

Making Food Safety Certification Attainable for Virginia Farmers While Preparing for Potential Market and Changes

Appalachian Sustainable Development, Kathlyn Terry

Appalachian Sustainable Development (ASD) will enhance the competitiveness of fresh fruits and vegetables by providing training and one-on-one technical assistance to specialty crop farmers across Virginia. Produce farmers will be prepared to obtain USDA GAP, Harmonized GAP, or Harmonized GAP with Global Addendum certification and will be prepared for Global GAP should the markets make such a change necessary. Additionally, producers will be prepared to meet the Food Safety Modernization Act Produce Safety Rule requirements with the addition of Produce Safety Alliance Grower Trainings.

Exploring Anaerobic Soil Disinfestation for Improved Vegetable Crops in Virginia.

Virginia Polytechnic Institute and State University, Steve Rideout

Vegetable production in Virginia is an important component of the Commonwealth's agriculture farm gate. The 2015 census revealed that Virginia ranked ninth in direct vegetable sales in the United States, producing \$217,343,742 on 3,415 farms (USDA, NASS: <http://www.vdacs.virginia.gov/press-releases-161220-nass.shtml>). Virginia vegetable producers continue to seek alternatives to methyl bromide fumigation to control disease-causing pathogens and weeds. Crop rotation with less profitable field or cover crops is not feasible. Another issue has also arisen involving permanent structures such as high tunnels that are in a fixed location. Over time, soil borne pathogens and other pests have built up, causing vegetable crop loss and or resistance to traditional control methods. The goal of this project is to evaluate a non-fumigant approach that does not require forfeited growing seasons. This type of control strategy is paramount to sustaining valuable vegetable production in Virginia and the larger Mid-Atlantic region.

Anaerobic soil disinfestation (ASD) is a technique that has been investigated as an alternative to fumigation in vegetable cropping systems in California, Florida, Tennessee, and Ohio. Proper ASD involves incorporation of a carbon source into soil at the bedding/plastic mulch application followed by subsequent irrigation to saturate the soil just beyond the water holding capacity. This greatly enhances the activity of anaerobic soil microbes (by lowering oxygen availability), creating an unfavorable environment for the growth and survival of pathogens that infect vegetables. Therefore, researchers at Virginia Tech's Eastern Shore Agricultural Research and Extension Center will explore ASD in Virginia to assist growers in understanding and implementing this promising management tool.

Assessing and Addressing Educational Needs of Exploratory/Beginning Growers of Hydroponic Produce for Local Markets

Virginia Polytechnic Institute and State University and Virginia State University, Holly Scoggins and Chris Mullins

Virginia Tech (VT) faculty Holly Scoggins, Associate Professor of Horticulture, Joyce Latimer, Professor of Horticulture and Extension Specialist for Greenhouse Crops, Amber Vallotton, Fresh Produce Food Safety Team Coordinator & Extension Specialist, and Virginia State University (VSU) faculty Chris Mullins, Greenhouse Extension Specialist, will assist exploratory and beginning commercial growers by assessing current needs, evaluating hydroponic growing systems, and delivering educational programs via workshops as well as developing multi-media educational resources for long-term use by stakeholders.

Cider Production from Virginia-Grown Apples: Managing Yeast Nutrition during Fermentation for Targeted Cider Aroma and Style

Virginia Polytechnic Institute and State University, Amanda Stewart

The Virginia Tech Department of Food Science and Technology's Enology and Fermentation group will develop research-based strategies for nitrogen-rich yeast nutrient management to retain desired fruit aromas during cider fermentation, and will disseminate results to stakeholders through state and regional workshops, extension publications, and industry-led field days.

Model-guided Bloom Thinning Applications for Managing Crop Load and Disease Pressure in Apple Orchards

Virginia Polytechnic Institute and State University, Sherif Sherif

Management of apple crop load by chemical thinning is one of the most critical orchard practices that significantly affects the annual production and profitability of apple orchards, and it can lead to significant losses if done improperly. Through the proposed project, Virginia Tech will determine and recommend chemical thinning strategies that optimize crop load, improve fruit quality, enhance return bloom, and reduce disease pressure in apple orchards. Although chemical thinning can be performed at bloom and post-bloom stages, the former is known to produce the largest fruit, the maximum return bloom, and the most consistent annual bearing. Furthermore, some of the chemicals used for bloom thinning have been proven effective in the management of early-season diseases (e.g. cedar apple rust, quince rust and fire blight). However, due to spring freezes that often coincide with apple bloom and can kill a portion of apple blossoms, the majority of apple growers in Virginia tend to rely on post-bloom thinning applications. On the other hand, the thinning efficacy of post-bloom chemical thinners is dependent on many conditions (e.g. fruit size, weather conditions, and tree carbohydrate reserve) that are not always met. The main task of the proposed project will focus on evaluating chemicals, rates, and models that can be applied at the bloom stage to supplement post-bloom thinning applications and to ensure effective management of crop load and early-season diseases. The findings of this research will be communicated to apple growers and stakeholders in Virginia through the Alson H. Smith Jr. Agricultural Research and Extension Center's program.

Expanding Livelihood Options for Virginia Land Owners through Tree Syrup Production

Virginia Polytechnic Institute and State University, Tom Hammett

The Virginia Tech led project team will increase the competitiveness of the Virginia maple syrup sector by engaging with Virginia landowners and farmers to develop new maple syrup production capacity, value added products, improved markets, and related practices that result in increased awareness of income generation and nutrition opportunities.

The maple syrup sector in Virginia is poised for expansion and increasing contribution to rural economic development. Seeing the success of West Virginia and Kentucky in fostering their maple syrup industry, the Virginia Tech program seeks to raise the competitiveness of Virginia's maple syrup sector.

Outcomes and related tasks will include:

1. Engage current producers to increase sap and syrup production through workshops; contacts through landowner organizations; and training, mentoring, and extension publications/practices.
2. Develop new products and markets to increase competitiveness through networking, promotion new value added products, and contact with the public through demonstrations and festivals.
3. Mentor new producers, enabling them to enter the sector through workshops; contacts through landowner organizations; and training, mentoring, and extension practices.
4. Raise awareness of maple syrup uses and products to increase market size through public outreach programs including maple syrup demonstrations, maple outreach activities, and tours of sugar bush and syrup making operations.
5. Engage landowners, farmers, and other stakeholders to form a maple syrup network to share market information, gain competitiveness through new and updated practices, and upgrade equipment to increase production efficiencies.
6. Develop and distribute extension publication and outreach resources that raise awareness about the production and health benefits of maple syrup products, help new producers start operations, and assist existing producers to improve production and marketing efficiencies.

Building a Bridge between VA Hops Growers and Brewers: Studying the Impact of Terroir and Postharvest Handling on Flavor and Quality

Virginia Polytechnic Institute and State University and Virginia State University, Yin Yun and Yixiang Xu

This is a joint effort between Virginia Tech and Virginia State University to respond to the increasing demand for hops as the indispensable component of beer driven by the unprecedented growth of the craft brewing industry in Virginia and the mid-Atlantic region. Virginia Tech will lead the research work. The team consists of Dr. Yun Yin (Flavor Chemist), Mr. Eldon Ken Hurley (Lab Director of Enology Analytical Services), and Dr. Holly Scoggins (Hops Expert and Horticulturist) at Virginia Tech, and Dr. Yixiang Xu (Food Processing Engineer) and Dr. Laban Rutto (Agronomist on Alternative Crops) at Virginia State University. This interdisciplinary team will focus on two key research questions related to the flavor profile and quality of region-specific hops varieties as affected by terroir and post-harvest practices. The overarching goal is to build a bridge and strengthen the working relationship between Virginia hops growers and brewers and enhance the market competitiveness of Virginia grown hops.

Specific tasks include selection of hops varieties, growing sites, harvest, and post-harvest practices, and investigation of aroma-active profile and quality for hops of choice. The results generated from this project are expected to serve as the baseline information aiding selection of desired hops varieties for craft brewers based on terroir and aroma profiles, and to promote the use of cost-effective post-harvest applications by increasing Virginia hops growers. Findings will be disseminated to stakeholders (farmers and brewers) at field days and through social media, and to a wide audience through online bulletins, refereed manuscripts, and presentations at regional hops conferences.

Evaluation of Organic and Biodynamic Weed Control Options for Specialty Crops in Virginia
Virginia Polytechnic Institute and State University, Jeffrey Derr

Virginia Tech will investigate organic and biodynamic weed control methods to determine crop safety and control of troublesome weeds for producers of vegetable, fruit, and nursery crops, with results disseminated at grower meetings and field days as well as through extension publications and newsletter articles.

Novel Approach to Control Multiple Major Diseases on Nursery Crops with Plant Endophyte
Virginia Polytechnic Institute and State University, Ping Kong

Virginia Tech will develop a biologically based technique that targets multiple major diseases affecting a variety of ornamental crops and disseminate the results to the end user through grower meetings and field days. This technology will enable growers to build crop health into their products, boosting consumer satisfaction and improving the competitiveness of the horticultural industry in the Commonwealth.

Vertical Farming of Strawberries in Greenhouses with Mason Bees for Pollination
Old Dominion University Research Foundation, Lisa Horth

Vertical farming is a relatively new farming method that entails growing more than one row of a crop in a greenhouse, at different heights, to maximize efficiency. This technique is beginning to be used for specialty crops like herbs (basil) grown in Virginia greenhouses. In the research proposed here, we (ODU Research Foundation; ODU Professor Dr. Horth) will evaluate the effectiveness of the increasingly popular mason bee for pollination of the specialty crop strawberries in a vertical farming layout. We have shown that mason bees are valuable pollinators for strawberries on farms and have determined that mason bees will land on strawberry flowers in greenhouses. Here, we will evaluate whether mason bees will effectively pollinate strawberry flowers in a vertical design in greenhouse conditions. We will test whether bees will pollinate flowers on different vertical rows at the same or different rates (e.g. do top shelf plants perform better than lower ones?). We will also test whether increasing the number of bees in the greenhouse improves the crop (produces larger berries). This work evaluates the benefits of two novel farming tools: vertical farming of berry crops, and the use of mason bees

for pollination of strawberries. The results will be presented at a national scientific meeting and published in a peer-reviewed journal for dissemination to a wide audience.