

*Changing the Way We Think
About Global Food Security*



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About Global Food Security

URBAN FOOD SYSTEMS SYMPOSIUM

June 22-25, 2016, Olathe, Kansas U.S.A.

Book of Abstracts

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2016 Urban Food Systems Symposium

Table of Contents

Keynote and Invited Speakers.....	1
<i>The Age of Food- Julian Gribbs.....</i>	1
<i>The long tradition of urban agriculture in the U.S. — and its future- Ken Meter</i>	1
<i>Building a Local Food Economy in North Carolina- Nancy G. Creamer</i>	1
<i>Planning Urban Spaces for Sustainable Food Production- Sarah Taylor Lovell.....</i>	2
<i>How Food Strategy Creates Cities Most Likely to Succeed- Wayne Roberts</i>	3
Oral Session 1: Urban Food Production Systems	3
<i>Concepts of sustainable intensification for urban food production systems- Jessie L. Vipham ...</i>	3
<i>Factors contributing to and limiting vegetable crop productivity across and urban to rural</i> <i>transect in greater Chicago- Ross Wagstaff.....</i>	4
<i>Integrating high tunnel production to provide resiliency for urban and peri-urban supply</i> <i>chains- Cary Rivard.....</i>	5
<i>Managing urban garden soils to minimize potential soil contaminant transfer to humans-</i> <i>Ganga Hettiarachchi</i>	6
Oral Session 2: Policy, Planning and Advocacy	6
<i>Strategic planning: Exploring the scope and participants of the food movement to enhance</i> <i>systemic change- Kelly Moore.....</i>	6
<i>St. Louis regional food study evaluates the evolution of industrial food production and its</i> <i>impact on public health, economics and environment- Melissa Vatterott.....</i>	7
<i>Constructing resilient systems in the conservative South- Mackenna Coon.....</i>	8
<i>Just like mama used to make: Urban farming as an adjunct to the federal import regulatory</i> <i>scheme regarding immigrant foodways- Wendy Tien</i>	9
Oral Session 3: Nutrition and Human Health	10
<i>Nutrition and food safety extension programming in urban KC- Londa Nwadike</i>	10
<i>Incentivizing SNAP transactions at farmers' markets in Cleveland, Ohio- Amanda Osborne....</i>	10
<i>Development of an environmental health risk assessment framework for consumption of</i> <i>foraged items in the urban environment: A Baltimore, MD case study using berries and greens-</i> <i>Chris Zuidema</i>	11
<i>Increasing access to fresh fruits and vegetables in a South Los Angeles food desert- Cynthia</i> <i>Davis</i>	12

Oral Session 4: Urban Farmer Training	13
<i>Developing new farmers at Cultivate Kansas City-</i> Katherine Kelly	13
<i>The Kinsman Farm: A case study of an urban incubator farm-</i> Jacqueline Kowalski.....	14
<i>Creating the Feeding Communities project, an urban agriculture training program designed for the Colorado Front Range-</i> Brien Darby	14
<i>Growing Growers training program: Maximizing impact through collaboration-</i> Marlin Bates	15
Oral Session 5: Food Security I	16
<i>Fighting racism at its root: An examination of San Diego's community gardens-</i> Jane Henderson	16
<i>Discursively constructing middle class positions: Food insecurity stories at a Midwestern food pantry-</i> Megan A. Koch-Schraedley	16
<i>Food systems for an increasingly-urban population-</i> Tanner Roark.....	17
<i>Informal assistance and the risk of household food insecurity for urban families-</i> Christian King	18
Oral Session 6: Community and Economic Development I	19
<i>Embedding food systems development in local government-</i> Helen Schnoes	19
<i>Iterative mappings: Spatial analysis for community food resilience-</i> Ellen Burke	20
<i>The urban fisher ecology: The case of the artisanal fishing community of the bay of Chorrillos, Lima, Peru-</i> Hector Bombiella	20
<i>Intergenerational community development through urban food systems-</i> Kelly Henderson	21
Oral Session 7: Food Security II	22
<i>Increasing access to local food by extending shelf life of fresh vegetables-</i> Eleni Pliakoni.....	22
<i>Mobile farmers' market pilot project brings everyone to the table-</i> Ariel Agenbroad	23
<i>Evaluating the local food system of Manhattan, KS: Producer and institution perspective</i> Candice Shoemaker.....	24
<i>Gathering Baltimore's bounty: characterizations of urban foraging behaviors, motivations, and barriers-</i> Colleen Synk.....	24
Oral Session 8: University/ College Programs	25
<i>The urban edge: The role of urban student organic farms in raising awareness of food system inequities-</i> Peyton Ginakes.....	25
<i>Advancing urban food systems with community-Campus partnerships-</i> Jacob Rayl	26
<i>Linking undergraduate student learning outcomes to urban agriculture in the Twin Cities-</i> Mary Rogers.....	27
<i>From university to community: Providing fresh produce to food Insecure urban communities in Greensboro, North Carolina-</i> Sanjun Gu	28

Oral Session 9: Community and Economic Development II.....	29
<i>Design and decision making for year-round market vegetable production: Scale, systems, and season extension-</i> Greg Garbos	29
<i>Local farmer's markets as a tool for community development-</i> Mary Rodriguez.....	29
<i>Funding Kansas community gardens: Lessons from a mini-grant project-</i> Cheryl Boyer.....	30
<i>The Giving Grove impact on food insecurity in Kansas City-</i> Amanda Lindahl.....	31
Poster Session.....	32
1. <i>Experiences of managing 18Broadway, an urban sustainability site, in KCMO: Benefits and challenges-</i> Catherine Bylinowski	32
2. <i>Local food system opportunities in Wichita, Kansas-</i> Rebecca McMahon	33
3. <i>Reducing food losses of locally grown produce by optimizing pre- and postharvest methods</i> Eleni D. Pliakoni.....	33
4. <i>Good food education: A community centered model-</i> Billy Polansky	34
5. <i>Seeds of prosperity: Connecting local food system partners to build a stronger food system-</i> Pamela Duitsman	35
6. <i>Building local food councils to improve community food security-</i> Pamela Duitsman	36
7. <i>Food Advocacy at Macalester College-an urban liberal arts college-</i> Vivian Mitnick.....	37
8. <i>Food handling practices and food safety messaging preferences of African American and Latino consumers in urban areas of Kansas City-</i> Londa Nwadike.....	37
9. <i>Growing refugee farmers in Kansas City-</i> Alicia Ellingsworth.....	38
10. <i>Developing an urban food system study tour to enhance student's experiential learning-</i> Kelly Gude.....	39
11. <i>Developing a comprehensive Master Urban Farmer Training program-</i> Mike Hogan.....	40
12. <i>Using square-foot gardening as a tool to teach crop science in urban settings-</i> Odile Huchette.....	40
13. <i>The KoolKat: A demonstrational mobile cooling unit to support the development of small and/or urban farms-</i> Cary L. Rivard.....	41
14. <i>Urban Agriculture Production Manual: A resource for growing a sustainable urban food system-</i> Natalie Cotter	42
15. <i>Permaculture and urban agriculture: Utilizing regenerative design within cities to improve environmental and human health while supporting local economies-</i> Matt Frank.....	43
16. <i>Expanding opportunities for urban and peri-urban farmers by developing a spring-planted high tunnel strawberry production system-</i> Kelly Gude	44
17. <i>The Longwood Graduate Program and Bright Spot Farms: Creating an updated program model for an urban agriculture non-profit-</i> Erin Kinley	44
18. <i>A meta-analysis of grafted tomato trials to determine rootstock performance-</i> David Loewen	45
19. <i>A comparison of soil management systems for urban agriculture-</i> Elizabeth A. Miernicki.....	46

20. <i>The 2016 Urban Food Systems Symposium: A professional meeting to change the way we think about global food security-</i> Kimberly Oxley.....	47
21. <i>Deep winter greenhouses: A growing movement in Minnesota-</i> Liz Perkus.....	48
22. <i>Use of passive modified atmosphere packaging (MAP) at a non-optimum temperature to improve shelf life and quality of locally grown vegetables-</i> Eleni D. Pliakoni	48
23. <i>The effects of leaf removal on adventitious root formation and plant growth of grafted tomatoes-</i> Lani Meyer	49
24. <i>Heavy metal deposition and soil microbial abundance in urban raised bed food gardens-</i> Ross Wagstaff.....	50

Keynote and Invited Speakers

The Age of Food

Julian Gribb

Julian Cribb and Associates, Australia

Dramatic evolution in the global diet, cuisine and consumer preferences will, over coming decades, change the foods we eat more profoundly than at any time in history. Emerging scarcities of land, water, oil, nutrients, fish and climate instability along with concerns about health and sustainability signal a major shift in the world food production paradigm from extensive, open-air and rural to intensive, indoors and urban. An amazing new food adventure awaits us in this, The Age of Food.

The long tradition of urban agriculture in the U.S. — and its future

Ken Meter

Crossroads Resources Center, Minneapolis, Minnesota

Often, the question of urban agriculture is posed as: “Is it realistic to grow food in urban areas?” This is a critically important question. Yet I start by posing a dramatically different discussion: “When oil gets scarce and expensive, how would any city survive unless it grows much of its own food?” I’ll address the first question indirectly, by taking a close look at the second. I will touch upon the history of urban and rural agriculture, look at food security issues, then outline food-growing initiatives in several U.S. cities today. I will also draw some lessons from The Netherlands and Japan.

Building a Local Food Economy in North Carolina

Nancy G. Creamer

Center for Environmental Farming Systems, North Carolina State University

Established in 1994, The Center for Environmental Farming Systems is a partnership of NC State University, NC Agricultural and Technical State University, and the NC Department of Agriculture and Consumer Services. CEFS' 2000-acre Field Research and Outreach Facility at Cherry Farm in Goldsboro, NC is one of the nation's premier research and demonstration sites for organic and sustainable production systems. The farm also hosts an 8 week residential internship program and farm apprentice program. Beyond the farm, CEFS' statewide Food System Initiatives include Supply Chain Development through NC Growing Together and NC Choices; Consumer Engagement through the NC 10% Campaign; Statewide Action Planning through Community Food Strategies; Advocating for Equity in the Food System through Food System Committee on Racial Equity (CORE); and Youth Engagement and Leadership Development through FoodCorps NC (co-hosted with NC-4H), Food Youth Initiative (FYI) and Students Working for an Agricultural Revolutionary Movement (SWARM). Many of these

projects and initiatives came out of a statewide planning process that resulted in a State Action Plan “From Farm to Fork: A Guide to Building North Carolina’s Sustainable Local Food Economy”. This presentation will describe the process and outcomes of a 1 and 1/2 year initiative which resulted in the action plan and significant follow-up activities in achieving the goals set forth in the plan. CEFS and its partners gathered information from across food system sectors, conducted regional meetings, facilitated targeted working issue teams, and hosted a statewide summit in May 2009. The Farm to Fork Action Plan developed action ideas for policy makers, educational institutions, government agencies, environmentalists, businesses, funding agencies, social activists, NGOs, community members and consumers. Most of the “Game Changer” ideas that were developed have now been completed by an engaged coalition of organizations and agencies in the state, along with significant funding partners. In addition to describing the process and outcomes, current and next steps will be discussed.

Planning Urban Spaces for Sustainable Food Production

Sarah Taylor Lovell

Department of Crop Sciences, University of Illinois

Urban agriculture is expanding in many cities throughout the US, as a land use option to address food insecurity, economic instability, and urban disinvestment. While the primary function is the production of food, these unique habitats have been promoted as multifunctional green spaces that provide a wide range of ecosystem services. Our research from Chicago, IL has demonstrated that urban agriculture is extensive across the city, but that much of the food production occurs on vacant lots and backyards where soils may be contaminated with lead and other harmful pollutants. Furthermore, much of the emphasis is on vegetable production systems that often represent critical tradeoffs relative to other types of green space. In particular, the production of annual crops has, in some cases, precluded or limited the potential for perennial habitats that include trees and shrubs, due to concerns about shading and competition for other resources such as water and nutrients. In order for urban agriculture to be better integrated into the green infrastructure of the city and to contribute to a wide range of ecosystem services, new designs that incorporate perennial vegetation are needed. Our current research explores the potential to integrate food forests, community orchards, and other perennial features into urban environments in order to support the local food system through the production fruits and nuts, as a low-input alternative or a complement to annual production. In addition to their production values, these systems could offer extended benefits similar to urban forestry such as microclimate control, carbon sequestration, and wildlife habitat. Once established, “Agroforestry for Food” requires little effort to maintain, while multi-layered showy flowers and fruit contribute to the visual quality of the space. Interesting new opportunities to integrate perennial food production into existing and planned future green infrastructure include plantings in parks, greenways, buffer zones, and institutional campuses. Urban planners and landscape

designers could play an important role in developing and promoting multifunctional spaces that increase the visibility and safety of food production in modern cities. Land use applications will be proposed for multiple scales, from efforts that impact a single building or garden, to those that consider an entire city or community.

How Food Strategy Creates Cities Most Likely to Succeed

Wayne Roberts

Food Policy Analyst and Writer, Toronto, Canada

Wayne Roberts has been active in public health, food studies and local food organizations across North America for over 20 years. He will share his observations about North American and global trends affecting food studies and public health movements at this time, the opportunities and challenges that exist, and what he sees as unique opportunities for creating sustainable urban food systems.

Oral Session 1: Urban Food Production Systems

Thursday, 1:30 pm, Room 221

Concepts of sustainable intensification for urban food production systems

Jessie L. Vipham, Molly M. McKnight, and P.V. Vara Prasad

Sustainable Intensification Innovation Lab, Kansas State University

To meet the food demand of a growing population it is necessary to increase global food production by about 70% by 2050. Furthermore, this increased production must come from existing land resources, without damaging the environment. The Feed the Future (FtF) Sustainable Intensification Innovation Lab (SIIL) is a United States Agency for International Development (USAID) funded program that supports research, knowledge sharing, and capacity building programs aimed at sustainably transforming farming systems of smallholder farmers in Africa and Asia. Sustainable intensification (SI) is defined as a process or system where agricultural yields are increased with minimal adverse environmental impact, and without the conversion of additional non-agricultural land. Our objectives are to develop research and capacity-building portfolios in collaboration with US universities as well as international and national organizations, and to sustainably increase agricultural productivity and income to provide food and nutritional security to smallholder farmers, while maintaining a strong focus on integrated farming systems research. Although our research is focused on smallholder production systems, the principles of SI are highly relevant to urban and semi-urban food production systems. Over time there has been continuous migration of farming families to urban and semi-urban areas for employment or educational opportunities. This has become an increasingly common phenomenon in many countries, including both developing and developed countries. Urban food production systems and

smallholder farmers are often constrained by similar obstacles: limited land, efficient utilization of resources, and environmental protection. The challenge for these production systems is to produce, process, and distribute foods that meet the needs of the local communities, markets and families. Such systems often include small-scale production of fruits, vegetables and animal products that can enhance consumption of safe and nutritious food. Systems of SI are relevant to both urban non-farming populations and smallholder farmers, who grow food based on their specific interests, needs and/or markets. Further, this production system approach can enhance the environment, recycling of waste, and biodiversity, while also addressing the nutritional needs of families and promoting gender equality. Similarities between urban, semi-urban, and smallholder farms food production systems present great opportunity for collaborative research, knowledge sharing, and communication and capacity building for the use of SI practices.

Factors contributing to and limiting vegetable crop productivity across an urban to rural transect in greater Chicago, Illinois

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Urban food production has gained popularity and many cities are now prioritizing food production as an urban land use. Little is known on the effects of the altered growing environment on vegetable food production. A field experiment was started in 2013 to assess the effects of increased pollution and urban microclimatic conditions on vegetable crops. Six experimental gardens with forty 0.89 m² raised beds containing a uniform compost, topsoil, and sand (50%, 40%, and 10%) mixture were established across a latitudinal transect of greater Chicago, Illinois. Seven vegetable crops (kale, brussel sprouts, pepper, tomato, beet, onion, and garden bean) were planted in early, mid, and late season plantings. Micrometeorological towers measuring temperature, light irradiance, wind, CO₂, and ozone were placed adjacent to each experimental garden. Structural equation models (SEM) were used to compare plant productivity to micrometeorological measures. Yield of early and late planted cole crops in 2013 and 2014 were greatest at urban sites. Onion yield was greatest at urban sites in 2014 and 2015, but yields were greatest at the most rural site in 2013. Yield of mid-season planted tomatoes and peppers were variable across the urban to rural transect without consistent trends. Beet yield was greatest at two peri-urban sites in 2013, but greater at urban sites in 2014 and 2015. Temperature was 1-2° C higher in the daytime and 2-4° C higher in the nighttime at urban sites compared to rural, but wind speed was greatest at rural sites. Ozone was 2x and 1.3x greater at peri-urban compared to urban and rural sites, respectively. Carbon dioxide concentrations were variable depending on season and traffic proximity. Measures of temperature (+), ozone exposure (-), light interception (+), and vapor pressure deficit (+) were correlated to productivity. Measures of ozone exposure most

strongly correlated with plant production across crops and years. The urban heat island increased crop productivity, especially in early and late season crops. Increased tree canopy prevalence at peri-urban sites had a significantly negative effect on productivity. An SEM model including 2013 and 2014 explained 40% of all beet yield variation, showed ozone had 91% negative correlation with yield, and growing degree day accumulation had a 46% positive correlation with yield. Vegetable crop productivity is aided by the increased temperature and reduced ozone of an urban environment, but crops in suburban areas adjacent to cities may be hindered by elevated ozone levels and urban tree canopies.

Integrating high tunnel production to provide resiliency for urban and peri-urban supply chains

¹Cary Rivard, ¹Kimberly Oxley, ²Megan Kennelly, and ¹Eleni D. Pliakoni

¹Department of Horticulture and Natural Resources, Kansas State University

²Department of Plant Pathology, Kansas State University

Local fruit and vegetable production in Kansas is rapidly growing to meet consumer demand. Data from a 2014 commercial vegetable grower conference indicates that 74% of growers are farming on less than 10 acres, 60% are using organic practices, and 54% have been growing for less than 10 years. One of the major challenges that these growers face is the highly-unpredictable and impactful force that weather plays in specialty crop production. In fact, data from the same grower survey indicates that extreme weather/climate was the #1 concern among growers in 2012 and 2014 and was the #2 concern in 2013. The central region of the United States is home to dramatic temperature changes, severe storms, summer drought and extreme heat, and most importantly damaging winds throughout the growing season. The implementation of high tunnels in the central United States has been instrumental for growers to consistently bring high quality products to market and in the 2014 survey 82% currently owned a high tunnel or planned to purchase one in the next year. High tunnels are being rapidly adopted by organic and/or local urban and peri-urban producers in order to reduce losses by decreasing foliar disease, and abiotic stressors including: unexpected freeze/frost events, wind, excessive heat, rain and hail damage. Kansas State University has been conducting research and extension programs since 2006 in the area of high tunnels and current research projects include: system-wide comparisons of high tunnel vs. open-field production, cultivar evaluations of tomato and bell pepper, production and economic data for new crops in high tunnels like day-neutral strawberries, and investigations into new growing technologies such as vegetable grafting. The website, www.hightunnels.org, is used to communicate the results of research, disseminate grower information, and serve as an online communication hub for high tunnel growers. Currently, the website has ~60,000 visitors per year, with growers accessing the site from more than 198 countries. This presentation will provide an overview of research and extension work being done to help support high tunnel growers in the United States with an emphasis on how high

tunnel production supports a robust local food system that is vulnerable to a weather extremes and climate change.

Managing urban garden soils to minimize potential soil contaminant transfer to humans

Ganga Hettiarachchi, Chammi Attanayake, Phillip Defoe, and Sabine Martin

Department of Agronomy, Kansas State University

The United States General Accounting Office estimates that there are approximately 450,000 brownfield sites in the U.S. The reuse of these sites increasingly includes reuse as gardens/farms, especially in areas with food insecurities, as this provides access to nutritious food for low income populations. Contaminants such as lead and other potentially toxic trace elements as well as other contaminants from previous land use may pose a health threat to growers and a threat to food safety. Yet the negative health effects of growing in potentially contaminated soils are often not known and/or addressed. The goal of our research is to increase in scientific knowledge regarding plant uptake and bioavailability of soil contaminants; best management practices to minimize soil contaminant transfer; enhance the capabilities of garden/farming initiatives to produce crops locally without potentially adverse health effects to the grower or the end consumer. This presentation will highlight research data from a seven year study on growing food crops on urban gardens established on former brownfields. Challenges of converting urban brownfields to community gardening sites will be discussed using community garden sites located in Kansas City, KS, Indianapolis, IN, and Tacoma, WA as examples. These sites had elevated levels of common urban soil contaminants such as lead, arsenic, and/or polycyclic aromatic hydrocarbons. After thorough evaluation of soil properties, soil amendments focused on improving soil quality as well as reducing both direct (soil-human) and indirect (soil-plant-human) potential transfer of contaminants to the gardeners were evaluated at least for two growing seasons. Our research indicates that gardening at mildly-contaminated urban brownfields carries a low risk of transferring contaminants to humans via soil ingestion and vegetable consumptions. However, precautions need to be taken to minimize the direct exposure of humans to contaminated soil as it is a potential exposure pathway of concern.

Oral Session 2: Policy, Planning and Advocacy

Thursday, 1:30 pm, Room 222

Strategic planning: Exploring the scope and participants of the food movement to enhance systemic change

Kelly Moore, and Mickie Swisher

Department of Family, Youth and Community Sciences, University of Florida

Food and food systems are a frequent focus of public discourse, policy, and community programming. There is growing interest in the geographic origin of food, production methods used, processing techniques, and other tangible and intangible characteristics of food and food systems. Food and food systems are seen as an opportunity to satisfy a number of personal, local, and national agendas and can have broad-reaching social, economic, and environmental impacts. Food activists and organizations vary in the changes they seek. This research aimed to articulate the goals and objectives of the “food movement” and describe the individuals who participate in food movement activities and their motives for doing so. We use interview data with 20 active leaders in the Gainesville, Florida food movement to conceptualize the food movement from the perspective of food activists themselves and articulate the degree to which a shared set of goals and objectives exists among them. Three overarching conceptual themes emerged from the interview data: 1) defining the food movement, 2) goals and objectives of the food movement, and 3) behaviors characteristic of food movement members. A single unifying set of goals and objectives enhances the capacity of the food movement to accomplish change within the food system by strengthening the mission and focus of initiatives and programming. We can also improve activists’ experience by understanding their motivation for participation and presenting opportunities to further engage around particular issues. Overall, this research can inform policy and programs that encourage increased participation and success in accomplishing systemic change by identifying a narrowly defined set of goals and objectives we can work towards.

St. Louis regional food study evaluates the evolution of industrial food production and its impacts on public health, economics, and environment

Melissa Vatterott, and Kathleen Logan Smith

Missouri Coalition for the Environment

Missouri Coalition for the Environment’s (MCE) St. Louis Regional Food Study analyzes the impacts of industrialized agriculture on the region’s health, economy, and environment. Using food system data from 1925-2007, MCE looked at 59 counties within the 100-mile radius around St. Louis City called the St. Louis Regional Foodshed (Foodshed). Over the last century, farms in the region have nearly doubled in size and the number of farms and farm workers has plummeted. With roughly 4 million people in the Foodshed, less than 3 percent of the population worked in agriculture in 2008. The average Foodshed resident over consumes added sugars, fats, and meats, while under consuming vegetables, whole fruits, and whole grains. These food consumption patterns are reflected in our region's burden of disease. Of the Foodshed's adult population, 9.5 percent were diabetic and 10.4 percent were obese in 2009. Issues of limited food access and no true consumer choice are at the center of the problem of food insecurity. 587,000 people or 14.7% of the population were food insecure in 2013. The four million Foodshed residents spent 16.8 billion dollars on food in 2013. Most of which went to food processing, packaging, transportation, marketing, and food retail, with

10.4 cents of every dollar going to actual farmers. The Foodshed has high quality soils capable of growing an array of fruits and vegetables, but current government incentives and industrial agriculture practices have led to a food system focused on maximizing production of one or two crops over hundreds of acres. This leaves us with degraded soils and little land to grow the fruits and vegetables we need to nourish our bodies. The St. Louis Regional Foodshed has the farmland and the farmers, the ranchers and the resources, and the soil and water necessary to feed ourselves. The St. Louis Regional Food Study illustrates how our industrial food system impacts us at the local level and argues for both policy and behavioral change to support a healthier, more equitable and sustainable food system. Since the study's release in November 2014, MCE's Food and Farm Coordinator Melissa Vatterott, has conducted outreach, gap analysis, and further research to identify the food system needs of the region. Vatterott currently leads the new St. Louis Food Policy Coalition, bringing stakeholders together involved in rural farming, urban agriculture, community development, nutrition, and others to advance local policies and collaborative projects.

Constructing resilient systems in the conservative south

¹Makenna Coon, ²Lexa Keane, ³Kindall Brantley, and ⁴Benjamin Winterberger

¹Biology and Environmental Studies Departments, College of Charleston

²Grounds Department, College of Charleston

³Studio Art and Art History Departments, College of Charleston

⁴International Studies Department, College of Charleston

College of Charleston, a South Carolina Liberal Arts College values an education where the student receives learning experiences from a large variety of disciplines. Developing an urban gardening program in this environment has proven to fall within the college's appreciation for diverse learning, but has faced many obstacles due to both environmental and social constraints. At the CofC urban gardening program, we tackle issues of urban food production by practicing restorative agriculture techniques and using space-intensive methods including companion planting, forest gardening, guilds, crop rotation to maintain soil nutrient structures, and intensive hot composting to utilize limited space for efficient compost production. This high intensity practice demands that resources are used in a strategic manner- meaning nothing is wasted. With our gardens on campus, we aim to demonstrate to the community and campus, ways to alleviate waste and offer a location to do so, exemplified by the compost drop off we offer to campus. Being a campus in the south, we face resistance to sustainable and restorative practices, resulting in our eagerness to educate and provide opportunity for increased practical experience for students and faculty. We have therefore learned to speak "different languages" when educating others, whether it is the legal team, or a professor, to confront systemic political hurdles and create more sustainable and creative communities. A way in which the program has grown to work with and overcome this problem is to operate on a multi-scalar system. Similarly to the plants we work with, we try to develop a network of support from different areas of the campus and community including

various educational departments, the library, the Office of Sustainability, and multiple surrounding stores and restaurants. Working with a variety of departments has built a synergistic arrangement where overlapping resources, knowledge bases, and support provide a larger opportunity to succeed. Currently the program is still in its beginning phases and the development to come will be fostered by the current and future relationships. As our knowledge widens with every experience, more availability develops to share this information to the larger community. The program ultimately seeks to re-define higher education, by providing an alternative approach to learning about oneself, leadership, community, and active citizenry through restorative agriculture.

Just like mama used to make: Urban farming as an adjunct to the federal import regulatory scheme regarding immigrant foodways

Wendy Tien

U.S. Department of Justice

Food and cooking long have been central aspects of cultural patrimony. As the United States has experienced more immigration from non-European countries, those immigrants have contributed to increased cultural diversity, in part through the introduction of previously unfamiliar ingredients and dishes. The introduction of unfamiliar ingredients to the American food supply can conflict with existing laws concerning food safety, protection of domestic crops, and national security. New immigrants craving the familiarity of their countries of origin may violate federal law restricting import of meat and produce when returning from trips abroad. Such laws usually advance sound public policy; for example, restrictions on importing fresh fruits and vegetables protect domestic produce from the Mediterranean fruit fly, present in over sixty countries, which has caused billions of dollars of damage to domestic crops. Individuals engaging in unauthorized import of food products usually are unaware of the potential consequences of their actions, and do not intend to harm the food supply or environment. Nonetheless, a lack of appreciation for the reasons underlying these laws on the part of recent immigrants, and a corresponding lack of understanding by lawmakers of the importance of particular foods to immigrant culture, weakens the effectiveness of such laws and punishes immigrants for attempting to maintain cultural practices. This paper acquaints readers with the framework of food safety and import laws, in the context of immigrant foodways. It discusses explicit and implicit cultural bias in legislation and law enforcement. For example, immigrants may be subjected to stricter penalties for unauthorized food import than returning tourists, due to bias. To address these issues, this paper presents local alternatives to the federal import regulatory scheme to resolve concerns about health, safety, and the environment. Such measures focus on encouraging urban production of vegetable and fruit crops based on local immigrant demand, improving distribution of such crops to regional markets, and educating local officials about previously unfamiliar culinary practices to reduce bias in the application of laws. Urban farming, used this way, serves as a strong adjunct to the federal import regulatory scheme by reducing the risk to the American food

supply from imported food, while increasing the role of immigrants as stakeholders in the local community.

Oral Session 3: Nutrition and Human Health

Thursday, 1:30 pm, Room 223

Nutrition and food safety extension programming in urban Kansas City

Londa Nwadike

Extension Family and Consumer Science, Kansas State University and University of Missouri

Kansas State University and the University of Missouri Extension Services conduct a great deal of programming in nutrition and food safety in urban areas of Kansas City. This presentation will highlight the efforts of local and state-level Extension educators' efforts across two different states and in four different counties. In particular, information will be shared on low-income nutrition education, other nutrition education efforts, work with farmers' market consumers and vendors, home food preservation, food preparation, and other related educational and outreach efforts. Methodologies used to work with underserved audiences and with community partners will also be outlined. All areas of Extension programming in urban areas face numerous challenges, which are also present in nutrition and food safety Extension programs. In urban areas, there are normally many other organizations providing similar services to those provided by Extension, including numerous non-governmental organizations (NGOs), hospitals, grocery stores, universities, and other entities. Therefore, it is essential for Extension personnel to partner with appropriate groups and focus on the comparative advantage that University Extension services can provide. Further, many people in urban areas are not familiar with Extension programming and need to be familiarized with what Extension is about and the value of working with or learning from Extension. In addition, populations in urban areas often tend to be more diverse and programming may likely need to be adapted to realities that community faces. Some examples of information that will be covered in the presentation include details about how the Wyandotte County Extension Nutrition Education program (in Kansas City, KS) has worked to personalize education for the diverse populations living in their county. This program has successfully trained community partners to assist with delivering evidence-based curricula to underserved audiences.

Incentivizing SNAP transactions at farmers' markets in Cleveland, Ohio

Amanda Osborne

Community Development, Ohio State University Extension, Cuyahoga County

"Double Value Produce Perks" (DVPP) is a SNAP incentive program developed in 2010 and piloted in 2011 by partners of the Cleveland-Cuyahoga County Food Policy Coalition (FPC)

and administered by Ohio State University Extension, Cuyahoga County. The DVPP program strives to meet objectives in the following areas of our food system: 1) improve access and affordability of fresh local produce for low-income residents utilizing the federal Supplemental Nutrition Assistance Program (SNAP), 2) provide first-time SNAP customers with the positive experiences necessary to ensure changes in shopping and consumption patterns related to fresh produce and farmers' markets, 3) contribute to the growth of our regional food system by supporting small- and mid-size farms by increasing their direct sales and bringing new customers to the market, and 4) influence policy at all levels (local, regional, state and national) that will improve federally supported nutrition programs and contribute to a more sustainable food system. Over the past five years, Produce Perks (DVPP) has sought to increase access to high quality fresh fruits and vegetables sold at over 20 farmers' markets for Cuyahoga County residents. This program helps to address the well documented issue of food deserts in Cuyahoga County. The success of the Produce Perks program has led to the development of two "produce prescription" programs that target expectant woman and individuals with hypertension.

Development of an environmental health risk assessment framework for consumption of foraged items in the urban environment: A Baltimore, MD case study using berries and greens

Chris Zuidema, Colleen Synk, Brent F. Kim, Jamie Harding, Summer Rak, Marla Emery, and Keeve E. Nachman

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"Bountiful Baltimore", a study conducted by the Johns Hopkins Center for a Livable Future, describes the behaviors of foragers and characterizes potential risks from consuming produce foraged in Baltimore. To achieve this, we developed a novel framework to assess environmental health risks related to the consumption of items foraged in the urban environment. The framework accounts for the uniqueness of urban environments and the potential for industrial and legacy soil contamination, which can accumulate in the edible tissue of foraged items. Data inputs for the framework include: 1) site histories to characterize prior land uses; 2) conversion of land-use data into likely activity-based pollutants; 3) analysis of soils and foraged items for contaminants of concern; 4) estimates of contaminant uptake in vegetation; 5) estimates of contaminant exposure based on consumption of foraged items, and 6) estimates of hazards associated with consumption of foraged items. Publicly-available resources for these inputs include (but are not limited to) property transfer records, historians in Baltimore Neighborhood Associations, analytical capabilities of private local laboratories, and toxicological dose-response metrics from the US EPA. The framework also incorporates characteristics and behaviors reported by 105 foragers in the Bountiful Baltimore study. The end products are qualitative and/or quantitative assessments of risks related to exposures from consuming foraged items depending on the information and resources available for a particular site and its contaminant profile. To examine the performance of this framework, we

choose sites with the greatest intensity of foraging activity in each of the four major zoning classifications in Baltimore, and evaluated the risk associated with the consumption of these foraged items. We focused our attention for these cases on organic compounds such as polycyclic aromatic hydrocarbons (PAHs) and industrial solvents like benzene, toluene ethylbenzene and xylene (BTEX) and metals such as cadmium (Cd), zinc (Zn) and arsenic (As). This environmental health risk assessment framework and case study of urban foraging in Baltimore is a basis for future work examining different foraged items, cities, and populations. The framework helps characterize risk associated with urban foraging and informs risk reduction strategies and communication that protects consumers of items foraged from urban environments.

Increasing access to fresh fruits and vegetables in a South Los Angeles food desert

¹Cynthia Davis, ²Danielle Campbell, and ³Senait Teklehaimanot

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Nationally, studies have demonstrated that social and environmental determinants of obesity and other chronic diseases include lack of access to grocery stores and farmers' markets, living in food deserts, high numbers of fast food restaurants and liquor stores in affected communities and low social economic status. Racial/ethnic minorities in urban communities experience a disproportionate burden of chronic disease such as: obesity and diabetes, due to poor access to fresh fruits and vegetables and higher per capita rates of fast food outlets in areas where they live. The prevalence of obesity has increased alarmingly in the U.S. over the past fifty years and has been linked to multiple chronic conditions including high cholesterol and triglycerides, type 2 diabetes, high blood pressure, heart disease, stroke and some cancers. Los Angeles County data indicate that living in an area without access to healthy food increases the risk of chronic diseases, including high blood pressure, diabetes and heart disease. In 2012, Charles Drew University (CDU) partnered with Crenshaw Christian Center and Heritage Education Group and received a USDA Farmers' Market Promotion Program grant to establish a Farmers' Market in a food desert. The goals of the project were threefold: 1) to establish a Farmers' Market in a food desert in Service Planning Area 6 (SPA 6) of Los Angeles County, 2) to create a consumer base for farmers, ranchers and non-food vendors to sell their products to a new consumer base, and 3) to develop a social media training program targeting the farmers and non-food vendors to use social media to increase the marketing of their products, especially among low income community residents. The CDU Farmers' Market has now been operating for three years. Several hundred customers frequent the market on a weekly basis. Additional activities targeting consumers who shop at the market include facilitating food demonstrations on site at the farmers' market, facilitating home gardening demonstrations and establishment of three community-based gardening projects targeting

elementary school-aged youth and adult women residing in a local substance abuse recovery facility. In lieu of numerous structural barriers encountered, such as, unsafe physical environments, limited access to super markets, easy access to fast food establishments and high poverty levels in the community, the CDU Farmers' Market Program was able to document positive short-term outcomes, including: 1) increased access to fresh fruits and vegetables among community residents frequenting the Farmers' Market, 2) establishment of three community-based gardens, 3) development of a social marketing training program for farmers, and 4) integrating a health screening component within the farmers' market.

Oral Session 4: Urban Farmer Training

Friday, 1:30 pm, Room 221

Developing new farmers at Cultivate Kansas City

Katherine Kelly

Cultivate Kansas City, Kansas City, Kansas

Cultivate Kansas City is a locally-grown non-profit working to grow food, farms and communities for a healthy local food system. Cultivate Kansas City (formerly the Kansas City Center for Urban Agriculture) was founded in 2005 with the goal of promoting urban agriculture. In the years since then, Cultivate Kansas City has become an advocate, educator, and activist in support of production of fresh, nutritious produce in city neighborhoods across the metro area. We have grown from two staff members with a \$80,000 budget to our current staff of 20 year-round and seasonal employees, one 3-acre production/demonstration farm, one 8-acre training farm, the city's first permaculture food forest, a third 1-acre farm in the works and a \$1.3 million budget. One of the primary missions of the organization is to promote and support urban farmer development both through specific programs with targeted grower audiences in addition to advocating for, and promoting urban farmers and local food among the public. The Gibbs Road Farm is a fully-operational commercial 2-acre certified organic production farm that demonstrates urban production and provides training for Growing Growers apprentices, staff and field crew members annually. 40% of the crew go on to become farm owner-operators, growing food across the city and throughout the metropolitan area. The Juniper Gardens Training Farm is a partnership with Catholic Charities of Northeast Kansas and the Kansas City, KS Housing Authority. It is located in downtown Kansas City, KS in the middle of Kansas' oldest and largest public housing project. The four-year farm incubation program assists re-settled refugees in starting independent farm businesses on ¼ acre plots and provides four years of production, marketing, and business management skills through workshops and one-on-one training from trained staff. Since 2008, seventeen students have graduated; and 15 are currently farming, 9 of them on land they purchased and own. Our Metro Farms and Food Systems staff work with growers and food projects across the metro area, providing farmers with technical assistance on

everything from land access to production to financing and working with other non-profit organizations. Through that work, 70% of urban farmers work with Cultivate KC to help them start, grow, and strengthen their farm businesses and dozens of community-based projects have been developed and launched. We will present an overview of how Cultivate has organized its farmer development activities and how we have, through strategic partnerships and collaborations, increased the amount of food produced, distributed, and eaten in the metro area.

The Kinsman Farm: A case study of an urban incubator farm

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¹College of Food, Agriculture, and Environmental Sciences, Ohio State University

²West Creek Conservancy

Urban agriculture has become an important piece of the green landscape in Cleveland. However, barriers exist that prevent persons for developing urban farms. Some of these barriers include access to land, land tenure, opportunities for networking with other beginning farmers, and the effort and cost of farm site development. In order to overcome these barriers, the Kinsman Incubator Farm was created in 2011 through a USDA Beginning Farmer Rancher Development Program grant, City of Cleveland Economic Development financing, and funding from the Ohio Department of Agriculture. The Kinsman Incubator Farm property was secured from the City of Cleveland via West Creek Conservancy and was developed by Ohio State University. The 6-acre parcel is divided into twelve ¼ acre plots that are leased by various individuals wishing to gain knowledge of farming in an urban setting before “incubating out” to a larger piece of land. This presentation will discuss the challenges and opportunities that have been encountered during the development and early years of this project and of Extension’s role in supporting the Kinsman Farmers.

Creating the Feeding Communities project, an urban agriculture training program designed for the Colorado Front Range

Brien Darby

Denver Botanic Gardens

In 2013, the Denver Botanic Gardens (DBG) began the Feeding Communities project with the purpose of creating a program that educates new and beginning urban growers on the topic of growing food with a focus on community in an urban setting. Aspects of the program include a textbook and curriculum that combines traditional lectures and video segments with hands-on activities both in the classroom and on an urban farm. The program is designed to be taught in 24 classroom hours with skills sessions throughout the growing season. The textbook authors are horticulturists of Denver Botanic Gardens (DBG) and employees of similar institutions in Denver; many of the authors also serve as instructors for

the class. In 2014, the Denver Botanic Gardens selected a pilot population (n=11) of adults living in public housing to take the class. An urban teaching farm managed by DBG is located at a public housing site in Denver. Convenience sampling of existing neighborhood residents was conducted to reduce barriers to participation. In following iterations, the material has been taught for college credit (n=25), for continuing education credit (n=10), and for aspiring urban farmers located throughout Denver (n=8). In this paper, the experiences gained from this program will be discussed as well as the changes being made to improve the program based on feedback collected from participants and instructors.

Growing Growers training program: Maximizing impact through collaboration

¹Marlin A. Bates, ²Cary Rivard, ³Londa Nwadike, ⁴Lala Kumar, ⁴Cory Creed, ⁵Josh Smith, and ²Laura Christensen

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⁴University of Missouri Extension

⁵Cultivate Kansas City, Kansas City, Kansas

Many extension agents and non-profit workers are dedicated to enhancing local food systems by engaging in farmer education programs. While many of these efforts are well coordinated, they are often short-lived and reliant on short-term funding. Participants stand to gain greater knowledge and ability to implement new practices through a more multi-faceted approach to outreach. However, these educators often either do not have the capacity or cannot contribute the time that it would take to host a successful program that incorporates educational activities through numerous avenues. Where possible, forging alliances can equip educators with the support necessary to launch and sustain meaningful, long-term programmatic endeavors. Growing Growers is a farmer training program that emphasizes sustainable practices. It has operated in and around Kansas City since 2004, largely due to the collaborative nature of how the work of this program is accomplished. Partners include K-State Research and Extension, University of Missouri Extension, Lincoln University Cooperative Extension, Cultivate Kansas City, and the Kansas Rural Center. The program provides monthly workshops that cover agricultural basics and advanced topics to appeal to both new and established farmers, as well as an apprenticeship program that locates interested farmers-in-training to work on existing host farms. The program also supports an online community of over 500 individuals that is dedicated to creating linkages in the local food system. Achieving the goals of increasing the number of local food producers and improving the availability of local food in the marketplace requires the hard work of many skilled educators over a long period of time. Collaborative programming provides resilience of these efforts through time by permitting employee turnover within one or more of the partner organizations without slowing the stride of the team toward these goals. The

importance of the collaboration is apparent to the organizing committee of Growing Growers. However, the content of the annual workshop offerings and ability to recruit apprentices are equally critical to the relevance and longevity of the program. By having numerous agricultural professionals engaged throughout program planning and implementation, the opportunity for Growing Growers to remain on the front edge of innovation is elevated well beyond the capacity of any one of the partner organizations alone.

Oral Session 5: Food Security I

Friday, 1:30 pm, Room 222

Fighting racism at its root: An examination of San Diego's community gardens

Jane Henderson

Department of Ethnic Studies, University of San Diego

In a tragically ironic historical time period where food harvests and profits are at record highs while hunger levels have not decreased, it is common to look solely at poor food distribution practices as explanation for inequality in food access. However, distribution is only the surface of a much deeper structural racism expressed in food insecurity, lack of access to produce, and epidemic diseases disproportionately afflicting communities of color. In response, this research approaches the problem with an understanding that race cannot be separated from the conversation of food justice; the food system of the United States was built on the oppression and exploitation of racial minorities through the seizure of indigenous land, African slavery and racialized migrant farm labor. In examining the state of food access in urban underserved communities in San Diego California, this research asks how community gardens may serve as tools for anti-racism. Mount Hope community garden provides a clear example of how connecting with the land and developing community based control over the local food system are pivotal aspects of resistance to the racism people of color face in Southeastern San Diego. Through qualitative research methods-- interviews and observant participation-- and an overview of critical race theory, critical food studies and eco-feminist literature, this research uses community gardens to ground examinations of structural racism in a conscious attempt for growth and healing.

Discursively constructing middle class positions: Food insecurity stories at a Midwestern food pantry

Megan A. Koch-Schraedley

Department of Communication, University of Missouri

Food insecurity remains a social and material problem that affects millions of individuals around the world. While food insecurity is an easily recognizable challenge for the populations and governments of developing nations, what many scholars do not consider is how food insecurity impacts individuals and shapes personal experiences in developed nations, like the United States where one in seven Americans relies on the services of food pantries (DiBlasio, 2014). In this study, I conducted a qualitative narrative thematic analysis of the stories of food pantry clients who use a Midwestern Food Pantry. By examining the stories of these individuals, I reveal how social class fluidity and stability shape discourse around food insecurity and the emotions of individuals who struggle to provide food for themselves and their families. The food pantry clients made downward and upward class comparisons to discursively identify themselves as members of the middle class. This qualitative exploration of the food insecurity experience provides insight into the American food system and social class structures in the US.

Food systems for an increasingly-urban population

Tanner Roark

College of Agricultural Sciences and Natural Resources, Oklahoma State University

The link between urbanization trends, food systems, and supply chains are undoubtedly interconnected. Moving forward, it will be vital to connect the increasingly-urbanized world population with rural-to-urban supply chains. Rural and urban development are mutually dependent upon one another, and these linkages are made possible by robust, sustainable and equitable food systems. The needs of the poor, both urban and rural, can be met with shorter food system value chains that link small-holder producers to the urban core. As urbanization continues, it will be necessary to ensure that urban areas do not fill up with the migrating rural poor. In this type of situation, the poor lack access to natural and social resources. For this reason, communities' developmental frameworks must focus on improving infrastructure and access to basic tools for success in a sustainable manner. The food demands of urban societies can and should be an avenue for small rural farmers to sell their crops so as to lift themselves out of poverty. Growing cities rely on both international and local food systems, but by strengthening rural-urban supply chains, the needs of many can be met without searching far and wide. A strong urbanization development plan can benefit rural producers by creating increased demand as well as market diversification. In many cases, small-holder farmers are overlooked in an increasingly mechanized agricultural system. The right to land is often granted to large producers that utilize new technologies to produce more efficiently. This phenomenon can lead to more urbanization and potentially larger problems. Fewer people currently bear the responsibility of growing the world's food than at any other point in history. In order to feed a growing population, it will be vital to approach the problem of food insecurity from all angles. By empowering, training, and investing in small-holder farmers, nations can support producers' right to land and make great strides in ensuring food security to all people. Small-holder farms play a key role in rural economic

development and poverty alleviation while slowing the trend towards urbanization that causes supply chains to struggle in the first place. Food security is an issue that impacts the entire world, and it will take the cooperation of all nations to solve this issue. Not only can food nourish people's bodies, but it can bring peace, create friendships, and eradicate poverty. The symbiotic relationship shared by rural-urban connectivity is capable of creating a food system that can feed an increasingly urban global population.

Informal assistance and the risk of household food insecurity for urban families

Christian King

Nutrition and Health Sciences, University of Nebraska

Food insecurity is a persistent problem in the United States. Food insecure households do not have access to enough food in order to maintain a healthy and active life. Rates of household food insecurity have plateaued at around 14 percent since 2008. Food insecurity is highly prevalent in cities. According to a report from a USDA ERS (2015), the rate of household food insecurity was 18.4 percent in metropolitan areas and 22.3 percent in principal cities in 2014. Food insecurity leads to many negative consequences for families. The types of assistance aimed at reducing food insecurity can be categorized into two: formal and informal. The formal type comprises public assistance programs that are specifically targeted to provide assistance to low-income families such as the Supplemental Nutrition Assistance Program (SNAP), the School Breakfast Program (SBP), and the National School Lunch Programs (NSLP). Studies have shown that these programs are effective in reducing food insecurity. However, given that rates of household food insecurity have not substantially decreased, solely using formal assistance may not be the most effective approach to reduce food insecurity. Few studies have examined the role of informal assistance in reducing the risk that households experience food insecurity. Informal assistance can take the form of social support, social capital, neighborhood involvement, and community involvement among others. This study will use longitudinal data from the Fragile Families and Child Wellbeing Study (FFCWS) to examine the role of informal assistance and the risk of household food insecurity. The Fragile Families data focuses on families with the majority of mothers who were unmarried at baseline as they are at higher risk of living in poverty and being separated from the father. The data was collected in 20 large US cities with population of at least 200,000. The findings of this study could potentially help in understanding the role of informal assistance in reducing the risk that households experience food insecurity. In addition, the use of informal assistance in conjunction to formal assistance could potentially increase the effectiveness of these public assistance programs.

Oral Session 6: Community and Economic Development I

Friday, 1:30 pm, Room 223

Embedding food systems development in local government

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Department of Sustainability, Douglas County, Kansas

Given challenges within the global food system, efforts to enhance community food security and build strong local food systems commonly find champions among non-profit advocacy groups and informal community coalitions. Despite passion and determination, sustaining such efforts and establishing a place for food systems issues on a city agenda or in its operations often proves difficult. Since its establishment in 2010, the Douglas County Food Policy Council (DCFPC) has gained national recognition for its effective work to embed food systems development in the local government—and served as a model for similar efforts throughout Kansas. A commitment to cross-sector collaborations and shared learning has allowed this advisory body of diverse stakeholders to gain the respect of political leaders and build relationships throughout the community. Dedicated staff time and funding from federal programs and state/local foundations provide needed capacity and resources to ensure progress continues to build upon earlier efforts. An overview of three major accomplishments will demonstrate how the work of the DCFPC has engaged core components of local government, including administration, economic development, and planning to grow the local food system. Each accomplishment emerged from a food system assessment conducted in the DCFPC's first year that identified community priorities and spurred local government investment and grant seeking. First, the DCFPC opened the space for innovative use of local government resources. Key program developments include creation of a community garden program utilizing vacant city land and creation of a federal food assistance matching program at farmers markets. (The latter program expanded to operate at a regional scale in 2015 while keeping oversight within Douglas County administration). Second, the DCFPC conducted a feasibility study to determine the viability of a regional food hub, fostering market infrastructure and supply chain development for local farmers and wholesale buyers. The resulting document informed actions of the Council, influenced the local economic development strategy, and inspired the creation of a farmer-owned cooperative. Finally, the DCFPC worked closely with grassroots groups and planning department staff to craft new urban agriculture policy that expanded opportunities for healthy food access and local food entrepreneurship. The research and engagement of the DCFPC and its staff informed the deliberations of Planning Commissioners unfamiliar with urban agriculture practices. In sum, the work of the DCFPC highlights how local governments can support food system development by engaging with community partners, attracting and offering reliable resources, and fostering innovation.

Iterative mappings: Spatial analysis for community food resilience

Ellen Burke

Department of Landscape Architecture, California Polytechnic State University

Community-level food resilience can be understood as an effort to anticipate change and strategically build adaptive responses, with the goal of reducing vulnerability to food shortages and interruptions in the supply chain. Long-term resiliency responses may include shortening supply lines, creating redundancy in critical areas, and/or increasing local production and distribution capacity. These responses may be catalyzed through development of community resources, strategic planning, and linkages both within communities and to neighboring communities. This paper uses the case of a community food resilience initiative in San Luis Obispo County (SLO), CA, to explore the role of spatial analysis in defining and supporting resiliency responses. Food resilience planning is often carried out by multiple activists and community-based organizations, each focused on narrowly-defined initiatives. The formation of a shared framework can be hampered by lack of an overall understanding of how the projects relate, of what assets and patterns already exist in the community, and of articulated common priorities. Yet a common framework is critical to managing resources and optimizing outcomes from community efforts. Mapping and spatial analysis are well-documented instruments for strategic action, from warfare to logistics management. In recent times, the use of spatial analysis as an iterative and generative process has been explored in the fields of landscape architecture and urbanism. This approach to spatial analysis focuses on discovery of relationships between parts; on reconciling ecological, economic and socio-cultural patterns; and on identifying flows and systems within a geographic area. Combining both strategic and iterative approaches to mapping can yield a holistic understanding of food systems, and holds potential for enabling development of framework approaches to food resilience planning. Over the past year food activists and planners in SLO have undertaken a hybrid spatial analysis that moves beyond inventory to address flows, distribution patterns, and physical and social food systems infrastructure, in order to create a shared framework for resilience planning. In this presentation I will describe and evaluate ongoing efforts in SLO to use spatial analysis as an instrument for creating shared frameworks and goals; and offer recommendations for the use of spatial analysis to inform the development of community food resilience strategies.

The urban fisher ecology: The case of the artisanal fishing community of the bay of Chorrillos, Lima, Peru

Hector Bombiella

Department of Sociology, Iowa State University

This paper examines the artisanal fishers of Chorrillos, a small bay near the southern edge of Lima, Peru, and how they use place as an instrument to defend their access to fishing

resources on Peru's central coast. From their on- and offshore territories fishers advocate against overfishing practiced by industrial and boliches (semi-industrial trawlers) fleets, and urban developers' attempts to displace the community situated in a highly touristic area. Artisanal fishing communities are amongst the most destitute socioeconomic groups in less developed countries suffering from structural poverty and social exclusion to high exposure to natural disasters. This study is about the poor and how they respond to contemporary neoliberal state demands for self-sufficiency and autonomy particularly in an urban setting. Using an ethnographic approach, I explore how fishers have used discourses of place, both on- and off shore, to face these threats and secure their rights to the bay to maintain their cultural and socioeconomic reproduction. The notion of place goes beyond the geographical and physical space where the fishing activity happens, to serve as a locus of production of fishers' character, as well as of specific forms of activism and citizenship. Fishers demonstrate their capacity as place-based activists advocating for the recognition of their knowledge and skills for the protection of coastal marine and urban ecosystems and as providers of a safe and accessible beach and leisure space for poor population that otherwise the city is not offering. The dock and the fishing grounds are therefore lived spaces of cultural production, transmission and transformation from which fishers re-create and re-define their roles in the larger society.

Intergenerational community development through urban food systems

Kelly Henderson, and Mary Rodriguez

Department of Agricultural Communication Education and Leadership, The Ohio State University

Urban food systems can reduce household and community food insecurity in low-income neighborhoods by building social capital and encouraging community engagement. Improving social capital plays a large role in a community's health and well-being. In many ethnically diverse, low-income communities in the U.S., grandparents play a key role in raising and feeding children. These communities have expressed the need to share traditional and historical knowledge with youth in their communities; gardens provide a space for this shared learning experience. Linden, a neighborhood in Columbus, Ohio, has a high percentage of people living at or below the poverty level. Unemployment rates nearly double the national average, and it is riddled with vacant housing and lots. With a disproportionate number of corner stores, Linden offers few options for youth to make healthy choices. To address these issues, stakeholders developed an intergenerational leadership program to build community capacity and increase food security by engaging and empowering youth through elder mentorship and participation in urban gardening and a farmer's market. Through positive collaboration, the youth organized a weekly farmer's market, selling locally produced and culturally appropriate food. Engaging with Linden residents through the garden and market, youth participants experienced shared agricultural learning opportunities across generations. The purpose of this presentation is to describe one participating stakeholder's experience

working with the Intergenerational Community Development through an Urban Food Systems grant project. Program participants included youth ages 14-16, elders ages 50 and older, and three facilitators. Outcomes of the program included: expanded garden production, horticultural and marketing training, community engagement, community access to fresh fruit and vegetables, and development of a 4-H club. Involving multiple generations reduces distance between youth and elderly by sharing traditional and modern knowledge and building tighter bonds in communities. Intergenerational agricultural learning experiences are relevant across cultural and geographical divides. Communities similar to Linden could greatly benefit from an intergenerational program to build social capital and create stronger urban food systems.

Oral Session 7: Food Security II

Friday, 3:30 pm, Room 221

Increasing access to local food by extending shelf life of fresh vegetables

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Consumption of fresh produce in the U.S. has increased significantly over the past two decades. In particular, leafy vegetable consumption has increased by 3-fold (from 3.8 to 11.2 lbs per capita) and fresh tomatoes by 25% (from 15.5 to 19.3 lbs) between 1990 and 2010. This increase in produce consumption has been accompanied by increasing interest among consumers in supporting local production and purchasing directly from the producers through venues such as farmers' markets and community-supported agriculture (CSA) operations. The number of U.S farmers' markets increased by over 400% between 1994 and 2012. Direct-to-consumer marketing of foods has increased to \$1.2 billion dollars in sales, compared to \$551 million in 1997, which is primarily attributable to small farms sales. In fact, one in six U.S. consumers recently reported that they make it a priority to buy local food products, primarily fruits and vegetables, which come mainly from small producers that are using organic practices. However, produce sold by smaller growers is typically handled and stored with relatively unsophisticated procedures. These growers' facilities often lack provisions for controlling moisture loss and have little or no control of product temperature. This greatly limits product shelf life and reduces the ability of local growers to "scale-up" to meet local demand. With organic production, harvest and handling may be particularly difficult since a farmer does not have access to the array of highly effective synthetic pesticides that protect crops on large conventional farms. Products exposed to pest related stresses or excessive sun (partial plant defoliation) in the field often have a limited postharvest life due to physical damage (heat) or exposure to nearby decays and this could represent a major limitation to the further expansion of the local/organic produce market.

The development of economically and socially sustainable local food systems will require postharvest practices that are suitable for small-scale and/or organic producers that may lack access to capital for postharvest equipment. This presentation will provide an overview of the research work that we have done to deliver practical and appropriate postharvest technologies to small farmers that can help them maintain the quality of their produce.

Mobile farmers' market pilot project brings everyone to the table

Ariel Agenbroad

University of Idaho Extension, Ada County

The following questions could be asked in almost any community: 1. How do we get fresh, local, healthy foods and education/awareness to low and mid-income members of our community? 2. Will better access to and education about choosing local, healthy foods increase consumption and improve community wellness? 3. How do we strengthen and stabilize our community food system to sustain the production and consumption of local healthy food long term? In the community of Boise, Idaho, a diverse group of farmers, educators, advocates, city officials and committed citizens are seeking to answer these questions through a Mobile Farmers' Market. Boise Farmers' Market, a producer-driven, downtown Saturday market, piloted a shoestring mobile market in summer 2015 that visited six public parks and low income housing developments each week for 10 weeks, coordinating with mobile recreation vans operated by the city that provided physical activities for youth at the sites at the same time. The City of Boise matched SNAP dollars and the University of Idaho Extension nutrition program presented education about preparing healthy foods from the market, along with recipes and samples. Although the mobile market was conceived and put into action with very little lead time, infrastructure or marketing, it was successful in exposing individuals in lower-income and underserved neighborhoods to locally grown, healthy foods. However, it was also clear that to become sustainable for farmers and the community, the mobile market would need to refine its concept and engage additional community partners to plan strategically for success and financial security. In fall 2015, a group convened to move the mobile market to the next level. At the table were representatives from the Boise Farmers' Market, University of Idaho Extension (representing food systems, small farms, horticulture and nutrition programs), Let's Move Boise, the City of Boise (including Parks and Recreation), the Partnership for Livable Communities, The Idaho Farmers' Market Association and the Idaho Hunger Relief Task Force. Working with a vision, mission and understanding clearly the barriers, the group formed a cohesive business plan and action steps for achieving their goals. What will follow in summer 2016 will be a reinvigorated, reimagined, fully evaluated mobile market with the full force of community support behind it. This presentation will share the process, the lessons learned, and how evaluation data from year one of the mobile market was used to strengthen and improve the project.

Evaluating the local food system of Manhattan, KS: Producer and institution perspectives

¹Candice Shoemaker, ¹Rhonda Janke, and ²Hikaru Hanawa Peterson

¹Department of Horticulture and Natural Resources, Kansas State University

²Department of Applied Economics, University of Minnesota

Kansas is in the USDA 2012 Census of Agriculture's Top 10 states for total agricultural sales, total crop sales, and total livestock sales. Despite the thriving agricultural industry, little research has been completed on the food systems supporting Kansas communities. The goal of this study was to evaluate the characteristics and perceptions of the local food system supporting Manhattan, Kansas – a metropolitan area located in North Central Kansas. Specifically, we wanted to understand producer barriers to expanding beyond direct markets into institutional markets such as school dining services, grocery stores, and hospital food services. The objectives were to 1) understand producer concerns for selling to institutions, 2) identify resources producers need to access institutional markets, 3) understand institutional preferences for local purchasing, and 4) understand producer and institution definitions of "local" food. In February 2013, a survey was mailed to 162 Kansas producers identified within a 150 mile distance of Manhattan, Kansas. Interviews were completed with eleven local institutions in March/April 2013. In general, farms were small-scale, producing a diversity of products, and utilizing direct-to-consumer markets with limited selling to institutions. Producer concerns for selling to institutions included low prices, small production quantities, and delivery costs. Institution concerns included product quantities, quality, and seasonality, quality of communication, and food safety. There was no consensus on a definition for "local" food systems. Opportunities for developing the local food system of Manhattan, Kansas include increasing seasonal production, increasing producer access to resources, and fostering relationships between local producers and institutions.

Gathering Baltimore's bounty: Characterizations of urban foraging behaviors, motivations, and barriers

¹Colleen Synk, ²Brent F. Kim, ³Ginny Rogers, ²Jamie Harding, ⁴Charles A. Davis, ⁵Marla Emery, and ⁶Keeve E. Nachman

School of Public Health, The Johns Hopkins University

Foraging is the practice of harvesting plants or fungi not deliberately cultivated for human use. Surveys suggest over one-sixth of the general population forages, including urban residents, primarily for personal consumption. As a result, foraging should be considered a component of urban food systems, contributing no-cost, fresh food for city residents. The behaviors, motivations, and barriers to urban foraging remain poorly characterized despite an emerging literature on the subject. A better understanding of these could inform policies related to the potential contributions of foraging to food security and other positive health

and social outcomes for urban communities. To characterize urban foraging, we conducted in-person surveys among persons who had reported foraging at least once in the prior year in the Baltimore metropolitan area. Participant recruitment was initiated within local foraging special interest groups and continued via snowball sampling. From each respondent, we collected information about species, quantity, seasonality, and preparation of harvested materials; frequency and locations of foraging activities; foraging experience, demographics, and motivations for and barriers to foraging; and the contributions of foraged materials to the diet. Our sample of 105 urban foragers had a median age of 34 years; 59% were female, 37% male, and 4% unspecified/other. Respondents had a median of five years of foraging experience. Self-reported foraged materials included 156 distinctive taxa, with greens and berries mentioned most frequently. For the majority of participants, foraged foods did not constitute a large portion of the diets (median percentage reported was 3%), though approximately one-fifth of participants said that foraged materials accounted for $\geq 10\%$ of their diets. Respondents harvested a median of 20 liters of edible material annually, accounting for only the top five most frequently harvested species. Respondents most commonly listed enjoyment, educational interest, and health as their motivations for foraging. Time constraints and lack of knowledge were the most frequently cited barriers. Foraging activities in Baltimore predominantly took place in parks, in contrast to other U.S. cities where foraging takes place across different types of land uses. This case study of urban foraging in Baltimore can serve as a foundation for future work examining foraging behaviors in other metropolitan areas, including a forthcoming assessment of potential contaminant exposures among urban foragers. Findings from such studies could inform policy discussions regarding the use and management of edible urban landscapes by expanding the species, spaces, and practices recognized as constituting urban food systems.

Oral Session 8: University/ College Programs

Friday, 3:30 pm, Room 221

The urban edge: The role of urban student organic farms in raising awareness of food system inequities

¹Peyton Ginakes, ¹Julie Grossman, ²Kirstin Mercer, and ³Hannah Wittman

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²Horticulture & Crop Science, The Ohio State University

³Centre for Sustainable Food Systems, University of British Columbia

A small handful of agricultural universities are located in large urban centers (populations $>500,000$) in North America. Urban, university-affiliated teaching farms provide unique opportunities to educate students and the broader community about agroecosystems and production; urban, local, and global food systems; and diverse and healthy diets. In particular, such venues provide valuable opportunities for collaboration with urban communities,

including those with low-income, immigrants and refugees, and at-risk youth. This case study will discuss the innovative programming at three urban, university-affiliated farms: the University of Minnesota (UMN), the University of British Columbia (UBC), and the Ohio State University (OSU). For example, in the Twin Cities, minority and immigrant farmers make up an increasingly large slice of the farming population, yet few resources exist for them to transport, store, wash and prepare their crops for market. The UMN student farm collaborates with The Good Acre, a non-profit organization whose mission is to provide resources for immigrant farmers to add value to their products. At UBC, urban indigenous gardens provide opportunities for cross-cultural engagement and teaching about indigenous food sovereignty, medicinal plants and land based pedagogies. We will provide examples upon which others can draw to enhance their own university-community partnerships in urban food systems.

Advancing urban food systems with community-campus partnerships

Jacob Rayl

Institute for Community Sustainability, Indiana State University

The intersections between urban agriculture, volunteerism and community building are practiced each day at Indiana State University in the community garden. Respected as one of the best community gardens in the state of Indiana, our site serves as a case-study of how a community garden, supported by the financial and convening resources of a university, can vivify a university's mission and improve quality of life in the community. This presentation aims to exemplify how universities and community gardens can work synergistically and fulfill goals on each side of the partnership. The core goals of community gardens are to feed the community and filling donation banks with nutritious food through urban agriculture. The university wishes to meet student needs for volunteer sites, class projects, and community outreach efforts. This presentation will include challenges and successes of the university-owned and community managed community garden as an effective form of urban agriculture and will explore the dynamics of community gardens from the aspect of being in association with a university. The community garden relies on resources from the University. With the land already owned by ISU, the expenses the University incurred was funding for a small shed and hand tools. Many items have been donated by the community gardeners as well. Heavy student volunteerism creates the ability for the garden maintenance to be free of cost. Furthermore, campus waste such as organic food scraps and leaves from campus grounds serve as great fertilizing additives into the community garden. Utilizing these traditional 'waste items' in turn is economically and sustainably responsible. The ISU community garden also facilitates experiential learning in the form of soil testing for university science laboratories and beginning a new body of literature on urban soil studies prior to building urban gardens. Students have the opportunity to have a plot at the community garden, which allows direct access to healthy food, a creative outlet as an extracurricular activity, productive exercise, and an easy venue for community service. This open area allows

interaction and dialogue between community members, local business affiliates, and students, and serves as an ideal platform for open experiential learning about different cultures and ways of growing food. The dynamics of cooperation and interaction within a garden setting allows participants to exchange ideas through the meditative act of growing food.

Linking undergraduate student learning outcomes to urban agriculture in the Twin Cities

¹Mary Rogers, ²Adam Kay, and ³Kirsten Valentine Cadieux

¹Horticultural Science, University of Minnesota

²Environmental Science, University of St. Thomas

³Environmental Studies, Hamline University

The Twin Cities has a vibrant local food movement. The cultivation of nourishing food in our metro helps to bridge the gap in the food system, empower and educate youth, connect us to our neighbors and make our metro safer. Neighborhood community gardens, urban farm businesses, food hubs, and educational gardens are all part of the urban food movement in the Twin Cities. At the college level, there is growing interest in the local foods movement and urban agriculture amongst undergraduate students. At the same time, scholarship in teaching and learning supports that student learning is enhanced through experiential, hands-on learning. There are many opportunities for instructors to use these urban agriculture systems as a tool for student learning, while fostering meaningful engagement within our greater community. Three instructors (Rogers, Kay and Cadieux) from three urban universities (University of Minnesota, St. Thomas and Hamline) in St. Paul, MN, instruct undergraduate courses centered on urban agriculture. This presentation will provide a brief description of these courses, and explore how institutional undergraduate student learning outcomes (SLOs) are integrated within an urban agriculture framework. Specific examples from our curricula will illustrate how we use urban agricultural systems to teach biological and social science, while integrating experiential and service learning activities. In addition, this presentation will explore how both students and the community can benefit from involvement in urban agriculture, and challenges and obstacles faced in the development and implementation of community-engaged courses.

From university to community: Providing fresh produce to food insecure urban communities in Greensboro, North Carolina

¹*Sanjun Gu, ¹John E. Beck, ¹Aaron Moore, and ²Linda Anderson*

¹Cooperative Extension, North Carolina A&T State University

²Share the Harvest of Guilford County

The North Carolina A&T State University resides in the city of Greensboro, which was named by Food Research and Action Center as one of the most food insecure municipalities in the country in 2015. Seventeen food deserts were identified where residents have limited access to purchase healthy foods, such as fruits and vegetables in their own communities. The University Research Farm is located in the proximity of Greensboro, where the Horticulture Unit of The Cooperative Extension Program conducts applied research and demonstrations on vegetable and small fruit crops. Projects are designed to meet the needs of urban and community gardeners, small scale commercial producers, and growers employing season extension techniques, including plastic mulch, low tunnels and high tunnels. One of our main goals is to target food insecurity by training gardeners and farmers who grow high quality produce for their underserved communities. In order to help meet the needs of our own community, the produce grown for applied research and demonstration projects is donated to local organizations that address food security. Because of our focus on season extension, we are able to provide people with fresh vegetables that are produced organically and off-season, extending these organizations' ability to serve their clientele outside of the summertime when they typically receive fresh produce donations. So far in 2015, from February to November, we have donated 5,263 pounds of fresh produce that included spinach, lettuce, salad greens, pac choi, sweet peppers, tomatoes, and cucumbers. Produce has been distributed to the Guilford and Forsyth County Cooperative Extension Offices for local projects and through Share the Harvest, a local organization that connects community gardens and gardeners with people in need of food. Share the Harvest has made our produce available to Triad Health Project, Guilford Child Development Food Pantry, Family Promise, Mary's House, Servant House, New Arrivals Institute, One Step Further/Servant Center, Food Not Bombs, Partnership for Community Care, Celia Phelps UMC Food Pantry, Delancey Street, Center for New North Carolinians, Remedy of Community Needs, African Services Coalition, Clarette Sutton, and Amy Murphy the "Chicken Lady". These local organizations and individuals serve a range of clientele, from homeless families to refugee communities, by preparing fresh cooked meals or providing produce to take home. Our partnership with Share the Harvest helps draw our University closer to the community and gives us the ability to directly impact food security in the surrounding neighborhoods.

Oral Sessions 9: Community and Economic Development II

Friday, 3:30 pm, Room 223

Design and decision making for year-round market vegetable production: Scale, systems, and season extension

Greg Garbos

Four-Season Tools, City Bitty Farm, AgRoofs, Kansas City, Missouri

Today's food system is changing faster than ever before, and farmers and buyers in our densely populated urban environments are creating a new agriculture economy. There is a collision of the consumer-driven demands for buying local, buying organic, eating what's in season, and knowing where your food comes from. However, the availability of locally and regionally grown produce in the late fall, winter, and early spring is almost non-existent. The explosion of season extension technologies like greenhouses, fixed and movable high tunnels, and low tunnels is indicative of the gap that currently exists between the demand for food every day of the year and the farmer's ability to produce it seasonally as needed. Coupled with the need for sustainability to include economic sustainability, understanding scale, systems, and season extension are critical decisions in developing economically viable business models. The farmers and engineers behind Four Season Tools, City Bitty Farm, and AgRoofs created the companies to meet the need for better solutions in this space. On a national stage, Four Season Tools designs farming systems, tools, and technologies focused on season extension structures. City Bitty Farm grows specialty greens in Kansas City, MO and is a resource for Four Season Tools for product development, education, and demonstration of for-profit year-round production. AgRoofs installs greenhouses, vegetative roofs, and agriculture roofs across the country. The combination of the expertise gained from our local urban movement with the exposure to initiatives all over the country shed light what success looks like. Since 2009, the portfolio of companies has sold millions of dollars of structures, services, and supplies. City Bitty Farm is now the top grossing urban vegetable farm in the Kansas City metropolitan region. Our urban farms are the classrooms and employers of the next generation of employees in food. However, the interplay between scale, systems, and season extension is critical to the economic success of for-profit urban farming. Thoughtful farm design (defining the seasons of production, what scale is required based on economics, and what systems and technology are required at that scale) is critical to capitalize on the local, organic, and urban food movement. This presentation will provide an overview of our work and a description of metrics for successes in building the local food system.

Local farmer's markets as a tool for community development

¹Mary Rodriguez, and ²Grady T. Roberts

¹Agricultural Communication, Education, and Leadership, The Ohio State University

²Department of Agricultural Education and Communication, University of Florida

With an increasing interest in local foods, farmer's markets have gained popularity in urban areas all over the U.S. As of August 2014, there were 8,144 farmer's markets listed in the USDA's (2014) National Farmers Market Directory. Local food markets have tremendous potential for contributing to community food security. Understanding why people chose to attend the markets is important to ultimately improve the community. There are many reasons why people buy locally grown food: perceived quality and freshness of local food, support for the local economy, and knowing the source of the product. People that frequent farmer's markets often place importance on product quality, nutritional value, and methods of raising a product and those methods' effects on the environment. Despite these reasons, there is more to be learned about who are truly benefiting from the farmer's markets and what benefits the markets bring to a community. The purpose of this study was to gain an understanding of the farmer's markets in a town in Florida. The objectives were: to describe the local food vendors and to learn more about the consumers at the markets. Ethnographic data collection methods used were participant observation and semi-structured interviews. Data were analyzed through thematic analysis to reach the conclusions and tell the story of the experience. Results of the study included: diversity of market clientele; market location determined type of clientele; reasons to shop at the local farmer's market were access, feeling of community, price, and environmental consciousness. Studying farmer's markets allows for a better understanding of the choices people make to buy locally. Local food systems increase access of community members to healthy and affordable foods, provide a sense of community, and can help combat food insecurity. A farmer's market is an experience that can promote a sense of place, making individuals feel a tie with their communities. The sense of community that is formed around the farmer's markets can help to create the bonds that increase social capital. The development of this type of capital is essential for development of communities. Social capital aids the communities in efforts to reduce poverty and can improve food and nutritional insecurity through strengthened community ties and resources.

Funding Kansas community gardens: Lessons from a mini-grant project

¹*Cheryl Boyer*, ²*Evelyn Neier*, ¹*Cary Rivard*, ³*Frannie Miller*, and ¹*Charles Marr*

¹Department of Horticulture and Natural Resources, Kansas State University

²Department of 4-H Youth Development, Kansas State University,

³Department of Entomology, Kansas State University

Many Kansans want to grow their own fresh produce, but often lack a place to have a garden. K-State Research & Extension (KSRE) partnered with the Kansas Health Foundation to establish the Kansas Community Garden Grants project in 2011. The objective of this project was to increase Kansans' access to fresh, healthy produce by expanding the number of community gardens in Kansas. The goal was to establish 60 new gardens over a three-year period. Seed money was made available for groups to receive mini-grants of up to \$5,000 to

establish new community gardens. In addition to seed funding, the grant provided the opportunity to educate stakeholders via conferences in 2013 and 2014. Community gardeners could learn more about both horticulture and garden management topics. Sessions on garden management, sustainability, and how to develop the garden team gave participants insight on how to cultivate their garden organization into a cohesive group. A website (www.kansascommunitygardens.org) was developed to provide access to the grant application and educational resources for community gardens. Videos answered “Frequently Asked Questions” about community gardening. Links were provided to KSRE horticulture websites and other community gardening publications and resources. A garden directory tells site visitors where the gardens are located throughout the state. One section includes a listing of all the gardens that have received grants with a short bio and links to any websites or Facebook sites associated with the gardens. An archive of previous conference presentations and handouts allows visitors to access information presented at the conferences. Through the three-year period 85 gardens (25 over the original goal) received grants worth more than \$394,000. The gardens were located in rural, suburban and urban areas of all parts of the state. Both allotment gardens and communal gardens were funded. The wide range of gardens involved in this project has put us in contact with a diverse audience. Prior to this project some of the garden participants have had little or no connection with the Cooperative Extension Service. At the end of the third year we were able to report: 85 gardens funded (82 still operating); 875,632 Sq. ft. in communal gardens were added; 1,500,805 sq. ft. in total community garden space is now available; 1,551 allotment garden plots added; and 5,253 gardeners/volunteers involved in community garden projects. The gardens have made a significant impact in providing more Kansans with access to fresh, healthy foods.

The Giving Grove impact on food Insecurity in Kansas City

Amanda Lindahl

The Giving Grove, Kansas City Community Gardens

Within the Kansas City metro area, substantial numbers of residents struggle to feed their families and many have little access to supermarkets. Many areas experience some amount of food insecurity. The Giving Grove, a program of Kansas City Community Gardens, works to improve local food security and strengthen communities by bringing together the resources to develop edible tree gardens. In the first three years of operations, the Giving Grove has planted 1162 fruit trees, 50 nut trees, 595 brambles, and 625 strawberry plants at 85 community sites across the metropolitan area. The estimated annual harvest from this is over 323,000 pounds, which will be made available as free produce to neighborhoods in need. The high potential yield shows great promise to making a positive impact on food security across the city.

Poster Session

Thursday, 3:30-5:30 pm, Room 220

**All poster authors must present during the poster session. Authors of odd-numbered posters should stand next to their poster from 3:30-4:30 pm and authors of even-numbered posters should be next to their poster from 4:30-5:30 pm.*

Challenges of Growing in Urban Areas

1. Experiences of managing 18Broadway, an urban sustainability site, in KCMO: Benefits and challenges

Catherine Bylinowski, Horticulture Extension, University of Missouri Extension

This poster presentation will share experiences of managing DST's urban sustainability demonstration project, at 18th and Broadway, KCMO, which includes approximately 6000 square feet devoted to fruit and vegetable production. This unique site, located south of the Kauffman Performing Arts Center and in the midst of the Crossroads District, in KCMO, also continues to act as an urban demonstration site for storm water catchment and use, as well as solar power generation, landscaping with native plants, and recycling. Since 2013, DST, Inc. has contracted with University of Missouri Extension to provide management of horticultural activities at the garden. One MU Extension staff person coordinates all horticulture activities at this and another DST Food pantry garden in downtown Kansas City, Missouri. In 2014 and 2015, over 5000 pounds of organically grown fruit and vegetables were supplied to Harvesters Community Food Network from the 18th and Broadway garden, all grown, cared for, and harvested by volunteers. Some volunteers commit to raising vegetables for the whole growing season; others come for one-time work sessions to perform garden tasks and garden maintenance. Benefits to the food pantry garden program include fresh produce supplied to local food bank and volunteer commitment to those in need and community betterment in the metropolitan area. Challenges include volunteers having varying amounts of time to devote to their adopted garden beds, varying degrees of horticulture knowledge of volunteers, and the fact that the garden is open to the public. Food Pantry Garden activities at 18th and Broadway Garden will continue in 2016. DST staff, MU Extension staff, and volunteers continue to develop ways to produce more high quality produce for distribution through the community food network and to enhance the horticulture education aspects of the site and the garden activities for volunteers and the public.

2. Local food system opportunities in Wichita, Kansas

Rebecca McMahon

K-State Research & Extension - Sedgwick County, Kansas State University

Opportunities for a thriving local food system are abundant in Sedgwick County. The county is home to Wichita, the largest city in Kansas, as well as an array of agricultural producers and processors, from small community gardens to some of the state's largest grain processing facilities. Residents have abundant choices for food. They may visit a farmers' market, a specialty food store or a grocery store to stock their pantries. Or, they may live in an area where a convenience store is the only viable location to buy groceries – a situation influenced by transportation, time and money. The county has seen a growing interest in local food. Grocery stores are stocking local produce, honey and meat, sometimes even featuring the producers. Families are searching for ways to eat healthy food more often. Sedgwick and surrounding counties have a number of positive attributes that could support a robust local food system, including a diversified agricultural system and excellent soil resources. 76% of the land in the county is agricultural. The economics are clear as well. Sedgwick County residents spent just over \$1 billion on food in 2012. If just 5% of those were local food purchases, an estimated \$54.6 million would circulate through the county each year. Despite these opportunities, less than 1% of the cropland is used to grow fruits and vegetables. The vast majority of farms are producing row crops and meats that feed into the larger food system. While there has been a significant increase of interest in home, school, and community gardening. That interest has not translated into much interest in commercial enterprises at this time. There is also minimal infrastructure available to support beginning farmers that wish to market through the local food system. Growth of a more diverse, local food system in Wichita and Sedgwick County depends on many factors, including the development of more infrastructure to support farmers, development of more diverse marketing opportunities, and finding new ways to connect consumers with local agriculture.

3. Reducing food losses of locally grown produce by optimizing pre- and postharvest methods

¹Eleni D. Pliakoni, ¹Cary L. Rivard, ²Jeffrey K Brecht, ²Jerry A. Bartz, and ²Xin Zhao

¹Department of Horticulture and Natural Resources, Kansas State University

²Horticultural Sciences Department, University of Florida

Local production is one of the fastest-growing segments of United States agriculture, with organic produce being among the most popular sectors. However, locally-grown produce has potential for shorter shelf life, and ultimately higher losses as a result of less than ideal sanitation, packaging and temperature management leading to postharvest deterioration and disease. In particular, small-acreage growers have little information available that is suitable for their operations, limited postharvest handling facilities, and many are first-generation farmers with no experience or infrastructure to reduce food losses. One practice

that growers have quickly adopted in many regions of the United States is the utilization of high tunnel production systems. High tunnels are being rapidly adopted by organic and/or local small-acreage producers in order to reduce losses by decreasing foliar disease and damage caused by extreme weather conditions. In addition to pre-harvest strategies, reduction of postharvest losses and extending shelf life would increase organic and/or local fruit and vegetable availability and meet consumer demand for organic and/or local produce. We are assessing pre- and postharvest losses of produce grown in high tunnel and open-field production systems and are investigating optimum postharvest treatments including washing with products that are approved by the National Organic Program (NOP), heat treatment, and modified atmosphere packaging (MAP). The goal is to reduce decay while maintaining overall quality using tomato and spinach as model crops. Additionally, a digital smartphone application is being developed for predicting food losses of various crops and to provide an on-farm tracking system for growers. A stakeholder advisory board is overseeing the project and evaluating the suitability of the postharvest handling procedures being investigated. They are also aiding in the development of the smartphone application. As produce growers in the United States look to scale up to meet demand for wholesale markets, one major barrier for these farmers is reducing pre- and postharvest losses. The goal of our work is to increase access and availability of local food for consumers by helping growers reduce losses and therefore stabilize the supply of local produce. This presentation will provide an overview of the project in addition to the results of the work thus far.

Community and Economic Development

4. Good food education: A community centered model

Heather Gillich, and Billy Polansky

Columbia Center for Urban Agriculture

The Columbia Center for Urban Agriculture (CCUA), an 8 year old 501(c)3 nonprofit in Columbia, Missouri, has a unique approach to good food education. Our programs are guided by a community centered approach, and evidence of community voices can be found threaded throughout our Opportunity Gardens, Outdoor Classroom, Urban Farm Experience, and Planting for the Pantry programs. This presentation seeks to explain and demonstrate the effect of successful community collaboration in increasing healthful food choices by Columbia residents. Our community centered programming gives the organization the ability to meet the public where they are in the consumption of healthful foods. This presentation will demonstrate how our programming affects change at many levels of the community. The Opportunity Gardens program enables CCUA to work with over 90 families each year by helping them to create vegetable gardens in their own yards. This is possible through mentoring in gardening skills and food storage and preparations, and is bolstered by strong relationships with the Columbia Housing Authority and Immigration and Refugee Services.

Our Outdoor Classroom supports the development, installation, maintenance, and integrated use of outdoor classrooms through an agroecology approach and support of committees established at each of 8 Outdoor Classroom site. Our strong partnership with the Columbia Public Schools and the local chapter of Slow Food Katy Trail enable us to offer the Harvest of the Month and Hungry for Awareness lesson sets at the 3rd and 5th grade level. Our Urban Farm experiences provide good food education through guided tours, curriculum enhancing field trips, and many community events. The Urban Farm hosts nearly 3,000 community members each year in these hands on experiences. Through cohesive presentation of our program structure and approach, this presentation will outline the community impact of our programs, our evaluation approach, and the possibilities for replication in other communities of similar size.

Connecting Urban Consumers With Agriculture

5. Seeds of prosperity: Connecting local food system partners to build a stronger food system

Pamela Duitsman

Human Environmental Sciences, University of Missouri Extension

Our American food system has not always provided what is needed for healthy people, healthy environments, or a healthy economy. As a result, local food has been the subject of Federal, State, and local government policy. Most recently, USDA has linked local foods to their program priorities: enhancing local economies; sustaining environments; improving food access and nutrition; responding to consumer demand; and strengthening farmers, producers and markets. In response to food system needs in southwest Missouri, the Ozarks Regional Food Policy Council (ORFPC) released a 20 county regional food systems assessment in the fall of 2014. The ORFPC assessment revealed that about 140,000 people in southwest Missouri (including 50,000 children) do not have a consistent, secure source of food every day. Nearly 88 percent of adults in the region do not consume enough fruits and veggies. The overarching goal was set for 20 percent of all food consumed in southwest Missouri to be produced locally by 2030. Currently, 1.6 percent is locally produced. While the region has land, resources, and a rich agricultural history, gaps exist that threaten the sustainability of the food system. The ORFPC Executive Summary lists 12 key policy recommendations. These include working closer with local schools on farm-to-school programs; creation of a local farm financing collaborative; farm business and marketing resources; assisting connections in the local food marketplace; and the creation of food hubs to connect local buyers and producers. To address challenges, provide possible solutions, and encourage greater communication and coordination of efforts, a subcommittee of the ORFPC was formed entitled "Seeds of Prosperity". University of Missouri Extension is leading this effort, with Seeds of Prosperity offering workshops to bring local producers, buyers, and key food system partners together.

Producers who have successfully increased production to source food to schools, colleges, hospitals and other institutions offer practical information and advice. Wholesale buyers provide models for food purchasing practices and opportunities for farmers and food businesses. A more prepared workforce is being created in the area of sustainable growing techniques to obtain maximum yield and higher farm profits. Today, the Ozarks community food system is growing stronger. For the ORFPC and other stakeholders in southwest Missouri, next steps include completing a food hub feasibility study, reinforcing local relationships, helping local buyers source 20 percent of their food locally, initiating and facilitating infrastructure projects, and providing education to everyone involved in Missouri's food future.

Policy, Planning and Advocacy

6. Building local food councils to improve community food security

Pamela Duitsman, and Donna Mehrle

Human Environmental Sciences, University of Missouri Extension

Voices for Food (VFF) is an integrated extension and research-based grant initiative focused on enhancing food security in six states experiencing food insecurity. Research indicates that Food Councils (FCs) are good models for increasing community engagement to improve community food system issues such as accessibility to nutritious foods and food insecurity. Each community food system is comprised of diverse sectors that offer unique strengths and challenges. VFF draws on Systems Theory to facilitate engaged dialogue and dynamic community linkages to promote food security, especially among low-income and food insecure populations. VFF was developed by a multi-disciplinary team of experts collaborating on all aspects of the initiative. The project uses a community-based approach to improve food security through targeted food system and policy changes implemented by local FCs. A VFF Food Council Creation Guide was provided to each community. The guide provides a wide array of resources and guidance to support FC formation, targeted policy changes, and community engagement. A detailed evaluation plan has been implemented for the VFF project, which includes tested tools for data collection. The first data collection cycle has been completed. A mid-point and post data collection cycle is planned. VFF is collecting data from food council members and community stakeholders, tracking food council activities, trainings and resources provided. Using the Systems Theory in multiple states provides an avenue to test approaches in a variety of settings, thus determining the strength of a Systems initiative to effect change in widespread implementation efforts. Mid-point and post data collection cycles will offer greater clarification on community outcomes and lessons learned. This project was supported by the Agriculture and Food Research Initiative Competitive Grant no. 2012-01823 from the USDA's National Institute of Food and Agriculture.

7. Food advocacy at Macalester College-an urban liberal arts college

Vivian Mitnick, Millicent Varely and Ilana Duby
The Sustainability Office, Macalester College

Macalester College is a small liberal arts college uniquely located in the urban Twin Cities with a culture of both internationalism and sustainability. In recent years, Macalester students have become more focused on food sustainability and food justice both within and outside their urban campus. The poster will highlight food advocacy programs and organizations being run by motivated students. Programs and organizations are not limited to, the student organization MacFEAST, including Macalester's Real Food Challenge (Pledge to have 30% Real Food by 2020) and Food Recovery Network (to re-purpose waste productively by donating to local food pantries), as well as the new overarching food network on campus, Cultivate Mac. The poster will provide a look into how campuses in urban areas can create an environment where students create a more sustainable food system and culture on campus, while interacting with their local urban area and creating a positive impact globally through education and awareness.

Nutrition and Human Health

8. Food handling practices and food safety messaging preferences of African American and Latino consumers in urban areas of Kansas City

¹*Londa Nwadike*, ²*Emily Vaterlaus Patten*, and ³*Jeannie Sneed*

¹Extension Family and Consumer Science, Kansas State University and University of Missouri,

²Department of Food, Nutrition, Dietetics and Health, Kansas State University

³Department of Hospitality Management and Dietetics, Kansas State University

Extensive research on consumer food handling practices has identified many common practices that could have a negative impact on food safety. There is limited research to determine if food-handling practices differ among diverse groups or if unique approaches are needed for providing food safety education for different audiences. This study evaluated if there were unique food handling practice differences between African American and Latino consumers in urban areas of the Kansas City metropolitan area; and whether there were differing responses to food safety messages. Focus groups (n=4) were conducted with African Americans (n=2) and Latinos (n=2) and each focus group consisted of 10-15 participants. Focus group dialogue was audio recorded and transcribed verbatim, with hand-written notes also taken. The transcripts were reviewed, coded, and grouped into themes using an iterative process by researchers. The 50 participants self-identified as either African American or Latino, had home meal preparation experience, and were 18 years or older. Each focus group was multi-generational and included males and females. Three focus groups were held in Kansas

City, Kansas and one was held in Raytown, Missouri, which are part of the Kansas City metropolitan area. Researchers partnered with key informants in the community (Extension Services in Kansas and Missouri, a local Latino community organization, and an emergency assistance program) to recruit participants and provide sites for conducting the focus groups. Risky food handling practices reported by both minority groups included rinsing poultry before cooking and limited food thermometer use. African American participants preferred informational food safety messages whereas Latino participants were split in preferring informational, guilt-inducing, and fear-inducing messages. Food and nutrition educators working in urban settings, as well as in other diverse environments, must develop cultural competence and tailor their messages accordingly to meet the needs of their diverse clientele.

Urban Farmer Training

9. Growing refugee farmers in Kansas City

¹Alicia Ellingsworth, ²Katherine Kelly, and ³Meredith Walrafen,

¹Juniper Gardens Training Farm, Cultivate Kansas City

²Cultivate Kansas City

³Catholic Charities of Northeast Kansas

Since 2008, Juniper Gardens Training Farm has been home to the New Roots for Refugees program and its student farmers. Juniper Gardens Training Farm is located in heart of the oldest and the largest federal housing project in the state of Kansas. On these eight acres, Cultivate Kansas City collaborates with Catholic Charities of NE Kansas and the Kansas City, Kansas Housing Authority, and grows new farmers through a four-year training program. On this previously vacant land, this collaboration provides top-notch training for refugees looking to restart their farm businesses in the United States. During the four-year program, sixteen re-settled refugees are each given ¼ acre plots, soil amendments, seeds and supplies; use of the farm's greenhouse, washstand and walk-in cooler; 30+ workshops annually and on-going, bi-weekly 1:1 technical assistance; access to equipment; and assistance with marketing, finances and English skills. The program measures its success by graduating farmers. Fifteen of the seventeen graduates continue to grow, with nine of those farming on land they have purchased and own. The smallest graduate farm incubator plot is 1/8th of an acre; the largest is 2 acres; we are working with a graduate to help find and finance a 5-acre operation. Two of the graduates have installed high tunnels and others plan to build greenhouses and walk-in coolers. The graduates are becoming mentors for the farmers-in-training thus growing a strong, supportive circle of new growers. Going forward, Cultivate Kansas City is providing training to scale up production through use of larger equipment and larger plots of land. Relationships to the purchasing community are being forged as the farmers-in-training are building their own network of contacts and purchasers of produce.

This presentation will describe the educational process, the program successes and impact measurements, and the challenges and opportunities we see in our current initiative to help the farmers scale up and move into wholesale markets.

10. Developing an urban food system study tour to enhance student's experiential learning

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In Fall 2011, the Department of Horticulture, Forestry and Recreation Recourses launched a new specialization in Urban Food Systems (UFS) within our M.S. in Horticulture program. The core classes for the program include: HORT 791 Urban Agriculture, HORT 794 Urban Food Systems, and HORT 792 Urban Food Production Practicum. In these classes we use local examples of urban food systems, including in Manhattan, Kansas City, and other near-by communities. However, it is important to expose our students to other urban areas outside the Kansas City metro region. Therefore we developed HORT 795 Urban Agriculture Study Tour. This course not only gives students new knowledge, but also helps them to develop contacts for job placement, and helps to advertise this emerging graduate program that is only available at Kansas State University. The intended learning outcomes of our study tours are 1) students will discover the actual context of UFS in a carefully designed faculty-led excursion and 2) students will apply their current UFS knowledge acquired in-class and in-practicum to the tour's specific locations. From these intended learning outcomes, students will be provided opportunities to perfect their critical thinking and communication skills. We believe that one of the best ways for students to see what they have learned in the classroom is to apply that knowledge in non-familiar settings, like those encountered in a study tour. We expect that the conversations that our students have throughout the trip will build confidence, which is one of the most important outcomes of graduate education. During fall 2015 we led our first study tour to Chicago, one of the top five cities in the United States leading the way in urban agriculture. Seven students and two faculty members visited 19 different sites including: urban farms and local food-related businesses, community development and social service groups, and not-for-profit organizations. The students had the opportunity to gain awareness about the complexity of issues surrounding urban agriculture and food systems work in Chicago. Additionally, we are conducting a study to document the value addition of study tour. The study began in fall 2015 with pilot-testing of the pre- and post-surveys of students in the study-tour course. This presentation will discuss how this course was developed as well as the challenges and the success we faced during that process, using both the faculty and the students perspective.

11. Developing a comprehensive Master Urban Farmer Training program

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The Ohio Master Urban Farmer Program was developed to address the educational needs of new urban farmers and food producers. The ten-week course has graduated a total of 109 Master Urban Farmers. The course is being taught in three cities in Ohio. The course covers a wide array of production, management, and marketing topics for urban producers. An Urban Ag Roads Scholar Tour to urban farms supplements the course. Evaluation results for the course show the following results: 1.High level of satisfaction- 100% of participants were very likely (98%) or likely (2%) to recommend the course to others. 2.Increased knowledge - 98% of participants reported a very high (72%) or high (26%) increase in knowledge. 3.Application of knowledge and skills: participants indicated that they planned to use the knowledge and skills they learned by participating in the program as follows: 39% planned to start a new business or enterprise; 72% planned to produce more food from existing operations; 12% planned to increase family income; and 84% planned to produce higher-quality or safer food from existing operations.

12. Using square-foot gardening as a tool to teach crop science in urban settings

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Urbanization is a general trend worldwide, and as the proportion of population living in urban area increases, more students come into agricultural programs with limited exposure to agriculture and no practical background. To improve students' practical training and attract more students into agricultural careers, NCA&T's Urban and Community Horticulture program developed an experiential learning curriculum in Urban Agriculture. The program received a \$150,000 NIFA capacity building grant in 2014 to develop an on-campus urban food teaching platform. The first phase of the urban food platform was to construct nine 8x4 ft. and three 4x4 ft. raised beds. Square-foot gardening was implemented as a production method. Raised beds and square-foot gardening were chosen because of: ease of access and construction, low cost, multiple growing cycles, year round production using season extension techniques, growing cycles could be adapted to the academic year, ergonomic consideration for students, and adaptability to urban spaces. The raised beds were constructed on a steeply sloped area adjacent to the campus greenhouse. The flexibility of the raised bed platform allowed taking advantage of the small space by terracing the beds.

Landscape timber was used for cost efficiency, aesthetics, and ease of construction for students. The construction process itself was a learning experience for students in understanding; site selection, construction materials, surveying, and media selection. The platform is being used year-round to provide hands-on approaches to agronomic concepts and research methods to include such things as; vegetable production techniques, plant anatomy, plant nutrition, plant propagation, season extension, plant disease management, IPM techniques, and experimentation using scientific methods. Using replicated trials and companion planting, students have been educated to a diversity of cropping options by combining herbs and flowers with vegetables. Data have been collected through replicated studies on plant density and adaptation of different vegetable varieties to the local environment and academic cycle. This platform is a cost effective, efficient and enjoyable system to teach urban food systems. The aesthetic qualities of the landscape timber construction make it an easy choice for on-campus usage, which in turn, is good for recruitment and community engagement. Future phases will include vertical growing walls and hydroponic systems.

13. The KoolKat: A demonstrational mobile cooling unit to support the development of small and/or urban farms

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Cooling facilities are a major barrier for small and/or urban farmers in the Great Plains region. A survey of local growers in 2014 revealed that access to proper storage facilities, especially cold storage, is one of the most frequently-encountered challenges for producers to increase local food production and implement Good Agricultural Practices (GAPs). In 2015, we found through follow-up surveys that only 32% of producers have access to quick cooling facilities, and 6% have access to refrigerated trucks. Based on these results, it is clear that more emphasis on cooling infrastructure is needed. Therefore, we built a demonstrational mobile cooler in March 2015 using a box trailer, insulation panels, and a cool-bot system with a 10,000 btu air conditioner. Structurally Insulated Panels (SIPs) were chosen for the insulation and were available locally as re-claimed materials. Unlike polystyrene foam sheets, SIPs have closed cell foam and therefore retain their R-value better during moist conditions. More importantly, polystyrene foam is not a cleanable surface and therefore does not comply with GAPs. The SIPs we utilized have a painted metal layer on either side, and is therefore compliant. Ten, 5'x10' panels were used for the cooler. We chose to utilize a 6' x 12' dual axle trailer (5' x 11' cooler), which could accommodate two pallets, in addition to providing substantially more weight capacity due to the second axle. The total estimated material cost for the mobile cooling unit was \$6290. Once the cooler construction was complete, we were able to provide knowledge to growers as well as the general public about the benefits of proper storage temperatures. The mobile cooling unit was featured in a number of

commercial growers events in 2015 including a Postharvest Handling Workshop and the Commercial Fruit and Vegetable Field Day. It will also be featured at several conferences during 2016. The ability for growers to be able to see the unit and look at the components has had tremendous impact.

Urban Food Production Systems

14. Urban Agriculture Production Manual: A resource for growing a sustainable urban food system

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Urban growers often have difficulty finding informational resources on urban production, as many guides and extension publications are written for growers at a different scale, with different considerations for marketing and different access to resources such as compost and water. This guide was begun as a project to sort through existing resources for small-scale growers to find those most useful to urban growers, and to identify informational gaps where new resources need to be developed. The manual will contribute to the Community and Regional Food Systems (CRFS) Toolkit at the University of Wisconsin Madison. The toolkit is a compilation of action-oriented resources to help practitioners, their community partners and local governments plan, implement, evaluate, and explore the connections between community food system activities. This relates to different conference themes of preserving and promoting urban agriculture production as well as ensuring food security within community and regional food systems. The Urban Agriculture Production Manual itself is directed at small to medium-scale, fresh-market growers in urban/peri-urban areas emphasizing organic and/or sustainable production practices. The project consisted of compiling useful resources for growers regarding the topics of business and marketing, crop information, crop planning, non-traditional growing environments, equipment, food safety, postharvest management, and season extension techniques. Information specific to urban areas, such as attention to brownfield field sites and alternative growing environments where space is limited, is also provided for growers and those interested in starting an urban farm. Policy-makers and urban planning professionals must understand that a successful community and regional food system also requires successful growers. Creating a policy environment that is supportive of direct markets on top of large-scale institutional procurement happens when cities and other institutions are actively supporting beginning farmers interested in the local food system movement. The Urban Agriculture Production Manual hopes to centralize resources useful to growers to ensure future successful operations, and enhance urban and regional food systems for the future. We recognize that the manual still has important gaps, where resources for urban farms simply do not exist, at least in printed or online form. To fill these gaps, we will be working with urban farmers to

define and create new resources. We welcome feedback from anyone who would like to participate.

15. Permaculture and urban agriculture: Utilizing regenerative design within cities to improve environmental and human health while supporting local economies

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Over the past decade a reemerging trend towards urban agriculture, in addition to growing consumer demand for local foods, and increased public awareness of industrial production systems' inherently negative environmental impacts have led towards the search for environmentally-friendly, self-sufficient, regenerative production systems. Permaculture, an ethical design approach rooted in observation of ecological processes, seeks to address these issues by creating regenerative systems for human material and non-material needs, including energy, shelter, food and building materials. Systems designed using permaculture can incorporate agricultural practices in addition to elements of a wide range of other disciplines, including landscape design, architecture, community development, energy production and storage and land management as well as economic, social, educational and legal structures. It is for these reasons that permaculture serves as an excellent tool for creating and implementing regenerative design systems for human needs in urban environments. In urban areas, permaculture and urban agriculture must make use of existing "dead space", i.e. ecologically unproductive surfaces such as rooftops, building facades, parking lots, right-of-ways, sod lawns, etc.; as well as vertical space since horizontal space is usually at a premium (both physically and financially). This is where permaculture and urban agriculture blend and make use of existing land uses as well as architectural, legal, economic and social structures within cities to improve both human and environmental health. Urban agriculture can be seen as an urban permaculture application that has the potential to address a host of issues, including the urban heat island effect, crime rates, mental health, nutrition, food access and security, property values, vehicular traffic calming, job opportunities and hands-on training, food education, community development, water and air pollution, and more. Permaculture challenges long held paradigms by holding up regenerative processes, production of a surplus, and care of people and the environment as objectives that are NOT mutually exclusive but instead, core tenets of good design. Permaculture and urban agriculture can aid in our quest towards a viable, healthy, abundant future based on ecological processes and renewable resources. Grassroots organizations, nonprofits, higher education institutions and local governments have begun to lead the way.

16. Expanding opportunities for urban and peri-urban farmers by developing a spring-planted high tunnel strawberry production system

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Intensive specialty crop production within high tunnel systems in the Central United States has greatly expanded. This production system, along with spring-planted day-neutral strawberry production, could provide growers with both early and late-season income. This study identifies which spring-planted, day-neutral strawberry cultivars are successful in a plasticulture, high tunnel system in regards to yield, quality, storage life, and consumer opinion, and investigates the treatment effect of evaporative cooling. The trial was conducted at the Kansas State University Olathe Horticulture Research and Extension Center during summer 2014. Six commercially-available cultivars were evaluated (Albion, Evie2, Monterey, Portola, San Andreas, and Seascape). 90-100% red, mature fruit was harvested twice weekly and four harvests were evaluated for postharvest quality throughout the season. Storage life was monitored every 24hrs by respiration rate, water loss and visual decay, with a scale from 5(excellent) to 1(very poor). Physical and organoleptic quality were evaluated every other day, and nutritional quality was evaluated on the day of harvest. Consumer analysis examined the overall likeness (9-pt Hedonic scale) of the varieties based on color, flavor, texture, and sweetness. Our results indicate that throughout the entire season (May 10-October 7), Portola had the highest yield (1.32 lbs/plant). Shelf life results illustrate that Seascape and Evie2 decayed quicker with significantly more water loss in comparison to San-Andreas and Portola ($P < 0.001$). Similarly, texture measurements of Evie2 and Seascape exhibited low firmness levels throughout the season ($P < 0.001$). Consumer research indicated significantly high overall liking of Monterey and Albion based on flavor, color, and texture ($p < 0.001$). Our results indicate that growing day-neutral strawberries in a high tunnel in Kansas has the potential for success based on the yield and quality of the fruit seen in our study.

17. The Longwood Graduate Program and Bright Spot Farms: Creating an updated program model for an urban agriculture non-profit

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The Longwood Graduate Program is a two-year curriculum culminating in a Masters of Science in Public Horticulture. In addition to traditional academic pursuits, the Longwood Graduate Fellows engage in several experiential projects, including an annual Professional Outreach Project. In fulfillment of the 2015 Professional Outreach Project, the Longwood Graduate Fellows partnered with Bright Spot Farms, a program of the West End

Neighborhood House designed to equip and empower youth aging out of Delaware's foster care system and young adults from the Delaware Psychiatric Center. Bright Spot Farms is a nonprofit urban farm located in Wilmington, Delaware, that uses horticulture-based activities to give trainees the skills needed to obtain employment after completing the program. These activities include specialty crop production, landscaping services, a farmers' market, a mobile market, and a formal horticulture curriculum. However, Bright Spot had outgrown its original business model and needed an updated program plan. For their Professional Outreach Project, the Longwood Graduate Fellows analyzed and evaluated Bright Spot Farms to create recommendations for the nonprofit's future growth and development. To do this, the Fellows spent several months conducting on-site evaluations, interviewing staff members, surveying farmers' market vendors and customers, and benchmarking similar organizations. Their work uncovered issues ranging from limited irrigation at one of the farm sites to the trainees' emotional challenges. Using the information gathered, the Fellows searched for solutions that could balance revenue-based activities with the organization's mission to train and empower at-risk youth. From this, they made recommendations to improve the farm's efficiency while restructuring the curriculum to better serve the trainees, resulting in a new program model that has the potential to be both mission-conscious and more economically sustainable. This project encompassed a wide range of disciplines, including urban agriculture, social sciences, and nonprofit management, and highlighted a unique way that urban food systems can be used to improve the lives of underserved youth.

18. A meta-analysis of grafted tomato trials to determine rootstock performance

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The practice of grafting tomatoes in the United States is expanding in order to utilize rootstocks that confer resistance to soilborne plant pathogens, tolerance to abiotic stressors, and potentially increased vigor. The utilization of grafted plants can be especially beneficial for urban and peri-urban farmers, particularly those growing in high tunnels. High tunnels are typically managed very intensively and soilborne diseases can be problematic due to limited crop rotation. Grafting plants with vigorous rootstocks allows for urban growers to increase their production dramatically without increasing their production space. However, it is currently not clear how to identify which rootstocks show increased vigor and under what conditions. Therefore, the objectives of this study were to: 1) develop a meta-analysis approach to determine the characteristics of vigorous rootstock; 2) identify rootstocks that consistently showed increased vigor both across diverse production systems and under specific growing conditions; and 3) determine the relationship between increased vigor and genetic yield potential using data from urban and peri-urban farms. A meta-analysis approach was used to compile research data from 34 replicated grafting trials that were conducted in various locations throughout Kansas from 2011-2015. Yield data was normalized based on the

impact of the rootstock as compared to the nongrafted control within each replication (rootstock/nongraft). The normalized data set was then used to measure the relationships between rootstock varieties, and determine which rootstocks conferred the greatest production advantage under which growing conditions. Certain rootstocks showed improved production in almost all growing conditions and/or trials. Other rootstocks may confer a comparative advantage primarily in growing systems with specific environmental or biological stressors, such as a soilborne disease. By combining data from multiple years and growing environments, this work will enable growers to select rootstocks that are tailored for their specific production system.

19. A comparison of soil management systems for urban agriculture

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Soil contamination is a primary concern in urban food production. Soil management systems such as raised-beds may be necessary to provide safe and productive growing conditions for urban crops. However, the costs and benefits of raised-beds and similar soil management systems for urban food production have not been explored. The objective of this study is to determine the effects of six soil management options on crop yield, soil biological, chemical, and physical properties, as well as ecosystem services including water and nutrient retention. Soil management systems studied include direct soil with synthetic fertilizers (DSF), direct soil with organic amendments (DSO), raised-bed with soil + compost mixture and synthetic fertilizers (RBMF), raised-bed with soil + compost mixture and organic amendments (RBMO), raised-bed with compost only and synthetic fertilizer (RBC), and raised-bed with compost only and cover crops (RBCC). Crops grown in each treatment include kale, garlic, pepper, cilantro, spinach, and radish. Crop yield was separated by quality (marketable vs. cull) and weighed. Soil water infiltration rate, soil chemical properties, and season-long weed emergence were measured. Kale, radish, and spinach yield was greatest in compost-only raised-beds while pepper yield was greatest in the direct soil with synthetic fertilizer. For kale, yield was four times greater in raised-beds compared to direct soil. Conversely, pepper yield was four times greater in direct soil than in raised-beds. Total marketable yield for spinach was between 1076 and 2153 g/m² for raised-beds and 4 g/m² for the direct soil treatment (DSF). Spinach yield in direct soil was limited by poor seeding establishment. Radish yield was twelve times greater in compost-only raised-beds compared to direct soil. The rate of soil water infiltration was greatest in compost-only raised-beds and lowest in direct soil without organic amendments. Emerged broadleaf weeds were greatest in the direct soil plots and grasses were most prevalent in the raised-beds with the compost + soil mix. Weed emergence was negligible in compost-only raised-beds. Despite greater initial investment, results suggest that compost-only raised-beds may provide the best mixture of agronomic (i.e. yield) and environmental benefits (i.e. soil water infiltration) for urban food production. However, crop-specific yield

response to soil treatments (kale vs. pepper) suggests growers should consider crop species before choosing a management system.

20. The 2016 Urban Food Systems Symposium: A professional meeting to change the way we think about global food security

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To meet the challenge of feeding the predicted world population of 9 billion in 2050 and beyond, the identification of sustainable and alternative food production practices that continue to meet, or exceed, high expectations for quality and safety is essential. Robust systems must be built in order to maintain food security for growing urban populations, in particular. Kansas State University's agricultural heritage, food systems expertise and world-class research facilities firmly establish the university as a leader in addressing the growing technological, educational and human resource needs of the global food system. In April 2015, a group of research and extension faculty at Kansas State University were awarded a grant to host the first Urban Food Systems Symposium in the U.S. The symposium is a collaboration with a local not-for-profit organization, Cultivate Kansas City. Funding that was provided by the KSU Global Food Systems Initiative was leveraged to gain sponsorship from various agencies including: the University of Missouri, Kansas Sustainable Agriculture Research and Education (SARE) program, and the City of Kansas City, Missouri. Internal sponsors also included the Department of Horticulture and Natural Resources as well as the Food Science Institute. Planning began in April 2015 and seven committees were formed, including: organizing, sponsorship, scientific, marketing and promotion, facilities and logistics, conference tour(s), and evaluation committees. Efforts were immediately put into place by the marketing committee, including the development of a website, printed materials, social media accounts, online advertising and email marketing efforts. The professional networks of the organizing committee members played an essential part in the marketing efforts. Additionally, a national email database was built by the Urban Food Systems graduate students. Abstract submission information was marketed throughout related Urban Food Systems associations, news outlets, social media, website and email marketing efforts. A total of 91 abstracts were received including submissions from the United States (22 states) and from 29 institutions. Student travel grants were also available and 23 submissions were received. The abstracts include information related to an interdisciplinary group of topics. The goal of the Urban Food Systems Symposium is to develop a community of researchers, educators, and community leaders to define and develop this important and emerging discipline.

21. Deep winter greenhouses: A growing movement in Minnesota

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Deep winter greenhouses (DWGs) are small, sturdy, passive-solar structures designed to produce vegetables in the winter in a small space with low energy input. Unlike traditional greenhouses, deep winter greenhouses have a very steep south-facing glazing wall to capture the low angle of winter sunlight, and the north side is typically built into an existing building or hill side to minimize heat loss. The foundation is filled with small rocks to act as a thermal mass, and during the day warm air from inside the greenhouse is forced into the rock bed to charge the thermal mass with heat. At night, heat radiates from the thermal mass and keeps the greenhouse warm with no additional heating. Growers use DWGs to grow mainly leafy greens and other brassicas that are tolerant of low light and cool temperatures from November through March. Plants grow in a layer of soil at ground level, or in a series of hanging planters made from rain gutters and filled with media. A single 102 cm (40 in) gutter can produce up to 678 g of fresh greens from one sowing. There are several DWGs currently in operation around the upper mid-west, and more are being built. These spaces can be used for production or education. In the study presented here, we compared the environment in three DWGs to six conventional greenhouses in Minnesota. The average temperature for DWGs in January 2015 was 8.6°C compared to 17.7°C for conventional greenhouses. DWG daytime temperature depended largely on whether it was sunny or cloudy; on sunny days temperatures can spike as high as 45.6°C in an unventilated DWG. This poster will describe DWG construction, planting schemes, and environment.

22. Use of passive modified atmosphere packaging (MAP) at a non-optimum temperature to improve shelf life and quality of locally grown vegetables

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Having refrigerated facilities for storing harvested produce can be a challenge for small and/or urban farmers, which can be a significant barrier for growers that seek access to wholesale markets. Modified atmosphere packaging (MAP) is a technique that could supplement limited cooling facilities, or even substitute for refrigeration altogether. The objective of this project was to investigate the effects of commercially-available passive MAP on the quality and storage life of vegetables that are stored at non-optimum temperatures. Spinach and broccoli were purchased from local urban and peri-urban farms. On the day of harvest, produce was brought to the lab and washed in iced water, and separated in 2 groups:

control (WC) stored in open produce bag, and stored in MAP bags (WM). The samples were stored at 13°C and 85% RH. CO₂ and O₂ concentrations were monitored daily. Every 3 days, subjective (overall quality, visual appearance, color, off-odor, texture and wilt) and objective (colorimeter, and texture for spinach) quality was evaluated. MAP bags equilibrated an atmosphere of 7% CO₂ and 6% O₂, and 12% CO₂ and 3% O₂ for spinach and broccoli, respectively. Storage life of spinach, as determined by the overall quality score, was extended by 3 days compared to the control that lasted 15 days. For spinach WM, off-odors were detected after day 9 while WC off-odors were detected after day 3. Furthermore, spinach WM had better texture and wilting scores after day 6. For broccoli, the use of MAP bags had a more pronounced benefit, having a storage extension of 7 days, with WM group lasting for 12 days when compared to WC that lasted 5 days. For broccoli, samples stored in MAP bags never became yellow, even after 14 days, while control was yellow at day 5. Even though the commercially-available passive MAP bags were developed for storing produce at optimum temperatures (0°C for both crops), their use at a non-optimum temperature (13°C) had a beneficial effect on the postharvest quality and shelf life of spinach and broccoli.

23. The effects of leaf removal on adventitious root formation and plant growth of grafted tomatoes

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Limited growing space can lead to reduced crop rotation as well as difficulty expanding production for urban and/or high tunnel growers. Grafting tomatoes with vigorous rootstocks provides the potential for higher yields without additional growing space. One significant barrier for growers is the low availability of grafted plants or the ability to propagate their own. A major challenge during propagation is managing the formation of adventitious roots (AR) from the scion, which can result in loss of rootstock function. Possible reasons that cause adventitious rooting include a poor graft union, scion water stress, high humidity, and hormone response(s) to wounding. Our study investigated how leaf removal (LR) affects the formation of adventitious roots on the scion and subsequent plant growth. Three leaf removal treatments, 0% LR, 50% LR and 90% LR, were applied to the scion 'BHN 589' and grafted onto rootstock 'Maxifort' rootstock. Plants were arranged in a healing chamber using a RCBD (4 reps), and 20 plants in each experimental unit. The experiment was repeated three times using three different healing chamber designs (shade, plastic, humidifier). After 10 days in the chamber, plants were removed and rated weekly on their AR for 3 weeks. For weeks 1-3 in all 3 experiments, plants with 90% LR had significantly lower AR ratings than 0% LR plants ($P < 0.05$). In the shade chamber, 50% LR plants also had significantly lower ratings than the 0% LR plants ($P < 0.05$). We also performed an experiment to look at how leaf removal affected early plant growth. Four treatments: 0% LR, 50% LR, 90% LR, and nongrafted were applied to the scion 'BHN 589' and then grafted onto 'Maxifort'

rootstock. Plants were grown in a greenhouse using a RCBD with 4 replications and 15 plants in each unit. On day 24 post-grafting, 3 plants samples in each experimental unit were measured for leaf area, shoot biomass root biomass, plant height, stem caliper, and flower count. Sampling was conducted once every 7 days for 5 weeks. By week seven, all grafted treatments performed similarly for most plant growth parameters and were not statistically different. Our results indicate that leaf removal of the scion can increase high quality plants for growers because of the lower adventitious rooting and does not reduce the early season growth of the transplant.

24. Heavy metal deposition and soil microbial abundance in urban raised bed food gardens

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Heavy metal contamination in post-industrial cities is a potential human health concern for urban food producers and consumers. Raised beds are a simple and effective way of reducing human exposure to soil contaminants and potential plant uptake of contaminants, but raised beds do not prevent the atmospheric deposition of heavy metals. Additionally, a healthy soil microbial community is important to crop growth and soil nutrient cycling, but little is known about how soil microbes respond to the urban environment. Six experimental sites with forty 0.89 m² raised beds containing a uniform compost, soil, and sand (50%, 40%, and 10%) mixture were established in 2013 across a latitudinal transect of greater Chicago, Illinois. Seven vegetable species were grown in the raised beds. Plant root simulator probes (Western Ag Innovations, Inc.) were used to determine bioavailability of heavy metals. Biannual soil samples to a depth of 10 cm were used to determine heavy metal content of bulk soil as well as soil microbial community composition using the phospholipid fatty acid (PLFA) method. In 2014, simulated root uptake of lead was highest at the most urban sites, but in early 2015 the overall levels of lead were higher, and the highest levels were found in one urban and two rural sites. The bulk soil concentration of lead was approximately 20% greater at two of the sites, which have a line of site to nearby roadways. Total microbial biomass and fungal biomass were influenced by crop productivity and the time of sampling. Microbial biomass increased with increasing crop productivity in the fall but not in the spring. Results suggest that soil microbes are only indirectly influenced by environmental changes across an urban to rural transect via changes in plant primary productivity. Urban farmers should consider proximity to major roadways when choosing production sites and use best management practices (e.g., high tunnels) to mitigate the deposition and accumulation of heavy metals in soil.

Index of Authors

Agenbroad, Ariel.....	23	Garbos, Greg.....	29
Anderson, Linda.....	28	Garrett, Karen.....	49
Attanayake, Chammi.....	6	Gillich, Heather.....	34
Barrett, Eric.....	40	Ginakes, Peyton.....	25
Barton, Elizabeth.....	44	Roberts, Grady.....	29
Bartz, Jerry.....	22, 33	Gragg, Sara.....	41, 47, 48
Bates, Marlin.....	15	Grossman, Julie.....	25
Beck, John.....	28	Gu, Sanjun.....	28
Bergefurd, Brad.....	40	Gude, Kelly.....	39, 44
Bernacchi, Carl.....	4	Hall, Peggy.....	40
Bombiella, Hector.....	20	Hanawa, Hikaru.....	24
Boyer, Cheryl.....	30	Harding, Jamie.....	11, 24
Brantley Kindall.....	8	Henderson, Jane.....	16
Brecht, Jeffry.....	33	Henderson, Kelly.....	21
Brennan, Andrea.....	44	Hettiarachchi, Ganga.....	6
Burke, Ellen.....	20	Hogan, Mike.....	40
Bylinowski, Catherine.....	32	Horn, Eileen.....	19
Campbell, Danielle.....	12	Huchette, Odile.....	40
Christensen, Laura.....	15	Jackson, Fran.....	44
Coon, Makenna.....	8	Janke, Rhonda.....	24
Cotter, Natalie.....	42	Joyce, Alexander.....	40
Creamer, Nancy.....	1	Juvik, Jack.....	4
Creed, Cory.....	15	Kay, Adam.....	27
Cribb, Julian.....	1	Keane, Lexa.....	8
Darby, Brien.....	14	Kelly, Katherine.....	13, 38
Davis, Adam.....	4	Kennelly, Megan.....	5, 49
Davis, Charles.....	24	Kim, Brent.....	11, 24
Davis, Cynthia.....	12	King, Christan.....	18
Dawson, Julie.....	42	Kinley, Erin.....	44
Defoe, Phillip.....	6	Koch, Megan.....	16
Dostal, Ryan.....	39	Kowalski, Jacqueline.....	14, 40
Duby, Ilana.....	37	Kumar, Lala.....	15
Duitsman, Pamela.....	35, 36	Kuniholm, Stephanie.....	44
Edgerton, Alice.....	44	Lindahl, Amanda.....	31
Ellingsworth, Alicia.....	38	Loewen, David.....	45
Ellsworth, Denise.....	40	Logan Smith, Kathleen.....	7
Emery, Marla.....	11, 24	Lovell, Sarah Taylor.....	2
Erwin, John.....	48	Marr, Charles.....	30
Favor, Judy.....	47	Martin, Sabine.....	6
Fochs, Mackenzie.....	44	McGee, Trequan.....	40
Frank, Matt.....	43	McKneight, Molly.....	3
Gao, Gary.....	40	McMahon, Rebecca.....	33

Mehrle, Donna	36	Roberts, Wayne	3
Mercer, Kristin	25	Rodriguez, Mary.....	21, 29
Meter, Ken	1	Rogers, Ginny.....	24
Meyer, Lani.....	45, 49	Rogers, Mary	27
Miernicki, Elizabeth.....	46	Schafer, Derek.....	14
Miller, Frannie	30	Schnoes, Helen.....	19
Mills Wasniak, Suzanne	40	Schweser, Greg	48
Mitnick, Vivian	37	Shoemaker, Candice	24, 39, 47
Moore, Aaron.....	28	Smith, Josh.....	15
Moore, Kelly.....	6	Sneed, Jeanine	37
Nachman, Keeve	11, 24	Swaney, Marianne.....	44
Neier, Evelyn.....	30	Swisher, Mickie.....	6
Nevison, Keith.....	44	Synk, Colleen.....	11, 24
Nwadike, Londa.....	10, 15, 37, 47	Teklehaimanot, Senait.....	12
Osborne, Amanda.....	10	Tien, Wendy.....	9
Oxley, Kimberly.....	5, 41, 47	Valentine Cadieux, Kirsten.....	27
Parker, Grace.....	44	Varel, Millicent.....	37
Penrose, Chris.....	40	Vaterlaus Patten, Emily.....	37
Perkus, Liz.....	48	Vatterott, Mellissa.....	7
Pliakoni, Eleni	22, 33, 39, 47, 48	Vipham, Jessie	3
Polansky, Billy.....	34	Wagstaff, Ross.....	4, 50
Pontes Chiebao, Helena ..	22,41,44, 48	Walrafen, Merideth.....	38
Prasad, Vara.....	3	Winterberger, Benjamin	8
Qiu, Tracy.....	44	Wittman, Hannah	25
Rak, Summer.....	11	Wofford, Alexandra.....	40
Rayl, Jacob.....	26	Wortman, Samuel.....	4, 46, 50
Rivard, Cary	5, 41, 45, 47, 49	Zhao, Xin.....	33
Roark, Tanner	17	Zuidema, Chris	11




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