardening. The survey asked how and where gardeners obtained their seeds and starts, and if they would be interested in local seeds. As a group, expert gardeners are very interested in obtaining local seeds (91%). Dissatisfied with offerings at local retailers, they save their own seeds (64%) and order from non-local seed companies (72%). They also grow their starts from seeds at a higher rate (80%) than non-expert gardeners. Non-experts, however, are also very interested in local seeds (53%), but only 20% report growing starts from seeds, and they are less likely than experts to save their seeds or order from seed companies.

How are seeds and starts obtained?	
	Percent
Obtain seeds/starts from area retailers	88.50%
Interested in obtaining seeds from local sources	73.10%
Save seeds	57.70%
Grow their own starts	50.00%
Obtain seeds from others	50.00%
Obtain seeds directly from seed companies	50.00%
Buys starts from the CSA	11.50%

Figure 26: Percentages of Sourcing Seeds and Starts

SOIL

Due to the poor soils found in this region, successful gardening greatly depends on the degree to which gardeners amend and build soil. When asked about their soil treatments, a very high percentage of both groups report the use of compost and manure, and a very low percentage report using synthetic fertilizers. Given the high degree (96.2%) to which both experts and gardeners are utilizing compost, it is important to note that many stated that their own supply was not sufficient for their needs. Moreover, approximately 27% of respondents said that they would have difficulty expanding due to poor soil conditions.

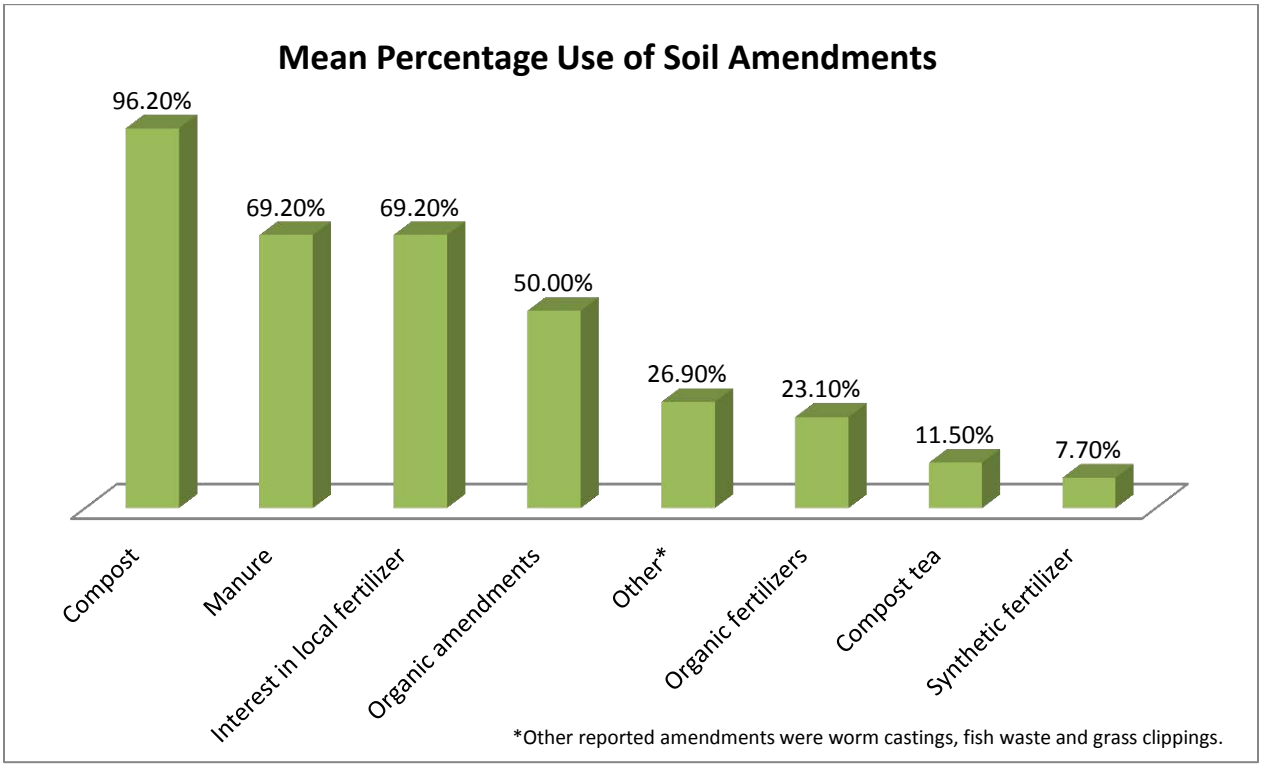


Figure 27: Average Percentage Use of Assorted Soil Amendments

PEST CONTROL

When asked about pests and pest control, most respondents reported that pests are not a significant problem. The most widely discussed pest problems involved mammals, particularly skunks and gophers. Approximately 8% of those surveyed report using synthetic pesticides. Most respondents were adamantly opposed to using chemicals to control pests.

Pest Control	
	Percent
Manual pulling and/or manual removal of pests*	38.50%
Utilize companion planting	30.80%
Organic pesticides	23.10%
Introduce beneficial insects	15.40%
No control of pests	15.40%
Synthetic pesticides	7.70%
*Responses to the 'other' category	

Figure 28: Methods of Pest Control

INFRASTRUCTURE

The possibilities for food production in Flagstaff can be enhanced when the effects of cold temperatures, wind, and limited and expensive water availability are mitigated through the use of infrastructure in the garden. The data suggests that the use of structures is widespread with over 92% reporting the use of at least one structure. The total number of respondents using season extenders is just over half. Raised beds were the most popular structure, while irrigation and water catchment systems were the second most popular.

There were significant differences in the number of expert versus non-expert gardeners utilizing season extenders. The number of experts using greenhouses (55%) is higher than that of non-experts (7%), and the percentage of experts using hoop-houses is 13% higher than that of non-experts. Eighty percent of expert and 66% of non-experts would be likely to purchase locally built infrastructure (when datasets are combined this figure is over 73%). Many of the respondents noted that it was very important to them that the structures be durable, affordable, and able to withstand very windy conditions.

Expert and Non-Expert Use of Infrastructure	
	Percent
Raised bed	69.20%
Rain-water catchment	46.20%
Irrigation	46.20%
Cold frame	34.60%
Windbreak	30.80%

Greenhouse	26.90%
Hoop-house	15.40%
Grey-water catchment	15.40%
Does not use structures	7.70%

Figure 29: Expert and Non-Expert Use of Infrastructure

EXPECTATIONS AND LIMITATIONS OF FOOD PRODUCTION

Over 81% of the respondents said that they would like to expand their home garden. The most frequently cited limitation to expansion was a lack of time (42%). Another 34% cited weather conditions as the main limitation (cold temperatures, hot temperatures and wind).

ENTREPRENEURIAL INTEREST

The survey asked whether or not people were interested in selling the food they produce. Of those ten growers interested in selling (39%), seven are already selling at the farmers' market or to a restaurant. Ninety percent of those interested in selling are interested in a Backyard Growers' Market Collaborative. Those uninterested in selling said it would not be worth the time or that their volume is too small.

INTEREST IN FUTURE OPPORTUNITIES

The survey also asked respondents to check which future opportunities they would be interested in. Responses indicate that there is substantial interest in many forms of education, sharing, and participation in a variety of opportunities.

Interest in Educational and Market Opportunities	
	Percent
Workshops related to food production	61.50%
Producing food for a CSA	42.30%
Participating in markets with others	38.50%
Regulations related to growing or selling	38.50%
Producing for farmers' market or stand	30.80%
A courier service	11.50%

Figure 30: Interest in Educational and Market Opportunities

The last question was open-ended and also asked about future opportunities: "[What are] other things you would like to see in regard to growing, selling, or otherwise creating a more local food system in Flagstaff?" Responses coalesced into five themes, the first of which can be described as interest in a *network* so that gardeners can meet and learn from one another. As one gardener stated, "We are not interested in selling food, we just want to meet other people growing food and having more success than we are."

Another common response was an interest in *obtaining seeds* that are appropriate or specifically adapted to Flagstaff's climate. Many respondents have participated in past seed exchanges and feel like that is a good venue for obtaining seeds, but these opportunities are infrequent. Also, there was a strong interest in *obtaining more soil, compost or organic material*. Gardeners feel that this could either happen through more sophisticated, yet informal networks or through a municipally supported composting program.

Policy-related concerns also surfaced in response to this question. These varied from water-harvesting ordinances and incentives, a municipal water management plan, changes in the current animal ordinance as well as tax breaks and more support from the city. A number of respondents would like to see more community gardens and more collaborative efforts in general. Examples of collaborative efforts were gardeners growing different crops to share with other gardeners, a community kitchen, a permanent place at the farmers' market for backyard gardeners to sell, and people pooling their resources to "produce more food."

A shared sense of the need for *equitability, accessibility and affordability* was often expressed as well. Some gardeners stated they would like to see more low-income families having access to fresh foods. Others stated that they would like to see everyone have affordable opportunities to garden.

BEST PRACTICES

In order to learn about sustainable and cost saving gardening practices of backyard growers, the survey asked respondents to identify the practices they use. For the purposes of this report, "best practices" are broken into *minimum* best practices (seed saving, composting, and catching rainwater) and *maximum* best practices (the aforementioned minimum best practices plus organic fertilizers or amendments, organic pesticides or other cultural or natural pest deterrents, structures, and wind breaks). Both minimum and maximum best practices contribute positively to sustainable and healthy home gardens and save on long-term costs. The cost and ease of *minimum* best practices is minimal, while *maximum* best practices may be initially cost-prohibitive for some.

The data for both minimum and maximum best practices suggest a high degree of sustainable practices among backyard growers in Flagstaff. The percentages in the expert dataset are higher for both minimum and maximum best practices, but not significantly so. Forty-two percent of all respondents are employing two out of three *minimum* best practices, and nearly one third of all respondents are using 6 out of a possible 7 maximum best practices.

CONCLUSIONS

Despite the harsh climatic conditions found in Flagstaff, there is a small, yet enthusiastic group of home gardeners who have been successful at yielding impressive amounts of food from their garden. This study confirms that there is room for growth in the local food economy of Flagstaff.

BACKYARD GROWERS' MARKET COLLABORATIVE

Well over one third of backyard growers surveyed are interested in selling the food they produce, and all but one of these individuals is also interested in a market collaborative. Given the interest of the respondents and the presence of a very informal market collaborative already taking place at the time of writing, the coordination, planning, and negotiation of a market collaborative with a permanent place in the Flagstaff Community Market has begun. Members planning this collaborative intend to be established in time for the opening of the 2012 Flagstaff Community Farmers' Market.

Figure 31: Joyce Koressel's Backyard Garden

ASSESSMENT OF INTEREST IN SEASON EXTENDERS

Among growers there is widespread consensus that greenhouses, cold frames, solar pods and hoop-houses can mitigate the many challenging climatic conditions in Flagstaff, thus enhancing production. Given the high percentage of growers wishing to expand their home gardens (81%), and the fact that almost 75% of respondents are interested in purchasing season extenders, we conclude that there is a healthy demand for locally researched and built season extenders and that this demand would support significant business expansion of an existing woodworking enterprise. A creative business model, however, should be attentive to affordability, as this was a frequently voiced concern among experts and gardeners alike.

In addition, this study found that there is significant interest among backyard growers to produce more food in their home gardens, to have more opportunities to obtain locally-adapted seed and to have better access to compost and soil. Projects and opportunities for future research are outlined below.

RECOMMENDATIONS FOR FURTHER RESEARCH

1. **Composting**: The combination of the high percentage of those desiring to expand production (81%), poor soil that substantially limits production expansion, the inability of growers to produce enough compost to amend their soil, and growers' interest in locally produced fertilizers (specified as compost),

suggests that there is substantial market demand for locally produced compost using untapped local waste streams. Research exploring the feasibility of a composting business or a municipal composting service is needed. Affordability must be taken into serious consideration.

2. **Seeds**: The study reveals that seed integrity and the availability of locally adapted seeds are very important to expert gardeners but less so to non-expert gardeners.
    a. This suggests there is a need for public outreach on the subject of seed biodiversity and seed saving. The study also reveals that there are few sources of locally-adapted seeds. The importance of frequent local seed exchanges cannot be clearer.
    b. Future research regarding seeds is needed to compile information already known about varieties best suited for Flagstaff as well as to research lesser-known varieties. Such research could be citizen-based by establishing test plots in gardens throughout Flagstaff. Such research would deepen understanding of microclimates, and forge relationships between the university and the public, researchers and citizens. Additional research could be done to understand why seed saving does not occur more frequently and how many gardeners are actually using non-hybrid and/or heirloom seeds.
3. **Home Gardener Network**: This study revealed strong desire for more opportunities to meet and collaborate with fellow gardeners. Further research should be done to ascertain what an effective community network would involve. Online-based network, blogs, or chat rooms as well as the establishment of neighborhood mentors could be components of a home gardener network. Seed swaps, seed-saving networks, garden tours and other opportunities for knowledge exchange and idea sharing could also be further facilitated by a network that connects gardeners to one another.
4. **Food Production Audit**: An audit of how much food is actually being sold, traded, donated, or immediately consumed by backyard growers, and how local production contributes to the overall food system would be useful further research. Such baseline data would allow the community to set "locally home grown" production goals as well as focus community gardening workshops to aid new growers.
5. **Soil**: As gardeners throughout Flagstaff have proven, it is possible to build and enrich the soil over time. While this inquiry unearthed many techniques and ideas, a more in-depth study of building soil, the best practices of building soils in Flagstaff, and the limitations and costs of doing so would be a true contribution to the building of a more local and sustainable food system.
6. **Water**: Given that Flagstaff is situated in an arid region of the country, the lack of water, drought conditions and predictions of water scarcity have and will continue to pose challenges to food production of any sort. The use of water collection systems in this study is encouraging. However, respondents would agree that their current water harvesting capacity is not adequate and further, that obtaining larger capacity systems would be expensive.
    a. This study recommends researching policies and incentive programs relevant to water harvesting, and that water collection incentives be enacted on a municipal level in the near future. This would help defray costs and encourage others not already collecting water to do so.
    b. Further, this study recommends a concerted effort to research adequate and appropriately scaled water harvesting models that can then be promoted through informal and formal networks.

REGIONAL DIRECT MARKET FARMERS

INTRODUCTION

Small-scale agricultural producers everywhere face myriad challenges to secure livelihoods. In northern Arizona, a region unsuited for large-scale or highly intensive agriculture, small scale producers, like their counterparts elsewhere, face increasing land prices from development pressures, rising costs of farm equipment and input costs, and stagnant crop prices, to name but a few challenges. In addition, northern Arizona farmers face persistent periodic drought conditions that make a secure livelihood very difficult. US Agricultural Census data reveal that farmland acreage in this region has decreased in the past two decades. Despite these factors, small scale farming in northern Arizona is still taking place, benefiting from a burgeoning local food movement, a heightened interest in locally-grown and sustainably produced food, and new outlets in the form of farmers markets, restaurants that source locally, and community supported agriculture projects (CSAs).

The broad purpose of this study was to understand how to strengthen and support the economic viability of small-scale farmers in the region. The study's two objectives were 1) to assess interest in and need for a Regional Cooperative Farming Enterprise able to identify business opportunities most efficiently realized through cooperative endeavor, and 2) to gather data needed to update the farmers' marketing tool, Canyon Country Fresh. To those ends, the study assessed the needs of regional food producers, identified their challenges, their production capacities, their interest in future expansion, and their interest in cooperative farming ventures.

SUMMARY

This study confirms that there are substantial challenges faced by regional direct market farmers in northern Arizona. In addition to weather, costs of labor, land, and equipment are great concerns, along with transporting goods to market, and getting access to new markets. Concern with governmental regulations is high. Moreover, while there are great challenges to expanding their operations, there is substantial interest among farmers in doing so. Finally, farmers in northern Arizona are very interested in cooperative enterprises such as CSAs and food cooperatives as well as in other forms of collaboration, such as shared crop planning, to minimize competition.

METHODS

Research staff created and administered a survey to regional growers and/or producers (Appendix F). The survey instrument consists of a mix of open, closed and multiple-response questions. Although the researcher made an effort to administer surveys in person, most were completed by the farmer and turned in later. The researcher followed up with respondents to clarify any questions.

The population surveyed in this study is that of small direct market farmers in northern Arizona. All respondents own or operate their businesses. Most of the respondents grow or produce food on diversified farms, growing many varieties of vegetables or raising livestock for meat for regional supply chains. One respondent sells dairy products only.

Participants were recruited through the existing network of the Flagstaff Community Farmers' Market and through the online directory, Canyon Country Fresh. The study surveyed 28 of the planned 30 farmers. Many growers declined participating in the survey due to time constraints (the survey schedule overlapped with the start of the markets) or lack of interest.

The 28 participants represent six counties within northern Arizona: Apache (*n=1*), Coconino (*n=1*), Gila (*n=1*), Maricopa (*n*=1), Navajo (*n=10*), and Yavapai (*n=12*).

The quantitative data was analyzed via SPSS statistical software. Due to the small sample size, only descriptives and frequencies were measured and discussed in this report. Qualitative data analysis was done using the content analysis approach.

RESULTS

PROFILE OF RESPONDENTS

The survey asked general questions concerning age, years of selling to market, how respondents characterize their growing methods, what markets they currently participate in and how income relates to these markets. Over half of the respondents are over 51 years of age, and almost one third have been selling their products for over ten years. In addition, over 50% are selling their products year-round and nearly two-thirds of the food products are being consumed within less than 100 miles from their origin. Over 40%[10] of respondents' incomes rely on the sale of seasonal or year-round products. Lastly, over 70% of the respondents identified themselves as being "chemical free" (Appendix D).

[10] Only respondents from Yavapai, Coconino, Gila, and Maricopa counties were included in this statistic as Navajo and Apache respondents were not asked to specify "income relies" or "income supplements" (Questions 2e and 2f, respectively).

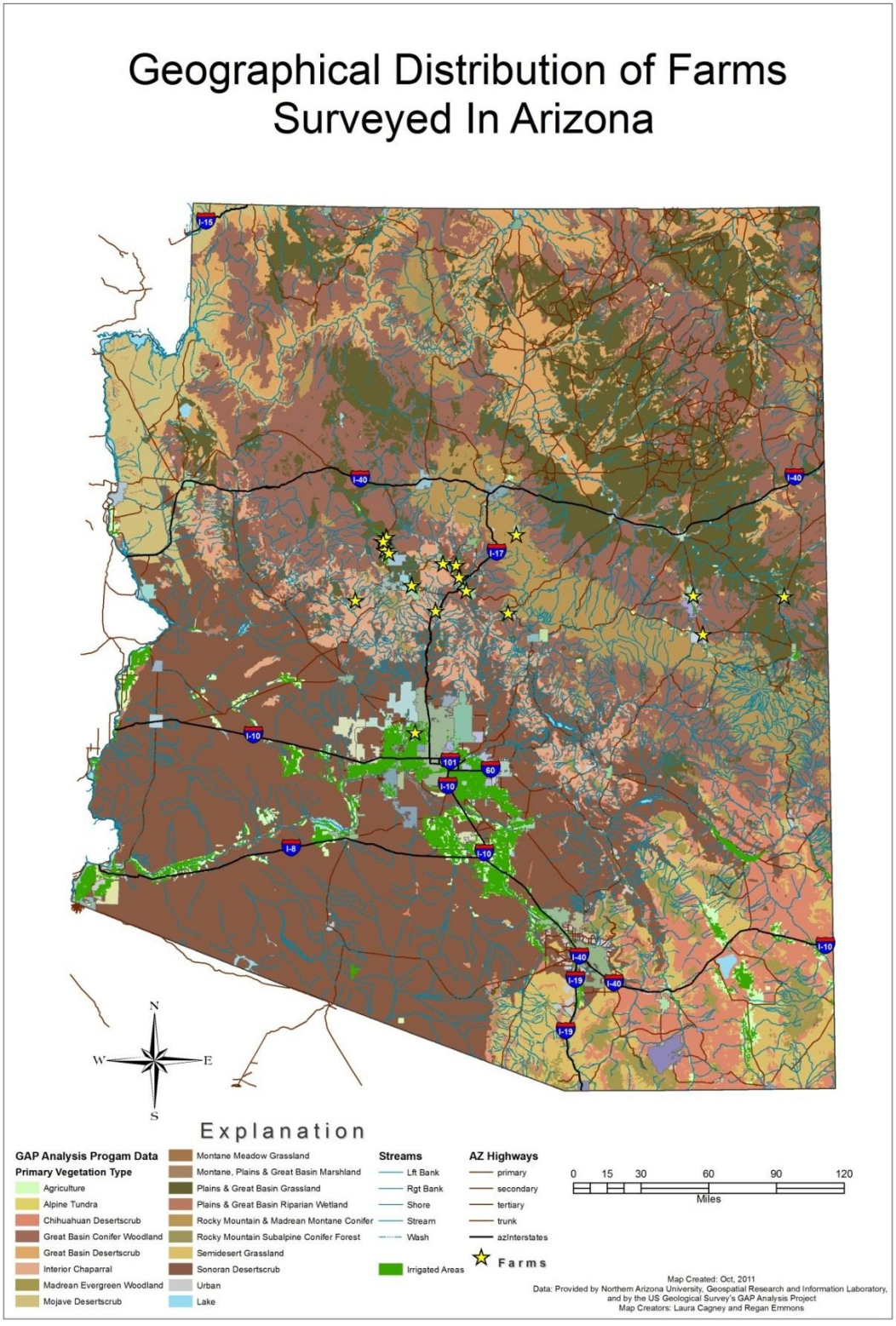


Figure 32: Geographical Distribution of Participating Farms

FOOD PRODUCTION AND DECISION MAKING

Respondents were asked how much food they were producing in any metric of their choice within a year or within a season. Estimates regarding meat, dairy, eggs and sprouts were given with more certainty while many of the vegetable growers declined to estimate at all. (See all data Appendix D.) Those growing vegetables are growing over 70 varieties that include leafy greens, root vegetables, squash, tomatoes, peppers, herbs, sprouts and melons, among many others.

Contributing Factors for Crop Choice (n=28)	
	Percentage
Experience	85.70%
Profit potential	53.60%
Labor timing and availability	53.60%
Production expertise	42.90%
Market access	28.60%
Price	28.60%
Equipment needs	21.40%
Risk	17.90%

Figure 33: Contributing Factors for Crop Choice

EXPANSION

Farmers were asked a series of questions regarding expansion of their farming operations. Over two-thirds said that they would like to expand their operation in the next 5 years. They identified the top two hindrances to expansion as lack of land availability and affordability (41%) and lack of labor availability for harvest (47%).[11] Also, almost one-third said that transportation of their products to market is a hindrance. Additionally, when asked if they were interested in receiving support in finding markets, 43% responded affirmatively.

Factors that hinder expansion	
	Percent
Harvest labor availability	47%
Land availability and or cost	41%
Weather	35%
Transportation	29%
Market outlets/connecting to buyers	23%
Equipment	23%
Cooling	23%
Irrigation	17%
Fees charged by the farmers market	17%
Costs associated with getting to farmers market	17%
Business planning	17%
Insect control	11%
Prices received	11%
Credit availability	11%
Disease control	11%
My volume is too small	11%
Advertising/marketing	11%
Costs associated with packaging product	5%
Other limiting factors hindering expansion*	5%
Access to markets	0.00%
*Lack of sufficient groundwater supply	

Figure 34: Factors that Hinder Expansion of Regional Farms

The table above reveals that respondents feel there are multiple factors that hinder expansion. Indeed, many respondents checked upwards of five. Respondents interested in expanding noted that they would turn to

[11] Only respondents who said they were not planning on expanding in 5 years were asked about hindrances to expansion, but many of the respondents who said they were unsure or would expand answered this question, declaring that while they did want to expand, there were limitations. The data is combined here.

another grower, a grower organization, a cooperative, or a combination for marketing information and assistance.

Nearly one-third of all respondents said that they would like to expand via increasing their production for more markets. Other ways growers would like to expand include adding equipment or structures such as greenhouses, facilities for water, and product storage. Some respondents would like to add acreage to their existing farm.

CONCERNS AND THREATS TO AGRICULTURAL PRODUCERS

Respondents were asked to check what concerns them the most as small-scale food producers. Over 85% of respondents said that state and federal regulations concerned them the most, and over 50% are very concerned by rising costs, such as equipment, soil amendments and fuel. The table below reveals respondents' other concerns.

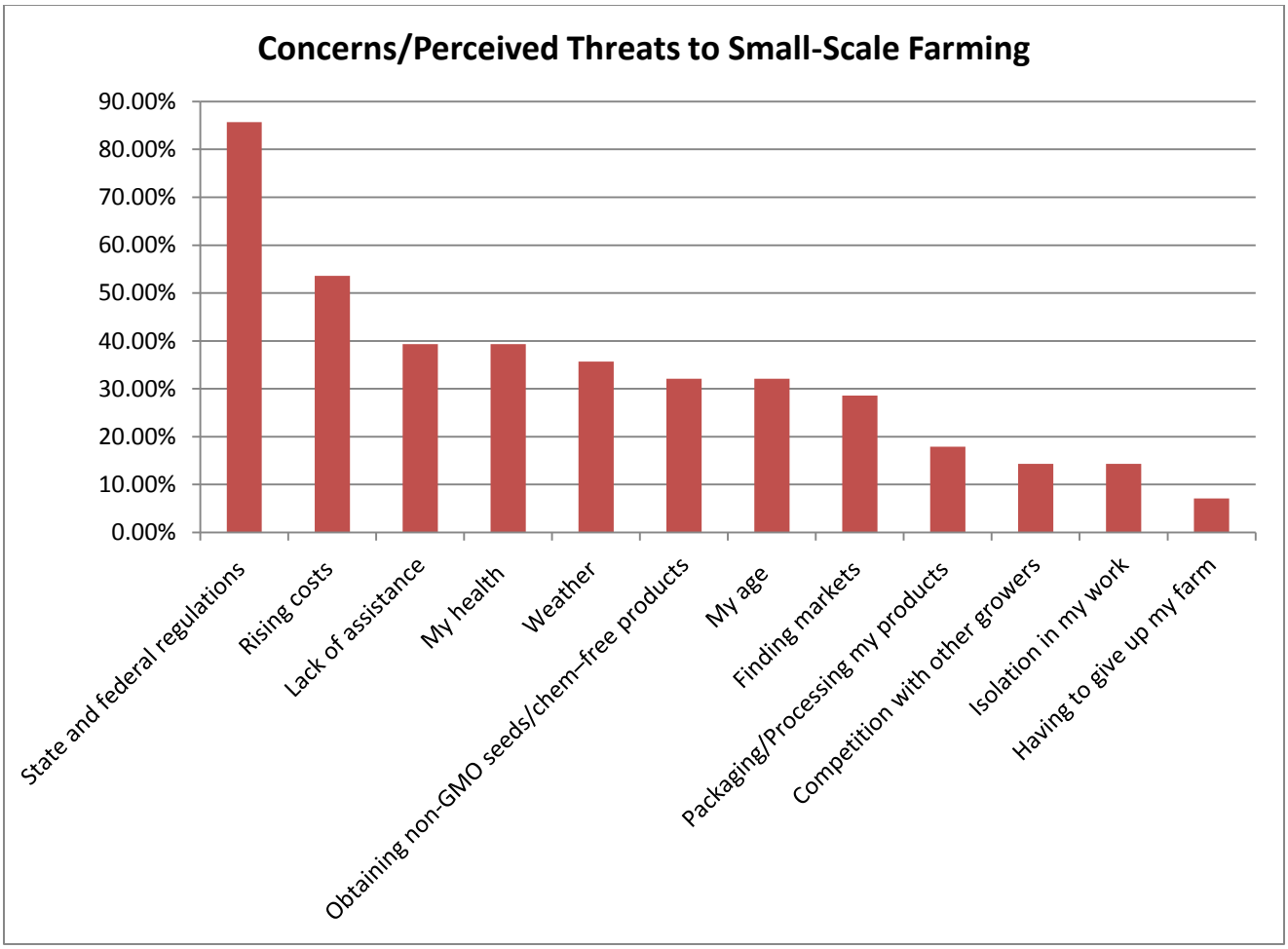


Figure 35: Perceived Concerns/Threats to Regional Farmers

FUTURE OPPORTUNITIES

The survey asked respondents to check whether they would be interested in opportunities in marketing, expanding their markets, and collaborative ventures. Interest in collaborative ventures among farmers is high, with 64% interested in participating in a CSA, 57% interested in a food cooperative, 54% interested in an online growers' network, and 79% interested in a list of businesses sourcing locally.[12] Almost 80% of respondents said they would like to see a list of businesses interested in buying locally. In addition, 83% of Yavapai county respondents would be interested in contributing to an institutional procurement program[13]. And 54% of all respondents said they would be interested in an online growers' network.

Future Opportunities	
	Percent
A list of businesses interested in buying locally	78.60%
Being included in a website which showcases agricultural endeavors in our region	71.40%
Participating in a CSA	64.30%
Participating in a food cooperative	57.10%
Participating in an online growers' network	53.60%
Grants and subsidies	53.60%
Attending workshops/courses related to food production	46.40%
Publishing a grower directory	46.40%
A farm internship program	46.40%
Participating in a growers coalition	39.30%
Participating in institutional procurement (*n=12; Yavapai County Farmers Only)*	83.00%
Having access to pick up or distribution points	35.70%
Coordinating market participation with other growers	35.70%
Seed banks	35.70%
Working with other growers in planting coordination (to increase variety and quality while decreasing competition among growers)	32.10%
Participating in a bulk food buyers' club	28.60%
Having a courier service (to pick up and take your products to market)	21.40%
Assistance creating a website	21.40%

Figure 36: Farmers' Interest in Future Opportunities

In addition to asking respondents about future opportunities, respondents were asked what would prevent them from collaborating with other growers in the future. The most common reason given was time (29%), followed by mistrust (18%).

[12] Most respondents checked multiple future opportunities.

[13] The question regarding institutional procurement (6d) was not on the surveys for Apache and Navajo counties.

CONCLUSIONS

This study found that there is substantial interest among regional direct market farmers in multiple forms of collaboration, including cooperative business endeavors. This study also found that farmers report that the top concern or threat they face is governmental regulations. Top challenges to expanding producers' operations are the cost and availability of land, lack of available labor, and distribution networks for getting products to market.

REGIONAL COOPERATIVE FARMING ENTERPRISE

One key object of the Production Needs Assessment was to assess interest in and the need for a Cooperative Farming Enterprise. This study substantiates both, finding great interest in and need for cooperative forms that can both sustain existing operations and support efforts to expand production. A Cooperative Farming Enterprise could strengthen and support the economic viability of small-scale farmers in the region

CANYON COUNTRY FRESH

A second objective was to update the online direct marketing tool known as Canyon Country Fresh (CCF). Having direct contact with regional farmers via the survey and through networking, over 30 entries were updated. This included adding new producers, removing farms no longer in production, and updating products and contact information. Please refer to Recommendations for more details on future needs for the Canyon Country Fresh website.

RECOMMENDATIONS FOR FURTHER RESEARCH

1. **Marketing**: There was a high degree of interest in a website that showcases local farms and other agricultural endeavors, and in a list of businesses interested in purchasing locally produced projects. Thus it seems clear that these two projects would be endorsed by the farming community and would create a unique pathway for businesses to find growers and producers. An expansion of Canyon Country Fresh, the existing online marketing tool, could incorporate these two additions.
2. **Distribution**: Transportation costs were one of the most commonly cited challenges limiting farmers from expanding their operation. In addition, alternative methods of transportation (pick-up points or a courier service) surfaced as an interest of over one-third of the respondents. Research into the feasibility and development of an efficient model for refrigerated distribution of goods from multiple farms to regional markets would be a significant contribution to the small-scale farming community and the food system in northern Arizona.
3. **Cooperative Farming Enterprise**: The most significant threat that small-scale farmers in northern Arizona report facing is governmental regulations. Developing a growers' coalition (almost 40% of

respondents stated they would be interested) to address some of these concerns would be another valuable contribution to strengthening the regional food system.

4. **Internship and Student Workers**: Almost 50% of respondents would be interested in having interns, and labor availability was the most common factor hampering expansion farmers reported. This report recommends an internship program, whereby students could work on regional farms for school credit, gain hands-on experience, and provide an alternative labor source on small-scale farms.

CONCLUSION

This study confirms that in the difficult economic and ecological conditions of our region small direct farmers struggle to meet the growing demand for local food as do backyard growers who might enhance their production and coordination in order to bring their produce to market. At the same time, the study also indicates that both backyard gardeners and small direct farmers have substantial interest in collaborative and cooperative enterprises to help sustain and expand their operations. Both kinds of producers need knowledge, networks, and locally adapted infrastructure to support and expand production to meet the growing demand.

Phase II of Local FARE's research will lay the groundwork for the development of multiple cooperative enterprises that can pool resources, share knowledge, and develop powerful and cost-efficient collaborative networks.

The final two reports of Phase I research that follow address the need for infrastructure that enhances production. They are examples of the kinds of strategically targeted research that can catalyze a vibrant regional food economy.

INFRASTRUCTURE RESEARCH:

SEASON EXTENDERS

Figure 37: Local FARE's Season Extenders at the ARD

As noted by growers in the Production Needs Assessment, local food production in northern Arizona presents considerable challenges, and various tricks of the trade are necessary to achieve even modest success. Season extenders offer unique advantages to the resourceful gardener wishing to increase the range and quantity of his/her yields. The anecdotal evidence supporting the utility and efficiency of these season extenders is persuasive. However, research remains to be done to quantify and optimize the variables which determine these efficiencies, and thereby recommend design principles for manufacturing and use guidelines for consumers. These include: heat storage or retention, venting or air flow, and materials selection.

DESIGN AND CONSTRUCTION OF SEASON EXTENDERS

INTRODUCTION

The season extension aspect of the project consisted of constructing small-scale (i.e. hand portable) greenhouses, known most commonly as either cold frames or hoop-houses, as a means of supporting an increase in vegetable growth, especially through the harsher phases of the northern Arizona seasonal cycles. These portable greenhouses varied widely in both materials and design in order to test what impact changes in design and materials had on the effectiveness of a given structure as a protective environment for plant growth.

With regard to cold frame design, three features were identified that, while simple to vary, were likely to affect outcomes: (1) the structure's wall composition; (2) the structure's lid composition; (3) the pitch (or angle) of the structure's lid. These three elements formed the basis for a comparison of three pairs of cold frames, or a total of six cold frames: each pair isolated one of the three design elements, which was then varied between the two members of a pair.

The hoop-house model of season extender ranged from the more common prototype, to variations in both materials and design. A total of four hoop-style structures were built; in addition to the typical model, we constructed two more rigid designs, integrating features of a cold frame. These included two "solar pods"[14], and a third type of unit—dubbed a "hooped pod"—a hybrid crossing a hoop-house and solar pod.

The various models incorporated a range of materials, some previously tried and proven, others newer and more experimental. Under consideration in the selection of materials were their relative advantages in terms of affordability, availability, and sustainability. Often competing but important considerations were the effectiveness and durability of a material.

What follows is an outline of the ten units that were constructed as season extenders. These include six cold frames, one hoop-house, two solar pods, and a hooped pod. This report concludes with a comparative summary analysis of the structures, followed by a preliminary report on the relative productivity of the structures.

DESIGN SUMMARY

COLD FRAMES

[14] Adapted from *Solar Gardening.* Gretchen and Leandre Poisson. (1994).

1. FIRST VARIABLE: WALL COMPOSITION

The standard wall composition of a typical cold frame consists of “two-by,” construction grade lumber. The obvious advantages of two-by lumber include its availability, low to moderate cost and acceptable to good durability. Its insulating value is relatively low, however. For purposes of comparison, two cold frames of comparable dimensions were constructed, one with the standard two-by walls, and a second with double, one-by walls, separated by two inches of extruded polystyrene foam insulation. Both cold frames have double-pane, glass lids.

Figure 38: Structure #1 – Cold Frame with Non-Insulated Walls

Figure 39: Structure #2 – Cold Frame with Foam Board Insulated Walls

2. SECOND VARIABLE: LID COMPOSITION

A second pair of cold frames varied in the composition of their respective lids. Cold frames are typically constructed using reclaimed glass windows, with wooden or aluminum frames. The great advantage of these windows is their widespread availability; disadvantages include their weight and their fragility.

As an alternative to glass lids, two synthetic materials were tested, each on a cold frame of identical dimensions constructed of two-by walls. A first lid used double-walled, 3/16" thickness (0.1875 in), poly-carbonate plastic, a nearly translucent sheeting material frequently used in greenhouse applications. The second lid used a semi-transparent, flexible fiberglass material "SunLite" (manufactured by Solar Connections), 0.04" thickness; this material is the same one recommended in the solar pod application.

Both lid designs incorporated two layers of each material, separated by a 1-1/4" gap, into which was installed an insulating material known as "angel hair." Angel hair insulation is composed of thin strands of fiberglass woven into a three-dimensional batt; this is the type of insulation also utilized in the Poisson's solar pod design.

Figure 40: Structure #3 – Cold Frame with Lexan and Angel Hair Lid

Figure 41: Structure #4 - Cold Frame with SunLite and Angel Hair Lid

3. THIRD VARIABLE: LID ANGLE

Cold frame lids are typically angled from a low point in front, to a high point at the rear of the structure. Increasing this angle (by increasing the difference in height between the front and rear walls) will increase the amount of direct sunlight that falls on the growing area interior to the cold frame.

In order to gauge the effect of this design variable on the micro-climate of the cold frame, two different angles were tried, varied by a factor of three. A normal angle for a cold frame lid is between 10 and 25 degrees. Here, the steep-angled lid sits at 27 degrees, while the low-angle lid was pitched at 9 degrees. The two cold frames are similar in other respects.

Figure 42: Structure #5 – Cold Frame with 27° Angled Lid

Figure 43: Structure #6 – Cold Frame with 9° Angled Lid

1. STANDARD HOOP-HOUSE

A standard hoop-house was built using 2x4 lumber for a wooden frame (or raised bed); 3/4” diameter PVC pipe for arched supports; and UV-rated, 6 mm plastic sheeting as the protective over-shell. The hoop-house measures nearly 8 feet in length, by 40 inches wide. The two end-caps are removable for ventilation and end-wise access, while the plastic sheeting can be rolled up from either (long) side of the hoop-house for full access.

Figure 44: Structure #7 – Standard Hoop-House

2. SOLAR PODS

The 8 foot by 4 foot dimensions given for the solar pod described in the book, *Solar Gardening*, were modified to an approximately 4 foot by 4 foot structure; in most other respects, the two solar pods built for this project followed the instructions detailed there. These called for a wooden frame over which is placed a hoop, or parabolic, shaped lid. Substantially more rigid than the hoop-house, this lid is framed in wood, which is then sheathed with two pieces of 0.04" thick, semi-transparent fiberglass ("SunLite"); sandwiched between these layers of fiberglass is the 1½" thick, angel hair insulation (described above).

The arched shape of the pod lid was modified slightly. The width across the lower endpoints of the arch was narrowed (by approximately 11 inches) while maintaining the overall length (as traveled along the parabolic curve) from one endpoint to the other (approximately 60 inches): this has the effect of increasing the steepness of the lid. As well as lessening the chances of snow collection on the top surface of the pod, this alteration decreases the reach required to work in the rear of the pod.

Other modifications included: a re-orientation of the lid's center support, from a piece of bent, metal tubing situated at the center of the pod's length and following the curve of the lid, to a piece of PVC oriented lengthwise from one end of the pod to the other, running along the lid's highpoint; use of solid lumber (i.e. laminated boards) for the lid's two end pieces, rather than plywood; and the addition of foam pipe wrap (slit into halves) at the seams where the fiberglass is attached to the wooden frame.

Figure 45: Structure #8 – Solar Pod of standard height

Figure 46: Structure #9 – Solar Pod with a detachable frame underneath to allow for taller growth

3. HOOPED POD

This design was a spin-off from the small-scale season extenders in use by a local grower, and incorporates features from each of the previously described units. Its base is constructed of solid lumber and its lid hinged, similar to a cold frame. It employs PVC pipe as arched supports, identical to the hoop-house. Finally, the rigidity of the shell resembles that supplied by the dual walls of fiberglass in the solar pod. In this case, however, a different material, known as "Solexx," was evaluated as the protective over-shell. This is a semi-transparent and highly flexible, double-walled, synthetic material manufactured specifically for greenhouse applications. Solexx has an R-Factor (measure of insulating ability) of 5mm = 2.30 or 3.5mm = 2.10 and is advertised as durable even in windy areas, noted in the Production Needs Assessment as a common concern of growers.

The footprint of the hooped pod imitates the solar pod, approximately 4 feet by 4 feet. The shape of the arched lid, though, is reminiscent of a hoop-house, extending more steeply and higher than a solar pod. The hooped and solar pod share an important feature, however, that is distinct from the hoop-house: while the protective shell of the pods is a solid, integrated structure which lies on top of the base, and is either open or closed, the hoop-house has removable ends, thus allowing adequate ventilation and some access while the protective shell remains in place.

Figure 47: Structure #10 - Hooped Pod with Solexx

SUMMARY COMPARATIVE ANALYSIS

COLD FRAMES

Three pairs of cold frames varied in one of three design elements: (1) wall composition, (2) lid composition, or (3) lid angle.

WALL COMPOSITION

This study compared typical, “two by” (2x) frame construction with a double-walled frame consisting of 2 inches of rigid foam insulating board between two, “one by” (1x) boards. The 1½” thick walls of the typical 2x design compared to an overall thickness of 3¼” for the experimental model. Other design elements, including overall interior area, double-paned glass lid, and lid angle were common between the two cold frames.

It seems certain that the thicker wall, with its center of insulating material, will maintain higher temperatures for longer periods of time than the standard, single wall thickness of 2x. This, of course, is one of the primary objectives in attempting to extend the viable growing season and is therefore to be recommended on the basis of this criterion.

It should be noted, however, that this design requires a significantly higher input of labor. Constructing and assembling walls made from solid 1x wood is very time consuming in itself; inserting the insulating center piece requires additional time. As an alternative to solid wood construction, the use of plywood has the advantage of speed in the construction of walled structures. While plywood framing can be an objectionable because of its toxicity and tendency to delaminate when exposed to moisture, it might be a suitable compromise if the first priority in performance is maintaining the highest possible temperatures.

LID COMPOSITION

Since reclaiming windows for use in cold frames is a relatively simple matter, these are often the first choice in lid construction. However, glass breaks easily, both by accident and under extreme weather conditions. It can also be extremely heavy, especially when double-paned, as is preferable in this application. Therefore, this study considered two alternate lid designs, each of which integrated a different synthetic material in its construction.

The two experimental lids imitated the cover on a solar pod, in that they enclosed angel hair insulation between two pieces of flexible, semi-transparent, UV-resistant material. Whereas the solar pod has a parabolic shaped lid, the two cold frame lids are rectangular (in order to lay flat on a cold frame), measuring 60” long x 30” deep x 2¼” thick. In the first instance, the lid uses the same 0.04” thick fiberglass sheeting employed in the solar pod application; a second lid is essentially identical in design and construction, but uses twin-walled polycarbonate as its inner and outer layers. In both cases, a wooden frame was built to accommodate the three layers, and then hinged to the rear wall of the box.

Both lids are lightweight while still sufficiently rigid. Importantly, their lighter weight permits the use of a device known as passive solar (vent) opener. Designed for greenhouse use, these devices extend with increases in temperature, thus automatically opening the attached window or lid. The integration of a solar passive opener provides a distinct advantage in cold frame design, since adequate ventilation is a critical component of their successful use. As they are commonly rated at 15lbs, solar vent openers tend to be impractical for use with glass lids. On this basis, the lighter weight lid design offers an appealing improvement over the double-pane glass lid.

A second notable advantage of the synthetic lid materials over the glass, at least for our northern Arizona sun, is their semi-transparency. Both the polycarbonate and fiberglass materials, particularly when double-layered, provide a modest degree of opacity compared with clear glass: the sunlight thus entering the closed cold frame does so in a greatly more diffuse manner. This, in turn, offers a degree of protection from the searing ultra-violet rays of our mountain elevations, while moderating the extremely rapid climbs in temperature characteristic of glass-encased enclosures. The tempering effect of diminished transmissivity, taken overall, is likely to promote a more hospitable growing climate.

While far superior to glass in terms of weight, as well as offering advantages related to resiliency and light transmission, the considerable expense of the synthetic materials is a substantial deterrent to their use by the average gardener. As previously mentioned, reclaimed glass windows suitable for cold frame lids are widely available and moderately priced, on the order of three to five times less expensive than a comparably sized piece of polycarbonate or fiberglass.

In terms of sustainability, the reclamation of used materials is preferable to the purchase of new materials, especially when the latter consist of a variety of toxic chemicals blended together in a polluting manufacturing process. On the other hand, a grower outfitted with an easier-to-use, better performing, and longer lasting cold frame is more likely to produce a higher yield of vegetables, and more consistently from year-to-year. Whether these advantages can actually be attributed to the lids composed of the synthetic materials will be borne out by the growth data.

LID ANGLE

Popular literature on cold frame construction sometimes recommends a steeper angle for cold frame lids as a means of increasing the amount of sunlight available to the interior, theoretically raising average growing temperatures inside the frame. Other opinions, however, dismiss this advice as ineffectual. This project, in order to issue more than an anecdotal opinion, built two cold frames which would test the popular theory, a control and an experimental model. Otherwise comparable in design and materials, the cold frames differed in the angle of the double-paned, glass lid affixed to the frame's back side.

A convenient angle for a cold frame lid, depending on the desired overall dimensions, can fall within a range of 10 to 25 degrees (measured from the horizontal). The low-angle lid for this project rose from front to back at 9 degrees, while the steep angle lid was pitched at 27 degrees. Angles below this are likely to result in difficulties with adequate drainage, as well as casting an unacceptably long shadow (of the frame's front) during periods of low-angle sun (i.e., spring and fall) – precisely when the cold frames are especially useful. Angles greater than

25 degrees require an unreasonable height differential between the front and back of the cold frame, permitting unacceptably low clearance for plant growth near the front, and requiring extremes of height in the back wall.

There are varieties of plants for which the above constraints in geometry would make sense, however; i.e., taller plants near the back of a steeply sloped frame, low-growing plants at front. And there are, of course, shade tolerant plants for which a higher front wall would be acceptable, perhaps even advantageous. For these specific applications, an extreme angle – be it low or steep – might be recommended. But the justification for limiting the range of a cold frame's usefulness would need to found in the growth data.

HOOPED STRUCTURES

Four hooped structures were constructed, including (1) a conventional hoop-house; (2) two solar pods, modeled after those featured in *Solar Gardening*; and (3) a hoop pod, a blend of design elements from the previous two. This summary analysis will compare these four units at once.

The conventional hoop-house, outfitted with 6 mm UV-rated plastic sheeting supported by arched PVC pipe, has proven to provide a suitable degree of protection from low temperatures and high winds, and can mitigate the damage induced by heavy rains and even hail. Hoop-houses are especially suitable to the cultivation of crops needing both more height and higher average temperatures for an extended period of time; tomatoes, requiring both, are an ideal crop for the hoop-house. Given the ease of construction, the relatively low cost of materials, and its capacity to provide an adequate degree of thermal insulation in light frosts – not to mention the wide popularity of home grown tomatoes – the hoop-house can be a very attractive means of season extension.

Figure 48: Standard Hoop-house extends the season for tall plants

However, the Northern Arizona climate, with frequent hard frosts coupled with intense UV radiation, can routinely overwhelm the moderate protection and durability afforded by the plastic sheeting. This fact is what recommends either the hooped or solar pod above the standard hoop-house for the local growing conditions. The pod designs, both with a more rigid and ultimately more durable shell, as well as a considerably higher thermal efficiency – that is, higher up-front insulating values *and* far less air gapping – would seem far better adapted to our gale force winds, pendulous extremes in temperature, scorching sun, and deluges of sky-borne moisture.

Figure 49: Woodworker John Gordon demonstrating flexibility of SunLite

The solar and hooped pods bear important differences, though, too. The construction of a solar pod, at least on a first attempt, is considerably more time intensive and requires more skill. The arched end pieces are (at a minimum) moderately complicated in themselves, while the entire project would be daunting for the novice builder. This, of course, is one of the appealing advantages of the hoop-house, and why, despite its drawbacks, deserves serious consideration: it is relatively simple (in time and materials) to do an adequate job, and even a little practice can produce a very useful season extender.

The hooped pod falls somewhere in between the solar pod and hoop-house: in terms of its manageability as a do-it-yourself project; in terms of its expense; and, though the data is still being collected, likely when measured by its overall performance. While more durable and air-tight than the hoop-house, the single layer of Solexx in a hooped pod cannot provide the same thermal efficiency as the solar pod's twin-walls of fiberglass in combination with the angel hair insulation. Finally, the height of the hooped pod, and thus its available growing area, is also likely to fall between hoop-house and solar pod, as the relative expense of the three different shell materials would tend to dictate the overall acceptable dimensions.

CONCLUSION

The relative benefits and challenges associated with each season extender's construction and materials must be balanced against actual data gathered on differences of plant growth in the structure, as well as usability and durability under adverse conditions. Due to the timing of this report, this project has only preliminary growth data for mid-August to mid-October. Thus the structures have not yet been tested through the cold and windy seasons. Fall/Winter/Spring testing will be necessary to determine, conclusively, the relative advantages of each. However, the next section of this report will provide preliminary analysis of the season extenders in relation to usability, durability, temperature data, and plant growth.

SEASON EXTENDER RESEARCH ANALYSIS

INTRODUCTION

During late August 2011, Local FARE installed the six cold frames, two solar pods, and one hooped pod (detailed above) on the top two terraces at the Applied Research and Development (ARD) Building on the NAU campus. Three edible plants were planted in each season extender: Red Asian Greens (from seed); Thai basil (from NAU Greenhouse transplants); and Serrano peppers (from NAU Greenhouse transplants). Mache, or corn salad, was also planted in all of these structures, but the seeds did not germinate, probably because soil temperatures in late August/September were still too high for this cold season salad green.

The Red Asian greens germinated very well, although the seedlings in two of the cold frames were completely devoured by pill bugs. These pill bugs were probably introduced into the cold frames by the somewhat woody composted soil/mulch that we used for each structure. The clayish, rocky soil at the ARD Building was so poor that we could not use it as a growing medium, so we brought in our own soil, created and donated to us by NAU's Grounds Department. There was no pill bug damage in the other seven structures whose soil had been fine-screened to remove larger wood chips. We did not screen the soil for the first two cold frames that we planted.

During the period between late August and mid-October, our experimental cold frames, solar pods, and hooped pod have shown their growth potential and design flaws. Because of its specific design and particular location at the ARD, each structure is essentially its own local microclimate, and the plants have reacted differently because of these two factors (design parameters and particular geographic location). Due to the location of the structures (some were located nearer the shade of Arizona ash trees, for example), some plants had a more difficult time growing than others. They simply did not receive as much available sunlight. We also noticed that the plants located in the northwest corners of cold frames tended to grow more vigorously than the plants located in the northeast corners of cold frames. The east walls of cold frames may be preventing morning

sunlight from striking all of the plants, suggesting that future cold frame designs might include a clear wall on the east side, to allow for more morning sunlight to reach the plants.

Differences in available sunlight within these structures definitely affected the growth of plants, but plant growth was also affected by an array of insects and spiders that thrive in moist, protected environments. Besides the pill bugs mentioned above, grasshoppers were occasionally present in all of the frames, and chewed small holes in some of the Red Asian greens. All non-beneficial insects were physically removed from the frames.

GENERAL DESCRIPTION OF EACH STRUCTURE'S GROWTH

STRUCTURES 1 AND 2—COLD FRAMES, DOUBLE-PANED GLASS LID, AUTOMATIC TOP VENT, NON-INSULATED OR INSULATED WALLS

This design pair of cold frames was the most interesting to observe during the research period. The vented tops allow the frames to breathe hot air out of the frame, and the insulated frame seemed to keep the air temperature more stable, even as temperatures started getting cooler and then colder at night. Both frames grew vegetables well, although Frame 1 was clearly the most successful design of the entire group of structures, growing the healthiest, most vigorous plants. The Red Asian greens were the most robust of all the vegetables we planted, and Frame 1's basil and peppers also grew quite well. The Thai basil plants on the right sides of the frames (east) were a bit smaller than those on the left (west) sides. This difference could be attributed to differences in morning light, and/or to the shade cast by the Arizona ash trees located just east (right) of each frame.

Figure 50: Cold Frame #1 Growth

Figure 51: Cold Frame #2 Growth

STRUCTURES 3 AND 4—COLD FRAMES, LEXAN OR SUNLITE LIDS WITH ANGEL HAIR INSULATION

Frames 3 and 4 have experienced relatively stable and similar temperatures. The differences between these two cold frames seem minor. Their lids seem to insulate and redirect light in a similar fashion, and their vent openers are adjusted to rise to the same height and to provide the same amount of ventilation. The Thai basil grew similarly in both frames. Frame 3 had a very bushy Thai basil plant on the left side (northwest corner), while the plants on the right side (northeast corner) of both frames grew less vigorously, probably due to the different amounts of direct morning sunlight that they received. The Serrano peppers in Frame 3 grew bushy, while the peppers in Frame 4 grew tall. These were the frames with unsifted soil that were plagued by the pill bugs.

Figure 52: Cold Frame #3 Growth

Figure 53: Cold Frame #4 Growth

STRUCTURES 5 AND 6—COLD FRAMES, DOUBLE-PANED GLASS LIDS ANGLED AT 9° OR 27°

The plants in these two cold frames were very different in their growth patterns. Direct sunlight was partially blocked in Frame 5 due to the higher front of the frame. This lack of sunlight seems to have restricted the growth of plants as compared to the other frames. Frame 6 had a different problem. The window angle of 27° degrees allowed more intense sunlight to shine down upon the plants than the "flatter" tops of the other structures, and resulted in leaf burn. The Serrano peppers burned and died, and the Thai basil suffered some medium burning. However, the basil seemed to rebound with vigor. The lack of light on the right (east) side of this frame severely affected plant growth. The basil's leaves were stunted and the Red Asian greens demonstrated a growth gradient from east to west (better growth to the west). Frame 6 is clearly not a good design for an elevation of 7000 feet, primarily because of the high altitude intensity of the sun. This frame may work better in the winter when the sun is at a lower angle, but during late summer/early autumn the sun "fries" the plants.

Figure 54: Cold Frame #5 Growth

Figure 55: Cold Frame #6 Growth

STRUCTURES 8 AND 9—SOLAR PODS, STANDARD HEIGHT OR HEIGHTENED SIDES

There were no problems with lack of sunlight in these two structures. These frames will likely do very well in colder or cooler temperatures because of the extra insulation that was included in their design. The Red Asian greens did very well in these frames, both exceeding 12-inch long leaves. The Thai basil and peppers grew about the same in each solar pod. This result may be due to the rounded lid design and how the light is refracted through the plastic and insulation once the sun rises, giving a more even radiance throughout the day.

Figure 56: #8 Solar Pod Growth

Figure 57: #9 Solar Pod Growth

STRUCTURE 10 — HOOPED POD, SOLEXX EXTERIOR

The design of this frame was very sturdy. The Thai basil and peppers grew well, as well as the Red Asian greens. This frame was also designed for cooler or colder temperatures and should do especially well in late autumn. The semi-transparent plastic created very intense sunlight inside, contributing to high temperatures if left unattended and unventilated. This design could be improved if a vent opener were added to the top, allowing air to circulate automatically during the day.

Figure 58: #10 Hooped Pod Growth

GROWTH IN INCHES

Structure		2 Thai Basil Plants		2 Serrano Pepper Plants		Red Asian greens
		Left	**Right**	**Left**	**Right**	
1	Cold Frame - Glass lid, Auto-Vent, Non-Insulated	3"	5"	3"	2" Flowers	14"
2	Cold Frame - Glass lid, Auto-Vent, Insulated	3"	No growth	2" 1 Pepper	3" 1 Pepper	8"
3	Cold Frame - Lexan with Angel Hair	3"	2"	3"	2"	5"(single plant)
4	Cold Frame - Sunlite with Angel Hair	2"	1"	3"	3" 1 Pepper	No lettuce
5	Cold Frame - Glass lid, 9° Angle	No growth	No growth	2"	1" 1 Pepper	11"
6	Cold Frame - Glass lid, 27° Angle	2"	No growth	Fried	Fried	9"
8	Solar pod - Standard Height	3"	2"	5" 1 Pepper	4" 1 Pepper	14"
9	Solar pod - Heightened Sides	4"	2"	3"	3"	12"
10	Hooped Pod - Solexx	2"	3"	4 4 Peppers	4" 1 Pepper	8"

Figure 59: Differential Growth Measured in each Structure from August 24 through October 10, 2011

TEMPERATURE DATA

Researchers placed temperature data loggers in nine of the season extenders[15]. The following is data recorded from the loggers between September 3rd and October 10th, 2011.

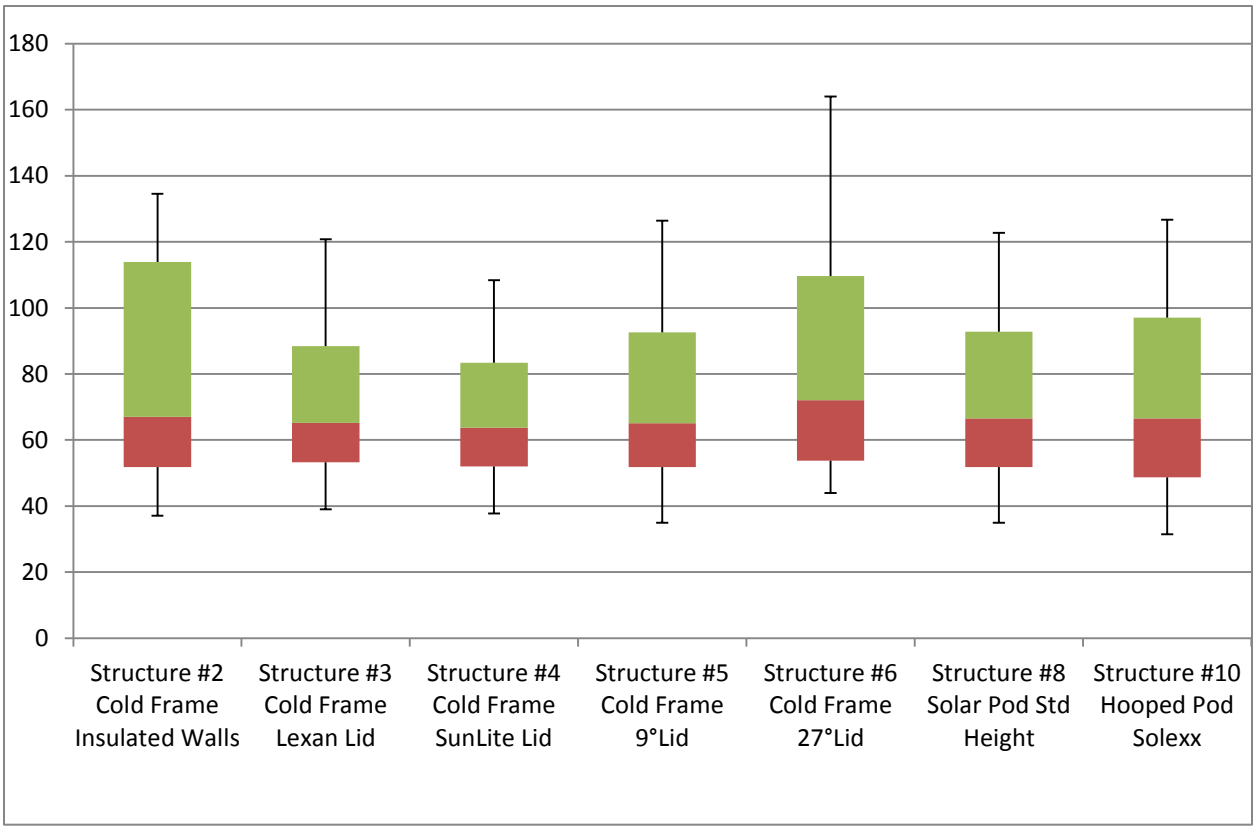


Figure 60: Box and Whisker Plot - Median, Min, and Max Temperature inside each Structure (Sept 3rd-Oct 10th 2011)[16]

[15] Structure #7 was placed at the SSLUG garden and not monitored by FARE.

[16] Two temperature data loggers failed, thus we have no data for Structures #1 and #9.

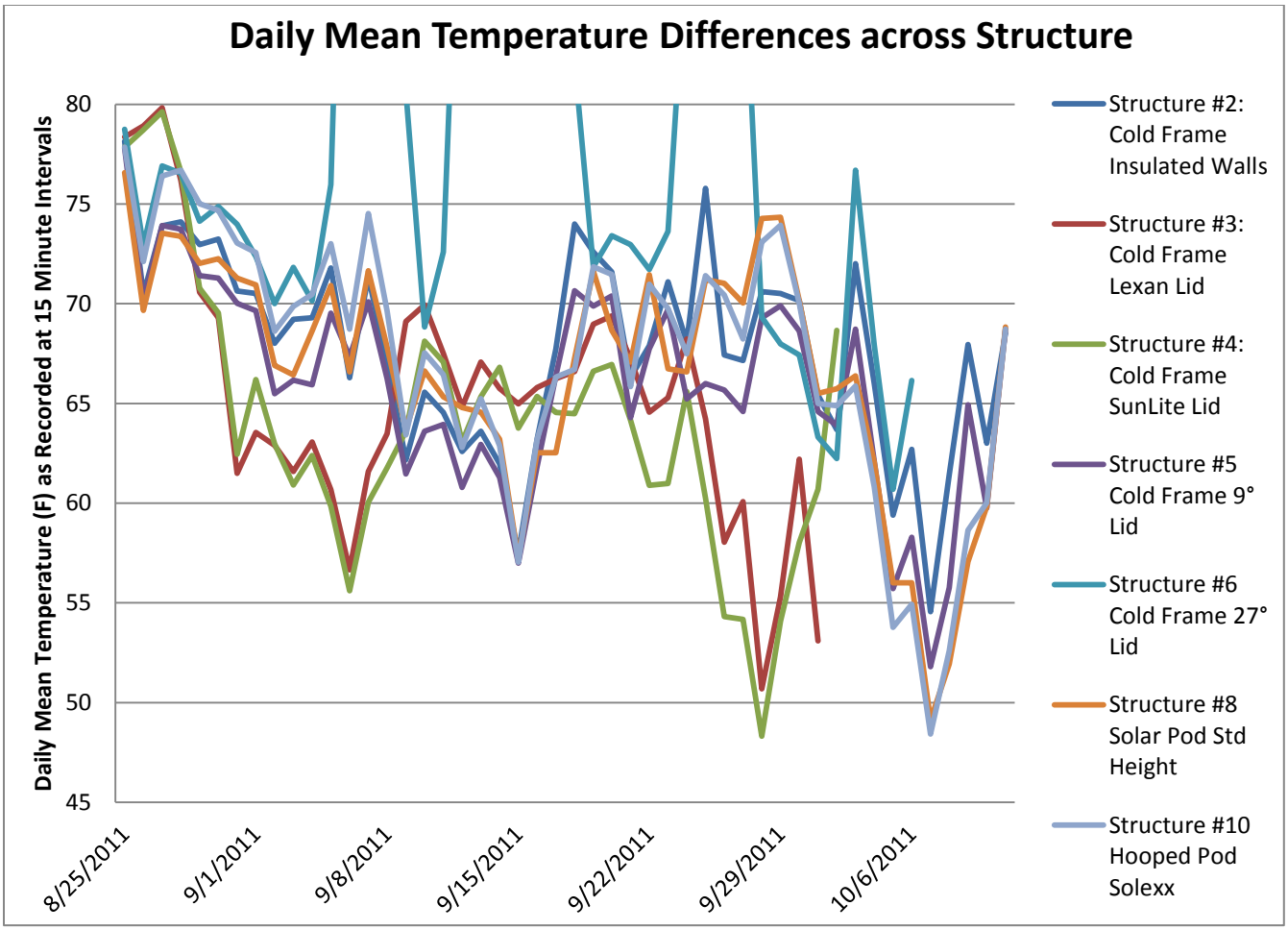


Figure 61: Mean Daily Temperature Data Recorded August 25th to October 10th [17]

CONCLUSION

Researchers designed, built, installed, planted, and maintained three different pairs of experimental cold frames, two solar pods, and a hoop-house in a relatively warm, south-facing microclimate at the ARD Building on the NAU campus. Preliminary findings suggest that three different design factors strongly influenced plant growth within these experimental structures. Those are: the presence or absence of insulation; the composition and relative clarity of the structure's lid; and the ventilating capacity of the structure. Generally speaking, the most successful designs were:

1. **Insulation**: Insulated in some way, creating warmer low temperatures, thus increasing plant growth of both cool and warm season plants;

[17] The temperature data logger in Structure #6 malfunctioned for several days, recording temperatures above 160° and below -33.3°. We therefore exclude that data.

2. **Transmissivity**: Had opaque, insulated lids that provided abundant sunlight for plants without burning their leaves with excessive intense light (as with clear, un-insulated tops);

3. **Ventilation**: Were sufficiently ventilated to allow the plants to breathe and grow, rather than "cooking" them or stunting their growth with excessive heat.

While our research is ongoing, our preliminary findings suggest some specific, successful design parameters for cold frames, solar pods, and hoop-houses for the high altitude Southwest.

ALL SEASONS PRODUCTION:

NAU GREENHOUSE RESEARCH

Due to anecdotal evidence that there is great market potential for local greenhouse-grown niche crops and because of awareness of water usage, Local FARE focused this portion of the project on: 1) investigating specialty crops that can best be grown in greenhouse production in Flagstaff; 2) testing innovative hydrostacking technology that is efficient in terms of water use and space; 4) evaluating costs and productivity of each specialty crop relative to growing method; and, 3) investigating (aligned with the Market Demand and Feasibility Study) the current market for specialty crops with local restaurants, caterers and other food providers. To undertake this research, the team had an initial meeting with several local businesses (identified by the MDFS as sourcing locally) who offered suggestions as to crops which they would purchase. The NAU Research Greenhouse Team then planted one full greenhouse (1000 sq. ft.) with a variety of niche crops, testing Hydrostackers against hydroponic buckets and traditional techniques. The Market Team subsequently solidified connections with local businesses and, as of August, 10, 2011, began selling produce from the greenhouse locally.

VEGETABLE PRODUCTION

INTRODUCTION

The vegetable production component of the Local FARE project had three main goals for FY 2011: to determine the types and varieties of vegetables most appropriate for sale to the local community and campus, to test production methods for most efficient production, and to start to develop a customer base. The first two objectives were carried out at the NAU Research Greenhouse with greenhouse staff while the third objective was pursued in collaboration with the Market Demand and Feasibility Study.

The vegetable production project at the greenhouse had two components: traditional greenhouse vegetable production and hydroponic vegetable production. For both components we have started 19 pepper varieties, 18 tomato varieties, three basil varieties, two cucumber varieties, and two kale varieties (Figure 62). Varieties were selected based on discussion with Local FARE, local restaurateurs, NAU Campus Dining and experience of past production from the greenhouse staff. Further, seed bred specifically for hydroponic/greenhouse production was also selected to test against standard varieties.

Figure 62: Vegetable Production at the NAU Research Greenhouse May 1, 2011 to September 30, 2011.

TOMATOES Variety	COLOR	TYPE	INDETERMINATE/ DETERMINATE	MATURITY (Days)	NOTES
Black Plum	Brown	Paste	Indeterminate	80	Heirloom
Porter	Dark Pink	Medium	Indeterminate	78	Heirloom
Riesentrabe	Red	Grape	Indeterminate	70	Heirloom
Brandywine	Red	Large	Indeterminate	90-100	Heirloom
Trucker's	Red	Medium	Indeterminate	75	Heirloom
Martino's Roma	Red	Paste	Determinate	75	Heirloom
Striped Stuffer	Red/Orange	Medium	Indeterminate	85	Heirloom
Djena Lee's	Yellow	Medium	Indeterminate	80	Heirloom
Trust	Red	Large	Indeterminate	70	Hydroponic
Lorenzo	Yellow	Medium	Indeterminate	70	Hydroponic
Patrona	Red	Plum	Indeterminate	70	Hydroponic
Red Brandywine	Red	Large	Indeterminate	90-100	VF
Orange Sunshine	Orange	Grape	Indeterminate	58	VFF
MiRoma Hybrid	Red	Small	Determinate	70	VFFN
Early Girl	Red	Medium	Indeterminate	58	VFFNTAS
Ravello Hybrid	Red	Paste	Indeterminate	60-65	VFT
Shady Lady	Red	Medium	Determinate	75	VFTASt
Golden Nugget	Yellow	Cherry	Indeterminate	55	

PEPPERS Variety	COLOR	SIZE	HEAT INDEX	MATURITY (Days)	NOTES
Chocolate Habanero	Brown/Red	Small	Hot	85	Habanero Type
Orange Thai	Orange	Small	Hot	80-90	
Serrano Tampiqueno	Red	Small	Hot	85	
Burning Bush Hybrid	Yellow	Small	Hot	85-100	Habanero Type
Cajun Belle	Red	Medium	Medium	60	
Big Bomb Hybrid	Red	Small	Medium	62-67	
Cherry Bomb Hybrid	Red	Small	Medium	65	
Pizza	Red	Small	Medium	80	Mild Jalapeno
Tobago Seasoning	Various	Small	Medium	85	Habanero Type
NuMex Sunrise	Yellow	Medium	Medium	75	
Fat N Sassy	Orange	Bell	Mild	70	
Giant Marconi	Red	Large	Mild	75	
Early Sunsation	Yellow	Bell	Mild	65	
Chitepin	Green/Red	Very Small	Very Hot	90	
Pequin	Green/Red	Very Small	Very Hot	105	
Orange Scotch Bonnet	Orange	Small	Very Hot	120	Habanero Type
Caribbean Red	Red	Small	Very Hot	110	Habanero Type
Orangella	Orange	Bell	Mild	70	
Fantasy	Red	Bell	Mild	70	

OTHER Variety	MATURITY (Days)	NOTES
Camero Cucumber	60	Hydroponic
Sultan Cucumber	55-60	Standard
Lettuce Leaf Basil	50	
Genovese Basil	65	
Thai Basil	45	
Dinosaur Kale	55	
Veets Kale	55	

TRADITIONAL PRODUCTION

Two different media were used to produce plants: new, sterilized Cornell mix (one-third each peat moss, vermiculite, and perlite) and sterilized recycled soil. The recycled soil is a mix of various greenhouse soils that may contain some organic matter. Greenhouse staff is testing recycled soil and utilizing recycled containers

because of the cost savings and energy savings (packaging, transportation, etc.) provided for long term production. A number of different container sizes were tested to determine the optimum size to balance space constraints and vegetable production. The traditional production was watered and fertilized by hand. The fertilizer was an inorganic fertilizer specifically blended for each specific vegetable type.

HYDROPONIC PRODUCTION

There are many hydroponic systems on the market. The Hydrostacker system was chosen based on its ability to provide vertical growing space to maximize greenhouse utilization. A total of 11 stackers were planted. A separate "bucket" style hydroponic system was set up with supplies that were adapted from those on hand at the greenhouse and was tested alongside the Hydrostacker system. This type of system allowed easier growing of large, aggressive growing plants such as tomatoes, cucumbers and peppers. Both of the hydroponic systems were watered and fertilized with the same timer and drip system. The fertilizer is specially blended for Hydrostackers and was also used for the bucket system.

PRODUCTION OVERVIEW

BASIL AND KALE

The Hydrostackers were well suited to production of both of basil and kale and can be assumed to do well for other herbs and leafy greens. However, the recommended Hydrostacker configuration is not ideal. The spacing recommended between stackers is too close, and the distance between should be increased. Also, the recommended stack of five growing containers does not allow the lower plants to be efficiently watered and therefore grow properly. A stack of two to three growing containers may be more effective for large plants such as these. Alternately, the stack of five containers might work with a mixture of plants that could take advantage of the microclimates created by the plants surrounding them. For example, a mixture of leafy greens, such as lettuce, could be grown in combination with basil.

Traditional growing methods for both species produced high quality plants in about the same amount of time as in the Hydrostackers. It is certainly effective to grow these species traditionally, but based on preliminary data, the Hydrostackers seem to be the most efficient production method for basil and kale.

Figure 63 displays the weight harvest amounts to date. Produce is either distributed immediately or stored under refrigeration at the greenhouse until distribution. Basil production is an unqualified success and is also a product that is in high demand. Feedback from customers indicates that our quality is excellent compared to other vendors. While kale can be efficiently grown and produced in the greenhouse it is not a high value crop and can be efficiently grown outside in the Flagstaff region.

TOMATOES

Due to the timing of the project, a full evaluation of tomato production will not be available. Full production has not occurred on all the varieties in all of the test treatments by the September 30, 2011 project end date. However, conclusions about the growing methods are presented and the current production data in Figure 63, along with feedback from customers, do give good indicators of the varieties that are most suitable for growing.

The Hydrostackers were not suitable for tomato production as configured. A different configuration could possibly be developed but is not predicted to be any more efficient than the bucket system or the traditional method.

The bucket system was installed and planted after the Hydrostackers and the traditional method. However, it appears to be the most promising based on plant growth and fruit production. It allows the most plants to be effectively grown in the smallest are with the least amounts of inputs such as soil, water, and fertilizer.

Figure 63: Vegetable Production by Species and Variety through October 15, 2011.

TOMATOES	TOTAL (LBS)	FLAVOR
Black Plum	13.1	Good
Brandywine (B)	27.6	Excellent
Djena Lee's	0	NA
Early Girl	2	Good
Golden Nugget	3.9	Very Good
Lorenzo	0	NA
Martino's Roma (MR)	7.8	Fair
MiRoma Hybrid (MIR)	11.9	Fair
Orange Sunshine	1.4	Excellent
Patrona	0	NA
Porter (P)	2.9	Very Good
Ravello Hybrid - R	8.5	Fair
Red Brandywine (RB)	10.9	Good
Riesentrabe (RIE)	2.5	Fair
Shady Lady	5.8	NA
Striped Stuffer	0	NA
Sugary Hybrid (SH)	1.5	Very Good
Trucker's (T)	2.4	Very Good
Trust	0	NA
TOTAL Tomatoes	**100.5**	

PEPPERS	TOTAL (LBS)
Big Bomb Hybrid	1
Burning Bush Hybrid	0
Cajun Belle	0.6
Caribbean Red	0
Cherry Bomb Hybrid	0.2
Chiltepin	0
Chocolate Habanero	0
Early Sunsation	1.6
Fantasy	0
Fat N Sassy (F&S)	0.4
Giant Marconi	2
Mini Belle (MB)	2.5
NuMex Sunrise (NS)	0.9

PEPPERS	TOTAL (LBS)
Orange Scotch Bonnet	0
Orange Thai	0
Orangella	0
Pequin	0
Pizza	0
Serrano Tampiqueno	0.2
Tobago Seasoning	0
TOTAL Peppers	**12.8**

OTHER	TOTAL (LBS)
Basil, Genovese	17
Basil, Lettuce Leaf	6
Basil, Thai	0.4
Cucumber, Camero	11.6
Cucumber, Sultan	13.2
Kale, Dinosaur	2.2
Kale, Vates	4.4
Total Basil	**23.5**
Total Cucumbers	**24.8**
Total Kale	**6.6**

The traditional production method produced healthy plants with good fruit production, but used more inputs such as soil, water, fertilizer, and space in comparison to the bucket system. Most of the mature fruit harvested to date has come from the traditional method.

Both the greenhouse staff and customers are evaluating tomato varieties on their flavor profile. Gross production weight per plant is of little use if the tomatoes lack flavor. The subjective flavor ratings in Figure 63 are based mostly on fruit produced in the traditional method. As fruit becomes available from the other methods, comparisons will be made.

There was no apparent difference in plant health and production between recycled, sterilized soil versus new, sterilized Cornell mix. Therefore, if recycled soil is available, its use can provide a significant cost and energy savings.

In general, for tomatoes in the traditional production method, the larger containers produced larger, more productive plants. In the bucket system, three and five gallon containers were used. To date there is no

apparent difference in plant health and production between the two sizes and therefore the use of three gallon containers can provide a cost savings.

Final tomato production data has not been determined yet. Preliminary results indicate that for large tomatoes the heirloom Brandywine and Trucker are top performers. For medium and plum style the Porter and Black Plum are promising. For grape style and cherry tomatoes the Orange Sunshine, Golden Nugget, and Sugary Sweet Hybrid appear superior.

PEPPERS

Again, due to the timing of the project a full evaluation of pepper production will not be available. Full production has not occurred on all the varieties in all of the test treatments by the September 30, 2011 project end date. Most of the hot peppers have an even longer maturity time than tomatoes, some up to 120 days. Preliminary analysis of growing methods is presented and the current production data in Figure 63, along with feedback from customers, will be used to indicate the most suitable varieties.

The Hydrostackers were a partial success for pepper production. The "bush" type growth form, associated with the hottest peppers, were particular good growers in the Hydrostackers. The more "upright" growth form, associated with sweet peppers, performed well but tended to over grow the stackers. The spacing of the standard configuration of the Hydrostackers would have to be adjusted to provide optimum growing conditions. Also, the five stack configuration would have to be adjusted. To date, the flavor profile of the peppers in the stackers has not been fully tested, but preliminary results indicate that some adjustment to the water and fertilizer regime may be needed to develop the full flavor (i.e. heat) profile of the peppers.

The bucket system was comparable to the Hydrostackers in plant growth and production but should provide better growing conditions for the upright form. Again, some adjustment to the water and fertilizer regime may be needed to develop the full flavor (i.e. heat) profile if hot peppers are grown in this system.

The traditional method produced healthy, productive plants comparable to either of the other two methods, but it took slightly longer to produce the plants. The advantage of the traditional method is that plants can be easier manipulated (i.e. stressed) to produce the characteristic heat profile of various peppers. The disadvantage of the traditional method is that more inputs, such as soil, water, fertilizer, and space are needed to produce the plants. However, the hottest, bush type peppers can be grown as a type of perennial to provide constant production from one plant for up to three years.

Again, there was no apparent difference in plant health and production between recycled, sterilized soil versus new, sterilized Cornell mix. Therefore, if recycle soil is available, its use can provide a significant cost savings.

Container size is not as significant in pepper production as compared to tomatoes. The bush type pepper can be effectively grown in five gallon containers. The larger, upright peppers do seem to prefer larger containers as the size and number of peppers increased with container size.

Final pepper production data has not been determined yet and production is significantly behind tomato production. Past greenhouse tests have indicated the Orange Scotch Bonnet, Cherry Bomb, and Numex Sunshine might be good choices for very hot to hot peppers. Past results have indicated that the Giant Marconi is a good choice for a sweet, red pepper.

CUCUMBERS

Both the standard and hydroponic cucumber varieties started off well in the Hydrostackers. However, as fruit production and maximum growth was attained, they overgrew the Hydrostacker capacity and the plants wilted. Increasing the watering regime could not be done because it would have adversely affected the other plants in the connected system. Supplemental hand watering was not effective in sustaining the plants. One of the healthiest plants was left in each of the two stackers allotted for cucumbers. Both plants regained their vigor are producing very good amounts of fruit. These results indicate that Hydrostackers are not suitable for growing cucumber, but that either the bucket or traditional methods could be used for production. Unfortunately, neither the bucket system nor the traditional system was tested, as cucumbers were a late addition to the species test list.

GREENHOUSE TO MARKET

Local FARE researched local distribution networks to establish markets for the produce from the Greenhouse Project. More information about the findings of the Market Demand and Feasibility Study can be found in the first section of this report. Below we offer a brief summary of the NAU Greenhouse specific project.

SUMMARY

Beginning in mid-August, Local FARE began selling produce to local restaurants Pizzicletta and The Cottage Place, catering company Local Alternatives, at the Flagstaff Community Market, and at the Flagstaff Community Supported Agriculture storefront. Through this preliminary research-style production, (i.e. despite testing many varieties), Local FARE sold $926 of produce from August 10th to October 31th.

In addition, several other business owners, including Rising Hy and Satchmo's, have confirmed that when the produce appropriate for their needs matures, they will gladly purchase it on an ongoing basis (e.g. twenty pounds of peppers/month for a dried chile spice blend for Satchmo's). Importantly, the closeness of the distribution network has allowed the marketers to guide the selection of varietals for the NAU Greenhouse to produce. For example, Rising Hy only utilizes Orange Scotch Bonnet peppers for a particular sauce; therefore, now that the greenhouse has grown a test batch which the owner approved, the greenhouse can escalate to production growth on that pepper.

Local FARE had originally intended to make produce grown on campus available to students and faculty at the new Health and Learning Center. Research by the MDFS determined that there are food growing and food handling certification requirements to meet before this can occur. To that end, MDFS researcher and greenhouse staff met with Sodexho and Campus Dining to familiarize themselves with the requirements. Subsequently, Greenhouse staff attended a workshop to learn about the USDA certification in Good Agricultural and Handling Practices (GAP/GHP). Should Local FARE be awarded FY12 funding, this certification or its equivalent will be attained, and staff will take additional steps toward making NAU-grown produce available to students on campus.

CONCLUSIONS

VEGETABLE PRODUCTION

A number of conclusions have been reached based on the data collected to date. However, the lack of final production data limits our conclusions concerning the most suitable vegetable varieties for greenhouse production.

The Hydrostacker system is most suitable for production of herbs and leafy greens. The vertical nature of the system makes them an efficient system. They were moderately successful in pepper production. One caveat is that the watering and fertilizing regime, along with the standard set up, may need to be altered for best results.

The bucket system is the best approach for growing tomatoes and sweet, upright peppers. Although cucumbers were not tested in this system, it seems that it would be a perfect fit for their growth habit. The bucket system has obvious advantages in water, soil, fertilizer, and space conservation.

The traditional system is the best system for hot, bush peppers. It provides the flexibility during production to produce the expected flavor profile. The system is also successful for producing tomatoes and herbs and could be used in combination with the bucket system.

Either recycled or new soil can be used to produce healthy, productive plants. When recycled soil is available it would provide a significant cost savings.

Basil production is an unqualified success in the Hydrostackers, hydroponic buckets and grown traditionally. Production could be expanded to provide a substantial amount of basil for the local market.

Kale can be efficiently produced in the greenhouse, but its relatively low value precludes it from further production.

Tomato and pepper production data is not complete and therefore final varieties for further study cannot be selected at this time. The Research Greenhouse will continue the study long enough to make a final determination of the best varieties.

GREENHOUSE TO MARKET

One distinct advantage of greenhouse growing in Flagstaff is the ability to provide off-season produce to the local community. This could be a major competitive advantage for the greenhouse for, as the greenhouse is coming into full production, the rest of the local producers are slowing down. With increase in production, the possibility exists that we could increase our market network, especially in the colder months.

That being said, the determination of whether the Research Greenhouse can cost effectively grow produce for the local market has not been conclusively demonstrated. At this point, most of the produce has been sold into the local market at a price similar to other vendors. Whether this price point will be the breakeven price for the greenhouse is not clear. As the greenhouse ramps up to full production of a limited number of vegetables to increase production efficiencies, we will be in a better position to learn the strength of the market for these crops and whether this could be a cost effective microenterprise for a greenhouse (or other season extender) to market enterprise.

PROJECT CONCLUSION

The research made possible by this funding has established that there is strong and growing demand for locally and regionally produced food. It also has identified the nature of the challenges producers face to sustain and expand their operations to meet this growing demand, and determined that there is strong interest in cooperative forms to meet these challenges.

This funding has also allowed us to develop an enterprising response to one of the key growing challenges in the high desert: the short growing season. We have ascertained not only that there is a healthy market for season extenders and a market for all-season greenhouse products, but we have strong preliminary findings for optimal designs for season extenders adapted to and manufactured in Flagstaff.

Thus, Local FARE's research suggests there are opportunities for substantial development of our regional food economy. Yet, our Market Demand and Feasibility Study and our Production Needs Assessment show that to develop a vibrant local and regional food system, we need carefully designed strategic interventions. A once integrated regional food economy has been torn asunder by the system of industrial agriculture. To rebuild, new knowledge must be generated and disseminated, new networks fashioned, and new forms of finance created to support new enterprise formation. In order to move forward with catalyzing the local and regional food economy of northern Arizona, Local FARE is pursuing Phase II research.

A substantial part of Phase II entails research on cooperative forms that can strengthen producers' capacity to meet the growing market demand for sustainably grown regional foods. Employee owned enterprises (EOEs) lower the barriers to new-enterprise formation by generating and pooling knowledge, finance, and networks.

Our research will assess the possibilities for establishing an employee ownership center in northern Arizona that can provide the necessary legal, financial, and technical assistance for successful development of employee owned enterprises. We believe this will not only support myriad food-related enterprises, (including but not limited to the ones we propose to catalyze in 2012), but will provide a model of knowledge-based enterprise formation that is generalizeable beyond the food sector.

We will also conduct research on transitions between aspiring and retiring farmers, as well as on opportunities for existing farmers to expand their productive enterprises on new farmland. Our Phase I research indicates that two thirds of area farmers wish to expand their operations, but that barriers to doing so are substantial. Transition and expansion of this kind depend on generating a database of available and soon-to-be available potential farmland, disseminating information that enhances the probability of enterprise success, and developing finance options. Several programs across the U.S. have developed to meet these needs, such as California's Farmlink. We will research best practices of extant programs in order to propose an optimal design for such a program on the Colorado Plateau.

Phase II research will also lay the groundwork for a new food-related microenterprise. We believe implementation of a mid to large scale composting program using local untapped waste streams can generate a

viable local and sustainable food-related enterprise. We will conduct research on composting feasibility and technologies on the NAU campus, using untapped waste streams from campus and from the Flagstaff community. We intend our research to support development of a campus-composting program, and to provide data and stimulus for a Flagstaff cooperative composting enterprise.

Finally, in Phase II we will continue and complete our Greenhouse to Market research.

As the great recession lingers, understanding of the health impacts of industrial food spreads, energy costs rise, and the threat of climate change grows, communities across the region have a great need to develop stronger, more resilient, just and diverse economies. Together, Local FARE's Phase I and Phase II research will create a firm foundation for a regional food economy that dynamically contributes to our communities' ability to intelligently and creatively respond to these challenges of our time.

APPENDICES

APPENDIX A

LOCAL FARE: FARMERS' MARKET SURVEY

SURVEY RESULTS

This survey will help gauge market demand for local/regional food (produce, meat, cheese, etc.), and will contribute to the creation of a regional food hub in Flagstaff. Your answers will be used in the aggregate form in creating future publications.

Thank you for your time and willingness to participate in this survey!

PART 1: Background information

1. Name of market: *(optional)* **n=6**

-see Appendix 1 for responses

2. Years the market has been operating at this location: **n=6** **mean=4.83 years**

3. Is the market: *(check one)* **n=6** **0%** Year-round **100%** Seasonal

If seasonal, what months do you operate? **50% - June to end of September; 16.7% each for end of May–October, mid-May–end of October, July–mid-September;**

mean=18 weeks

What day(s) of the week do you operate? **33.3% - Saturdays; 16.7% each for Sundays, Tuesdays, Wednesdays, Thursdays**

4. What are the average sales (in 2010) for your market?

n=6 **mean=$9,548; range=$1,250-$22,500** Per week

n=6 **mean=$171,667; range=$10,000-$450,000** Per year

5. Have you ever conducted a customer or grower/producer survey? **n=6 50%** Yes **50%** No

If yes, when? **n=3** **2010, 2009**

Will you share the information? **n=3** **100%** Yes **0%** No

6. Does your market require all produce to be Arizona-grown? **n=6** **66.7%** Yes **33.3%** No

7. Does your market require a certain percentage of product to be grown/produced by the growers/producers? **n=6** **83.3%** Yes **16.7%** No

If yes, what percentage? **n=5** **100%**

PART 2: Market grower/producer information

8. On average, how many growers/producers participate in your market?

n=6 **mean=32.7; range=7-70** Per season **n=6** **mean=20.3; range=7-45** Per week

9. Have you noticed a change in vendor participation over the years? **n=6** **100%** Yes **0%** No

10. Please list the *percent* change in growers/producers: (for example, a +5% increase since last year) **n=6**

mean=12.5% Last year

mean=23.3% 3 years

mean=42.5% 5 years

mean=97.5% 10 years

11. Why have there been changes in growers/producers participation? *(check all that apply)* **n=6**

83.3% Customer demand

0% Policy changes (city/county/other)

100% WIC availability

83.3% SNAP availability

50% EBT availability

66.7% Senior Farmers Market Nutrition Program

66.7% Meat sales available

0% SB1070

33.3% Other **(Responses: Economic Viability of Small growers)**

12. Please list the *number* of growers/producers (in 2010) who travel to your market within: **n=6**

mean=27.7 0-60 miles

mean=9 61-100 miles

mean=1.5 101-200 miles **0** more than 200 miles

13. Please *check all items* found at your market during the peak of the season: **n=6**

100% Vegetables	**100%** Eggs	**100%** Nuts
66,7% Baked Goods	**100%** Tree Fruits	**83.3%** Soaps
83.3% Berries	**100%** Crafts	**100%** Nursery Plants
100% Fresh Herbs	**100%** Honey	**66.7%** Vegetable Plants
83.3% Cheese	**100%** Processed foods	❒ Other: _____
66.7% Dried Herbs	**100%** Meat	❒ Other: _____
100% Cut Flowers	**100%** Jams/Jellies/Preserves	

14. Which statement best describes your market? *(check one)* **n=6**

16.7% My market needs more produce. **83.3%** My market needs more customers.

If you said more produce, do you want: *(check one)* **n=1**

0% More quantity **100%** More variety

15. Do you feel your market needs more growers/producers? **n=6** **83.3%** Yes **16.7%** No

16. Please provide any additional comments on customer demand and produce availability: **n=4**

-see Appendix 1 for responses

17. Do growers/producers pay a fee to participate in your market? **n=6** **100%** Yes **0%** No

If yes, what is the fee? **mean=$3.26/market**

18. Do growers/producers pay a percentage of sales to participate in your market? **n=6**

83.3% Yes **16.7%** No

If yes, what is the percentage? **n=5** **mean=10% sales each market**

19. Does your market provide space for backyard gardeners to sell their produce? **n=6**

100% Yes **0% No**

If no, why not?

20. Would you support a backyard gardener cooperative at your market? **n=6**

100% Yes **0% No**

Please explain. **–see Appendix 1 for responses**

21. What is the biggest challenge to the long-term viability of your market? **n=6**

-see Appendix 1 for responses

22. What do you think would help increase local food production in your area? **n=6**

-see Appendix 1 for responses

PART 3: Market Customer Information

23. Please rate how important the following characteristics are to your market customers: **n=6**

Characteristic	1=Not important	2=Somewhat important	3=Very important	Mean
Arizona grown	**0%**	**50%**	**50%**	**2.50**
Regionally grown	**0%**	**0%**	**100%**	**3.00**
Grown or made by the vendor	**0%**	**0%**	**100%**	**3.00**
Sustainable production methods	**16.7%**	**33.3%**	**50%**	**2.33**
Organic production methods	**16.7%**	**66.7%**	**16.7%**	**2.00**
In season produce	**0%**	**0%**	**100%**	**3.00**
Price	**0%**	**50%**	**50%**	**2.50**
Unusual varieties	**50%**	**16.7%**	**33.3%**	**1.83**
Product quality	**0%**	**0%**	**100%**	**3.00**
Farming methods used	**16.7%**	**33.3%**	**50%**	**2.33**
Other: _____				

Other responses include: Chicken sales (processed) as a result of customer demand (n=1); Know producers (n=2).

PART 4: Additional Comments

24. Please use the area below for any additional comments.

-see Appendix 1 for responses

APPENDIX A-1

1. Name of market: *(optional):* **n=6**

Chino Valley Farmers Market, Flagstaff Community Market – East Side, Flagstaff Community Market – Westside City Hall, Prescott Farmers Market, Prescott Valley Farmers Market, Verde Valley Farmers Market

16. Please provide any additional comments on customer demand and produce availability: **n=4**

With more variety, customer base grows. n=3

A number of different farmers' markets in the geographic area cater to different customers and vendors; their own flavor at each market.

20. Would you support a backyard gardener cooperative at your market? Please explain: **n=1**

Treat them the same as other growers in the sense of supporting local interest; they bring their own canopy/table; encourage them to have signs, explain produce. Market could provide canopy at Wednesday market.

21. What is the biggest challenge to the long-term viability of your market? **n=6**

Food safety bill – uncertainty about effects. n=3

County Health department rules and interpretations as to processed foods. Also, what to do with the extra produce if it doesn't sell at the market.

1. Continued viability/expansion of small independent growers; 2. Potential regulatory (USDA) requirements. n=2

22. What do you think would help increase local food production in your area? **n=6**

Education, new farmers seeing benefit of local food production and sustainable agriculture. n=3

If local restaurants commit to true local food purchases.

Education / backyard growers / Foodlink.

Education, lead by example (i.e. Backyard Gardener example); be tactical about what to grow. Master gardeners cooperative extension (in Coconino County) does not focus on growing rich now; they should be like Yavapai County and focus on growing. Foodlink, community and school gardens are also important.

24. Please use the area below for any additional comments. **n=4**

Standardizing health county dept policies so farmers are not confused. n=2

Health department fees are not conducive to small vendors wanting to try/experiment one or two times with their produce. Price to some customers is the most important factor in visiting farmers' markets.

Noticed increase in last 10 years of the informal local economy. Backyard gardeners can show up unannounced 4x at the market, but they must still pay 10% of gross sales.

APPENDIX B

LOCAL FARE GROCERY STORE AND SUPERMARKET SURVEY

SURVEY RESULTS

This survey will help gauge market demand for local and regional produce, and will contribute to the creation of a regional food hub in Flagstaff. Your answers will be used in the aggregate form in creating future publications.

Thank you for your time and willingness to participate in this survey!

PART 1: Background information

1. Are you the: *(please circle all that apply)* **n=9**

66.7% Produce Manager / **0%** Store Manager / **33.3%** Other

2. Name of business: *(optional)* **n=7**

-see Appendix 1 for responses

3. Please describe your establishment: **n=9**

33.3% National chain supermarket

33.3% National chain store

0% Regional chain supermarket

11.1% Other

22.2% Independently owned grocery store

4. How many years has your store been in business in Flagstaff? **n=9 mean=16.6, range 1-28**

5. What is your store's total annual sales? **n=2 mean=$2,270,000, range $40,000-$4,500,000**

6. How many years have you been in your position at the store? **n=8 mean=7.75, range 1-22**

7. Are you responsible for sourcing/purchasing your store's produce? **n=9**

77.8% Yes **22.2%** No

PART 2: Sourcing Local/Regional Produce

8. Please estimate what *percent* of your store's volume of produce sales comes from: **n=9 for range and n==9 for median**

range 0-95%; median=5% "Local" – within 200 miles of Flagstaff

range 5-80%; median=50% Western U.S. Region (AZ, CA, WA, OR, NV, CO, UT, NM, ID, WY)

range 0-10%; median=5% U.S. (contiguous 48 states, non-Western region)

range 0-50%; median=30% Outside the U.S. and HI and AK

9. If your store does *not* sell local produce, why not? *(check all that apply)*: **n=3**

0% Company policy

0% Regulatory barriers

66.7% Contracts with other suppliers

0% Price

100% Produce availability

0% Do not know local suppliers/farmers

0% Lack of customer demand

0% Not interested

66.7% Other **(Responses: Climate; Seasonality of produce)**

Continue to #15.

10. How long has your store sold local produce? *(number of years)* **n=6 mean=21.8**

11. Please list some of the local growers/producers from whom your store sources: **n=4**

-see Appendix 1 for responses

12. Why does your store sell local produce? *(check all that apply)* **n=6**

50% Company philosophy

50% Customer demand

66.7% Product quality/taste/freshness

100% To support local farmers

66.7% To support local economy

16.7% Distribution advantages

50% Less environmental impact

33.3% Price

33.3% Other **–see Appendix for responses**

13. How does your store source local produce? *(check all that apply)* **n=6**

83.3% Direct from producers

50% Distributors

16.7% Brokers

0% Wholesalers

0% Processors

0% Internet

0% Conferences and trade shows

50% Other **–see Appendix for responses**

14. How does your store let customers know that your produce is local? *(check all that apply)* **n=6**

100% In-store signage

0% In-store events

66.7% Talk with customers directly

33.3% Newsletter/flyer

16.7% Promotions

33.3% Other **–see Appendix for responses**

15. What are the challenges of sourcing local produce? *(check all that apply)* **n=9**

33.3% Distribution or transportation

66.7% Local growing conditions (e.g. water, climate)

0% Company policy

55.6% Seasonality of product

33.3% Consistency of product (aesthetic)

11.1% Quality of product (taste)

55.6% Lack of specific product/variety

11.1% Cost of product

88.9% Insufficient volume

11.1% Inadequate communication (please specify)

11.1% Other **–(Response: Cold storage, spacial challenges)**

Please *circle* the most important challenge above. **n=9**

33.3% - Insufficient volume; 22.2% each Distribution or transportation, Local growing conditions, Lack of specific product/variety

16. Is your store interested in sourcing more local produce? **n=8** **87.5%** Yes **12.5%** No

17. Do you prefer that growers/producers contact you directly for produce sales? **n=9**

44.4% Yes **55.6%** No

If yes, please list the information or materials you need from growers/producers.

-see Appendix 1 for responses

If no, what is the process growers/producers should use?

-see Appendix 1 for responses

18. Please list any processes/factors that contribute to a successful business relationship with growers/producers.

-see Appendix 1 for responses

19. Please rate how important the following characteristics are to your customers: **n=9**

Characteristic	1=Not important	2=Somewhat important	3=Very important	Mean
Arizona grown/produced	**11.1%**	**55.6%**	**33.3%**	**2.22**
Regionally grown/produced	**11.1%**	**44.4%**	**44.4%**	**2.33**
Organic production methods	**0%**	**33.3%**	**66.7%**	**2.67**
Sustainable production methods	**11.1%**	**44.4%**	**44.4%**	**2.33**
Other farming methods	**85.7%**	**14.3%**	**0%**	**1.14**
Support local farmers/growers	**25%**	**50%**	**25%**	**2.00**
In season produce	**0%**	**33.3%**	**66.7%**	**2.67**
Consistency of product (aesthetic)	**0%**	**22.2%**	**77.8%**	**2.78**

Quality of product (taste)	**0%**	**0%**	**100%**	**3.00**
Unusual varieties	**22.2%**	**77.8%**	**0%**	**1.78**
Price	**0%**	**33.3%**	**66.7%**	**2.67**
Nutritional value	**25%**	**50%**	**25%**	**2.00**
Information from produce team	**0%**	**44.4%**	**55.6%**	**2.56**
Other:				

Other responses include: Overall cleanliness & presentation; Crispness and freshness; Packaging; Friendliness; Labeling

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PART 3: Additional Comments

20. Please use the area below for any additional comments.

-see Appendix 1 for responses

APPENDIX B-1

2. Name of business: **n=7**

Albertson's, Flagstaff CSA, New Frontiers Natural Marketplace, Safeway, Sam's Club, Target, and Wal-Mart #4252

11. Please list some of the local growers/producers from whom your store sources: **n=4**

Big Chuy Watermelon, Kandy Melons, used to get Euro-Fresh Tomato Co., Tomatoes on the Vine

Foxy Farms, Sanderson, Eurofresh, Nature Sweet, Kandy, Sunkist, Evercrisp, Andy Boy, Dandy

Marketside (salads), Dole

Whipstone Farms, Marilyn's Orchard, Flying M, Tickaboo, Crooked Sky Farms, Chino Valley Farm, McClendon's Select, Downey Farm, Willowbrook, Wong's Farm

12. Why does your store sell local produce? Other responses include: **n=2**

Customers trust what they're finding on the shelf; reputation.

Would rather buy U.S. first.

13. How does your store source local produce? Other responses include: **n=3**

Customer word of mouth (to provide contact name/info).

Produce buyers (company). (Note: Parent company produce buyer does the buying from producers).

From central purchasing office.

14. How does your store let customers know that your produce is local? Other responses include: **n=2**

COOL – Country of Origin Labeling

We only sell local/regional produce; emails; it's how we're known.

17. Do you prefer that growers/producers contact you directly for produce sales?

If yes, please list the information or materials you need from growers/producers? **n=4**

A lot more personal; get to know them; relationship. Copy of recent organic certification if organic. If not organic, they sign an affidavit of growing practices.

Updated list of local produce grown and access or availability.

Must go through corporate buyer. Sample of product; invoicing; some way to pay them (account); how farm is run (USDA).

Crop plan, certificate of insurance, business license, site visits.

If no, what is the process growers/producers should use? **n=5**

It would have to go through our distribution center. I just can't buy from a grower.

Contact Target food distribution center.

Call Sam's Club home office. Standards (size of produce, etc.), seasonality so that they carry produce year-round.

Contact central purchasing office. Company buys for about 120 stores, not just one store, i.e. can growers/producers supply all the volume? Paperwork as to how they grow their produce. Any license.

Contact corporate office.

18. Please list any processes/factors that contribute to a successful business relationship with growers/producers. **n=6**

Consistency in years past with supply and quality

Consistency in all (volume, communication); willingness to credit on pad product; guarantee their product

Product quality

Quality, price point (this is the main thing, although the popularity of local food / customer demand is important; ie if enough customers demanded a product, they would carry it even if price was higher), meeting their standards

Quality of produce, even if customers do pay a little bit more to get that Pricing is also important

Open communication, flexibility, honesty

20. Please use the area below for any additional comments. **n=8**

We live in a very challenging region, with distance product has to travel, especially fuel charges ($2-3/box additional). Some companies charge more per pallet because of increased fuel charges. This also affects time produce sits in the box. A list of local growers would be helpful (wholesale, roadside, farmers' markets).

I found in most recent years, customers are asking more frequently about produce grown outside the U.S. Their main concern is pesticide uses. [The store] has let us know that they are try[ing] to add to the amount of organics by popular demand.

This store tries to buy Arizona first, then California, then Texas, then Mexico; seasonality Chile. Regarding organic or sustainable production methods important to customers, it depends on the person.

Quality and not being out of stock of main staple items, such as potatoes, onions, lettuce, tomatoes, etc.

Always do best to satisfy member needs. Already do local book signings, source wine from Verde Valley Region (Club of the Community), join in local parades/events. Customers need to be comfortable with what they're buying; know that they are having peace of mind when buying from them. A lot to do with quantity, but certainly quality as well. All unsold food is donated or recycled (produce, meat, bakery). Have their own composter that gets picked up and goes to livestock feed.

Local community needs to support their local farmers more because local farmers are being driven out of business by national farm chain distributor, i.e. impacts quality and price because a lot of steps are taken to get produce to store and onto shelf and ultimately impacts quality and pricing. "Truck to Shelf"

Growing locally in Flagstaff is constantly challenging due to the weather changes.

Organic is not as important as knowing the farmer and knowing that the farmer is using natural/sustainable methods. Pesticide free. Certified naturally grown.

APPENDIX C

LOCAL FARE RESTAURANT AND FOOD INSTITUTION SURVEY

SURVEY RESULTS

This survey will help gauge market demand for local/regional food (produce, meat, cheese, etc.), and will contribute to the creation of a regional food hub in Flagstaff. Your answers will be used in the aggregate form in creating future publications.

Thank you for your time and willingness to participate in this survey!

PART 1: Background information

1. Are you the: *(please circle all that apply)* **n=17** **70.6%** Owner/ **76.5%** Chef/ **64.7%** Manager

2. Name of restaurant: *(optional)* **n= 17** **–see Appendix 1 for responses**

3. Number of customers served per day: **n=19** **mean=363/day, range=3-2,600**

4. What is your total annual revenue? **n=10** **mean=$770,600, range=6,000-3,100,000**

5. How many years have you been in business? **n=20** **mean=15.7 years, range=less than one year to 75 years**

6. Do you serve: *(please check all that apply)* **n=20** **45%** Breakfast **90%** Lunch **100%** Dinner

7. How would you define your establishment? *(check one)* **n=20 (multiple were checked)**

30% Upscale full-service restaurant

45% Casual/family full-service restaurant

55% Caterer

40% Other **–see Appendix 1 for responses**

8. Please estimate what percent of your food comes from: **n=20**

mean=14.7%, range=0-80% 0-60 miles (includes Camp Verde, Cottonwood, Winslow, Ash Fork)

mean=10.4%, range=0-40% 61-100 miles (includes Prescott, Chino Valley)

mean=36.5%, range=0-98% 101-200 miles (includes Phoenix, Kingman, Show Low)

mean=36.3%, range=0-100% more than 200 miles (includes Tucson, Yuma, Willcox)

PART 2: Sourcing Local/Regional Food

9. Do you use local/regional food? **n=19** **94.7%** Yes **5.3%** No

10. If you do *not* source local/regional food, why not? *(check all that apply)*: **n=7**

28.6% Don't know what's available

28.6% Too difficult

57.1% Price

14.3% No customer demand

0% Don't see any benefit

0% I used to

57.1% Other **–see Appendix 1 for responses**

11. How long have you used local/regional food? *(number of years)* **n=18** **mean=7.6 years, range=1-26 years**

12. What percentage of your purchases is currently local/regional food? *(percentage)* **n=17** **mean=42.5%, range=1-100%**

13. Why do you source food locally/regionally? *(check all that apply)* **n=18**

27.8% Customer demand

61.1% Taste

77.8% Quality

83.3% Support local farmers

22.2% Marketing

50% It's the right thing to do

50% Other **–see Appendix 1 for responses**

14. How do you source local/regional food? *(check all that apply)* **n=19**

63.2% Foodservice distributors

68.4% Direct from growers or producers

10.5% Wholesale markets

52.6% Farmers' markets

36.8% Other **–see Appendix 1 for responses**

15. What are the challenges of sourcing local/regional food? *(check all that apply)* **n=19**

63.2% Delivery

78.9% Year-round availability

15.8% Consistency of product (aesthetic)

15.8% Quality of product (taste)

57.9% High price

36.8% Low volume

31.6% Other **–see Appendix 1 for responses**

16. List the specific TYPES of local/regional food you use, location sourced, volume, and price: **n=17, –see Appendix 1 for responses**

Type	Location sourced (city)	Volume (indicate # of flat, bushel, etc. per week)	Price

The most frequently listed items include: tomatoes (14 responses), beef (10), greens (10), chiles (8), herbs (7), cheese (6), chicken (4), fruit (4), eggs (3), onions (3), and other meat (besides beef and chicken) (3).

17. Please rate how important the following characteristics are to your customers: **n=20**

Characteristic	1=Not important	2=Somewhat important	3=Very important	Mean
Arizona grown	**21.1%**	**26.3%**	**52.6%**	**2.32**
Regionally grown	**21.1%**	**42.1%**	**36.8%**	**2.16**
Grown or made by the farmer	**22.2%**	**27.8%**	**50.0%**	**2.28**
Sustainable production methods	**21.1%**	**47.4%**	**31.6%**	**2.11**
Organic production methods	**42.1%**	**26.3%**	**31.6%**	**1.89**
In season produce	**21.1%**	**21.1%**	**57.9%**	**2.37**
Price	**0%**	**45.0%**	**55.0%**	**2.55**

Unusual varieties	**33.3%**	**27.8%**	**38.9%**	**2.06**
Product quality	**0%**	**5.0%**	**95.0%**	**2.95**
Farming methods used	**27.8%**	**50.0%**	**22.2%**	**1.94**
Other: **n=6, –see Appendix 1 for responses**				

18. Do your customers demand more local/regional food? **n=17** **41.2%** Yes **58.8%** No

19. How do you let customers know your food is local/regional? **n=17** **–see Appendix 1 for responses**

20. If products become available from local/regional sources, how likely are you to increase the amount of local/regional food in your establishment? Please fill in the specific food item and indicate likelihood of it being on your menu. **n=17** **–see Appendix 1 for responses**

Food Item *(fill in below)*	1= Very Unlikely	2= Unlikely	3= Likely	4=Very Likely	Volume (indicate # of flat, bushel, etc. per week)	By when
	1	2	3	4		

The most frequently listed items include: other meat (besides beef and chicken) (10 responses), fruit (8), chiles (8), tomatoes (7), herbs (6), chicken (6), greens (5), vegetables (5), eggs (5), cheese (4), and beef (4).

21. What would help in increasing local/regional food purchasing in the future? *(check all that apply)* **n=20**

30% Broker

35% Standards of excellence

65% Consistency of volume

55% Consistency of product

35% Customer demand

75% Competitive pricing

0% I am not interested

45% Other **–see Appendix 1 for responses**

22. Would you alter your menu to feature local/regional food as it becomes available? **n=17**

100% Yes **0%** No

If yes, by what percentage? **n=12, mean=30.9%, range=10-75%**

If no, why not?

PART 3: Additional Comments

23. Please use the area below for any additional comments.

–see Appendix 1 for responses

APPENDIX C-1

2. Name of restaurant: **n=17**

Brix Restaurant and Wine Bar, Buster's, Campus Coffee Bean, Criollo Latin Kitchen, Diablo Burger, Flagstaff Medical Center, Josephine's Bistro, La Fonda Mexican Restaurant, Local Alternative Catering, Louie's Chicken Shack, Morning Glory Café, Mountain Oasis, New Jersey Pizza, Salsa Brava, Satchmo's The Cottage Place, The Peaks Assisted Living

7. How would you define your establishment? Other responses include: **n=8**

Casual, counter service

Local foods based burger joint

Food manufacturer, repacking facility

Bulk sales to CSA

Coffee, restaurant & bakery

In-home catering and cooking, education, kitchen demos

We do catering, serve patients, floor stock, café operation

Events

10. If you do *not* source local/regional food, why not? Other responses include: **n=4**

Not large enough quantities available

No purveyors; not big enough; low volume

Not enough to provide for our needs; we receive a rebate for ordering our food from one main distributor; multiple processing of invoices costs money

Purveyor contract

13. Why do you source food locally/regionally? Other responses include: **n=9**

Sourcing local was always part of the plan; support local ranchers, too; look at Nabhan Manifesto

Taste of honey especially important; neighbors

Organic reasonably priced; supports local farmers because know them more

Fundamental solution to national health care and economic longevity

Enjoyment and magical, especially from own or friends' gardens

Convenience

Cornerstone of our company

Philosophy of using things that are available

Keep it local

14. How do you source local/regional food? Other responses include: **n=7**

Shared purchases from local (Netzky)

4th Street Market

Flagstaff CSA Storefront, McClendon's

Anyone prove valid food source

4th Street Market, New Frontiers, Grows own (herbs)

Flagstaff CSA Storefront

Sterns, Holsum Foods (Made in PHX Valley)

15. What are the challenges of sourcing local/regional food? Other responses include: **n=6**

Depending on what the farmer has; determined by farmer and weather as what grows

Grower knowledge to produce and market

The "middleman" in terms of delivery and buying; higher costs associated with all these issues

Climate

No distributor

Safe food source; multiple government levels of inspection

16. List the specific TYPES of local/regional food you use, location sourced, volume, and price: **n=17**

ALL PRODUCE, STERNS

AZ DAIRY CHEESES, AVALON FOOD

BABY LETTUCE, LOCAL, 8 CS. WK, $7.34

BACON, PHOENIX, 10 LBS/WK, $40

BASIL

BBQ SAUCE, FLAGSTAFF (RISING HY), 1 GAL/WK, $40/GAL

BEEF, ARIZONA LEGACY (CENTRAL AZ), $2,400/MONTH

BEEF, BAR T RANCH, $200/MONTH

BEEF, BAR T RANCH, $200/MONTH

BEEF, COCONINO CO., 400-800 LBS/WK, $4.50/LB

BEEF, FLYING M

BEER, CHANDLER

BELL PEPPERS, 4TH ST MARKET, 1 CASE/WK

BLUE CORN MEAL

BREAD, VILLAGE BAKER (FLAGSTAFF)

CABBAGE, PHOENIX

CAGEFREE EGGS, ARLINGTON, 1/4 CASE, $28.23/CASE

CARROTS, FLAGSTAFF & CHINO VALLEY, FREE

CELERY, 4TH ST MARKET,

CHEESE (GOAT), FOSSIL CREEK

CHEESE, FOSSIL CREEK (PAYSON) AND COTTONWOOD

CHEESE, PHOENIX, 400 LBS/WK, $2.19/LB

CHEESE, SHAMROCK, 20-30 LB, $4-6/LB

CHEESE, SOUTHERN AZ DAIRY CO-OP (PHOENIX), $500/MONTH

CHICKEN, RIDGEVIEW FARMS (CHINO VALLEY)

CHICKEN, RIDGEVIEW FARMS, $1,000/MONTH

CHICKEN, RIDGEVIEW FARMS, $1,000/MONTH

CHICKEN, YOUNG'S MARKET

CHILES, MCCLENDON'S

CHILIS, CHINO VALLEY, 300-400 LBS/YR, $2-3/LB

CHIVES, FLAGSTAFF, FREE

CILANTRO, CHINO, 200 BUNCHS, 24 CT $24

CUCUMBERS, SHAMROCK, 12 LBS, $1.25/LB

CUCUMBERS/ONIONS/PECANS, VERDE VALLEY

DRIED FRUIT, BLUE CORNMEAL, SUPPLIER IN COTTONWOOD

EGGS, BUCKEYE (HICKMAN'S), 5 CRATES(DZ)/WK, $9/CRATE

EGGS, SHAMROCK, 180 DZ, $1/DZ

GREEN CHILI, HATCH

GREEN CHILI, PHOENIX

GREENS, FLAGSTAFF & CHINO VALLEY, FREE

GREENS, MCCLENDON'S (PEORIA)

GROUND BEEF, FLYING M, 4LB/WK, $8/LB

HABANERO, CHINO

HAM, PHOENIX, 5 LBS/WK, $30

HEIRLOOM TOMATOES, CHINO VALLEY FARMS, $3/LB

HERBS, MT. HOPE (COTTONWOOD)

HONEY, FLAGSTAFF, 5 GALL/WK, $80/5GALL

HOT SAUCE, RISING HY (FLAGSTAFF)

JALAPENO CHILES, 4TH ST MARKET, 15 LB/WK

LEMONS, PHOENIX, 2-3 CASES/DAY

LETTUCE

LETTUCE, 4TH ST MARKET, 10 CASES/DAY

LETTUCE, FLAGSTAFF CSA, $3-4/BAG

LETTUCE, SHAMROCK, 40 LBS, $0.70/LB

LIMES, PHOENIX, 5 LB/DAY

MEAT - BEEF, FLYING M (FLAGSTAFF)

MEATS, SHAMROCK, 75-100 LB, $4-6/LB

MELONS, TICKABOO RANCH (CAMP VERDE)

MILK, SHAMROCK, 60 GAL, $4.50-$4.75/GALL

MINT AND HERBS, FLAGSTAFF, FREE

MINT, FRONT YARD

OLIVE OIL, QUEEN CREEK (AVALON FOOD)

ONION, HOPI

ONION, SHAMROCK, 50 LBS, $0.30/LB

ONIONS, CHINO AND VERDE, 400 LBS, $1.50/LB

ORGANIC APPLES, SPECIAL ORDER WITH US FOODS (TOOK 2 WEEKS; CHECKING STERN PRODUCE FOR AVAILABILITY AND PRICING)

PASTA, VERDE VALLEY

PECANS, SAHUARITA, 15LBS/WK, $7.73/LB

PEPPERS, WHIPSTONE AND CHINO VALLEY FARMS

PICKLED JALAPENOS, PHOENIX, 3 JARS/WK, $20

POTATOES, SHAMROCK, 100 LBS, $0.50/LB

PRODUCE, MCCLENDON'S (PEORIA), $2,000/MONTH

PRODUCE, MCCLENDON'S (PEORIA), $2,000/MONTH

SALAD GREENS, PEORIA, 3 CS/WK, $60

SAUSAGE, PHOENIX, 15 LB/WK, $50

SHANK BEEF (SEASONAL), FLYING M, 4LB/WK, $8/LB

SPICE MIX, DUST

SPICES/HERBS, MT. HOPE, COTTONWOOD

SPINACH (ORGANIC), SHAMROCK, 24 LBS, $1.25/LB

SPINACH, PEORIA, 2 CS/WK, $40

SPROUTS, COTTONWOOD, 5-7LBS/WEEK, $5

SPROUTS, VERDE VALLEY, $6/3LB

SQUASH, FLAGSTAFF, FREE

SUSTAINABLE 4 OZ HAMBURGER PATTIES, US FOODS, $1.14/PATTIE

TOMATO, PHOENIX, 69-99 CENTS/LB

TOMATO, VERDE VALLEY AND CHINO VALLEY, 500 LBS, $1.25/LB

TOMATO, WILCOX, 14 CS. WK, $22

TOMATOES, 4TH ST MARKET, 14 CASES/WK

TOMATOES, CHINO VALLEY FARMS, $900/MONTH

TOMATOES, CHINO VALLEY FARMS, $900/MONTH

TOMATOES, FARMERS' MARKET

TOMATOES, GARLANDS, $2/LB, $1/LB FOR #2S

TOMATOES, MCCLENDON'S (PEORIA)

TOMATOES, MCCLENDON'S, $1/LB

TOMATOES, PHOENIX, WILLCOX, CHINO VALLEY, VERDE VALLEY, 1-3 CASES/WK, $20/10 LBS OF WILLCOX CAMPARI TOMATOES, UP TO $60/15 LBS OF SUMMER HEIRLOOMS

TOMATOES, SHAMROCK, 50 LBS, $1/LB

TOMATOES, STERN'S PRODUCE

TORTILLAS, MAMA LOLAS, $500/MONTH

VEGETABLES/PRODUCE, CHINO VALLEY FARMS

WE BUY LOCAL/REGIONAL HONEY, MILK EGGS, SQUASH, BASIL, BEEF, CILANTRO, OREGANO, BEANS, FENNEL, FRUIT, CHEESE, ETC. WE MAKE OUR OWN MOZZARELLA AND RICOTTA AND WE BUY MANY OTHER DOMESTIC AND IMPORTED ARTISINAL PRODUCTS.

WINE, GRANITE CREEK VINEYARDS, $150/MONTH

WINE, GRANITE CREEK VINEYARDS, $150/MONTH

WINE, PAGE SPRINGS AND VERDE VALLEY, 1 CASE/WK, $90

YELLOW HAT CHILES, 4TH ST MARKET, 15 LBS/WK

17. Please rate how important the following characteristics are to your customers:

Other responses include: **n=6**

Food safety according to the news

Food safety regarding antibiotic, humanitarian issue

Dirty dozen toxicity list of veggies/fruits

Consistency

Use of all products and by-products on the farm and surrounding area; leaching of materials into water and on other crops

Freshness

19. How do you let customers know your food is local/regional? **n=17**

Talk to them

Signage/verbage

Menu, in conversation with employees; the name of the establishment

Tourists usually ask versus local people

Servers let customers know; put it on their tasting menu and serving sheet; email out in summer to their mailing list

Word of mouth (pom poms)

Word of mouth when ordering, Facebook

Mention it on menu for sprouts – no other way

Verbally as customers are making the order

Print advertising, signs, verbally

We advertise both in and out of the restaurants. Both Criollo and Brix are founded on these principles.

Advertise in and out of the restaurant.

Word of mouth during education classes

Don't advertise one way or another.

I put out an email and put on the employee portal.

Word of mouth

Announcement, Facebook, salsa bar

20. If products become available from local/regional sources, how likely are you to increase the amount of local/regional food in your establishment? Please fill in the specific food item and indicate likelihood of it being on your menu. **n=17**

AGED BEEF, 4
ALL PRODUCTS
ALMONDS, 3, 15-17 LBS
ARTISAN CHEESES, 4
AVOCADOES, 3, 1.5-3 CASES
BASIL, 3, 3-4 LBS
BEEF, 3
BEEF, 3, 200 LB/WK
BELL PEPPERS (BETTER AVAILABILITY), 4
BELL PEPPERS (RED, GREEN), 3, 5-10 LBS
BELL PEPPERS, 4, 1 CASE/WK
BREAD, 4
BUNS/BREAD, 3
CHEESE, 4
CHEESES, 4
CHERRY SIZE TOMATOES (GREENHOUSE IN WINTER), 4
CHICKEN (B/C OF WEATHER AND CONSISTENCY IN PRICE), 2
CHICKEN, 3, 60LB/WK
CHICKEN, 4
CHILI VARIETIES IN WINTER (GREENHOUSE IN WINTER), 4
CHILI, 4
CHILIS - VARIOUS, 4
CILANTRO, 3, 2-4 LBS
CUCUMBERS, 3, 1-2 CASES
EGGS, 1,000 LBS/WK
EGGS, 1,000 LBS/WK
EGGS, 4
FIGS (BETTER AVAILABILITY), 4
FRUIT, 4
GREENS, 3, 150 LB/WK
HABANEROS, 4
HERBS, 4
JALAPENO PEPPER, 4, 15 LB/WK
JALAPENOS, 3, 2-4 LBS
LAMB
LAMB, 25 LBS/WK
LAMB, 25 LBS/WK
LEMONS, 4, 2-3 CASES/DAY
LETTUCE (ESP IN SUMMER)
LETTUCE, 3

LETTUCE, 3, 10 CASES/DAY
LIMES, 4, 5 LBS/DAY
MEAT, 4
MILK, 4
MORE ASPARAGUS, 4
MORE MEAT/POULTRY, ETC., 4
MORE NUT VARIETIES, 4
MUSHROOMS
ONIONS, 3
ONIONS, 4
ONIONS, 4, 20LB/WK, ASAP
ORGANIC 1/2 & 1/2, 4
ORGANIC APPLES, 4
ORGANIC CHEESE, 4
ORGANIC CHICKEN, 4
ORGANIC CILANTRO, 4
ORGANIC GREEN ONION, 4
ORGANIC PINTO BEANS, 4
ORGANIC POTATOES, 4
ORGANIC REEN CHILI, 4
ORGANIC TOMATOES, 4
PARSLEY, 3, 2 LBS
PORK
PORK, 100 LBS/WK
PORK, 100 LBS/WK
PORK, 3, 200 LB/WK
POTATOES, 4
PRODUCE, 4
RIDGEVIEW CHICKEN, 4
SEASONAL FRUITS (MELONS, BERRIES), 4
SEASONAL PRODUCE (GRAPEFRUIT, ORANGES, LEMONS, LIMES, APPLES), 4
SPINACH
STRAWBERRIES (BETTER AVAILABILITY), 4
TOMATOES, 3
TOMATOES, 3
TOMATOES, 3, 5-6 CASES
TOMATOES, 4
TOMATOES, 4, 14 CASES/WK
WE BUY ALL QUALITY LOCAL FOOD. I AM CURRENTLY TRYING TO SOURCE LOCAL PORK, LAMB AND EGGS.
WE BUY ALL QUALITY LOCAL FOOD. I AM CURRENTLY TRYING TO SOURCE LOCAL PORK, LAMB AND EGGS.
YELLOW HAT PEPPER, 4, 15 LBS/WK

21. What would help in increasing local/regional food purchasing in the future?

Other responses include: **n=9**

Infrastructure, such as beef processing facility in Coconino Co.; Cold storage for beef and produce; Distribution.

Processing and government certification; distributor

Transporter

Ease of shopping day to day

Getting our food distributors to start offering with their deliveries; we already have too many different places we get food from.

Better availability

Educated customer who will ultimately demand it.

Availability

To source with other farmers who have jumped through state and federal regulations (on par with hospitals and medical hospitals).

23. Please use the area below for any additional comments. **n=14**

As important as sustainability is, there are economic forces against it.

Because of elevation grade of the Colorado Plateau and Northern Arizona, any definition of local food that's more restrictive than 250 miles is unreasonable.

If this were to happen, it needs to be more than just one year so to give the best product to our customers. If we were to go local/regional sourcing, customers will start wanting to know farming methods and therefore the restaurant will also need this information/education; the restaurant wants to be in touch with its customers. Customers will also want to know what type of packaging the food comes in. This restaurant is one of the few restaurants to recycle all the packaging, and works with the city to do this. Especially difficult to source year-round tomatoes, onions, peppers, celery.

Aged beef, but need a processing facility.

Customers expect a certain percentage of organic (on the menu), and organic is more important than local to customers. 65% demand organic and 25% demand local. Customers will expect all local to be organic. Thank you XOXO

Things are getting so much better. It was hell getting our product for the better part of a decade. Over the last 3-5 years the availability, variety and access to local/regional products has gotten so much better it's really quite amazing. Arizona citrus is amazing and plentiful but other fruit options are few and far between. It breaks my heart that we don't have figs growing anywhere. We do have access to great dates and a few weeks of good blackberries. We have also juiced hundreds of pounds of prickly pears over the years. Your mamma! President Bush sucked and Obama sucks too! P.S. We have made a great effort to make our products affordable and available to poor/working poor people with some success but these people are really getting left out of the loop. It's not easy for blue collar and middle class people either.

Local is a consideration but being a conscientious buyer there are many other aspects to consider, sustainable, shipping methods and frequency.

Education – key it's a two-way street, plus communication between farmer and eater. That's why farmers' markets are good because there is communication there, people can try new product, and give all the money to the farmer versus to the middleman. The whole idea is

supporting the people who are making the least amount of money. Mentality should change, in terms of peoples' thinking (or not) of where food comes from.

Quality, consistency and availability are key to any local produce. (Owner) can change his menu accordingly as long as their criteria are met. Regarding availability – it has to be well known what that supply and timeline are. Having an all organic establishment is not quite feasible/realistic at this time; i.e. not enough farmers. Would like to have more healthier choices, because 50% of customer base are travelers.

Quality and volume are key for restaurants to buy locally.

Cost, quality, and availability to meet our volume needs have been an issue in our establishment.

Currently uses a lot of fresh fruits and vegetables in menu; menu change from seasonality of produce; is concerned with the freshness and the cooking associated with the final product.

I support local farming and eggs, bread, cheese. Coffee direct ship from source as much as possible.

As we begin to offer more local products, clients begin to expect (it). Pricing is difficult.

APPENDIX D

PROFILE OF RESPONDENTS

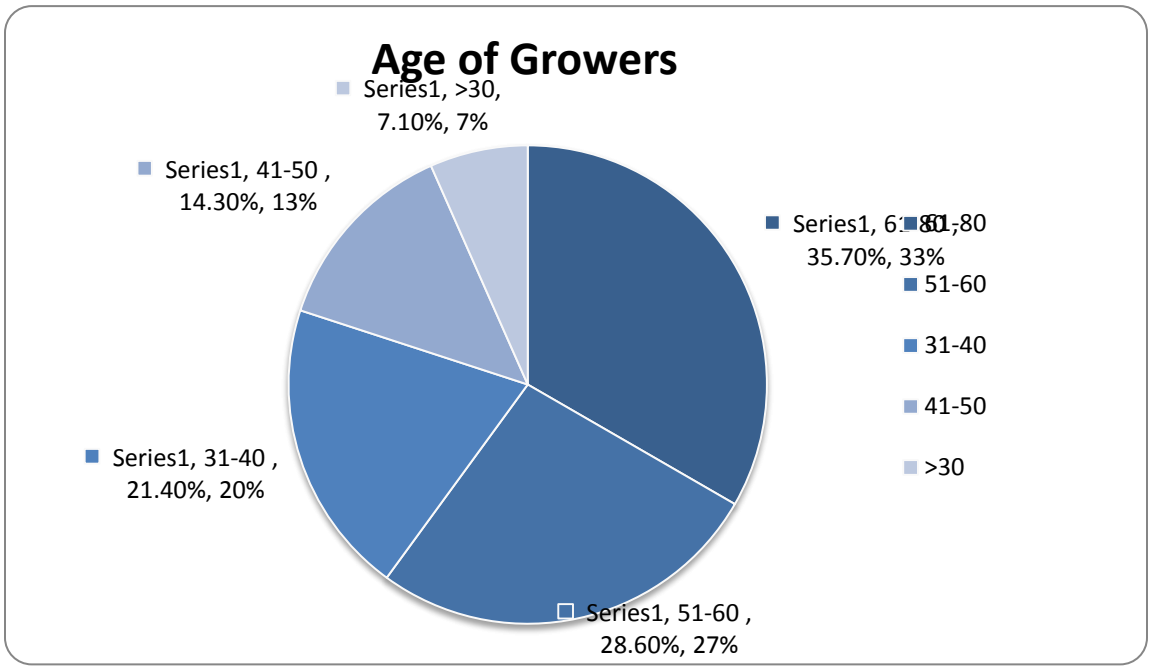

Figure 64: Age of Growers

Years selling produce to market (*n=25*)	
	Percent
Over 10 years	29%
7-10 years	25%
Less than 3	18%
3-6 years	14%
I do not sell commercially	4%

Figure 65: Years selling produce to market

In addition to the high rate of those using chemical-free methods, almost 68% identified themselves as using "naturally grown" techniques, and over 60% said they were "organic." Many of the respondents checked at least four of these categories.

Farming Methods		
	N	Percent
Chemical free	20	71.40%
Naturally Grown	19	67.90%
Organic	17	60.70%
Non-GMO	15	53.60%
Biodynamic	5	17.90%
Other *	4	16.00%
Conventional	2	7.10%

*free range, antibiotic free, hormone free, hydroponic, pesticide free and permaculture

Note: A response does not necessarily mean that respondents are certified in that particular farming technique. Only two respondents in the study are certified, one USDA Certified Organic and another one is Certified Naturally Grown.

Figure 66: Farming Methods

The below figure represents the maximum number of miles respondents' products have traveled. Most food miles were estimated as a range from place of origin to destination. Almost all growers are consuming their own products, thus the minimum miles traveled is often less than 15. Also, almost all food produced on these farms is consumed in the state of Arizona.

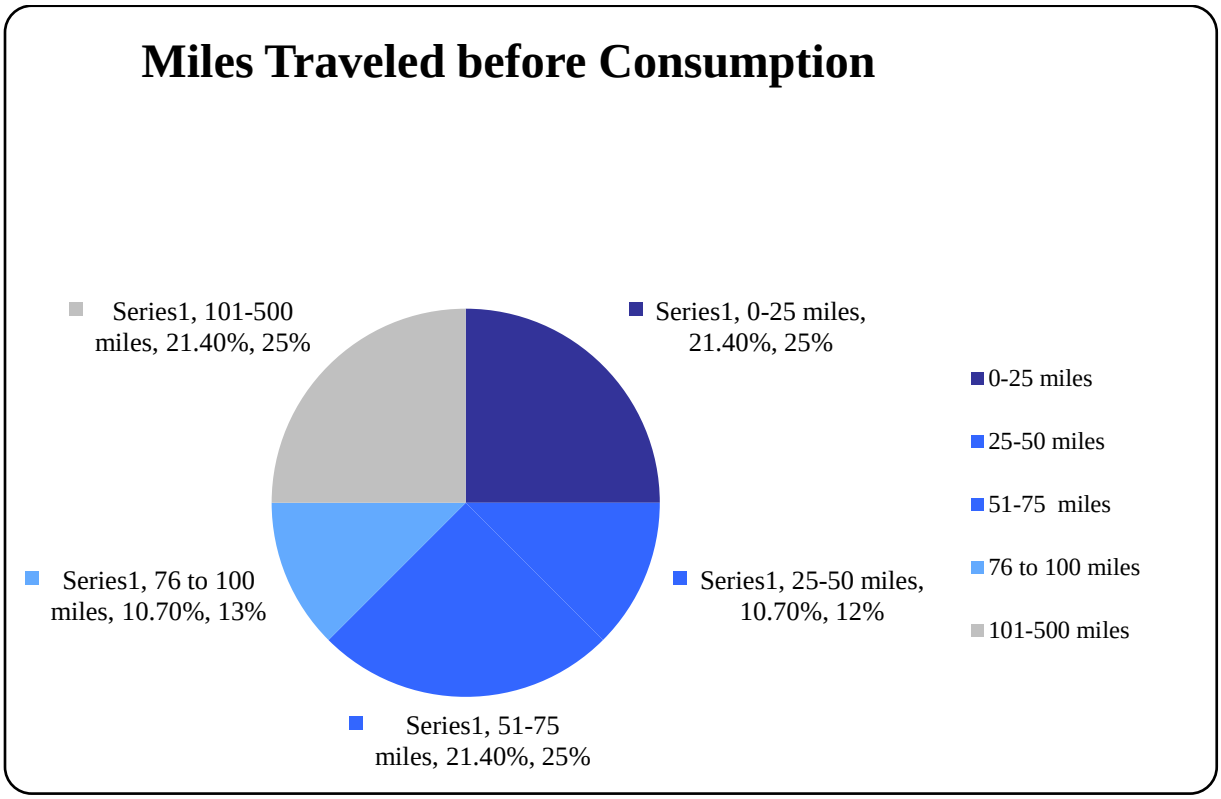

Figure 67: Miles traveled before consumption

Markets and Income	Percent
Income is supplemented by seasonal sales (n=13)	53.00%
Sells year-round to local markets and business (n=28)	46.40%
Income relies on seasonal sales (n=13)	23.00%
Sells at local markets seasonally (n=28)	21.40%
Income relies on year-round sales (n=13)	15.00%
Income is supplemented by year-round sales (n=13)	15.00%
Sells seasonally at local markets and businesses (n=28)	14.30%
Sells at local businesses seasonally (n=28)	3.60%

Figure 68: Markets and income

Approximations of Product Yield				
Product Category	Product	Qty/week	Qty/season	Qty/per year
Meat				
	Beef			10,000 lbs
	Beef			20 heads
	Beef and Goat			2000 lbs
	Chicken			10,000
	Turkey			50-100
	Turkey			500
Vegetables				
	Multiple Varieties	350-400 lbs		
	Multiple Varieties			5000 lbs
	Multiple Varieties		7500 lbs	
	Onions		10-15,000 plants	
	Tomatoes		2,000 plants	
	Sprouts	300-400 lbs		
	Squash		500 plants	
Dairy				
	Value-added dairy products			10500 lbs
	Goat and Cow Milk			18000 lbs
Eggs				
	Chicken Eggs	56 dozen		
	Chicken Eggs			3650 dozen
	Emu Eggs		25-35 dozen	

Figure 69: Approximations of product yield

APPENDIX E

LOCAL FARE: BACKYARD GARDENERS SURVEY

1. What do you do with the food you produce in your garden? *please check all that apply*,
   - ☐ My family and I immediately consume the food I produce.
   - ☐ I can and/or preserve the food I produce for consumption later.
   - ☐ I donate the food I produce to a charity.
   - ☐ I trade some of the food I produce.
   - ☐ I sell some of the food I produce to, *please check all that apply and skip to question 3*
     - ○ Farmers' market
     - ○ Restaurants
     - ○ Individuals
     - ○ Other, *please specify* _____
   - ☐ Other, please specify _____

2. Would you like to sell the food you produce? Y / N

   If you answered yes to this question, please check the factors, if any, that hinder your ability to sell your food. *please check all that apply*

   - ☐ I have no place to sell it.
   - ☐ I have no source of transportation to markets (farmer's markets, restaurants, etc.).
   - ☐ My volume is too small.
   - ☐ The costs associated with packaging or processing products are too high.
   - ☐ I don't have access to a certified kitchen or a meat processing facility to process my products.
   - ☐ There are regulations and laws that prohibit me to sell my products.
   - ☐ I don't have enough time.
   - ☐ I don't know where to begin.
   - ☐ There are other reasons, *please specify* _____

3. What products do you grow/raise/produce and how much of each? Please be specific about which crops you grow (i.e. broccoli, duck eggs, etc.) and please estimate to the best of your ability and indicat on the chart below.

Product	Amount per season (lbs, tons, volume, etc.)
a.vegetables (includes herbs and edible flowers)	

4.

b. fruits
c. eggs
d. meat
e. dairy
f. beans
g. nuts
h.processed items (jellies, jams, pickles, etc.)
i. honey

5. What is your current gardening space? _____
6. How/where do you obtain seeds or starts for your garden? *please check all that apply*
   - ☐ I grow my own starts.
   - ☐ I buy seed and/or starts from area retailers.
   - ☐ I buy starts from the Community Supported Agriculture (CSA)
   - ☐ I save my seeds from year to year.
   - ☐ I get my seeds from individuals.
   - ☐ I buy seeds directly from seed companies, *please specify seeds and company*

     _____

   - ☐ Other, *please specify* _____
   - ☐ I would be interested in obtaining seeds produced locally

7. How do you fertilize your garden? *please check all that apply*

- ☐ synthetic fertilizers (*Miracle-Gro*, etc.)
- ☐ organic fertilizers
- ☐ organic soil amendments
- ☐ compost
- ☐ compost tea
- ☐ manure
- ☐ other, *please specify* _____
- ☐ I do not use fertilizers
- ☐ I would be interested in obtaining fertilizers produced locally

8. How do you control unwanted insects/weeds/disease in your garden? *please check all that apply*

- ☐ With synthetic pesticides
- ☐ With natural or organic pesticides
- ☐ By introducing beneficial insects
- ☐ By companion planting
- ☐ Bat boxes
- ☐ Other, *please specify* _____
- ☐ I do not control pests.

9. What sort of permanent/semi-permanent structures do you use in your garden? *please check all that apply*

- ☐ greenhouse
- ☐ hoop house
- ☐ cold frame
- ☐ raised bed
- ☐ wind break
- ☐ rain-water catchment
- ☐ grey-water catchment
- ☐ sprinkler and/or irrigation system
- ☐ other, please specify _____

- ☐ I do not use any structures in my garden.

- ☐ I would be interested in obtaining structures built locally

10. Would you like to increase your food production? Y / N

If you said yes to the above question, please check the factors, if any, that hinder your ability to do so. *please check all that apply*

- ☐ temperatures too cold
- ☐ temperatures too hot
- ☐ insects
- ☐ poor soil quality
- ☐ other local conditions (too much or too little sunlight, moisture, wind, etc)
- ☐ water is too expensive
- ☐ I do not have enough time
- ☐ I do not have enough land
- ☐ I do not have the necessary equipment (mechanized equipment such as a tiller)
- ☐ I do not have the necessary structures (see question 8)
- ☐ I do not know how
- ☐ Other reasons, *please specify* _____

11. Would you like to grow/raise/produce that you aren't already? Y / N

What would they be? _____

10a. If you answered yes to the question above, please check the factors that hinder your ability to grow/raise/produce other products. If you listed more than one product, please list which product it corresponds to.

- ☐ seeds/starts are not available _____
- ☐ seeds/starts are available, but are too expensive _____
- ☐ temperatures are too cold _____
- ☐ temperatures are too hot _____
- ☐ insects _____

- ☐ soil is not appropriate _____

- ☐ local conditions (too much/not enough sunlight, moisture, wind, etc) _____
- ☐ watering would be too expensive _____
- ☐ I do not have enough time _____
- ☐ I do not have enough land _____
- ☐ I do not have the necessary equipment _____
- ☐ I do not have the necessary structures _____

- ☐ I do not have access to a commercial kitchen and/or facility for processing it
  _____
- ☐ I do not know how _____
- ☐ There are no factors that hinder my ability to grow/raise/produce other products

  _____

12. Please indicate the following opportunities you would be interested in/or would like to learn more about:
    - ☐ Producing food for a community supported agriculture (CSA) group
    - ☐ Producing food for a farmers market or a farm stand
    - ☐ Coordinating market participation with other gardeners
    - ☐ A service that would pick up my products and take them to market
    - ☐ Attending workshops or courses related to food production
    - ☐ Pertinent policies and regulations that pertain to growing or selling food
    - ☐ Other things you would like to see take place that pertains to growing, selling, or otherwise creating a more local food system in Flagstaff:

      _____

      _____

      _____

      _____

      _____

APPENDIX F

LOCAL FARE: SMALL DIRECT FARMERS SURVEY

Section I: What kind of food producer are you?

Please indicate which descriptions best describe your food production interest and activity by checking one or more of the following:

1. _____ Backyard gardener interested in selling my produce

2. Small direct farmer who (*local* = in north central AZ within 150 mile radius of your operation):

2a. _____ sells at local markets seasonally

2b. _____ sells local businesses seasonally

2c. _____ sells local markets *and* local businesses seasonally

2d. _____ sells year-round to markets and local businesses

2e. _____ whose income relies on or is supplemented by selling produce seasonally

2f. _____ whose income relies on or is supplemented by selling produce year-round

2g. _____ is interested in increasing production for more markets

2h. _____ is interested in receiving support in finding markets

2i. Other (describe): _____

3. Circle all of the descriptions that characterize your farming techniques:

conventional organic chemical-free naturally-grown non-GMO biodynamic other

4. Do you plan on expanding your operation in the next 5 years? Yes No

4a. If yes, how so?

_____

4b. If yes, to which sources would you turn for marketing information and assistance (check all that apply):

i. _____farm bureau
ii. _____extension
iii. _____buyer (broker/wholesaler)
iv. _____Arizona Dept of Agriculture
v. _____another grower
vi. _____grower organization

vii. _____co-op
viii. _____no one
ix. _____other: _____

4c. If not, check the limiting factors that hinder expansion:

i. _____market outlets/connecting to buyers
ii. _____weather
iii. _____irrigation
iv. _____insect control
v. _____prices received
vi. _____land
vii. _____harvest labor availability
viii. _____credit availability
ix. _____equipment
x. _____transportation
xi. _____cooling
xii. _____disease control
xiii. _____my volume is too small
xiv. _____fees charged by farmers' market
xv. _____access to farmers' markets
xvi. _____costs associated with getting product to farmers' market
xvii. _____costs associate with packaging product
xviii. ____advertising/marketing
xix. _____business planning
xx. _____competition from other growers
xxi. other (please describe)

_____
_____

5. How do you decide what to grow or raise? (check all that apply)

5a. _____experience

5b. _____market access

5c. _____risk

5d. _____profit potential

5e. _____labor timing/availability

5f. _____price

5g. _____equipment needs

5h. _____production expertise

5i. _____other: _____

6. Specify the kind of support, if any, you would like to receive or would be interested in learning more about:

6a. _____ Participating in /contributing to / creating a community supported agricultural (CSA) group

6b. _____ Participating in /contributing to / creating a food cooperative

6c. _____ Participating in a bulk food buyer's club

6d. _____ Contributing to an institution's food procurement program (school, hospital, university)

6e _____ Having a courier service pick up your produce and take it to market for you

6f. _____ Work with other growers in planting coordination (so as to enhance variety and quality of market products while decreasing competition with other growers at the same market)

6g. _____ Having access to pick-up or distribution points more convenient to your location

6h. _____ Coordinating market participation with other growers (which markets on which days)

6i. _____ Being included in a website which showcases agricultural endeavors in our region

6j. _____ Participating in an online growers' network

6k. _____ Participating in a growers' coalition

6l. _____ Attending workshops/courses related to food production

6m. _____ Publishing a grower directory

6n. _____ List of businesses interested in buying local

6o. _____ Farm internship program

6p. _____ Grants and subsidies

6q. _____ Seed banks

6r. _____ Assistance in creating a website for your operation

6s. _____ Other: _____

Section II: General information

7. In what county is your farming operation based? _____

8. What is your age?

8a. _____ under 30

8b. _____ 31-40

8c. _____ 41-50

8d. _____ 51-60

8e. _____ 61-80

9. How many years have your been growing produce for market?

9a. _____ I don't sell commercially

9b. _____ less than 3

9c. _____ 3 -6

9d. _____ 7 -10

9e. _____ over 10

10. Do you have a computer? Yes No

11a. Do you have internet access? Yes No

11b. If you have an online website? Yes No

12. If your answer was “Yes” to question #11a, how do you use the internet in your operation? (check all that apply)

12a. _____ selling

12b. _____ buying inputs

12c. _____ finding information

12d. _____ other: _____

13. What do you produce? Please be specific about which products you produce (i.e. broccoli, duck eggs, lamb meat etc.) and please estimate the quantity to the best of your ability (any measurement is fine, as long as you specify)

13a. Meat _____

13b. Vegetables _____

13c. Fruits _____

13d. Dairy _____

13e. Eggs _____

13f. Processed items (jams, jelly, etc.) _____

13g. Flowers/Plants _____

13h. Other: _____

14. What would you produce that you are not producing right now, if conditions were right?
_____

15. How many miles would you say that your ***product*** typically travels before it is consumed? _____

16. What , if anything, would prevent you from collaborating with other growers? (check all that apply)

16a. _____ Time

16b. _____ Mistrust

16c. _____ I’m afraid I would end up giving more than I received

16d. _____ I'm afraid I would not have enough to contribute to the collaboration

16e. _____ Lack of information

16f. Other: _____

16g. _____ I have no reservations about participating in a collaborative project.

17. What are your largest concerns as a small direct farmer? (check all that apply & circle the number that is of ***most* concern** to you.)

17a. _____ State and federal regulations

17b. _____ Rising costs (equipment, soil amendments, fuel, etc.)

17c. _____ Lack of assistance in the farming process (labor, help on specific projects, information, etc,)

17d. _____ Finding markets

17e. _____ Weather

17f. _____ Competition with other growers

17g. _____ Obtaining non-GMO seeds & other chemical-free products

17h. _____ Packaging / processing my products

17i. _____ My health

17j. _____ My age

17k. _____ Isolation in my work

17l. _____ Having to give up my farm

17m. _____ Other: _____