

Introduction:

Citizen science has become a major asset to the scientific community in recent years. Citizen science allows for scientists to have more time and breadth to the various components involved in a variety of experiments. The project I was involved with focused on vegetable production and which vegetable varieties would be most successful in the different microclimates of Washington State. The intent behind this project is to improve the experience and yields of home gardeners by providing data and resources for them to produce quality vegetables in their home garden. The scientists in this aspect are Master Gardeners who volunteer their time through Washington State University Extension. They apply and are selected based on their ability to communicate plant growth, development, and use to the community, which makes them a perfect match for this project.



Figure 1: An example of the role Master Gardeners play in the community of agriculture and where they can be located at different events. <http://mastergardener.wsu.edu/>

Responsibilities:

- Conduct research surrounding citizen science and its role in modern day scientific experiments.
- Write a literature review focused on the role of citizen science within University Extension.
- Research the factors of climate throughout the State of Washington.
- Divide the State of Washington into different zones classified by similar climate patterns.
- Select vegetable crops to be used within the experiment that are simple to grow and replicate in an experiment.
- Construct a booklet to guide Washington State University Master Gardeners through experiment trials, data collection, and problem solving.
- Provide resources and contacts for Master Gardeners to utilize and communicate with throughout the project.

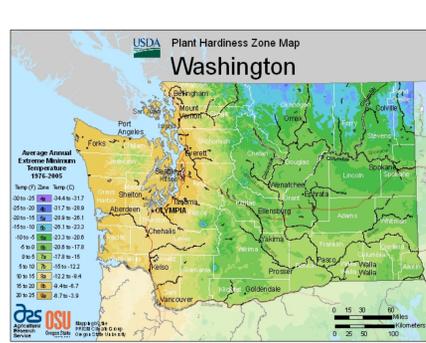


Figure 2: This map provided by the USDA was utilized in determining the zones by outlining the most recent average annual minimum and maximum temperatures for the state of Washington. <http://planthardiness.ars.usda.gov/PHZMWeb/>

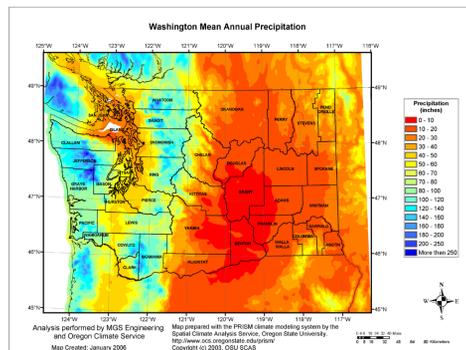


Figure 3: This map provided by Washington Department of Transportation and was utilized in determining the zones by outlining the most recent mean annual precipitation in the State of Washington. <http://www.wsdot.wa.gov/publications/fulltext/hydraulics/wameannanprecip.pdf>



Figure 4: This map I created is used to illustrate the 6 different climate zones in Washington State and is a point of reference for Master Gardeners involved in the project.

Improving Home Garden Vegetable Production through Citizen Science

Washington State University Puyallup Research and Extension

Puyallup, Washington

Austin W. Baker

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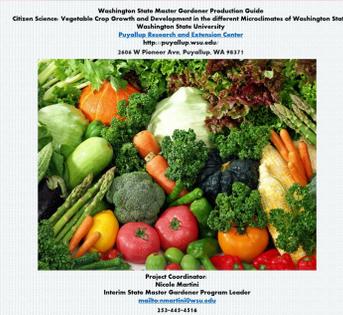


Figure 5: The cover of the booklet which Master Gardeners will utilize and reference while conducting their vegetable trials.

What is Citizen Science?

Citizen science is an essential tool which can increase a scientist ability to collect more data and expand the variables for their experiment. For this project, Master Gardeners from across the state will grow different vegetable crops and within that different varieties. The objective is to see which varieties are more successful in the 6 different climate zones which are represented in figure 4. The reason citizen science is essential in this experiment is because even with several scientist involved, they could not collect as much data without those individuals who permanently live within the area.

When there are several eyes looking at the same project, the opportunity for collaboration and communication is opened up among science and the community. Often science is misinterpreted and a gap is built between the two communities. This illustrates the importance of citizen science as the general public is invited to participate in the scientific process and can provide solid answers to complicated questions.

Many people in various fields of science do not give much credit to volunteer scientists who do not have the same education or experience as they do. Those who feel this way question the validity and reliability of the results obtained from the experiments. While Master Gardeners are citizen scientists with years of experience, the booklet which will complete this project allows for the questions to be minimized by providing a thorough guide complete with resources and contacts which can clarify any confusion. This allows for the scientists to feel confident in the data being reported.

Citizen Science

The general public is not often considered a knowledge-maker in the eyes of the scientific community (Fischer 2000). The exclusion of those outside the realm of professional scientific research from the knowledge-making process can lead to gaps in academic literature. It can also lead to a disempowering and exploitative relationship between researchers and the communities they study as data is taken from communities and put in an inaccessible place such as an academic journal. Citizen science attempts to make the knowledge-making process of a science more democratic by giving a community some degree of decision-making power over what is studied, how it is studied, the collection of data, and the conclusions drawn from the research (McCormick 2009).

One example of citizen science is related by Jason Corburn in his book *Street Science* (2005). A group of residents in the Greenpoint and Williamsburg neighborhoods of Brooklyn, New York, worked with the Environmental Protection Agency (EPA) to conduct an urban food system assessment. The community urged the EPA officials to expand their assessment to include individuals fishing in nearby Newtown Creek, which is now a Superfund site (US Environmental Protection Agency 2011). The EPA gave the community some influence over study design and data collection by working with the residents to develop and conduct a survey of the fishermen in addition to the original food system assessment.

There are as many ways to perform citizen science as there are communities. Another approach to citizen science is a model developed in the Netherlands called "science shop". Science shop gives a community influence over the target of research by allowing the community to use "knowledge-production institutions", such as universities, as consultants to

Figure 6: This excerpt from "Using Citizen Science to Quantify Community Garden Crop Yields" by M.Gittleman, K.Jordan, and E.Brelsford provided a definition of citizen science accompanied with an example. This piece was utilized in the literature review as it directly correlated with the Master Gardener Citizen Science Project.

Summary:

Citizen science has been a great asset to the scientific community. While it has its criticism, it has proven to aid in the diversity and exposure of scientific information. From this project home gardeners will have the ability to grow highly successful and nutritious vegetable crops in all climates across the state of Washington. The use of Master Gardeners as citizen scientist will allow for them to utilize their knowledge and experience to not only teach the public about their work, but the importance of science and public participation in agriculture.



Figure 7: Gardening in Washington State was exceptionally helpful in obtaining information for this project. When questions would arise I would refer to this site first, rarely did I have to look else where for an answer.



Figure 8: "People Power" by Eric Hand was a primary source utilized in the development of the literature reviewed and assisted in building a strong platform for the construction of the booklet.



Figure 9: Much of the internship was research based and my time was spent in the Education Addition at Washington State University, Pullman Campus. Photograph Credit: THA Architecture <http://thaarchitecture.com/cleveland-hall-college-of-education>

Conclusion:

Over the course of this internship I had the unique ability to explore the concept of citizen science. This is an area to which I was unfamiliar. The knowledge base I gained from the internship was immeasurable as I did not see the connection and importance between science and the community so close to home such as growing vegetables across Washington State. This internship allowed me to expand my communication skills as I worked closely with my mentor and professionals in their field to develop a highly reliable piece of literature for citizen scientist to use to better agriculture for the people within my home state. This experience has been essential in my education as I intend to take my knowledge and share it with my future students. Being involved an FFA advisor, there is opportunity to turn students toward citizen science projects which they can utilize for school projects and supervised agricultural experiences. These projects provide the student with recognition at the local, state, and national level, all while helping further scientific innovation.