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The Growing Together Project: Understanding impacts on field day attendees and Iowa Master Gardeners

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**The Growing Together Project: Understanding impacts on field day attendees and
Iowa Master Gardeners**

by

Laura Irish

A thesis submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Co-Majors: Horticulture; Sustainable Agriculture

Program of Study Committee:
Cynthia Haynes, Co-major Professor
Denny Schrock, Co-major Professor
Shannon Coleman

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2018

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DEDICATION

To Cory and my family

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ABSTRACT

Citizen science has been shown to be an effective tool for increasing data collection, as well as a great benefit to those who participate in the research project. The rising costs and limited funding for conducting large-scale research projects make citizen science projects valuable assets for researchers. Understanding the impact of citizen science projects on volunteers must be done to better engage with and retain the volunteers. The Growing Together project, a partnership between the ISU Extension and Outreach Master Gardener program and Human Sciences Extension, was created to increase food security in Iowa. The two major components of the partnership were the pantry donation gardens located at the ISU Home Demonstration Gardens and mini-grants. These components allowed Iowa residents and master gardeners opportunities to increase food security in their communities through either participating in a mini-grant or a Home Demonstration Garden in 2016 and 2017. Using both paper and electronic survey software, field day attendees and volunteers in Iowa were asked to respond to a series of questions investigating: 1) the perceptions of field day attendees about food security after participation in a Home Demonstration Garden, and 2) the effectiveness of citizen science training in increasing knowledge of data collection techniques of master gardener volunteers compared to untrained volunteers participating in the Growing Together projects. The information gained from these two studies will guide future coordinators of both the field days and citizen science trainings, while also providing a baseline for continued study of these volunteer and attendee groups.

CHAPTER 1. GENERAL INTRODUCTION

Food Security and Gardening

According to the United States Department of Agriculture (U.S. Dept. Agr.), food security is defined as always having access to foods that promote a healthful and active lifestyle. The department describes two levels of food security: high, which means always having access to foods that promote healthful and active life styles; and marginal, which means little or no change in diet, but the individual expresses worry over food sufficiency. In addition, the department describes two levels of food insecurity: low, which is characterized by reduced variety, quality, or desirability of food, with little or no reduction in food intake; and very low, includes disrupted eating patterns and/or reduced food intake (U.S. Dept. Agr. Economic Research Service, 2015b). In 2015, the U.S. Dept. Agr. Economic Research Service estimated that 13.7% of households in the U.S. were food insecure at some point during the year. The average food insecurity level in Iowa between 2013 and 2015 was 10.6% (U.S. Dept. Agr. Economic Research Service, 2015b). While Iowa ranks below the national average in food insecurity, annually more than 331,000, or about 1 in 9, Iowans face the problem.

Food insecurity is most prevalent in rural areas (U.S. Dept. Agr. Economic Research Service, 2015b). Food deserts play a critical role in the percentage of food-insecure people in rural communities (Gantner et al., 2011). A food desert is an area with low-income people who have limited access to sources of healthful foods, which includes distance to the nearest large supermarket or a lack of transportation, personal or public, to the healthful food source (Gantner et al., 2011; Mader and Busse, 2011; U.S. Dept. Agr.

Economic Research Service, 2015a). Food deserts in rural areas create a snowball effect. Those in rural areas, who lack access to nutritionally-sound foods, generally live further away from the nearest Supplemental Nutrition Assistance Program – Education (SNAP-Ed) or Women, Infants, and Children (WIC) distribution site. SNAP-Ed is a federal program that focuses on nutrition promotion and obesity prevention. WIC is a federally-funded, state-run program that provides increased food assistance and nutrition education to low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to children under the age of five (U.S. Dept. Agr. Food and Nutrition Service, 2016). The long distance that rural, food-insecure people must travel to obtain assistance makes it more likely that they will either forgo traveling that far to obtain assistance, or they physically have no means of getting there even if they would like to participate in the programs available (Bletzacker et al., 2009). In 2012, Iowa SNAP-Ed provided nutrition education courses and materials to 1,200 school-aged children in districts with over 50% free or reduced lunch programs, and sent surveys to 1,037 of their parents after the students' participation in the program. Parents reported a significant increase in the amount of fruits and vegetables that the children consumed after participation in the program (U.S. Dept. Agr., 2013).

Childhood obesity levels have been on the rise for multiple decades; since 1980 the rate of obesity in adolescence, children between 12-19 years old, has quadrupled (Centers for Disease Control and Prevention, 2015). Multiple studies of children have shown that those who participate in school gardens consume more fruits and vegetables than their control group peers who were not exposed to gardening activity (Mcaleese and Rankin, 2007; Meinen et al., 2012; Parmer et al., 2009). Working on changing childhood

behaviors regarding fresh fruit and vegetable consumption may decrease the likelihood of health issues both during their childhood and adult lives (Centers for Disease Control and Prevention, 2015). Researchers have found that education alone may not increase the amount of fruits and vegetables eaten, but physically working in gardens increases fruit and vegetable consumption (Baker et al., 2013; Carney et al., 2012; Eikenberry and Smith, 2004; Flanigan and Varma, 2006; Hamm and Bellows, 2003; Mcaleese and Rankin, 2007; Meinen et al., 2012; Parmer et al., 2009). While Parmer et al. (2009) did not work with adults, they found that children retained more knowledge on the benefits of fruits and vegetables when they were exposed to gardening than those that were just given lectures on the benefits of eating fresh fruits and vegetables.

Community gardens have been studied intensely in the past 15 years. Some studies indicate that increased exposure to fresh fruits and vegetables increases the overall health of the individual participating in the community garden. These health increases include higher levels of cardiovascular activity, decreased processed food consumption, and benefits to mental health (Carney et al., 2012; Centers for Disease Control and Prevention, 2010; Draper and Freedman, 2010; Mader and Busse, 2011; Meinen et al., 2012). Community gardens vary in design, intent, and function. Some invite anyone to garden and reap the benefits of gardening; others are gardened by a select few who donate the excess produce to local organizations. Regardless of the management of the community garden, excess produce donated to local organizations and community members benefits all those involved. Foods consumed soon after harvest have higher nutritional content than those that were shipped long distances and stored (Mader and Busse, 2011). School and community gardens contribute to increased consumption of

fresh fruits and vegetables by local community members (Langellotto and Gupta, 2012; Baker et al., 2013). Both types of gardens lessen the presence of food deserts by increasing access and affordability to healthful foods.

Citizen Science

The Cornell Lab of Ornithology, a leader in the field of citizen science, defines citizen science as “projects in which volunteers partner with scientists to answer real-world questions” (Citizen Science Central, 2018). Citizen science in the U.S. has been documented since 1990, and has focused primarily on phenology data collection (Silvertown, 2009). The number of citizen science projects has steadily increased in the U.S. in the last 20 years because of the cost-effectiveness in utilizing volunteers as data collectors (Brossard et al., 2005; Levrel et al., 2010). Both researchers and citizen scientists benefit from these projects (Mayer, 2010). The demographics of citizen scientists assisting in a seed preference test were older than 49 years of age, were well-educated, and interested in science (Trumbull et al., 2000). Volunteers who participate in citizen science projects often have an increase in subject-area knowledge, however in most reported studies participants did not exhibit an increase in understanding of general scientific processes (Kelling et al., 2015; Brossard et al., 2005; Starr et al., 2014; Trumbull et al., 2000). Some values of utilizing citizen scientists in research include increased data-collection, relatively inexpensive cost of volunteers as data collectors, quick dissemination of information, and potential engagement with a more vested volunteer (Aigner and Kuhar, 2014; Law et al., 2017). The expense of running a large-scale, sustained citizen science project may be cost prohibitive unless a continuous stream of funding is available (Bonney et al., 2009). Most citizen science projects focus

on phenology, because of the relatively low inputs needed to train the volunteers in identifying blooming times or other plant- and animal-related seasonal phenomena (Aceves-Bueno et al., 2017). Few citizen science projects focus on intensive or active participation methods (Aceves-Bueno et al., 2017; Law et al., 2017). The quality of the data collected by citizen scientists varies, primarily due to the effectiveness of the researchers in training the volunteers, and the implicit knowledge change of the volunteers before and during the research process (Bonney et al., 2009; Law et al., 2017; Mayer, 2010). Dr. Mark Schwartz, a professor of geology at the University of Wisconsin-Madison, told the USA National Phenology Network “that most of these [citizen scientists] can do a very good job of collecting data if they’re given clear instructions” (Mayer, 2010).

In-person trainings have been utilized in citizen science research programs and are normally considered an effective means of training volunteers (Crall et al., 2012). However, Starr et al. (2014) found that video trainings were just as effective in training volunteers in identifying invasive species as in-person trainings. Bonney et al. (2009) have outlined general recommendations for training citizen science volunteers, with the recommendations varying based on the scale of the projects. However, all trainings must be carefully thought-out and provide all the necessary support for the citizen scientists to successfully collect the research data both during and after the trainings (Bonney et al., 2009; Mayer, 2010). Shrestha et al. (2004) cited that transportation issues were the largest issue faced by many volunteers residing in rural areas. As with all research projects, barriers must be preemptively solved and emerging barriers must be promptly addressed (O’Brien et al., 2008). O’Brien et al. (2008) found that getting involved and staying

involved in volunteering are the two major categories of barriers. To address these major categories of barriers, O'Brien et al. (2008) suggests working with community partners to increase awareness of volunteering opportunities and giving feedback on the achievements made by the volunteers after participating in the project. For a successful citizen science project, strong partnerships paired with effective training programs and measureable outcomes should be created (Dalglish, 2006).

Master gardeners collected research data as citizen scientists in Iowa and Minnesota through a multi-state collaborative project involving biochar (Cenusa bioenergy, 2018). These master gardeners recorded both qualitative and quantitative data pertaining to the seven garden plots in Iowa and Minnesota (FarmEnergy, 2014), including plant growth measurements and soil sampling (Miller, 2015). Collecting plant growth data is more intensive than many phenology-related research projects. This biochar project highlights how properly trained master gardener volunteers are reliable data collectors.

Master Gardener Program

The Extension Master Gardener program is an international program that began in Washington in 1972. The program exists in all 50 states and the District of Columbia. In 2016, nationally there were over 88,950 active Extension Master Gardeners. The original purpose of Extension Master Gardener was to address the needs of the increasing number of suburban households. As the program expanded, the focus of the Extension Master Gardeners broadened to include activities such as: educating in community gardens, controlling invasive species, establishing public demonstration gardens, and teaching youth, elder, and at-risk audiences (Extension, 2010).

The Iowa Master Gardener program has trained over 14,000 volunteers in the past 39 years. By providing current, research-based, home horticulture information and education to Iowa citizens, the program has influenced more than 90 counties in Iowa. In 2017, Takle et al. found that the demographics of Iowa Master Gardeners were majority white, greater than 45 years of age, and moderately wealthy. Takle et al. (2016) also found that master gardeners in Iowa participated in the program to increase their knowledge of horticulture and for altruistic reasons. The demographics and reasons for joining the master gardener programs in Texas and Missouri mirror what Takle et al. found in Iowa (Schrock et al., 1999; Schrock et al., 2000; Waliczek et al., 2002).

Iowa Master Gardener volunteers must complete 20 hours of volunteer services and attend at least 10 hours of continuing education to remain active in the program after their initial intern year (Master Gardener Program, 2018). Master gardener interns must complete 40 hours of volunteer service and participate in 40 hours of core training in their first year. Interns may be more involved in the Growing Together project due to their increased exposure to the food-security trainings given during the 2016 and 2017 winter-webinar series, and/or due to their increased volunteer hour requirement.

Demonstration Gardens

Demonstration gardens have been used by extension programs for a wide range of reasons, including as a training location for research projects (Glen et al., 2013). These gardens have been utilized to increase learning of community members, as well as change attitudes regarding various subject areas (Harmon and Jones, 1997). Since 1977, Home Demonstration Gardens have been planted at various Iowa State University (ISU) Research and Demonstration Farms. All of the gardens are planted with the same crops in

approximately a 40' by 80' area. These gardens, primarily located in rural areas, have focused on showcasing new cultivars of edible and ornamental crops to the public. Objectives also include growing the same crops at different locations, with varying soil types and climates, to determine if the cultivars perform equally well across the state. The theme of the 2016 and 2017 Home Demonstration Gardens was food pantry donation gardening. As part of the SNAP-Ed and Iowa Master Gardener partnership (discussed below), master gardeners volunteered to collect cultivar yield data on various vegetable and fruit species at the Home Demonstration Gardens in both 2016 and 2017.

Field Days

According to Practical Farmers of Iowa, field days are events where farmers “come together to share details of on-farm research and demonstration and learn from each other in a spirit of openness and curiosity” (Field Days, 2018). The purpose of field days is to increase dissemination of research, and hopefully elicit adoptions of new practices by increasing knowledge of the participants (Comito et al., 2017). The Porter Farm in Texas is cited as one of the first cooperative farm demonstration sites in U. S., and since its inception in 1903, many more demonstration farms have been created to showcase new farming methods (Kozlowski, 2010). Franz et al. (2010) found that farmers in Louisiana, Tennessee, and Virginia prefer to learn through hands-on experiences, demonstrations, farm visits, and field days, whereas Extension agents perceived that farmers preferred farm visits, one-on-one interactions, demonstrations, and field days. Strong et al. (2010) also confirm that cattlemen in Florida prefer hands-on teaching strategies over traditional teaching methods. Farmer-to-farmer interactions produce higher rates of adoption of techniques showcased at field days than field days

without an interactive component (Comito et al., 2018; DeJong-Hughes et al., 2011; Franz et al., 2010; Strong et al., 2010). Successful field days should include a combination of demonstrations, static displays, presentation by researchers, and a panel of farmers who are experienced in the area or practice (DeJong-Hughes et al., 2011). The field day success loop model has six major sections that, when all incorporated, extend the impact of field days: 1) attends field day, 2) gains support and knowledge, 3) increases confidence, 4) adopts conservation, 5) networks with others, and 6) increases influence (Comito et al., 2018). Previous research has shown that increased interactions among attendees increases knowledge gain, while increasing participation in field days in subsequent years (Comito et al., 2017). Eliciting behavior change occurs from farmers influencing other farmers, rather than the information presented at the field day (Dillman et al., 1989).

The majority of field day attendees identify as white, moderately wealthy, male, and over the age of 45 (Comito et al., 2018; Diehl et al., 2012; Stivers, 2016). Many field day attendees prefer word-of-mouth, newspaper ads, and promotional flyers as forms of publicity (Comito et al., 2018). Researchers of field days have found success in increasing knowledge of the attendees after participation in a field day (Diehl et al., 2012; Stivers, 2016).

Growing Together: Healthy Food Access Project

The Growing Together: healthy Food Access Project is a collaborative extension project between the Iowa State University Extension and Outreach Master Gardener program and the Human Sciences Extension staff (Growing Together, 2018). SNAP-Ed is a federal program that focuses on nutrition promotion and obesity prevention. In Iowa,

monies from SNAP-Ed funded Home Demonstration Gardens and mini-grants. This has allowed Iowa residents and master gardeners opportunities to increase food security in their communities through either participating in a mini-grant project or Home Demonstration Garden. In 2016 and 2017, the project donated over 147,000 pounds of fresh produce to local food pantries for Iowans in need. The work of Iowa Master Gardeners participating in these projects and acting as citizen scientists were presented at annual field days at each of the Home Demonstration Gardens in the summer.

Objectives

The overall goal of this project is to determine the impact of pantry gardens and field days on knowledge and behavior changes of attendees and volunteers in Iowa. To accomplish this goal, there are two main objectives of this study. The first objective is to identify the knowledge change and donation intentions of field day attendees. By identifying the change in knowledge of attendees, field day coordinators may be more effective in providing information during the field days, and the coordinators may also use this information to better lay out the field days to increase adoption of new techniques. By identifying donation intentions of the field day attendees, coordinators may quantify the pre-action impacts that their field days have on the change in behavior of attendees i.e. their likelihood to donate more produce to local food pantries.

The second objective examines the differences in ability to identify research bias and the barriers faced by master gardeners working as citizen scientists in the Growing Together project. By evaluating the differences between master gardeners who actively participated in a Home Demonstration Garden research project versus the master gardener mini-grant recipients who collected data on total pounds donated to food

pantries, extension educators will be able to easily identify the effectiveness of their research trainings on data collection and food safety.

CHAPTER 2. KNOWLEDGE CHANGE AND DONATION INTENTIONS OF FIELD DAY ATTENDEES

A paper to be submitted to *HortTechnology*

Laura Irish, Cynthia Haynes, Denny Schrock

Abstract

Participation in field days increases adoption of new techniques and fosters learning. Since 1977, the Iowa State University (ISU) Department of Horticulture has hosted several Home Demonstration Garden field days at ISU research farms to educate consumers on best practices and cultivars for growing annual flowers and vegetables. Each year gardens are planted at the farms and feature a specific topic or theme. In 2016 and 2017, twelve Home Demonstration Garden field days were hosted in July or August. The objective of these field days was to showcase cultivars of vegetables that are in demand at food pantries, and that home gardeners could grow easily for donation. In addition to showcasing crops, presentations were delivered that focused on food-insecurity implications in Iowa and how community members could impact food security locally. Of more than 400 field-day attendees in 2016 and 350 attendees in 2017, 151 (60.2%) and 140 (40%) respectively, participated in an optional survey at the end of the day, respectively. Participants reflected on their food security knowledge and intentions to donate fresh produce before or after participation in the field day. Slightly more than a third (39.53% and 37.12%) of attendees reported some increase in food-security knowledge after participation. In addition, 85% (2016) and 72.5% (2017) of respondents reported that they will, or would consider, donating fresh produce to a local pantry after participation in this field day, an increase of more than 40% from previous donation

patterns in both years. Results from this study are being used to focus future programming of the Home Demonstration Garden field days and content of the field days' surveys.

Introduction

Food insecurity, defined by the U.S. Dept. Agr. as not always having access to foods that promote a healthful and active lifestyle, affected over 331,000 Iowans annually between 2013 and 2015 (U.S. Dept. Agr. Economic Research Service, 2017). Food insecurity is most prevalent in rural areas compared both to urban and suburban areas of the country (U.S. Dept. Agr. Economic Research Service, 2017). Decreasing the prevalence of food insecurity is a paramount issue for Iowans. One way for community members to engage with food-security projects is by participating in a produce-donation project, such as Plant a Row for the Hungry (GWA, 2018).

In addition to physically gardening as a means of increasing awareness of food security, field days have been shown to increase the dissemination of information, as well as elicit adoption of new strategies or practices after the field days conclude (Diehl et al., 2012; Stivers, 2016). The purpose of field days is to showcase or demonstrate specific practices to attendees (Shepard, 2001). Across the United States, those who participate in field days have identified as predominately male, moderately wealthy, from rural locations, and over the age of 45 (Comito et al., 2018; Diehl et al., 2012; Stivers, 2016).

A pilot partnership between the Supplemental Nutrition Assistance Program – Education (SNAP-Ed) and the Iowa Master Gardener program was created to address hunger in Iowa by increasing access of fresh produce to those who are food insecure. One aspect of the SNAP-ED and Iowa Master Gardener research project partnership focused

on donation gardening and how this partnership can increase awareness of food security in Iowa.

The Iowa State University (ISU) Research and Demonstration Farms hosted six Home Demonstration Garden field days in 2016 and 2017. The Home Demonstration Gardens were started in 1977, and have focused on showcasing new cultivars of edible and ornamental crops. Annually, over 300 community members attend these field days in Iowa. The theme of the 2016 and 2017 Home Demonstration Gardens was food pantry donation gardening, and as a result the gardens were planted with cultivars of common vegetables and fruits that were expressly wanted by Iowa food pantries (Hradek, 2015).

No data previously exist on the change in knowledge or demographics of the Home Demonstration Garden field day attendees. The objectives of this study were to identify the demographics of field day attendees and their change in knowledge and change in comfort in discussing food security with those who are food insecure. This information will allow for field day coordinators to better cater their promotion of field days and increase food-security promoting projects in Iowa.

Methodology

Survey instrument development

During 2016 and 2017, the focus of the ISU Home Demonstration Gardens was on growing crops desired for donation by food pantries. The primary objectives of these surveys were to determine relative knowledge gain about food security and change in comfort level of discussing food security in Iowa after participation in one of twelve Home Demonstration Garden field days. A secondary objective was to analyze correlations between demographics and patterns of donation of fresh produce to pantries.

The data collected will influence how food-insecurity information is presented and how community members can increase pounds of donations of fresh produce to local pantries.

Survey instruments were developed in June 2016 and June 2017. The research project was reviewed and determined exempt through Iowa State University's Institutional Review Board (IRB 16-302 and IRB 17-255) before survey distribution. Survey and research professionals reviewed survey instruments for content.

2016 survey

The first-year (2016) survey consisted of 15 questions: 12 closed-ended and three open-ended. Two questions addressed the primary objective. These questions were based on a 4-point scale ranging from “none” to “a lot.”

Two questions addressed the secondary objective: previous donation and projected donation of produce to a food pantry. The response options were “yes,” “no,” and “maybe.” Two questions were used to identify how the attendees heard about the field day and if attendees were aware of food pantries in the area. Nine demographic questions were also included in the survey.

2017 survey

Minor changes were made to the second-year (2017) survey to improve clarity and to expand on the newly added edible flower theme of the Home Demonstration Garden. The second-year survey consisted of 21 questions: 17 closed-ended and four open-ended. The same two questions from the 2016 survey were used to address the primary objective.

Four questions addressed the secondary objective. Two used a 4-point scale of “none” to “a lot”; one was open-ended; and the fourth used a 4-point scale ranging from “not at all likely” to “very likely.” Three questions were used to identify how the

attendees heard about the field day, if attendees were aware of food pantries in the area, and if they planned to grow cultivars from the Home Demonstration Garden in their own gardens next year. Two questions, using a 4-point scale from “none” to “a lot,” were used to identify if the attendees had a change in comfort or knowledge about edible flowers. Ten demographic questions served as controls for the six primary and secondary questions.

Data Collection

Printed surveys and consent forms were administered to attendees after field-day presentations at the six Home Demonstration Gardens on 19 and 28 July 2016; 2, 4, 6, and 9 Aug. 2016; 18 and 20 July 2017; and 1, 2, 3, and 5 Aug. 2017. Field-day attendees voluntarily completed the surveys and could skip any questions. Two envelopes were used to separate consent forms and surveys to keep identities of the attendees anonymous. Of the 400 attendees in 2016, 151 completed the survey. Of the 350 attendees in 2017, 140 completed the survey. According to standards established by the American Association of Public Opinion Research the response rates were 60.2% and 40%, respectively (AAPOR, 2008).

Data Analysis

Data were coded in Excel (Office 365, Microsoft Corporation, Redmond, WA) and analyzed with the SAS software package (version 9.4; SAS, Cary, NC). Data addressing knowledge gain and comfort change about food security were analyzed with χ^2 and Wilcoxon sign rank tests. Data on pantry donations were analyzed using χ^2 to determine interactions among the donation and demographic questions. The “yes” and

“maybe” responses about donation patterns were combined in 2016. The 2017 question related to food-security activities was coded and then grouped into three emergent themes according to Saldana’s (2013) process for themeing (sic) data. Frequencies were used to represent all demographic data and the food-security activity data. Cronbach’s alpha scores of 0.77 and 0.80 were found for 2016 and 2017, respectively.

Results

Demographics

The survey results presented in Table 1 show that Home Demonstration Garden field day attendees both years were predominately female (63.51% and 60.61%), white (95.83% and 96.15%), and above 64 years of age (58.51% and 57.78%). Most of the attendees (61.23% and 66.42%) were from rural communities, populations of <2,500 people, and lived in two family households (59.73% and 66.42%). The median annual income in both 2016 and 2017 was between \$50,000 and \$74,999. The demographic questions indicate that most field-day attendees identified as white, greater than 45 years of age, and moderately wealthy, similar to the demographics of master gardeners in Iowa and Missouri (Schrock et al., 1999; Takle et al., 2017).

The majority of field day attendees had a fruit/vegetable garden at home (81.88% and 88.57%) (Table 2). Only 16% of attendees in 2016 reported being a master gardener, while 42.03% in 2017 identified as a master gardener. Over 90% of attendees in 2016 indicated that there were 0-5 pantries within 20 miles of their homes, while only 81.29% in 2017 indicated 0-5 pantries near their homes. In 2017, more than 29% of the attendees responded that they had never attended a field day before. Most of the attendees learned

about the field day through personal contact with a friend, family member, master gardener, or garden club member.

Knowledge Gain

By using Wilcoxon sign rank tests, we found that participation in these field days increased participants' knowledge of food security both in 2016 and 2017 ($S < 0.0001$). In 2016 and 2017, over one-third of the participants (39.53% and 37.12%, respectively) indicated that they had an increase in knowledge about food security (Table 3). The mean score for knowledge of food security (3.53) was greater in 2016, while 2017 showed lower means before and after the field day with an overall smaller change between the means. More than 80% of attendees in both years indicated that they knew somewhat to a lot about food security after participating in the field days.

In 2017 knowledge of edible flowers was also measured (Table 3). Results from a Wilcoxon sign rank test indicate that field day attendees' knowledge increased after participation in the field days ($S < 0.0001$). The mean increased by 0.94, indicating that the attendees had some knowledge of edible flowers after the field day.

Comfort Change

A Wilcoxon sign rank test found a difference between attendees' comfort in discussing food security with those who are food insecure both in 2016 and 2017 (Table 4) ($S < 0.0001$). The means of attendees' comfort with discussing food security with those who are food insecure increased from 2.67 to 3.13 and 2.39 to 2.85 in 2016 and 2017, respectively. More than 89% of attendees in 2016 and 70% of attendees in 2017 indicated they had some to a lot of comfort in discussing food security.

In 2017 comfort in discussing edible flowers with others was also measured (Table 4). Results from a Wilcoxon sign rank test indicate that field day attendees' comfort increased after participation in the field days ($S < 0.0001$). The mean increased by 1.02, indicating that the attendees went from having very little comfort to some comfort in discussing edible flowers.

Donation Pattern

For 2016, a χ^2 test found an interaction between status as a master gardener at an ISU Home Demonstration Garden and future intention to donate produce to a food pantry ($P < 0.0285$) (Table 5). The same year over 56% of master gardeners reported donating to food pantries before participating in the field days, while 37% of non-master gardeners donated. No interactions between being a master gardener and donation were found in 2017. However, nearly 80% of master gardeners intended to donate fresh produce to a local pantry, with only 69% of non-master gardeners indicating donation intentions afterward. Non-master gardeners with gardens were more likely than non-master gardeners without gardens to have donated fresh produce to a pantry prior to the field days ($P < 0.0444$).

In 2016, more than 50% of males and 35% of females donated produce to food pantries before the field day, with both groups increasing their overall intentions of donating fresh produce in the future (83.02% and 87.91%, respectively) (Table 6). Donation intentions more than doubled both in males and females in 2017.

Having a fruit or vegetable garden at home did not interact with donation patterns in 2016 (Table 6). In 2017, attendees with gardens were more likely to have donated

produce in the past than attendees without a garden ($P<0.0094$). Intentions to donate more than doubled for those with or without a garden at home.

Attendees who identified more than 5 pantries within 20 miles of their homes were more likely to have donated fresh produce to a pantry in 2016 than those who identified only 0-5 pantries in that distance (Table 6). No differences between number of pantries and donation patterns were found in 2017.

No interaction between age and donation patterns was found either in 2016 or 2017. Donation intentions nearly doubled both in 2016 and 2017 for attendees over 65 years of age.

An interaction between area of residence and future donation intentions also existed in 2016 (Table 6) ($P<0.0429$), while no interaction existed between area of residence and past donation patterns. No differences in donation intention by area of residence were found in 2017, however participants in each area of residence indicated increased donation intentions, ranging from 28% to 44%.

Activities

In 2017, field day attendees were asked about activities they could engage in to increase food security in their communities (data not reported). The mean likelihood of participants indicating working at/with a pantry or donating produce to a pantry was 3.38, which was 0.15 and 0.34 points higher than engaging in education-related activities and gardening activities, respectively. The majority (55.17%) indicated intentions to work with a pantry, while less than a quarter (22.41%) responded with education-related activities as actions they could engage in to increase food-security.

Discussion

Demographics

Overall, the demographics of the Home Demonstration Garden field day participants differed greatly from other field day attendee demographic reports (Comito et al., 2018; Diehl et al., 2012; Stivers, 2016). Attendees of the Home Demonstration Garden field days were overwhelmingly female and over the age of 65, which differs from the prevailingly male-dominated presence at field days (Comito et al., 2018; Stivers, 2016). Similar to the demographics of field day attendees in Iowa, Home Demonstration Garden attendees were white, moderately wealthy, and preferred word-of-mouth, newspaper ads, and promotional flyers as forms of publicity (Comito et al., 2018).

Knowledge Gain

The percentage of the field day attendees who learned something about food security-related issues in Iowa indicates that the field days were an effective technique in educating the public. Other researchers with similar styles of field days have shown success in increasing knowledge for the attendees (Diehl et al., 2012; Stivers, 2016). Similar to the field day success loop (Comito et al., 2017), the success of the Home Demonstration Garden field days was due to the attendees hearing and seeing simple practices on increasing food-security and having the opportunity to discuss with others currently involved in the Home Demonstration Garden project. The smaller change in knowledge gain in 2017 compared to 2016 may have occurred because the 2017 attendees attended the 2016 field days, or that the attendees had a higher level of knowledge prior to attending the field days than the 2016 attendees. The 2017 attendees may also have previously volunteered at or donated produce to a food pantry in their

community, which would explain the smaller change in knowledge. As a statewide initiative in both 2016 and 2017, master gardener trainings focused on food-security. The higher percentage of master gardeners who completed the surveys in 2017 may have had increased exposure to food security-related education outside of the field days than the master gardeners in 2016.

The inclusion of edible flowers in 2017 was to engage community members who are not focused on vegetable gardening. By potentially attracting a more varied demographic of gardeners, we hoped to use the field day to influence more people to learn about food-security and how they could influence it in Iowa. However, little change in demographics of field day attendees was found.

Comfort Change

Allen et al. (2017) found an increase in comfort in teaching after participation in a one-day workshop, which aligns with the field day attendees' increase in comfort discussing food security with those who are food insecure. The comfort level of attendees in discussing food security with those who are food insecure increased both in 2016 and 2017, which suggests that the attendees had more knowledge on the subject and were more able to communicate about food security because of their participation in the Home Demonstration Garden field day. Discussion of food security with those who are food insecure adds a layer of complexity. Attendees may have had an increase in comfort in discussing food security, however they may not have had an increase in comfort in discussing food security with those who are food insecure. In 2016 and 2017, respectively, 60% and 62% of respondents reported no increase in comfort in discussing food security with those who are food insecure (data not reported).

The drastic increase in comfort of discussing edible flowers highlights the importance of utilizing various techniques to increase learning about food security for a wide-variety of community members.

Donation Pattern

Blaine et al. (2010) found that 32% of community gardeners in Cleveland, Ohio donated produce to food banks and shelters, which is lower than the 41.06% of field day attendees who had donated to food pantries before the Home Demonstration Garden field day. The only demographic questions that interacted with donation intention in 2016 were identifying more than five pantries within 20 miles of the participant's home, living in a rural or suburban location and status as a master gardener. In 2017 having a garden was the only demographic factor that interacted with donation intention. The increased number of nearby pantries directly relates to donation history, which means that the limited number of pantries will not hinder field day attendees from potentially donating fresh produce in the future. The interaction between place of residence and donation may have occurred due to the location of the Home Demonstration Gardens. These gardens were located in rural areas prior to this project, so more rural residents were indirectly targeted. Iowa Master Gardeners are required to complete 10 hours of continuing education annually. Six hours of food security-related webinars were recorded and released for master gardeners to watch before the 2016 field season as an option for a portion of their continuing education requirement. The webinars may have influenced the donation intentions of master gardeners, which partially explains why being a master gardener interacted with donation patterns. This increase in master gardeners intending to

donate fresh produce may have carried over into the 2017 season, so no interaction was found between their intentions to donate.

There was a 44% increase, from 41% to 85%, of respondents who intended to donate fresh produce in 2016. Having a vegetable garden did not affect whether attendees donated to food pantries before the field days in 2016, which suggests that attendees donated items that are not grown from their own garden. In 2017, we found that attendees who identified as having a fruit/vegetable garden had been more likely to donate produce prior to the field days. The intention to donate indicates that the field days were effective in educating the public about pantry gardens, that food pantries in their area accept fresh produce, and the importance of contributing to food security in their local communities.

Activities

While only 40% of the attendees completed both questions related to food-security activities, we found that those who identified activities they could engage in were more likely to intend to engage in activities surrounding donating to a pantry or volunteering at a food pantry. The intentions of the attendees on educating others about food security or growing a personal/community donation-garden were lower than food pantry-related activities. This suggests that the attendees more heavily sway toward altruistic motives, which aligns closely with the motivations of Iowa Master Gardeners previously reported (Takle et al., 2016).

We achieved the original goals of determining if participation in a Home Demonstration Garden field day increases knowledge and comfort in discussing food security, as well as identifying which demographics influence pantry donation intentions. This study highlights the importance of surveying knowledge and intentions after

participating in a field day. While a limitation of this study was not having a strong gardener-to-gardener connection during the field days, future programming can be altered to improve the layout of the field day discussions (Comito et al., 2017). Researchers and field day coordinators may use these findings to generate surveys to measure knowledge and impact in food security-related fields, to better engage with food pantries in the communities surrounding the Home Demonstration Gardens, and focus on collecting post-field day donation adoption data to further explain the influence of the field days.

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Table 1. Frequency and percentage of age, area of residence, race, gender, household number, and income of Home Demonstration Garden field day attendees.

	2016		2017	
	Frequency	Percent	Frequency	Percent
Age				
18-24	6	04.08%	3	02.22%
25-34	7	04.76%	7	05.18%
35-44	11	07.48%	2	01.48%
45-54	3	02.04%	9	06.67%
55-64	34	23.13%	36	26.67%
65+	86	58.51%	78	57.78%
Area of residence				
Rural	90	61.23%	89	66.42%
Suburban	44	29.93%	20	14.92%
Urban	13	08.84%	25	18.66%
Race				
White	138	95.83%	125	96.15%
Black	1	00.70%	1	00.77%
Hispanic	2	01.39%	0	00.00%
Other	3	02.08%	4	03.08%
Gender				
Male	54	36.49%	52	39.39%
Female	94	63.51%	80	60.61%

Table 1 continued

Household number

1	30	20.13%	26	19.40%
2	89	59.73%	89	66.42%
3	14	09.40%	11	08.21%
4	8	05.37%	3	02.24%
5+	8	05.37%	5	03.73%

Income

<25,000	5	04.46%	13	11.11%
25-34,999	17	15.18%	23	19.66%
35-49,999	16	14.29%	19	16.24%
50-74,999	25	22.32%	22	18.80%
75-99,999	21	18.75%	19	16.24%
100-149,999	22	19.64%	12	10.26%
150,000+	6	05.36%	9	07.69%

Table 2. Frequency and percentage of master gardener status, having a fruit/vegetable garden, prior field day attendance, referral method, and number of pantries identified by Home Demonstration Garden field day attendees in 2016 and 2017.

	2016		2017	
	Frequency	Percent	Frequency	Percent
Master Gardener				
Yes	24	16.00%	58	42.03%
No	126	84.00%	80	57.97%
Home Garden				
Yes	122	81.88%	124	88.57%
No	27	18.12%	16	11.43%
Field Day Attendance				
0	---	-----	39	29.10%
1-2	75	51.02%	37	27.61%
3-4	27	18.37%	20	14.93%
5+	45	30.61%	38	28.36%

Table 2 continued

Referred by

friend or family	40	22.60%	28	17.18%
promo /flyer	33	18.64%	27	16.56%
radio or news	18	10.17%	13	07.98%
Newspaper	30	16.95%	31	19.02%
social media/website	12	06.78%	10	06.13%
Other	44	24.86%	54	33.13%

Pantries in Area

0-5	133	90.48%	113	81.29%
6-10	10	06.80%	23	16.55%
11-15	3	02.04%	3	02.16%
16+	1	00.68%	0	00.00%

Table 3. Percentages and means of knowledge change of field day attendees regarding food security and edible flowers in 2016 and 2017.

	Knowledge Food Security				Knowledge Edible Flowers	
	2017		2016		2017	
	Before	After	Before	After	Before	After
N	137	135	139	131	140	135
none	14.6%	1.5%	10.1%	0.0%	32.86%	03.70%
very little	25.5%	13.3%	18.0%	0.8%	37.14%	15.56%
somewhat	46.0%	60.0%	48.9%	45.0%	21.43%	57.78%
a lot	13.9%	24.4%	23.0%	54.2%	08.57%	22.96%
Mean*	2.59a	3.07b	2.85a	3.53b	2.06a	3.00b

Letters indicate significant difference at $S < 0.0001$ within paired columns

*Based on a 4-point scale from none to a lot

Table 4. Percentages and means of comfort change of field day attendees regarding food security and edible flowers in 2016 and 2017.

	Comfort Food Security				Comfort Edible Flowers	
	2017		2016		2017	
	Before	After	Before	After	Before	After
N	135	134	138	128	139	135
none	17.0%	3.0%	11.6%	2.3%	29.50%	01.48%
very little	37.8%	26.1%	22.5%	8.6%	47.48%	19.26%
somewhat	34.1%	53.7%	53.6%	62.5%	19.42%	58.52%
a lot	11.1%	17.2%	12.3%	26.6%	03.60%	20.74%
Mean*	2.39a	2.85b	2.67a	3.13b	1.97a	2.99b

Letters indicate significant difference at $S < 0.0001$ within paired columns

*Based on a 4-point scale from none to a lot

Table 5. Frequencies and percentages of food pantry donation patterns for master gardeners and non-master gardeners.

	2016			2017		
	Frequency	Past	Future	Frequency	Past	Future
Master Gardener Status						
Master Gardener	23	56.52%	100.0%a	54	40.74%	79.63%
Non-Master Gardener	124	37.90%	80.65%b	68	27.94%	69.12%
Master Gardeners						
Garden	21	61.90%	100.0%	52	44.23%	80.77%
No garden	2	00.00%	100.0%	4	00.00%	75.00%
Non-Master Gardeners						
Garden	99	39.39%	83.84%	62	32.26%a	69.35%
No garden	25	32.00%	68.00%	9	00.00%b	44.44%

Letters indicate significant difference at $P<0.0285$ and $P<0.0444$ within groups

Table 6. Frequencies and percentages of food pantry donation patterns based on gender, garden, number of nearby pantries, age, and area of residence.

	2016			2017		
	Frequency	Past	Future	Frequency	Past	Future
Gender						
Male	53	50.94%	83.02%	51	35.29%	78.43%
Female	91	35.16%	87.91%	72	30.56%	69.44%
Garden						
Yes	120	43.33%	86.67%	110	37.27%a	75.00%
No	26	30.77%	76.92%	12	00.00%b	46.15%
Pantries in Area						
0-5	131	36.64%a	85.50%	102	32.35%	69.61%
6-10	9	66.67%b	66.67%	23	36.13%	86.96%
11-15	3	100.00%b	100.0%	3	00.00%	66.67%
16+	1	100.00%b	100.0%	---	-----	-----

Table 6 continued

Age

18-24	6	00.00%	100%	3	00.00%	100.0%
25-34	7	28.57%	100%	5	00.00%	80.00%
35-44	11	36.36%	100%	2	50.00%	100.0%
45-54	3	66.67%	100%	8	12.50%	87.50%
55-64	34	35.29%	91.18%	33	36.36%	66.67%
65+	82	43.90%	76.83%	73	36.99%	72.60%

Area of residence

Rural	89	38.20%	82.02%a	83	30.12%	74.70%
Suburban	41	41.46%	95.12%a	19	36.84%	63.16%
Urban	13	46.15%	69.23%b	22	40.91%	81.82%

Letters indicate significant difference at $P < 0.0094$, $P < 0.0261$, and $P < 0.0429$ within group

CHAPTER 3. MASTER GARDENERS AS CITIZEN SCIENTISTS: THE IMPORTANCE OF TRAINING AND OVERCOMING PERCEIVED BARRIERS

A paper to be submitted to *HortTechnology*

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Abstract

In 2016 and 2017, six surveys were administered to Iowa Master Gardener volunteers who were participating in SNAP-Ed funded food-security projects. The primary purposes of the surveys were to identify the knowledge change and effectiveness as citizen scientists of the master gardener volunteers. The majority of volunteers who participated in the Growing Together project self-reported an increase in science-, communication-, and food pantry-related knowledge. Those who volunteered specifically at a Home Demonstration Garden proved to be effective citizen scientists as participation in citizen science trainings increased understanding of research techniques. An increase in Iowa Master Gardener participation in food-security projects should be considered because increased participation would have a greater impact on increasing food security across Iowa. Results from this study are being used to focus future training programs, specifically in quantifying the scientific process-related appreciation of master gardener volunteers before and after participating in an intensive data-collection research project.

Introduction

Cornell Lab of Ornithology defines citizen science as “projects in which volunteers partner with scientists to answer real-world questions” (Citizen Science Central, 2018). The number of citizen science projects has been steadily rising in the

United States in the last 20 years. Participation in citizen science projects has been shown several times to increase volunteer knowledge in a specific subject area, however no increase in the understanding of general scientific processes by participants have been found (Kelling et al., 2015; Brossand et al., 2012; Starr et al., 2014; Trumbull et al., 2000). There are several benefits to utilizing citizen scientists in research, including increased data-collection, relatively inexpensive cost of volunteers as data collectors, quick dissemination of information, and potential engagement with a more vested volunteer (Aigner and Kuhar, 2014; Law et al., 2017). These benefits are often realized in large projects that require citizens to complete simple tasks such as identifying and recording occurrence of certain species or weather related events. These citizen science projects often focus on phenology and have been successful for several decades in recording changes in migratory patterns, invasive species habitats, and climate change. The relatively low inputs needed to train the volunteers in identifying blooming times or other plant- and animal-related seasonal phenomena may be one reason these projects are successful (Aceves-Bueno et al., 2017). Few citizen science projects focus on intensive or active participation methods (Aceves-Bueno et al., 2017; Law et al., 2017). Law et al. (2017) noted that the quality of the data collected by citizen scientists varies. They concluded that this variability was due to the effectiveness of the researchers in training the volunteers and the implicit knowledge change of the volunteers before and during the research process. Therefore, if the training sessions were thorough enough to cover data collection procedures and expectations, and support was available when needed, then more complicated or intensive data collection tasks should be possible with an interested and vested group of volunteers.

Master Gardener volunteers are one such audience that might be engaged and willing to collect such intensive data as citizen scientists. This assumes that the project would be educational, garden-related, and impactful in their communities—all are essential aspects of any master gardener project. One such project is the partnership between the Supplemental Nutrition Assistance Program – Education (SNAP-Ed) and the Iowa Master Gardener program to address hunger in Iowa by increasing access of fresh produce to those who are food insecure. This partnership funded several Home Demonstration Gardens and mini-grant projects throughout Iowa.

Home Demonstration Gardens have been planted at some of the Iowa State University (ISU) Research and Demonstration Farms since 1977. These gardens, located in rural areas, have focused on showcasing new cultivars of edible and ornamental crops to the public. The theme of the 2016 and 2017 Home Demonstration Gardens was food pantry donation gardening. As part of the SNAP-Ed and Iowa Master Gardener partnership, master gardeners volunteered to collect data on cultivar yield of various vegetable and fruit species at the Home Demonstration Gardens in both 2016 and 2017.

Mini-grants were awarded from the SNAP-Ed funding to individual Iowa Master Gardeners in 2016, and to Iowa county Extension programs with master gardener involvement in 2017. The mini-grant recipients had to demonstrate that they were increasing pounds of produce going to the local pantry systems by either growing produce gardens or connecting growers to the food pantries.

The objectives of this study were to compare the knowledge change and effectiveness as citizen scientists between master gardener volunteers who actively participated in a Home Demonstration Garden research project versus the master

gardener mini-grant recipients who collected data on total pounds donated to food pantries. Secondary objectives included determining the food-security level of the volunteers, identifying the barriers they faced working on this project, and discovering the comfort levels of the volunteers in discussing food security.

Methodology

Survey instrument development

In 2016 and 2017, Iowa Master Gardeners participated in the Growing Together project through either volunteering at one of the Home Demonstration Gardens or in managing a mini-grant project to increase food-security in their local communities. Master gardeners who volunteered at a Home Demonstration Garden were given a 2-hour training on food safety and data collection before the field season in 2016 and again in 2017. Master gardeners involved in mini-grant projects were not required to participate in the in-person trainings. The primary objectives of these surveys were to compare knowledge change and effectiveness as citizen scientists between master gardener volunteers at the Home Demonstration Gardens and master gardeners who were involved with mini-grants. The secondary objectives of these surveys were to determine if master gardeners working on food-security projects were considered food-insecure in the past year, identify any barriers/challenges they faced while working on the project, and determine their comfort levels in discussing food-security as a result of the project. The data collected will influence how future master gardener citizen scientist trainings are given and how researchers will involve master gardeners in food security-related research.

Survey instruments were developed in June 2016 and June 2017. Iowa Master Gardeners were surveyed using instruments created in Qualtrics Survey Software (July 2016 and July 2017; Provo, Utah, USA). The research project was reviewed and determined exempt through Iowa State University's Institutional Review Board (IRB 16-302 and IRB 17-255) before survey distribution. Survey and research professionals reviewed the survey instruments for validity.

2016 surveys

The two, first-year surveys (2016) varied slightly to accommodate the differences between volunteering at a Home Demonstration Garden versus a mini-grant project. The survey for master gardeners volunteering at a Home Demonstration Garden in 2016 consisted of 34 questions: 27 closed-ended and seven open-ended. The survey for master gardeners who received mini-grants in 2016 consisted of the same 34 questions as the survey given to the Home Demonstration Garden volunteers, with one added open-ended question asking why they applied for the mini-grant.

Fourteen questions addressed the primary objective. Three of the questions were based on a 4-point scale ranging from "poor" to "excellent;" two were open-ended; one used a 4-point scale ranging from "no accomplishment" to "excellent accomplishment;" three were based on questions asking participants to identify statements that would affect data collection; and five asked them to identify if the statements were biased or unbiased.

Nine questions addressed the secondary objective. Two questions addressed the master gardeners' comfort levels, using a 4-point scale from "very uncomfortable" to "slightly comfortable;" one question asked them to specify the barriers they faced; and six questions were used to determine their food-security level. These exact questions are

used by the U.S. Dept. Agr. Economic Research Service for quickly assessing if individuals are experiencing any form of food insecurity.

Four questions were used to determine if the master gardeners had worked on or planned to work on projects impacting food-security, and to see if the collaboration with the ISU Research Farm established a meaningful relationship between the two parties. Seven demographic questions completed the survey.

2017 surveys

To limit differential recall during the 2017 growing season, the surveys were split into before- and after-style surveys (Coughlin, 1989). The before-survey for master gardeners volunteering at a Home Demonstration Garden consisted of 31 questions: 25 closed-ended and six open-ended. Three questions were used to match the survey to its potential after-survey, one question asked about previous produce donation, and one asked the master gardeners if they participated in projects involving food-security prior to this project. Eleven questions were used to address the primary objective; these questions were the same ones used on the first-year survey. Seven questions addressed the secondary objective. Eight demographic questions completed the survey. The after-survey consisted of 36 questions: 25 closed-ended and nine open-ended. The same three identifying questions, eight demographic questions, and six food-security questions were used as in the before-survey. The language changed from ‘prior’ to ‘future’ for the donation and projects involving food-security questions. The same two questions were used from the 2016 survey to address the partnership between the master gardeners and the ISU Research Farm. Thirteen questions addressed the primary objective, and eight addressed the secondary objective.

The before-survey for mini-grant project participants in 2017 was identical to the Home Demonstration Garden survey, except that one demographic question was added about why the master gardener became involved in the mini-grant, and the citizen science question of understanding the research methods was omitted. The after-survey for mini-grant participants in 2017 was identical to the Home Demonstration Garden survey, except that the questions about collaboration were geared toward the food pantry instead of the ISU Research Farm.

Data collection

Surveys were administered via emails sent to the master gardeners, whose email addresses were requested during the in-person trainings and collected from the mini-grant application forms, and to the master gardener coordinators of counties receiving mini-grants. Master gardeners voluntarily completed the surveys and could skip any questions other than the consent question and three identifying questions in 2017.

The 2016 surveys were distributed on 21 Oct. 2016 and 19 Oct. 2016 for the Home Demonstration Garden survey and mini-grant survey, respectively. Two follow-up emails were sent at two-week intervals to all participants. The surveys were closed one week after the final reminder emails. Eight master gardeners completed the Home Demonstration Garden survey and eighteen finished the mini-grant survey. Responses from the Iowa Master Gardener Volunteer Reporting System indicate that 231 master gardeners volunteered in the Growing Together project in 2017, however an individual breakdown between those who participated in mini-grants versus Home Demonstration Gardens was not shown.

The 2017 surveys were distributed on 12 July 2017 and 16 Oct. 2017, and 3 Aug. 2017 and 2 Nov. 2017 for the Home Demonstration Garden surveys and mini-grant surveys, respectively. Two follow-up emails were sent at two-week intervals for all surveys, and the surveys were closed two weeks after the final notice. Nine master gardeners completed the before- and after-Home Demonstration Garden surveys, while 19 master gardeners completed the before- and after-mini grant surveys. Some of the master gardeners varied within either the Home Demonstration Garden or mini-grant surveys.

Data analysis

The data were analyzed using descriptive statistics in Excel (Office 365, Microsoft Corporation, Redmond, WA). All open-ended questions were coded and then grouped into emergent themes according to Saldana's (2013) process for themeing (sic) data.

Results

Knowledge Change

The master gardeners indicated learning in three themed areas: science-, communication-, and pantry-related topics. The science theme was primarily comprised of items related to the art and science of gardening; e.g. one master gardener learned about "all of the hard work it takes to plant, maintain, and harvest from the garden. But, many hands make light work!" The communication theme primarily comprised of responses directly related to communication between volunteers, transferring knowledge, and learning. Two master gardeners noted that they learned "to pass this knowledge on to

others,” and that they “should put more effort into better communication with volunteers.” The pantry theme was comprised of topics directly stating involvement with a pantry, statements of intent to donate produce, or learning about the needs of pantries and their recipients. An example of a response from the pantry theme was “many food pantries do not get a wide variety of fresh produce donated and the clients often do not know how to utilize some unique produce such as zucchini, squash, etc.”

The survey results show that master gardeners who volunteered at a Home Demonstration Garden learned the most about science-related topics (Table 1). No Home Demonstration Garden master gardener volunteers indicated learning in communication-related topics in 2017. However, the majority of master gardeners who participated in a mini-grant indicated that they learned the most about communication-related topics in both 2016 and 2017 (Table 1).

Four themes emerged from the responses of master gardeners about their specific accomplishments: learning, personal gain, partners, and benefiting others (Saldana, 2013). Nearly 50% of the master gardeners in all surveys indicated that one of their major accomplishments was knowing that their contribution in the project benefited others (Table 2). One of the master gardeners commented both on the benefit of helping others and the personal gain from participating in a mini-grant: “helping the community by dedicating my time to help harvest and deliver produce from the garden. Deep satisfaction of a job well done after harvesting.” The learning theme spanned both learning about horticulture and learning about food security in their communities. One master gardener stated, “it became more obvious why there are food deserts in our county.”

The level of accomplishment from participating in the projects was highest in 2016, with volunteers from the Home Demonstration Gardens indicating an average level of 3.75 out of 4, and volunteers from the mini-grants indicating an average level of 3.72 out of 4. Overall levels of accomplishment were slightly lower in 2017 for both volunteer groups (3.27 and 3.68, respectively) (Table 2).

Citizen Science

In 2017, Home Demonstration Garden volunteers indicated an average increase of 0.37 in understanding of the research objectives, while the mini-grant recipients indicated an average increase of 0.21 in understanding (Table 3). Home Demonstration Garden volunteers also indicated an increase in understanding the research methods over the course of the project in both years, while mini-grant recipients indicated no change in understanding of the research methods in 2016.

In all three surveys, master gardeners who volunteered at a Home Demonstration Garden were better at identifying that consuming a handful of berries while harvesting would affect data compared to those who participated in a mini-grant (100%, 90.91%, and 100% versus 94.44%, 73.68%, and 84.21%, respectively) (Table 4). Only two master gardeners from all the master gardeners surveyed incorrectly answered the estimation of number of berries as not affecting overall data. A mixture of recognizing and not recognizing the deleterious effects of roguing varying sizes of berries during harvest was seen across all surveys (Table 4).

At the beginning of the 2017 project, master gardeners at Home Demonstration Gardens were better at correctly identifying all biased and unbiased statements than in 2016 (Table 5). They also had an increase over time in correctly identifying that the

nitrogen deficiency question was a leading, and therefore biased, question (12.50% to 36.36%). Between the two 2017 surveys, all other questions were less often answered correctly after participating in the Home Demonstration Gardens. Mini-grant recipients also showed no change or a decrease in ability to identify biased and unbiased statements in 2017. Between 2016 and the beginning of 2017, mini-grant recipients were better at identifying the two unbiased statements on yield and number of plants grown, and the biased statement on nitrogen deficiency (Table 5).

Food-security Level

All master gardeners who completed the surveys were determined to be food-secure at the time of the survey distributions (data not reported).

Barriers

After coding and grouping the answers, three themes emerged about barriers from the project: science, communication, and support. A fourth category was added for those who answered that there were no barriers (Table 6). Over 70% of master gardeners who volunteered at a Home Demonstration Garden in 2016 indicated that science-related barriers were prevalent, while in 2017 only 21% identified science-related barriers. The sentiments of many master gardeners were similar to the response of this master gardener about: “the need to be consistent in garden weeding and timely harvesting.” During 2017, the three barrier categories were fairly evenly distributed with communication (35%) slightly outweighing support and science as the largest barrier. In both 2016 and 2017, mini-grant volunteers identified support as the largest barrier in their project. Lack of support included distance away from a pantry garden, lack of labor, lack of time, having

too much work for the limited number of volunteers to adequately handle, and lacking the direct support of county staff. One master gardener reported that “time was a barrier. Needed more time of it (sic) so I could volunteer at the garden even more frequently. LOVED spending time there.”

Comfort Change

Master gardeners in both groups indicated that their comfort in discussing food security increased during 2016, while it decreased in 2017 (Table 7). Comfort in discussing food security was highest in the 2017 before-surveys, while the lowest were found in the 2016 before-surveys. The overall comfort in discussing food security of master gardeners was somewhat comfortable to very comfortable (ranges from 2.71 to 3.68 out of 4).

Discussion

Knowledge Change

Researchers who focused on training citizen scientists have found an increase in specific content knowledge after participation in a science-based training (Kelling et al., 2015; Brossard et al., 2012). The high percentage of Home Demonstration Garden master gardeners who learned more about science-related topics in the project confirm that the trainings given at the beginning of the summer were effective in educating the master gardeners about best practices in growing/harvesting produce and practicing good food-safety techniques. Although many master gardeners commented on the tediousness of collecting the cultivar data, they demonstrated an understanding of the process for collecting accurate cultivar data by correctly answering the technique questions in the

surveys and through observations of their actions while collecting cultivar data during the growing seasons. Based on their understanding of taking accurate cultivar data, future researchers should focus on assessing the appreciation level of master gardeners towards scientific processes. The lack of responses on learning about communication-related topics from the master gardeners who volunteered at the Home Demonstration Gardens in 2017 indicates that we did not focus enough on increasing the communication efficacy between master gardeners, as we originally intended. On average, the mini-grant recipients were engaged with three-times more community partners than the Home Demonstration Garden volunteers, which may explain why mini-grant participants learned more about communication than science- and pantry-related topics.

The sense of accomplishment themes that emerged after participating in the Home Demonstration Gardens and mini-grants were similar to those reported by Takle et al. (2016). Takle et al. (2016) found that Iowa Master Gardeners joined the Master Gardener program to increase their knowledge about horticulture, impact others in their community, and socialize with friends, which fits the themes of learning, benefiting others, and working with partners. One master gardener stated, “for me, the donation of the vegetables to those who needed it was the major accomplishment.” Master gardeners who participated in the Growing Together project heightened their sense of accomplishment, regardless of their manner of participation. The levels of accomplishment, rated on a 4-point scale from no accomplishment to excellent accomplishment, between the two groups were similar, with only 0.03 point difference between groups in 2016 and less than 0.5 point difference between groups in 2017. High levels of accomplishment were found in the program, which indicates that the project was

successful in providing a meaningful volunteer experience for the Iowa Master Gardeners.

Citizen Science

Many citizen science projects have been conducted in the United States. Those who participated in a science-based training were found to increase their understanding of the specific content of the training, but did not increase their understanding of the scientific process (Brossard, 2012; Starr et al., 2014; Trumbull et al., 2000). The master gardeners who participated in the summer trainings were more likely to indicate that they understood the research objectives and methods than those who did not participate in the trainings.

In-person trainings have been utilized in citizen science research programs as an effective means of training volunteers (Crall et al., 2012). The data collection technique questions asked in the surveys paralleled the activities performed during the summer trainings. Overall the master gardeners who participated in the in-person trainings were more likely to correctly identify the techniques that would impact the results of the data than the untrained mini-grant recipients (Table 4). Observations of the master gardeners at Home Demonstration Gardens showed that while the master gardeners understood the methods, they did not understand the reasoning behind the methods of harvesting the unmarketable produce. This indicates that the master gardeners recognized they needed to take the data to conform to the methods, but they may not have valued the scientific process.

The only question on data collection technique in which the master gardeners were not consistent in answering was the one that had the researcher tell the volunteers to

rogue any unusually-sized berries. The varying responses among the master gardeners may be due to the question including an instruction from an authority to perform an action, whereas the other two questions in the section were based on decisions made by the volunteers.

Starr et al. (2014) found that video trainings were just as effective in training volunteers in identifying invasive species as in-person trainings. In 2017, a shortened video of the training given in-person was created for master gardeners who joined the Home Demonstration Garden project mid-season.

The majority of master gardeners were able to correctly identify statements which were biased or unbiased. The only exception was the majority of Home Demonstration Garden volunteers were unable to determine that the “did you think the bright yellow leaves on Cultivar B were due to a nitrogen deficiency” was a biased statement. This may be due to master gardener volunteers at the Home Demonstration Gardens being focused on gardening and the science behind gardening, whereas the mini-grant recipients may have been focused on education and partnership-building as part of this project. Their steady increase in correctly identifying the bias in this question also may have been due to their involvement in the trainings in both 2016 and 2017. Throughout the growing season, master gardener participation fluctuated at the Home Demonstration Gardens. The overall decrease in correctly answering the biased or unbiased statements may be due to the addition of a master gardener who was not formally trained, or who did not watch the online training.

Food-security Level

All master gardeners were found to be food-secure at the time of survey completion. One master gardener emailed the primary investigator to inform that they answered the questions in the food-security portion as if they were food-insecure; however, no set of answers was found to be indicative of a food-insecure individual.

Barriers

The barriers noted by the master gardeners were similar to those found by O'Brien et al. (2008). The science theme specifically dealt with environmental factors and knowledge about gardening. We assume that the mini-grant recipients were less likely to indicate barriers with gardening than the Home Demonstration Garden volunteers, because the mini-grants were not all focused on gardening—some were focused on connecting gardeners to pantries, which does not directly deal with the challenges of growing produce for donation. The decrease in identifying science-based barriers by the master gardener volunteers at the Home Demonstration Gardens may be due to their increased learning of the science and art of gardening, which were discussed in previous sections. Communication, a barrier also found by O'Brien et al. (2008), was a substantial barrier for all master gardeners in this project. This included direct communication breakdown between volunteers and partners, as well as a decreased interest by volunteers and participants in completing tasks originally set by the master gardener volunteers. The majority of the support issues were from a shortage of labor and distance between sites (i.e. from a garden to a food pantry). Shrestha et al. (2004) cited that transportation issues were the largest issue faced by many in rural areas who wanted

to volunteer. With many of the gardens located in rural areas, we expected transportation to be a barrier faced by the master gardeners.

While master gardeners expressed various barriers in volunteering in these projects, many master gardeners remarked that their efforts were well worth it because they were positively impacting their communities.

Comfort Change

The increase in comfort in discussing food-security in 2016 aligns with Allen et al.'s (2017) findings that participation in a one-day workshop increased physicians' comfort in conversing with patients. The nearly 0.4-point decrease in comfort during 2017 in both volunteer groups may be due to the master gardeners' increased exposure to the complexity of food-security. Interviewing the master gardeners may provide further explanation of their decrease in comfort. Of the research found, none showed a relationship between increased knowledge and decreased comfort in discussing a subject.

We achieved the original goals of comparing the difference in knowledge change between master gardener volunteers at a Home Demonstration Garden and master gardener mini-grant recipients, and the difference between the groups as effective citizen scientists. We found that master gardeners who participated in Home Demonstration Gardens understood the proper techniques used in collecting cultivar data better than master gardeners who participated in the mini-grants. Overall, master gardeners who are trained in proper data collection procedures are able to collect reliable data. To better understand if master gardeners value the scientific process, further research should be done.

We also determined that the master gardener volunteers were not food-insecure, identified the barriers they faced while participating in the Growing Together project, and discovered the changes in their comfort in discussing food security. This study highlights the importance of having strong partnerships, training programs, and measurable outcomes for citizen science projects (Dagleish, 2006). While a limitation of this study was not having a large population of master gardeners working on these projects, future promotions of this project can be increased to improve master gardener volunteer involvement. Additional research should focus on the long-term knowledge retention of the master gardeners. Future trainings should focus on activities that increase awareness on research bias and increase communication techniques. Based on these findings, quantifying volunteer appreciation of data collection will be an important next step for evaluating citizen science efficacy.

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Table 1. Frequencies of learning-related themes identified by master gardeners in before- and after-surveys during participation in a food-security project.

Home Demonstration Garden							Mini-Grant						
2016**			2017				2016**			2017			
Before*					After**		Before*					After**	
Theme	Ct.	Percent	Ct.	Percent	Ct.	Percent	Ct.	Percent	Ct.	Percent	Ct.	Percent	
Science	13	76.47%	5	55.56%	11	78.57%	12	35.29%	11	40.74%	10	27.78%	
Communication	1	5.88%	2	22.22%	0	0.00%	16	47.06%	11	40.74%	13	36.11%	
Pantry	3	17.65%	2	22.22%	3	21.43%	6	17.65%	5	18.52%	13	36.11%	

*What they hoped to learn from participating in the project

**What they learned from participating in the project

Table 2. Frequencies and means of accomplishment-related themes identified by master gardeners after participation in a Home Demonstration Garden or mini-grant food-security project.

Themes	Home Demonstration Garden		Mini-Grant	
	2016	2017	2016	2017
N	11	15	28	30
Learning	2	1	9	4
Personal gain	1	1	1	3
Partners	3	3	6	11
Benefit others	5	10	12	12
Mean*	3.75	3.27	3.72	3.68

*Based on a 4-point scale with 1= no accomplishment, 2 = minimal accomplishment, 3 = some accomplishment, and 4 = excellent accomplishment

Table 3. Frequencies and means of understanding research objectives and methods in before- and after-surveys during participation in a Home Demonstration Garden or mini-grant food-security project.

	Home Demonstration Garden				Mini-Grant			
	2016*		2017		2016*		2017**	
	Before	After	Before	After	Before	After	Before	After
Frequency	7	7	8	11	17	17	19	19
Objectives***	3.14	---	2.63	3.00	3.47	---	3.37	3.58
Methods***	2.63	3.13	2.13	2.73	2.67	2.67	---	---

*In 2016 the before and after questions were on the same survey

** Research methods question not asked on the 2017 mini grant surveys

***Means based on a 4-point scale from 1= poor to 4 = excellent

Table 4. Percentages of master gardeners able to identify data collection techniques that may affect overall data in before- and after-surveys during participation in a Home Demonstration Garden or mini-grant food-security project.

	Home Demonstration Garden			Mini-Grant		
	2016	2017		2016	2017	
		Before	After		Before	After
Cultivar A looks tastier than						
Cultivar B, so the volunteers decide						
to eat a handful of berries each.						
correct	100.00%	100.00%	90.91%	94.44%	73.68%	84.21%
incorrect	0.00%	0.00%	9.09%	5.56%	21.05%	15.79%
unsure	0.00%	0.00%	0.00%	0.00%	5.26%	0.00%
The researcher tells the volunteers						
to take out any unusually small or						
large berries while harvesting.						
correct	62.50%	100.00%	63.64%	88.89%	78.95%	84.21%

Table 4 continued

incorrect	25.00%	0.00%	9.09%	0.00%	10.53%	10.53%
unsure	12.50%	0.00%	27.27%	11.11%	10.53%	5.26%

**To save time the volunteers decided
to estimate the number of berries
harvested each day.**

correct	100.00%	85.71%	90.91%	88.89%	100.00%	94.74%
incorrect	0.00%	0.00%	0.00%	5.56%	0.00%	5.26%
unsure	0.00%	14.29%	9.09%	5.56%	0.00%	0.00%

Table 5. Percentages of master gardeners who correctly identified biased or unbiased statements in before- and after-surveys during participation in a Home Demonstration Garden or mini-grant food-security project.

	Home Demonstration Garden			Mini-Grant		
	2016	2017		2016	2017	
		Before	After		Before	After
Which of the two cultivars had higher yields?						
correct	87.50%	100.00%	81.82%	88.89%	89.47%	84.21%
incorrect	12.50%	0.00%	18.18%	11.11%	10.53%	15.79%
Did you like the bigger blueberries on Cultivar A than the normal-sized berries on Cultivar B?						
correct	75.00%	100.00%	90.91%	100.00%	100.00%	100.00%
incorrect	25.00%	0.00%	9.09%	0.00%	0.00%	0.00%
How many plants of each cultivar						

Table 5 continued

were grown on your site?

correct	87.50%	100.00%	90.91%	88.89%	100.00%	89.47%
incorrect	12.50%	0.00%	9.09%	11.11%	0.00%	10.53%

Were the plants of comparable size?

correct	62.50%	87.50%	72.73%	88.89%	78.95%	78.95%
incorrect	37.50%	12.50%	27.27%	11.11%	21.05%	21.05%

Did you think the bright yellow leaves on Cultivar B were due to a nitrogen deficiency?

correct	12.50%	25.00%	36.36%	72.22%	100.00%	89.47%
incorrect	87.50%	75.00%	63.64%	27.78%	0.00%	10.53%

Table 6. Frequencies of barrier-related themes by master gardeners in before- and after-surveys during participation in a Home Demonstration Garden or mini-grant food-security project.

Theme	Home Demonstration Garden				Mini-Grant			
	2016		2017		2016		2017	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Science	8	72.73%	3	21.43%	4	17.39%	5	20.83%
Communication	2	18.18%	5	35.71%	8	34.78%	8	33.33%
Support	1	9.09%	4	28.57%	11	47.83%	9	37.50%
None	0	0.00%	2	14.29%	0	0.00%	2	8.33%

Table 7. Frequencies and means of comfort in discussing food security between master gardener participants at Home Demonstration Gardens and mini-grants in before- and after-surveys.

Home Demonstration Garden					Mini-Grant			
2016			2017		2016		2017	
Level	Before	After	Before	After	Before	After	Before	After
Count	7	8	8	11	18	18	19	19
1	2	1	0	1	2	3	0	4
2	0	0	1	2	1	0	1	0
3	3	3	3	4	9	2	4	2
4	2	4	4	4	6	13	14	13
Mean*	2.71	3.25	3.38	3.00	3.00	3.39	3.68	3.26

*Based on a 4-point scale from 1 = very uncomfortable to 4 = very comfortable.

CHAPTER 4. GENERAL CONCLUSIONS

The Growing Together project depends on the partnership between master gardener volunteers and Human Science Extension staff to be successful. Through these studies, the impact of Home Demonstration Garden field days on field day attendees, and the impact of two-hour-long citizen science trainings on master gardener volunteers were identified. The information gained from these two studies will guide future coordinators of both the field days and citizen science trainings, while also providing a baseline for continued study of these volunteer and attendee groups. The purposes of these studies were to answer the following research questions:

1. What are the perceptions of field day attendees about food security after participation in a Home Demonstration Garden field day?
2. Were the citizen science trainings effective in increasing knowledge of data collection techniques of master gardener volunteers compared to untrained volunteers participating in the Growing Together projects?

Empirical Findings

The demographics of the Home Demonstration Garden field day attendees were identified through this research. Coordinators could generate publicity and communication about upcoming field days and other gardening events in the area using the publicity preferences of the current field day population. In addition, coordinators could utilize other methods or markets to potentially engage different demographics to participate in the field days. Expanding the reach of this food-security project to include a

younger, more urban or suburban audience could also expand the impact of the Growing Together project.

Field day attendees self-reported increases in knowledge about food security after participation in the 2016 and 2017 field days, which follows trends from previous studies by others about the success of field days. The attendees' comforts in discussing food security with those who were food insecure also increased due to participation in the field days. This suggests that their increased knowledge of food security increased their comfort in discussing food security. Participation in the field days also showed an increase in intentions to donate fresh produce to local pantries. Quantifying behavior change as part of a post-field day study would highlight if attendees followed through on their intentions and show a behavioral change, or if their intentions to donate produce were left unfulfilled.

While it is likely that the demographics of the Home Demonstration Garden field day attendees will vary slightly from year to year based on the theme of the garden, it is unlikely that the topic of food security will disappear in the next few years. The impact of food deserts and other food security-related topics has been increasing in the past couple of years. This topic has captured the attention and interest of many of the master gardeners and other community members with gardens who have expressly voiced their interest in continuing to donate fresh produce from the gardens without the presence of the Growing Together project. Understanding the current demographics and interests of field day attendees and local master gardeners will allow for future comparisons as the themes of the Home Demonstration Gardens change.

Understanding the effectiveness of the citizen science trainings on master gardener volunteers demonstrates to future training coordinators which topics are important for continued success of the trainings. Master gardeners in both the trained and untrained groups responded with learning new information after participation in the Growing Together project. Master gardeners rated their participation in this project with a high level of accomplishment. This means they highly valued their efforts and impact from working on this project. This project was designed to contain all the aspects master gardeners highly value in a volunteer experience: opportunity to learn more about horticulture, help others or impact others in their local community, and connect with like-minded individuals.

The master gardeners who participated in the Home Demonstration Gardens also were shown to be effective citizen scientists even with more intensive data collection procedures. They recognized proper data collection techniques, frequently recognized biased statements, and were able to remember and understand research objectives. They also provided insights into the challenges of collecting data for cultivar trials. The barriers for many of the master gardeners are, for the most part, trainable issues – with the exception of transportation issues in rural areas. Transportation issues may need to be dealt with at the local level rather than statewide. There are also opportunities for improvement in training and discussing scientific processes in general. Master gardener remarks about the tedium of collecting count data for the cultivar yield trials could indicate that they may not value the scientific process, or that they do not understand how this data will be used in a final analysis. Regardless, they continued to count data throughout the harvesting periods.

It is likely that the effectiveness of the trainings will vary from year to year, however the master gardeners were motivated to continue collecting the data for altruistic and personal knowledge-gain reasons. This lower appreciation for the scientific process highlights the importance for educating the volunteers on the merits of collecting high-quality data.

The common thread between these research questions is effectiveness of the Growing Together project in increasing access to fresh produce for Iowans. The Home Demonstration Garden field days were effective in educating the attendees about food security, while showing intentions to donate after participation increased. Focusing on food security and citizen science trainings may have increased production in the Home Demonstration Gardens, which may have ultimately increased the amount of fresh produce available in the local communities. ISU Research and Demonstration Farms and Iowa Master Gardeners are connecting with local communities in ways many never thought about before the project.

The influence of the Growing Together partnership has implications beyond these two projects. The partnership created a more informed community. As the community involvement in food-security projects increases, sustaining this project and others like it will occur long after the fiscal support from the Growing Together partnership wanes.

It is unknown if some of the survey respondents completed both the 2016 and 2017 surveys, which may have influenced the smaller changes seen in knowledge and comfort both in the attendee and master gardener groups. In future surveys, simply asking the attendees if they participated in the previous year's field day would resolve this unknown. As movements toward improving food-security in local communities

increases, we expect a larger presence of individuals assisting in the Growing Together projects.

Future Research

To continue quantifying the impact master gardeners have on food-security in their communities, surveys should be conducted annually to capture the types of projects and outcomes from the various projects they participate in across Iowa. The Home Demonstration Garden field days should also modify versions of the survey instruments used in this study to capture any change in demographics and knowledge of the field day attendees annually. It is unlikely that a rapid shift in demographics will occur in the field day attendees, however a shift in demographics may be seen in the Iowa Master Gardener program as more emphasis is placed on food-security-related projects.

A few potentially researchable questions have surfaced from these projects:

- Have the field day attendees actually donated fresh produce to a local food pantry after participation in the field days?
 - a. Did attending a past field day solidify their intention to donate and create a change in behavior?
 - b. Do their intentions to donate match their actions, or are their intentions left unfulfilled?
 - c. If they did not fulfill their intentions to donate produce, what can be done to assist them in donating produce to pantries?
 - i. What barriers exist in preventing field day attendees from donating fresh produce or other perishable items more frequently to food pantries?

- Do the master gardeners trained as citizen scientists retain their knowledge of proper data collection techniques 6- or 12-months after participating in the trainings?
 - a. If not, would offering trainings online annually or bi-annually assist in retention of proper data collection knowledge?
 - b. How can we better evaluate their scientific literacy or understanding of the scientific process throughout or after training?

The impact from these studies will be realized when coordinators of both the Home Demonstration Gardens and master gardener programs take action in annually surveying the participants of these projects. Creating additional meaningful surveys to further study the impacts of the Growing Together partnership will provide evidence of the benefits of these studies.

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APPENDIX A. INSTITUTIONAL REVIEW BOARD APPROVAL

2016

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 7/19/2016

To: Laura Irish
260 Horticulture Hall

CC: Dr. Cynthia Haynes
131 Horticulture Hall
Denny Schrock
137 Horticulture Hall

From: Office for Responsible Research

Title: Master Gardener Food Security Project

IRB ID: 16-302

Study Review Date: 7/19/2016

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
 - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
 - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed**. For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.**

2017

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 6/21/2017

To: Laura Irish
260 Horticulture Hall

CC: Dr. Cynthia Haynes
131 Horticulture Hall
Dr. Denny Schrock
137 Horticulture Hall

From: Office for Responsible Research

Title: Master Gardener Food Security Project

IRB ID: 17-255

Study Review Date: 6/21/2017

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
 - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
 - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed**. For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.**

APPENDIX B. SURVEYS

2016 Field Day

Field Day Attendee Survey Questionnaire

1. Do you have a fruit/vegetable garden at home? Yes No
2. Are you a MG volunteer at this demonstration garden? Yes No
3. How many field days have you attended, including today? 1-2 3-4 5+
4. Where did you hear about this field day?
 - a. A friend or family member
 - b. Promotional material/flyer
 - c. Radio or news broadcast
 - d. Newspaper
 - e. Facebook/Twitter/Instagram/Website
 - f. Other: _____
5. Have you ever donated produce to a food bank/food pantry? Yes No Maybe
6. Will you donate to a food bank/food pantry after this field day? Yes No Maybe
7. How many food banks/pantries are you aware of within 20 miles of your home?

0-5 6-10 11-15 16+

	BEFORE				AFTER			
8. How knowledgeable were you about food security ____ this field day?	1 none	2 very little	3 somewhat	4 a lot	1 none	2 very little	3 somewhat	4 a lot
9. How comfortable are you discussing food security with those who are food insecure ____ this field day?	1 none	2 very little	3 somewhat	4 a lot	1 none	2 very little	3 somewhat	4 a lot

10. What is your age? Circle: 18-24; 25- 34; 35-44; 45-54; 55-64; or 65+

11. Do you live in a rural, suburban, urban area?
 (<2,500) (2,500-49,999) (50,000+)

12. What is your race or ethnicity? _____

13. What is your gender identity? _____

14. How many are in your household? _____

15. What was your total household income before taxes during the past 12 months?

<\$25,000 \$25,000 to \$34, 999 \$35,000 to \$49,999

\$50,000 to \$74,999 \$75,000 to \$99,999 \$100,000 to \$149,999 >\$150,000

Thank you for participating in this survey!

2016 Home Demonstration Garden

Home Demonstration Garden Survey Questionnaire

Which project are you working on?

- Demonstration Garden
- Mini Grant
 - Black Hawk Co.
 - Bremer Co. – Waverly Community Garden
 - Bremer Co. – Janesville Housing
 - Cass Co.
 - Davis Co.
 - Des Moines Co.
 - Dubuque Co. – Grow project with the Dubuque Mission Rescue
 - Dubuque Co. – Sageville Elementary School Garden
 - Linn Co. – Feed Iowa First
 - Linn Co. – Student garden for Our Table to Yours service
 - Linn Co. – Wellington Heights Neighborhood
 - Louisa Co.
 - Lyon Co.
 - Madison Co. – Connect project
 - Madison Co. – Grow project with school garden
 - Marion Co.
 - Muscatine Co. – Middle School Garden
 - Muscatine Co. – Mulford Community Garden
 - Pocahontas Co.
 - Polk Co. – Demonstration Garden with orchard/berry patch
 - Polk Co. – Enabling Garden
 - Polk Co. – Teach project with 4H
 - Story Co. – Beloit Project
 - Story Co. – FFA Community Garden
 - Woodbury Co.

1. Do you have a fruit/vegetable garden at home?
 Yes No
2. What was your comfort level discussing food security **before** this project?
 - a. Very uncomfortable
 - b. Slightly uncomfortable
 - c. Slightly comfortable
 - d. Very comfortable
3. What is your comfort level discussing food security **after** this project?
 - a. Very uncomfortable
 - b. Slightly uncomfortable
 - c. Slightly comfortable
 - d. Very comfortable
4. Have you worked on projects impacting food security **before** this project began?
 Yes No Unsure
5. Do you plan on working on projects impacting food security **after** this project?
 Yes No Maybe
6. To what extent do you understand the objectives of this project?

- a. Poor
 - b. Fair
 - c. Good
 - d. Excellent
7. To what extent did you understand research methods **before** this project?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Excellent
 8. To what extent do you understand research methods **after** this project?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Excellent
 9. What have you learned while working on this project? Please be specific.
 10. What were the barriers or challenges you faced while working on this project? Please be specific.
 11. What level of accomplishment do you feel after participating in this project?
 - a. No accomplishment
 - b. Minimal accomplishment
 - c. Some accomplishment
 - d. Excellent accomplishment
 12. What specific major accomplishments, if any, do you feel you've made? Please be specific.
 13. Did the collaboration between Master Gardeners, ISU demonstration gardens, and food banks/pantries establish a meaningful relationship between all parties?
Yes No If no, please specify why: _____
 14. **Scenario:** Click the answer you feel is most appropriate based on your citizen scientist background. A researcher is looking at the difference in blueberry production between two cultivars, A and B. The researcher specifically wants to know the average weight of marketable berries from each cultivar and has asked volunteers to count the number of berries and weigh the total throughout the harvesting season.
 - a. Cultivar A looks tastier than Cultivar B, so the volunteers decide to eat a handful of berries each. This:
 - i. does not affect overall data
 - ii. may affect overall data
 - iii. unsure if it will affect overall data

- b. The researcher tells the volunteers to take out any unusually small or large berries while harvesting. This:
- does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
- c. To save time the volunteers have decided to estimate the number of berries harvested each day. This:
- does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
15. The same researcher from the previous question decides to verbally survey his volunteers. Are the following questions biased or unbiased?
16. You're going to read several statements that people have made about their food situation. For these statements, please answer whether the statement was often true, sometimes true, or never true for you in the last 12 months—that is, since last September.
- a. The first statement is, "The food that I bought just didn't last, and I didn't have money to get more."
- Often true Sometimes true Never true Don't know
- b. "I couldn't afford to eat balanced meals."
- Often true Sometimes true Never true Don't know
- c. In the last 12 months, since last September, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?
- Yes No Don't know
- i. How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
- Almost every month Some months but not every month

	Biased	Unbiased
Which of the two cultivars had higher yields?		
Did you like the bigger blueberries on Cultivar A than the normal-sized ones on Cultivar B?		
How many plants of each cultivar were grown at your site?		
Were the plants of comparable size?		
Did you think the bright yellow leaves on Cultivar B were due to a nitrogen deficiency?		

Only 1 or 2 months

Don't know

- d. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
- Yes No Don't know

e. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?

Yes

No

Don't know

17. What is your age? Circle: 18-24; 25- 34; 35-44; 45-54; 55-64; 65+

18. Do you live in a rural, suburban, urban area?
(<2,500) (2,500-49,999) (50,000+)

19. What is your race or ethnicity? _____

20. What is your gender identity? _____

21. How many are in your household? _____

22. What was your total household income before taxes during the past 12 months?

<\$25,000

\$25,000 to \$34, 999

\$35,000 to \$49,999

\$50,000 to \$74,999

\$75,000 to \$99,999

\$100,000 to \$149,999

>\$150,000

Thank you for participating in this survey!

2016 Mini Grant

Mini Grant Awardees Survey Questionnaire

Which project are you working on?

- Demonstration Garden
- Mini Grant
 - Black Hawk Co.
 - Bremer Co. – Waverly Community Garden
 - Bremer Co. – Janesville Housing
 - Cass Co.
 - Davis Co.
 - Des Moines Co.
 - Dubuque Co. – Grow project with the Dubuque Mission Rescue
 - Dubuque Co. – Sageville Elementary School Garden
 - Linn Co. – Feed Iowa First
 - Linn Co. – Student garden for Our Table to Yours service
 - Linn Co. – Wellington Heights Neighborhood
 - Louisa Co.
 - Lyon Co.
 - Madison Co. – Connect project
 - Madison Co. – Grow project with school garden
 - Marion Co.
 - Muscatine Co. – Middle School Garden
 - Muscatine Co. – Mulford Community Garden
 - Pocahontas Co.
 - Polk Co. – Demonstration Garden with orchard/berry patch
 - Polk Co. – Enabling Garden
 - Polk Co. – Teach project with 4H
 - Story Co. – Beloit Project
 - Story Co. – FFA Community Garden
 - Woodbury Co.

1. Do you have a fruit/vegetable garden at home?

Yes

No

2. What was your comfort level discussing food security **before** this project?

- e. very uncomfortable
- f. slightly uncomfortable
- g. slightly comfortable
- h. very comfortable

3. What is your comfort level discussing food security **after** this project?

- i. very uncomfortable
- j. slightly uncomfortable
- k. slightly comfortable
- l. very comfortable

4. Why did you apply for this mini grant? Please be specific.

5. To what extent do you understand the objectives of this project?

- a. Poor

- b. Fair
 - c. Good
 - d. Excellent
- 6. To what extent did you understand research methods **before** this project?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Excellent
- 7. To what extent do you understand research methods **after** this project?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Excellent
- 8. What have you learned while working on this project? Please be specific.
- 9. What level of accomplishment do you feel after participating in this mini grant project?
 - a. No accomplishment
 - b. Minimal accomplishment
 - c. Some accomplishment
 - d. Excellent accomplishment
- 10. What specific major accomplishments, if any, do you feel you've made? Please be specific.
- 11. What were the barriers or challenges you faced while working on this project? Please be specific.
- 12. Did the collaboration between Master Gardeners and food banks/pantries establish a meaningful relationship between all parties?

Yes No If no, please specify why: _____
- 13. Have you worked on projects impacting food security **before** this project began?

Yes No Unsure
- 14. Do you plan on working on projects impacting food security **after** this project?

Yes No Maybe
- 15. **Scenario:** Click the answer you feel is most appropriate based on your citizen scientist background. A researcher is looking at the difference in blueberry production between two cultivars, A and B. The researcher specifically wants to know the average weight of marketable berries from each cultivar and has asked volunteers to count the number of berries and weigh the total throughout the harvesting season.

- a. Cultivar A looks tastier than Cultivar B, so the volunteers decide to eat a handful of berries each. This:
- does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
- b. The researcher tells the volunteers to take out any unusually small or large berries while harvesting. This:
- does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
- c. To save time the volunteers have decided to estimate the number of berries harvested each day. This:
- does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
16. The same researcher from the previous question decides to verbally survey his volunteers. Are the following questions biased or unbiased?
17. You're going to read several statements that people have made about their food situation. For these statements, please answer whether the statement was often true, sometimes true, or never true for you in the last 12 months—that is, since last September.
- a. The first statement is, "The food that I bought just didn't last, and I didn't have money to get more."
- Often true Sometimes true Never true Don't know
- b. "I couldn't afford to eat balanced meals."
- Often true Sometimes true Never true Don't know
- c. In the last 12 months, since last September, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?
- Yes No
- iv. How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
- Almost every month Some months but not every month
- Only 1 or 2 months

	Biased	Unbiased
Which of the two cultivars had higher yields?		
Did you like the bigger blueberries on Cultivar A than the normal-sized ones on Cultivar B?		
How many plants of each cultivar were grown at your site?		
Were the plants of comparable size?		
Did you think the bright yellow leaves on Cultivar B were due to a nitrogen deficiency?		

d. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

Yes

No

e. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

Yes

No

18. What is your age? Circle: 18-24; 25-34; 35-44; 45-54; 55-64; 65+

19. Do you live in a rural, suburban, urban area?
($<2,500$) (2,500-49,999) (50,000+)

20. What is your race or ethnicity? _____

21. What is your gender identity? _____

22. How many are in your household? _____

23. What was your total household income before taxes during the past 12 months?

$<\$25,000$

$\$25,000$ to $\$34,999$

$\$35,000$ to $\$49,999$

$\$50,000$ to $\$74,999$

$\$75,000$ to $\$99,999$

$\$100,000$ to $\$149,999$

$>\$150,000$

Thank you for participating in this survey!

2017 Field Day

Field Day Attendee Survey Questionnaire

1. Do you have a fruit/vegetable garden at home?
 - Yes No
 - a. Have you ever donated produce from your garden to a food bank/pantry/shelter?
 - Yes No
 - b. Will you donate fresh produce to a food bank/pantry/shelter after this field day?
 - Yes No
2. Are you a Master Gardener?
 - Yes No
 - a. Are you a MG volunteer at this home demonstration garden?
 - Yes No
3. How many food banks/pantries are you aware of within 20 miles of your home?

0-5	6-10	11-15	16+
-----	------	-------	-----
4. Will you try to grow the vegetable cultivars at this demonstration garden in your own garden next year?
 - Yes No
5. What activities can you engage in to increase food-security in your community? Please specify.
6. How likely are you to implement one of the food-security activities you listed as part of your routine?

not at all likely	a little likely	somewhat likely	very likely
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	BEFORE				AFTER			
7. How comfortable are you discussing with others about edible flowers _____ this field day?	1 none	2 very little	3 somewhat	4 a lot	1 none	2 very little	3 somewhat	4 a lot
8. How knowledgeable are you about edible flowers _____ this field day?	1 none	2 very little	3 somewhat	4 a lot	1 none	2 very little	3 somewhat	4 a lot
9. How knowledgeable are you about food security _____ this field day?	1 none	2 very little	3 somewhat	4 a lot	1 none	2 very little	3 somewhat	4 a lot
10. How comfortable are you discussing food security with those who are food insecure _____ this field day?	1 none	2 very little	3 somewhat	4 a lot	1 none	2 very little	3 somewhat	4 a lot

11. How many ISU field days have you attended before today? 0 1-2 3-4 5+

12. How did you hear about this field day?

- a. a friend or family member
- b. promotional material/flyer
- c. radio or news broadcast
- d. newspaper
- e. Facebook/Twitter/Instagram/website
- f. other: _____

13. What is your age? Circle: 18-24; 25-34; 35-44; 45-54; 55-64; or 65+

14. Do you live in a rural, suburban, urban area?
 (<2,500) (2,500-49,999) (50,000+)

15. What is your race or ethnicity? _____

16. What is your gender identity? _____

17. How many are in your household? _____

18. What was your total household income before taxes during the past 12 months?

	<\$25,000	\$25,000 to \$34,999	\$35,000 to \$49,999	
\$50,000 to \$74,999	\$75,000 to \$99,999	\$100,000 to \$149,999	>\$150,000	

Thank you for participating in this survey!

2017 Home Demonstration Garden Before

Home Demonstration Garden Survey Questionnaire 1

What is your mother's maiden name?

What is your favorite tree?

Which project are you working on?

- Demonstration Garden
 - Ames – Horticulture Research Station
 - Atlantic – Armstrong Research Farm
 - Kanawha – Northern Research Farm
 - Muscatine – Muscatine Island Research Farm
 - Nashua – Northeast Research Farm
 - Rock Rapids – Fairgrounds

1. Did you participate in this Home Demonstration Garden project last year?

Yes

No

2. Do you have a fruit/vegetable garden at home?

Yes

No

a. Have you ever donated produce from your garden to a food bank/pantry/shelter?

Yes

No

3. What is your comfort level discussing food security?

- a. very uncomfortable
- b. slightly uncomfortable
- c. slightly comfortable
- d. very comfortable

4. Have you worked on projects impacting food security **before** this project?

Yes

No

Unsure

5. To what extent do you understand the objectives of this project?

- a. poor
- b. fair
- c. good
- d. excellent

6. To what extent do you understand the research methods of this project?

- a. poor
- b. fair
- c. good
- d. excellent

7. What would you like to learn while working on this project? Please be specific.

8. **Scenario:** Circle the answer you feel is most appropriate based on your citizen scientist background. A researcher is looking at the difference in blueberry production between two cultivars, A and B. The researcher specifically wants to know the average weight of marketable berries from each cultivar and has asked volunteers to count the number of berries and weigh the total throughout the harvesting season.

- a. Cultivar A looks tastier than Cultivar B, so the volunteers decide to eat a handful of berries while harvesting. This:
- does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
- b. The researcher tells the volunteers to take out any unusually small or large berries while harvesting. This:
- does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
- c. To save time the volunteers have decided to estimate the number of berries harvested each day. This:
- does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data

9. The same researcher from the previous question decides to verbally survey the volunteers. Are the following questions biased or unbiased?

	Biased	Unbiased
Which of the two cultivars had higher yields?		
Did you like the bigger blueberries on Cultivar A more than the normal-sized ones on Cultivar B?		
How many plants of each cultivar were grown at your site?		
Were the plants of comparable size?		
Did you think the bright yellow leaves on Cultivar B were due to a nitrogen deficiency?		

10. You're going to read several statements that people have made about their food situation. For these statements, please answer whether the statement was often true, sometimes true, or never true for **you** in the last 12 months—that is, since last June.
- a. The first statement is, "The food that I bought just didn't last, and I didn't have money to get more."
- Often true Sometimes true Never true Don't know
- b. "I couldn't afford to eat balanced meals."
- Often true Sometimes true Never true Don't know
- c. In the last 12 months, since last June, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?
- Yes No Don't know
- i. How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Almost every month

Some months but not every month

Only 1 or 2 months

Don't know

d. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

Yes

No

Don't know

e. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?

Yes

No

Don't know

11. What is your age? Circle: 18-24; 25-34; 35-44; 45-54; 55-64; 65+

12. Do you live in a rural, suburban, urban area?
($<2,500$) (2,500-49,999) (50,000+)

13. What is your race or ethnicity? _____

14. What is your gender identity? _____

15. How many are in your household? _____

16. What was your total household income before taxes during the past 12 months?

<\$25,000

\$25,000 to \$34,999

\$35,000 to \$49,999

\$50,000 to \$74,999

\$75,000 to \$99,999

\$100,000 to \$149,999

>\$150,000

Thank you for participating in this survey!

2017 Home Demonstration Garden After

Home Demonstration Garden Survey Questionnaire 2

What is your mother's maiden name?

What is your favorite tree?

Which project are you working on?

- Demonstration Garden
 - Ames – Horticulture Research Station
 - Atlantic – Armstrong Research Farm
 - Kanawha – Northern Research Farm
 - Muscatine – Muscatine Island Research Farm
 - Nashua – Northeast Research Farm
 - Rock Rapids – Fairgrounds

1. Did you participate in this Home Demonstration Garden project last year?

Yes

No

2. Do you have a fruit/vegetable garden at home?

Yes

No

a. Have you ever donated produce from your garden to a food bank/pantry/shelter?

Yes

No

3. What is your comfort level discussing food security **after** this project?

- a. very uncomfortable
- b. slightly uncomfortable
- c. slightly comfortable
- d. very comfortable

4. Do you plan on working on projects impacting food security **after** this project?

Yes

No

Maybe

5. To what extent do you understand the objectives of this project?

- a. poor
- b. fair
- c. good
- d. excellent

6. To what extent do you understand the research methods of this project?

- a. poor
- b. fair
- c. good
- d. excellent

7. What have you learned while working on this project? Please be specific.

8. What were the barriers or challenges you faced while working on this project? Please be specific.

9. What level of accomplishment do you feel after participating in this project?

- a. no accomplishment
- b. minimal accomplishment
- c. some accomplishment

d. excellent accomplishment

10. What major accomplishments, if any, do you feel you've made? Please be specific.

11. Did the collaboration between Master Gardeners, ISU demonstration gardens, and food banks/food pantries establish meaningful relationships among all parties?

Yes No If no, please specify why: _____

12. **Scenario:** Click the answer you feel is most appropriate based on your citizen scientist background. A researcher is looking at the difference in blueberry production between two cultivars, A and B. The researcher specifically wants to know the average weight of marketable berries from each cultivar and has asked volunteers to count the number of berries and weigh the total throughout the harvesting season.

- a. Cultivar A looks tastier than Cultivar B, so the volunteers decide to eat a handful of berries while harvesting. This:
 - i. does not affect overall data
 - ii. may affect overall data
 - iii. unsure if it will affect overall data
- b. The researcher tells the volunteers to take out any unusually small or large berries while harvesting. This:
 - i. does not affect overall data
 - ii. may affect overall data
 - iii. unsure if it will affect overall data
- c. To save time the volunteers have decided to estimate the number of berries harvested each day. This:
 - i. does not affect overall data
 - ii. may affect overall data
 - iii. unsure if it will affect overall data

13. The same researcher from the previous question decides to verbally survey the volunteers. Are the following questions biased or unbiased?

	Biased	Unbiased
Which of the two cultivars had higher yields?		
Did you like the bigger blueberries on Cultivar A more than the normal-sized ones on Cultivar B?		
How many plants of each cultivar were grown at your site?		
Were the plants of comparable size?		
Did you think the bright yellow leaves on Cultivar B were due to a nitrogen deficiency?		

14. You're going to read several statements that people have made about their food situation. For these statements, please answer whether the statement was often true, sometimes true, or never true for **you** in the last 12 months—that is, since last October.

- a. The first statement is, "The food that I bought just didn't last, and I didn't have money to get more."

- Often true Sometimes true Never true Don't know
- b. "I couldn't afford to eat balanced meals."
- Often true Sometimes true Never true Don't know
- c. In the last 12 months, since last October, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?
- Yes No Don't know
- i. How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
- Almost every month Some months but not every month
- Only 1 or 2 months Don't know
- d. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
- Yes No Don't know
- e. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
- Yes No Don't know
15. What is your age? Circle: 18-24; 25-34; 35-44; 45-54; 55-64; 65+
16. Do you live in a rural, suburban, urban area?
 (<2,500) (2,500-49,999) (50,000+)
17. What is your race or ethnicity? _____
18. What is your gender identity? _____
19. How many are in your household? _____
20. What was your total household income before taxes during the past 12 months?
- <\$25,000 \$25,000 to \$34,999 \$35,000 to \$49,999
- \$50,000 to \$74,999 \$75,000 to \$99,999 \$100,000 to \$149,999 >\$150,000

Thank you for participating in this survey!

2017 Mini Grant Before

Mini Grant Awardees Survey Questionnaire 1

What is your mother's maiden name?

What is your favorite tree?

In which county is project are you working on?

- Mini Grant

- Black Hawk Co.
- Bremer Co.
- Cass Co.
- Clayton Co.
- Dallas Co.
- Dubuque Co.
- Hardin Co.
- Johnson Co.
- Linn Co.
- Muscatine Co.
- Pocahontas Co.
- Polk Co.
- Poweshiek Co.
- Story Co.
- Woodbury Co.

1. Did you participate in a SNAP-Ed mini grant last year?

Yes No

2. Do you have a fruit/vegetable garden at home?

Yes No

a. Have you ever donated produce from your garden to a food bank/pantry/shelter?

Yes No

3. What is your comfort level discussing food security?

- a. very uncomfortable
- b. slightly uncomfortable
- c. slightly comfortable
- d. very comfortable

4. Why did you become involved in this mini grant project? Please be specific.

5. To what extent do you understand the objectives of this project?

- a. poor
- b. fair
- c. good
- d. excellent

6. What do you hope to learn while working on this project? Please be specific.

7. Have you worked on projects impacting food security **before** this project began?

Yes No Unsure

8. **Scenario:** Click the answer you feel is most appropriate based on your citizen scientist background. A researcher is looking at the difference in blueberry production between two cultivars, A and B. The researcher specifically wants to know the average weight of marketable berries from each cultivar and has asked volunteers to count the number of berries and weigh the total throughout the harvesting season.
- Cultivar A looks tastier than Cultivar B, so the volunteers decide to eat a handful of berries while harvesting. This:
 - does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
 - The researcher tells the volunteers to take out any unusually small or large berries while harvesting. This:
 - does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
 - To save time the volunteers have decided to estimate the number of berries harvested each day. This:
 - does not affect overall data
 - may affect overall data
 - unsure if it will affect overall data
9. The same researcher from the previous question decides to verbally survey the volunteers. Are the following questions biased or unbiased?

	Biased	Unbiased
Which of the two cultivars had higher yields?		
Did you like the bigger blueberries on Cultivar A more than the normal-sized ones on Cultivar B?		
How many plants of each cultivar were grown at your site?		
Were the plants of comparable size?		
Did you think the bright yellow leaves on Cultivar B were due to a nitrogen deficiency?		

10. You're going to read several statements that people have made about their food situation. For these statements, please answer whether the statement was often true, sometimes true, or never true for you in the last 12 months—that is, since last June.
- The first statement is, "The food that I bought just didn't last, and I didn't have money to get more."

Often true	Sometimes true	Never true	Don't know
------------	----------------	------------	------------
 - "I couldn't afford to eat balanced meals:"

Often true	Sometimes true	Never true	Don't know
------------	----------------	------------	------------
 - In the last 12 months, since last June, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes No
- i. How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
- Almost every month Some months but not every month
- Only 1 or 2 months Don't know
- d. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
- Yes No
- e. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?
- Yes No
11. What is your age? Circle: 18-24; 25-34; 35-44; 45-54; 55-64; 65+
12. Do you live in a rural, suburban, urban area?
 (<2,500) (2,500-49,999) (50,000+)
13. What is your race or ethnicity? _____
14. What is your gender identity? _____
15. How many are in your household? _____
16. What was your total household income before taxes during the past 12 months?
- <\$25,000 \$25,000 to \$34,999 \$35,000 to \$49,999
- \$50,000 to \$74,999 \$75,000 to \$99,999 \$100,000 to \$149,999 >\$150,000

Thank you for participating in this survey!

2017 Mini Grant After

Mini Grant Awardees Survey Questionnaire 2

What is your mother's maiden name?

What is your favorite tree?

In which county is the project are you working on?

- Mini Grant

- Black Hawk Co.
- Bremer Co.
- Cass Co.
- Clayton Co.
- Dallas Co.
- Dubuque Co.
- Hardin Co.
- Johnson Co.
- Linn Co.
- Muscatine Co.
- Pocahontas Co.
- Polk Co.
- Poweshiek Co.
- Story Co.
- Woodbury Co.

1. Did you participate in a SNAP-Ed mini grant last year?

Yes - No

2. Do you have a fruit/vegetable garden at home?

Yes No

a. Have you ever donated produce from your garden to a food bank/pantry/shelter?

Yes No

3. What is your comfort level discussing food security **after** this project?

- a. very uncomfortable
- b. slightly uncomfortable
- c. slightly comfortable
- d. very comfortable

4. Why did you become involved in this mini grant project? Please be specific.

5. To what extent do you understand the objectives of this project?

- a. poor
- b. fair
- c. good
- d. excellent

6. What have you learned while working on this project? Please be specific.

7. What level of accomplishment do you feel after participating in this mini grant project?

- a. no accomplishment

- b. minimal accomplishment
- c. some accomplishment
- d. excellent accomplishment

8. What major accomplishments, if any, do you feel you've made? Please be specific.
9. What were the barriers or challenges you faced while working on this project? Please be specific.
10. Did the collaboration between Master Gardeners and food banks/food pantries establish a meaningful relationship between all parties?
 Yes No If no, please specify why: _____

11. Do you plan on working on projects impacting food security **after** this project?

Yes No Maybe

12. **Scenario:** Click the answer you feel is most appropriate based on your citizen scientist background. A researcher is looking at the difference in blueberry production between two cultivars, A and B. The researcher specifically wants to know the average weight of marketable berries from each cultivar and has asked volunteers to count the number of berries and weigh the total throughout the harvesting season.

- a. Cultivar A looks tastier than Cultivar B, so the volunteers decide to eat a handful of berries while harvesting. This:
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 - iii. unsure if it will affect overall data
- b. The researcher tells the volunteers to take out any unusually small or large berries while harvesting. This:
 - i. does not affect overall data
 - ii. may affect overall data
 - iii. unsure if it will affect overall data
- c. To save time the volunteers have decided to estimate the number of berries harvested each day. This:
 - i. does not affect overall data
 - ii. may affect overall data
 - iii. unsure if it will affect overall data

13. The same researcher from the previous question decides to verbally survey the volunteers. Are the following questions biased or unbiased?

	Biased	Unbiased
Which of the two cultivars had higher yields?		
Did you like the bigger blueberries on Cultivar A more than the normal-sized ones on Cultivar B?		
How many plants of each cultivar were grown at your site?		
Were the plants of comparable size?		

<\$25,000	\$25,000 to \$34, 999	\$35,000 to \$49,999	
\$50,000 to \$74,999	\$75,000 to \$99,999	\$100,000 to \$149,999	>\$150,000

Thank you for participating in this survey!