2014 Proceedings

59th New Jersey Agricultural Convention and Trade Show

February 4-6, 2014

Sponsored by:

Vegetable Growers' Association of New Jersey, Inc.

In Conjunction with

Rutgers Cooperative Extension

And the

New Jersey Department of Agriculture

Trump Taj Mahal
1000 Boardwalk at Virginia Avenue
Atlantic City, New Jersey

VEGETABLE GROWERS ASSOCIATION OF NEW JERSEY, INC.
The Garden State

NEW JERSEY
DEPARTMENT OF AGRICULTURE

RUTGERS
New Jersey Agricultural Experiment Station

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Session Organizers

Tuesday, February 4

Greenhouse – A.J. Both, Extension Specialist in Ag Engineering, Rutgers Cooperative Extension

Are you Ready Should a Disaster Strike? – Richard VanVranken, Agricultural Agent, Rutgers Cooperative Extension Atlantic County

Food Safety – Meredith Melendez, Senior Program Coordinator, Rutgers Cooperative Extension Mercer County

Organic – Joe Heckman, Specialist in Soil Fertility, Rutgers Cooperative Extension

Peppers – Andy Wyenandt, Specialist in Vegetable Plant Pathology, Rutgers Cooperative Extension

Vine Crops – Michelle Casella, Agricultural Agent, Rutgers Cooperative Extension Gloucester County

Farm Safety Family Farm Management – Ray Samulis, Agricultural Agent, Rutgers Cooperative Extension Burlington County

AgTourism Risk Management – Steve Komar, Agricultural Agent, Rutgers Cooperative Extension Sussex County

Insects & Disease Hot Topics – Bill Sciarappa, Agricultural Agent, Rutgers Cooperative Extension Monmouth County

Wednesday, February 5

Sweet Corn – Ray Samulis, Agricultural Agent, Rutgers Cooperative Extension Burlington County

Leafy Green and Herb Production – Wesley Kline, Agricultural Agent, Rutgers Cooperative Extension Cumberland County

Farm Labor – Jack Rabin, Associate Director of NJ Ag Experiment State, Rutgers University

Field/Forage Crops – Steve Komar, Agricultural Agent, Rutgers Cooperative Extension Sussex County

Tomatoes – Peter Nitzsche, Agricultural Agent, Rutgers Cooperative Extension Morris County

Grain Marketing – Dave Lee, Agricultural Agent, Rutgers Cooperative Extension Salem County

Blueberries – Gary Pavlis, Agricultural Agent, Rutgers Cooperative Extension Atlantic County

Direct Marketing – Bill Hlubik, Agricultural Agent, Rutgers Cooperative Extension Middlesex County

Thursday, February 6

Food Safety Workshop – Wesley Kline, Agricultural Agent, Rutgers Cooperative Extension Cumberland County

Agribusiness – Meredith Melendez, Senior Program Coordinator, Rutgers Cooperative Extension Mercer County and Jenny Carleo, Agricultural Agent, Rutgers Cooperative Extension Cape May County

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After the meeting, additional copies of the Proceedings may be obtained by contacting:

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GREENHOUSE

GREENHOUSES

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In this presentation, I will touch on three important aspects related to greenhouse crop production: energy, light and water.

Selecting a fuel source will have a significant impact on the cost of greenhouse heating. If you are using natural gas, you may not be too worried about the impact of fuel prices on your bottom line. But how does natural gas compare to different fuels and what other measures can be taken to reduce energy costs for greenhouse operations? Have you considered alternative approaches to conventional greenhouse heating? I will briefly discuss ground-source heating systems, the benefits of energy storage (in the form of hot water), and the advantages of combined heat and power systems.

Light provides the energy source for photosynthesis. Therefore, the light environment inside greenhouse operations is critically important for proper plant growth and development. I will review light transmission through the greenhouse superstructure, the use of light emitting diodes (LEDs) for supplemental and photoperiod lighting, and the application of photovoltaic systems.

A reliable source of clean irrigation water is essential for a successful greenhouse operation. In order to reduce dependency on an outside water supply (e.g., well water, municipal water), more and more growers are using recirculating systems that recycle used irrigation water. Significant water savings can be accomplished, but additional care is required to prevent contamination with disease organisms and nutrient deficiencies/toxicities. A few water handling and treatment systems will be discussed.

HYDROPONIC PRODUCTION OF BASIL

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Hydroponics can be defined as the production of plants without soil. Numerous methods of hydroponic production exist, all of which involved the use of a water-based nutrient solution. The nutrient solution, while customized to the specific needs of a crop, contains the sixteen chemical elements required for proper plant growth and development, normally found occurring naturally in soil or applied as fertilizer.

A wide range of vegetables, herbs, and other crops can be produced through hydroponics, however, careful evaluation of several factors including climate and light conditions, energy costs, scale of operation, and market potential, is important to ensure a manageable and profitable operation. Basil is well-suited to hydroponic production due to its fast growth rate and high market value.

There are numerous technical and business considerations essential to the success of a hydroponics operation. First, environmental conditions appropriate for the crop must be maintained to achieve optimal yields and productivity of the system. Through the use of computerized greenhouse environmental controls, temperature, relative humidity, light levels and nutrient delivery systems can be adjusted to achieve required conditions while optimizing operating costs.

The advantages of hydroponics as a crop production method include:

- Efficient use of resources (space, water, nutrients, energy)
- Year-round production
- Uniform quality
- Predictable supply
- Price stability

The successful hydroponic grower will need to master the principles of plant biology, disease and pest management, water chemistry and greenhouse management. In addition, skills in business administration, production planning,

finance and accounting, and sales and marketing are necessary for building a profitable hydroponics venture.

Other business considerations include access to capital to finance a greenhouse and associated structures and equipment, and availability of labor. A commercial scale hydroponics system requires rigorous management and attention to detail as well as a commitment to the long hours and relentless pace that accompanies any farming venture. Finally, the challenges in satisfying Federal food safety laws and customer mandated third-party certifications must be addressed.

With careful planning and preparation, and attention to detail, hydroponics can be a viable form of agricultural production.

Are You Ready Should a Disaster Strike?

ARE YOU AG READY? LESSONS LEARNED FROM IRENE AND SANDY

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If a DISASTER hit your Farm or Ranch today, would you still be in business next month?

- ✓ FLOOD
- ✓ DROUGHT
- ✓ POWER OUTAGE
- ✓ DISEASE OUTBREAK
- ✓ TERRORIST INCIDENT
- ✓ WINTER STORM
- ✓ FIRE
- ✓ OTHER

Hurricane Irene in late 2011 and 2012's Super Storm Sandy reminds us once again that *"an ounce of prevention is worth a pound of cure!"*

Rutgers NJAES Vegetable Working Group members partnered with a national team of production and risk management Extension agents and specialists to develop the ReadyAG©: Disaster and Defense Preparedness for Production Agriculture interactive website and downloadable workbooks, with general and commodity specific sections, are designed to help farm and ranch owners plan for and manage disasters and catastrophic events that can occur on the farm.

BEFORE disaster strikes, ReadyAG© can help you:

- **IDENTIFY vulnerable areas of production and management**
- **PRIORITIZE areas to strengthen**
- **Create an ACTION PLAN specific for your operation**
- **Develop an accurate INVENTORY of your assets**
- **Identify and engage LOCAL CRITICAL SERVICES**
- **Find additional HELP**

The intent of ReadyAG© is to help farmers and ranchers become better prepared for all disasters, so they can continue to be viable even in the face of disastrous events, by directing them to take a critical look at their agricultural operation, guiding them to determine areas that need improvement, thus helping them to become better prepared for any event that could disrupt their operation.

The ReadyAG© workbook contains questions for farmers and ranchers to consider and answer about various segments of their agricultural operation that may be vulnerable or at risk for disasters. An overview of the ReadyAG self-audit system will be presented. Farm owners are encouraged to visit the website http://readyag.psu.edu and to review the workbook with family members, employees, and with emergency personnel in the community. The following few pages from the workbook will give you an idea.

How this ReadyAG© Workbook is Organized

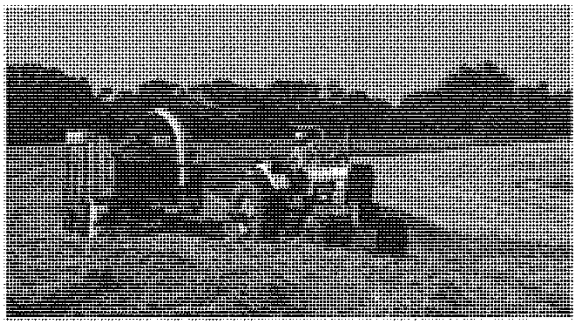
The preparedness and planning **GENERAL** worksheets are divided into four sections. The majority of functions on your operation will fit into these major areas. Your operation may be unique and include additional areas of concern. We encourage you to identify any additional or unique functions within your agricultural enterprise and address the vulnerability and risk associated with those production and management functions that are not included in this workbook. All producers should complete the GENERAL section, and the commodity section that represents your operation.

FACILITIES and MATERIALS.
This section represents the structures, equipment, supplies, and other real property associated with your farming enterprise. All buildings, fields, orchards, animal areas, plant nursery area, feed storage and handling equipment, vehicles, equipment, supplies, product handling, and storage areas would be included in this section. The variety of supplies, materials, raw ingredients, feed, feed additives, fertilizer, pesticides, medicines, water, and other items and areas required for normal function of your agriculture business should be included in this section.

PEOPLE.
This section includes anyone who has access, provides some service or function for you, works for you, or otherwise moves onto and from your agricultural enterprise. Included would be all employees, family members, service personnel, sales persons, delivery people, veterinarians, consultants, Extension Educators, customers, the general public, and invited and uninvited visitors.

PLANNING and PRACTICE.

This section represents what takes place at your location. It includes the day-to-day activities, the routine function, and those activities that occur only at certain times such as harvest, or shipment of animals to another facility or to market. The activities of your business and the management for production practices are included such as use of footbaths for animals or visitors, use of quarantine areas, limited access to facilities, and the development and use of other security practices.

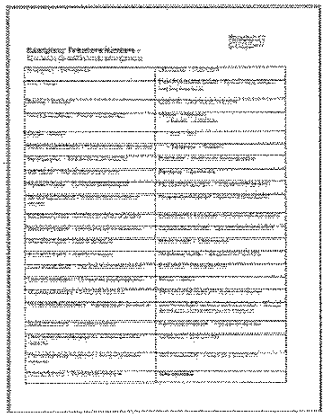


REVIEW and UPDATE.

This section includes the items and practices that you should periodically check, review and update. Included would be insurance, how product and people move on your operation, locks, doors, gates, lights, security cameras, electronic monitoring equipment, gauges, inventories of pesticides, medicines, chemicals and other hazardous materials, worker protection standards training, pesticide training, first aid training, lists of critical contacts and phone numbers, emergency response plans, and other important functions and areas of concern that should be evaluated on a regular basis.

By taking a critical look at each of these areas, you can determine the areas and functions that need improvement to help you become better prepared for any event that could disrupt your operation. The intent is to help you become better prepared for all disasters, so you can continue to be a viable even in the face of disastrous events. The investment of time and resources to plan is significantly less than the costs of a disaster on those who are not prepared. Although it is not possible to plan for all possible scenarios, the plans and activities that you develop will help to reduce your level of risk and, therefore, improve your sustainability.

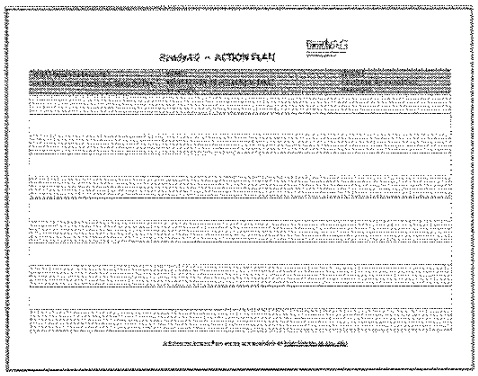
Additional information contained in the workbook includes:

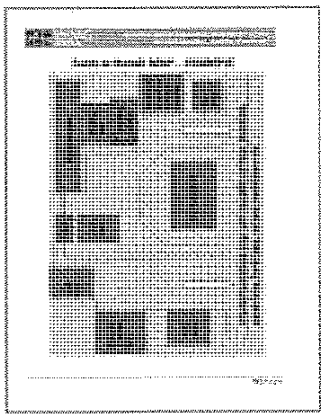


A pull out sheet for **EMERGENCY NUMBERS** –
to post near telephones or on office doors. Laminate this sheet and use an erasable marker to update these as needed, but at least on an annual basis.

SAMPLE ACTION PLAN –
use this simple form to create a list of priority actions to improve your ability to better manage all disasters and emergencies on your farm or ranch.

If you complete the questions on-line, an action plan will be developed for you based on your response to the questions.
If you complete the questions on a printed copy of the workbook, you will need to hand record the priority items onto a blank action plan.





FARM or RANCH MAPS information –
where to find maps of your operation, what information you should include on the map, and who should get a copy of your map.

REFERENCES and ADDITIONAL RESOURCES –
where you can go on the web to download this material and where you can get additional valuable information for disaster and emergency planning for your farm or ranch.

How to fill out the ReadyAG© Worksheets

The worksheets in this workbook list questions about various segments of your agricultural operation that may be vulnerable or at risk. The questions in each section are intended to guide you through the most important functions of your agriculture enterprise. This workbook is a guide to make you aware of potential vulnerabilities and how you might address them, whether these factors are naturally occurring, human error, or intentional acts. Each question asks for your response about the **STATUS, and PRIORITY,** for each issue and provides space for **COMMENTS.**

TOPIC QUESTION	STATUS	PRIORITY	COMMENTS
Question .... ?	☐ Done ☐ Not Done	☐ High ☐ Low	

The **STATUS** column is answered "Done" or "Not Done". If the question being asked is something that you are already doing and have in place on your operation, then answer "Done". If you have not adopted the practice, then respond "Not Done".

The **PRIORITY** column can be answered either "High", or "Low". If the management practice described in the question has not been implemented, the priority rating/ranking will allow you to determine its importance when considering its adoption. A "High" priority ranking indicates that this item could be critical to your operation and the need to adopt the practice as soon as practical. "Low" priority implies the practice is not needed, or can be adopted sometime in the future. It may be important, but it is not something that needs to be addressed in the immediate future. It is important that you provide an answer for the priority for every question.

To illustrate this important point, the **PRIORITY** column is used to indicate if a management practice is essential to keep your agriculture operation functioning. If asked if there is on–site back-up power available and you cannot continue normal operations without electricity, then the **PRIORITY** of this question is "High", as in a dairy operation. If you lose electric power for several days without having a negative effect on your operation, then the response to **PRIORITY** would be "Low". This could be the case for crop production prior to harvest and storage.

The **COMMENTS** column provides an area for your notes where you may indicate a need to adopt a practice, who to include in the decision/process, a timeframe to get it done, and possibly a time to revisit this item. This information should be used to add information to an action. The action plan is used to identify and address actions that can improve your level of preparedness and your ability to stay in business after a disaster.

The **ACTION PLAN** will be automatically generated for you if you complete the worksheets on-line. If you fill out a printed version of the worksheets, you will need to hand copy the "High" PRIORITY items from the worksheets onto a blank ACTION PLAN template – which is available to be printed from the ReadyAG© website. Transfer to the ACTION PLAN all questions in which your answer is "NOT Done" and "High" PRIORITY. This list will become ***your*** ACTION PLAN.

ARE YOUR MARKETS READY? – UPDATE ON SPECIALTY CROP BLOCK GRANT PROGRAM

Logan Brown
Economic Development Representative
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P.O. Box 330
Trenton, NJ 08625
logan.brown@ag.state.nj.us

The USDA Specialty Crop Block Grant Program

- What crops are eligible
- What organizations are eligible
- What types of projects are eligible
- How does the program work

How to Apply for a Specialty Crop Block Grant

Specialty Crop Block Grant projects in New Jersey since 2007

2013 - Amount Awarded: $777,044 Number of Projects: 13

Partner with the Mercer County Board of Agriculture to prepare specialty crop producers to comply with Good Agricultural Practices (GAP) and the Food Safety Modernization Act (FSMA) by educating direct market growers on FSMA compliance and GAP; conducting pathogen sampling of manure and manure based composts; conducting pathogen sampling of packing house equipment; developing cost effective means of compliance with FSMA and GAP

Partner with the Garden State Wine Growers Association to increase sales of northern New Jersey wines by promoting them through a targeted promotional campaign

Partner with the New Jersey Blueberry Growers Association to promote the consumption of New Jersey blueberries by developing and implementing a targeted promotional campaign consisting of radio advertisements

Continue to enhance the competitiveness of New Jersey fruits and vegetables by providing promotional support to the Jersey Fresh brand through print and television advertisements and point of sale advertising

Partner with the New Jersey Peach Promotion Council to promote New Jersey peaches through advertising in print media and various promotional events

Partner with the Outer Coastal Plain Vineyard Association to increase sales of New Jersey wines by conducting market research of wine consumers, creating a brand identity for a new proprietary blend, determining the proper channels through which

target consumers can be reached with incentives, and creating a —Buy Local" marketing program to promote the new blend

Partner with the Jersey Fruit Cooperative Association, Inc. to lower the operating costs of fruit farms while minimizing the negative impact of fruit production on the environment by providing sustainability training to fruit growers and packing
houses

Partner with the New Jersey Agricultural Society to increase specialty crop producers' understanding of agricultural issues such as water and land use, trade agreements and land preservation and to enhance their business management, marketing, and communication skills by providing agricultural leadership development training. Matching funds will be provided to cover the costs that do not solely enhance the competitiveness of specialty crops

Partner with the New Jersey Agricultural Society to increase production and consumption of specialty crops by educating low-income families and the general public on their nutritional value; educating the general public about local sources of specialty crops; and marketing specialty crops and nutrition through video, online resources, and handouts

Partner with the American Cranberry Growers' Association to increase the consumption of cranberry products by those suffering from metabolic syndrome by determining if cranberry consumption, even with added sugar, will improve some parameters of metabolic syndrome; showing the presence of beneficial phytochemicals in human plasma after cranberry consumption; testing the use of one or more cranberry varieties with a lower acid level; and sharing the results of the study with local cranberry growers

Partner with Rutgers New Jersey Agricultural Experiment Station and the Small Fruits Council to increase production of New Jersey strawberries by assessing the status of the production and marketing of minor small fruits such as strawberries, brambles, and ribes; expediting the evaluation and release of strawberry selections from the Rutgers breeding program; and sharing results of the project with small fruits growers

Partner with the New Jersey Blueberry and Cranberry Research Center to minimize the damage caused by key insect pests of blueberries by evaluating and developing innovative insect behavior- based approaches to managing oriental beetle, plum curculio, brown Marmorated stink bug and spotted wing drosophila; demonstrating the effectiveness of an attract-and-kill strategy for controlling these pests; and sharing results with blueberry growers

•Perform pre-award and post-award activities to administer Specialty Crop Block Grant Program funding and ensure that the
State Agency and sub-awardees abide by Federal and State requirements and regulations

Upcoming Application Deadline of April 30, 2014
Program Contact Information;
USDA/AMS/SCBG; http://www.ams.usda.gov/AMSv1.0/SCBGP
NJDA; logan.brown@ag.state.nj.us

Food Safety

SURVEY OF NEW JERSEY FARMS FOR *E. COLI* IN TOMATOES, SPINACH, LETTUCE, IRRIGATION WATER AND SOIL SAMPLES

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Food safety is a part of producing a quality product and good growers instinctively include this in their daily practices. Many farm walk throughs have taken place with both experienced and inexperienced growers with farm food safety specifics. What was found during these farm visits is that many components of a solid food safety plan are already in existence and that while tweaks may be needed, farms are already reducing the risk of cross-contamination on many levels. Farms, third party audit or not, should have a farm food safety plan in place. The creation and the annual review of this plan will offer growers the opportunity to focus on farm activates with food safety in mind.

During the summer and fall of 2012 and 2013 twenty NJ farms were sampled for *E. coli* as a part of a USDA NIFA grant through the Center for Food Safety and Security Systems at the University of Maryland. The New Jersey samples are a part of a greater sampling project that also includes Delaware, Maryland, Florida, California and Ohio. *E. coli* was chosen as the target organism since it is an overall indicator of sanitation and is of fecal origin. The objective of this sampling is to collect data representative of the diversity in vegetable production in the United States. The presentation of the collected data will help ensure that future development of risk metrics is both effective and appropriate for all scales of production.

The twenty NJ farms that participated in the sampling ranged from small organic operations (less than five acres) to conventional farms selling into the wholesale market. Source water was sampled from wells, surface streams and irrigation ponds. End of the line water was sampled from drip tubing and risers. Compost was sampled at the farms utilizing both animal based and non-animal based composts. Spinach and lettuce were the sample crop during September and October and tomatoes were the sample crop during July and August. Half of the NJ farms sampled had deer fencing in place and half of the farms were certified organic.

Sampling took place in the mornings bi-weekly and care was taken to not contaminate the samples through the collection process. Single use gloves sprayed with alcohol were used for each sample and sterile collection containers were used. Each farm was given a unique code to ensure confidentiality. Both random and targeted samples were collected, although no true difference was noted in *E. coli* results between the two types of samples. Targeted samples included crops growing at the end of the row near transportation lanes, evidence of potential animal contact, and produce visibly touching the ground.

All samples collected were placed into a 45^{o} F cooler and transported that day to the University of Maryland lab or the Rutgers Food Safety lab for processing. Samples were assessed for colony forming units of *E. coli*. Only cells capable of reproducing were counted, dead cells were

ignored. Currently there are no *E. coli* standards for irrigation and spray water, standards for open water are utilized as the thresholds for *E. coli*. Current standards for generic *E. coli* for open water are:

- 126 cfu/100ml/mg – 5 sample average mean
- 235 cfu/100ml/mg – Single foliar application sample
- 576 cfu/100ml/mg – Single non-foliar application sample

Samples were taken in tomato production areas from 8 New Jersey farms during the summer of 2012. We expected to find higher *E. coli* in surface water, and did. Rain events, wild and farm animal intrusions, and run-off from developed areas all can add to the total *E. coli* count. In the cases that surface water tested positive for *E. coli*, the end of the line sample (drip or overhead) also had a positive reading for *E. coli*. Pathogenic *E. coli* was not detected in any of the NJ positive *E. coli* samples. Municipal leaf compost was utilized at one farm location and all four samples taken from the compost were negative for *E. coli.*

Tomato sampling during 2013 took place at five New Jersey farms. Fruit samples were taken after they had been harvested and transported to the packing house. Twenty samples of five fruit each were collected Pre and post-wash. In total four pre-wash samples tested positive for *E. coli* and zero post-wash samples tested positive for *E. coli.*

During the fall of 2012 eight farms were sampled in spinach production areas. The spinach sampling period had fewer end of the line samples due to growers not irrigating as frequently. All source water for the sampled spinach crops was well water, and no *E. coli was* found in the source water. *E. coli* did appear on four leaf samples and the timing of these positive samples was after a rain event. At one location the spinach samples were collected downhill from an active horse pasture. A distance of about 150‘ and a mowed grass buffer separated the horses and the spinach crop. Pathogenic *E. coli* was not detected in the *E. coli* positive samples.

Eight farms were sampled in lettuce production areas for *E.coli* in the Spring of 2013. Few lettuce leaf samples were positive for *E.coli*, but all of the positive samples were above the generic *E.coli* threshold set by the recreational water standard. Less than half of the source water samples tested positive for *E.coli*, only surface water samples tested positive for *E. coli*. Drip irrigation was used predominantly in the lettuce production area and no end-of-line samples tested positive for *E.coli*. Animal based compost samples were taken at one farm location, and none of the samples tested positive for *E.coli*. The composting system includes winter cover, regular turning and temperature monitoring.

E. coli is expected in surface water and this was shown during out 2012 and 2013 sampling. Growers, especially those working with small acreage, have limited water resources and many farms rely only on surface water. Those using a surface water source for overhead irrigation should keep in mind the potential for contamination of their product. Drip irrigation is an excellent method of keeping water off of the harvestable crop and a reasonable solution to reducing cross-contamination on the farm.

Attention should also focus on locations of animal manures on the farm. Crops should be uphill from manure storage areas, pastures and animal housing. Crop rotations and existing structures can limit your options, but our sampling results showed the reality of *E. coli*

movement from one area to another during a rain event. Animal based composts should also be located away from production areas and in a location that does not allow runoff to enter production areas.

Research has shown that consumers feel that the produce from local farms is safer than the produce from large scale operations. We expect with the implementation of the Food Safety Modernization Act and continued media focus on food safety that you the grower will be faced with questions from your consumers about your food safety practices. Having a farm food safety plan in place is an excellent way to show consumers that you are committed to providing a safe quality product.

For more information on small farm food safety visit:

Rutgers Vegetable Crops Online: http://njveg.rutgers.edu/

Rutgers Plant and Pest Advisory: http://plant-pest-advisory.rutgers.edu

The Produce Safety Alliance: http://producesafetyalliance.cornell.edu/psa.html

UPDATE: THE LEAFY GREEN MARKETING AGREEMENT (LGMA)

Kurt D. Nolte
University of Arizona, 2200 West 28th St., Yuma, AZ, 85364

Although the vast majority of produce-related food-borne illnesses in the United States are traced back to food processors and not to farms, several recent outbreaks associated with fresh or fresh-cut produce have brought the farm squarely into the food safety picture. A 2006 outbreak of E. coli 0157:H7 in bagged, ready-to-eat spinach and iceberg lettuce sent consumers running from leafy greens; a 2008 Salmonella outbreak, linked first to tomatoes and then to chili peppers, had a similar chilling effect. As a result, both government and industry have developed guidelines or strict protocols intended to improve produce safety on the farm. Driven by a desire to prevent liability and to reassure consumers, many wholesale produce buyers and handlers — from regional distributors serving schools, to multinational supermarket chains — require farmers to comply with one or more of these on-farm food safety protocols. The protocols typically govern water and land use, worker hygiene, wildlife management and other activities. Often, the farmer must pay for an audit to demonstrate compliance before the buyer will purchase his or her product. Farmers selling to multiple buyers find themselves entwined in an increasingly complex and costly web of food safety programs, audits and certifications.

The primary fresh produce safety programs that are available to specialty crop producers include:

- **Federal Good Agricultural and Handling Practices (GHP/GAPs):** On-farm food safety guidelines developed by the U.S. Department of Agriculture and the Food and Drug Administration. Although producers are not required by law to follow the guidelines, many retailers and government institutions are making GAPs compliance — verified by an audit — mandatory for any producers wishing to supply them.
- **The Leafy Greens Marketing Agreement (LGMA):** Developed by large-scale farmers and buyers of leafy greens (spinach, lettuce, chard, kale and other products) in California and audited by the California Department of Food and Agriculture. The agreement has also been adopted by the state of Arizona. As with the federal GAPs, producers are not required by law to comply with the California or Arizona LGMA, but companies that purchase 99 percent of California or Arizona grown leafy greens require compliance by any producer supplying them.
- **Industry "super metrics":** Corporate food safety protocols developed by fresh produce buyers. The practices and documentation requirements of the protocols are usually considered confidential business information shared only between the company and the farmers from whom it buys. Press reports, academic research and other sources suggest that the super metrics are more demanding and stringent than requirements

under the LGMA or the federal GAPs audit program. In order to sell to the company, farmers must be certified by an auditor to demonstrate compliance with the protocols.

- **Global GAPs and other international food safety protocols:** Multinational food retailers and other wholesale produce buyers, including large U.S.-based companies, have created what they hope will become universal food safety protocols or ―meta-standards" governing commercial food production worldwide. These include the GlobalGAPs, a standard that integrates labor and environmental concerns along with food safety, and the Global Food Safety Initiative, a benchmarking system largely intended for private food safety schemes.

This presentation provides a specific overview of the Leafy Green Marketing Agreement as it relates to the ramifications of existing and proposed protocols, while recognizing that the one-size-fits-all approach may not be appropriate especially when identifying the diversity of farm sizes and production methods present in the U.S. food system.

Summary of the LGMA

In spring of 2007, a group of California handlers of leafy greens established the Leafy Greens Products Handler Marketing Agreement (LGMA) in response to the September 2006 E. coli outbreak that was attributed to spinach grown in the Salinas Valley. The spinach recall resulting from the outbreak, and the consequential lack of consumer confidence in the industry, had a disproportionate impact on produce farmers and handlers in California and Arizona, since nearly 89% of leafy greens sold in the United States come from these two states. A voluntary program, the LGMA has been widely accepted by the produce industry, grocers and foodservice firms. Arizona also adopted an LGMA and has been implementing the program since 2008. .Although the LGMA is an agreement between handlers, many of its compliance requirements fall upon growers to implement, as it requires signatory members to source their leafy greens solely from growers found to be in compliance with a set of food safety provisions called ―best practices."

Like the federal GAPs, the Leafy Greens Marketing Agreement (LGMA) is a set of guidelines containing best practices for minimizing microbial risk related to water use, the use of soil amendments like compost, worker hygiene, wildlife and other issues. But unlike the federal GAPs, the LGMA was developed by industry and is focused on one produce category, leafy greens. The LGMA definition of leafy greens includes spinach, lettuce and other greens typically included in freshcut mixes and eaten raw, as well as kale, cabbage and related crops that are generally sold whole and unprocessed and are usually cooked before eating.

The LGMA guidelines are technically voluntary, but because produce companies that

purchase over 99% of California's leafy greens have committed to selling only products grown in compliance with the LGMA,25 the standard has essentially become mandatory for many California farmers. It has since been adopted by Arizona's leafy greens industry. Both Canada and Mexico have adopted regulations allowing the imports of leafy greens only from LGMA certified companies. The LGMA is considered a public-private partnership because the California Department of Food and Agriculture (CDFA) employs the inspectors that audit the farms participating in the LGMA. These inspectors receive training from the USDA similar to that given to the federal GAPs inspectors and then receive additional training on the LGMA's food safety practices. The produce handlers who are members of the LGMA have agreed to tax themselves to collectively pay for the expense of government audits. California companies publicize their participation in the LGMA through a seal on produce packaging confirming that the product is certified by the California Department of Food and Agriculture.

Key pluses and minuses of the LGMA

Produce buyers believed that the LGMA would reduce the incidence of contamination in leafy greens fields and saw mandatory government audits of the LGMA standards as offering additional security. For leafy greens farmers, the LGMA offered hope of a respite from private industry standards and the requirement that they comply with multiple standards in order to sell to multiple buyers. The food safety benefits to companies participating in the LGMA are unclear. Shortly after this summary went to press, an LGMA signatory company recalled 22,000 cases of lettuce that had been shipped to 29 states because lettuce from the lot tested positive for Salmonella.29 No food safety protocol guarantees safe food, nor is it known where the contamination of the lettuce took place. That said, the recent outbreak raises questions about the agreement's effectiveness.

For farmers, the expected gains from having one standard applied consistently across the leafy greens industry have not materialized. Some produce buyers who adopted the LGMA continue to enforce their own standards as well, requiring farmers to be audited for both. For example, SYSCO claims that it —support[s] and enforces all current requirements set forth by the California Marketing Agreement with [additional] higher standards in the areas pertaining to water quality and ATP Bioluminescence testing." Fresh Express, Chiquita's fresh produce brand, is a signatory to the LGMA but uses additional requirements with its farmers. Another weakness of the LGMA is that it cannot be easily adopted by small and mid-sized farms or farms growing multiple crops. Small farm, conservation and wildlife groups were not at the table until very late in the LGMA development process; while they succeeded in making certain changes to the agreement, concerns still linger — particularly around the stringent guidance on wildlife, noncrop vegetation and water testing. These groups also worry that small and biodiverse farms are being forced to choose between market access and their biodiversity and conservation goals.

Current Status of the LGMA

In October 2007, the USDA issued an Advanced Notice of Proposed Rulemaking stating its intent to make the LGMA a national protocol. In March 2009, the USDA‘s Fruit and Vegetable Industry Advisory Committee, which plays an important consultative role within the agency, passed a motion in continued support of a national LGMA. Two months later, the United Fresh Produce Association, along with the Produce Marketing Association, Western Growers Association and seven other groups, officially petitioned the USDA‘s Agricultural Marketing Service to establish a national marketing agreement for farmers and handlers of leafy greens. This petition started a formal process by AMS, including public hearings that will influence the agency‘s decision about whether a marketing agreement proposal should go forward.

On December 5, 2013, the USDA announced that it has terminated the national leafy green marketing agreement (LGMA), after four years' worth of public meetings, public comments and department work. The LGMA would have allowed industry to develop and oversee leafy green handling guidelines within constraints set by FDA and other regulators. The abrupt USDA shift in policy is due to incoming Food Safety Modernization Act (FSMA) rules, some of which will have implications for the leafy green industry. And, LGMA agreements remain in Arizona and California, where they were first conceived after a 2006 E. coli outbreak devastated the spinach sector. USDA's decision to terminate the national program will not affect those states' food safety systems.

ORGANICS

SAFETY, LICENSING & PESTICIDES IN NEW JERSEY ORGANIC FARMING

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There are several areas in pesticide usage, safety and certification that need clarification for organic and sustainable farmers. Organic producers who apply OMRI certified materials or over the counter products for pest control need to adhere to worker protection rules, pesticide labels, IPM practices and federal/State regulations when their operations meet specific criteria.

Users of OMRI products that meet the regulatory definition of —pesticide", unless specifically exempted, are subject to being regulated under the Federal Insecticide, Fungicide and Rodenticide Act of 1972 (FIFRA) by the US Environmental Protection Agency.

—Pesticide" means and includes any substance or mixture of substances labeled, designed or intended for use in preventing, destroying, repelling or mitigating any pest, or any substance or mixture of substances labeled, designed, or intended for use as a defoliant, desiccant, or plant regulator; provided, that the term —pesticide" shall not include any substance or mixture of substances which the US EPA does not consider to be a pesticide (NJAC 7:30).

In New Jersey, the agency which regulates pesticides is the New Jersey Department of Environmental Protection Pesticide Control Program (DEP). Persons who apply pesticides for the purpose of raising an agricultural commodity, including organic farmers, need to be licensed as a Private Pesticide Applicator. Examples of commodities are vegetables, fruit, flowers, greenhouse plants, Christmas trees, or animals such as livestock. Farmers and/or their employees are usually Private Pesticide Applicators. Companies that are hired by the farmer to apply pesticides must have a Commercial Pesticide Applicator and an Applicator Business license.

Federal regulations for certification of applicators apply only to those products labeled as —restricted use". However, New Jersey regulations are significantly more restrictive and include all pesticides (both restricted and general use). Thus, many organic producers are required to become licensed in the State.

New Jersey pesticide users must be certified and licensed as Private Applicators unless they meet one of three specific exemptions.
applicators who use general use pesticides to produce an agricultural commodity or commodities with gross annual receipts of less than $2,500.
persons applying pesticides (such as a —handler") under the direct supervision of a licensed private applicator.

Applicators who use certain 'minimum risk' pesticides only (those defined by EPA as exempt from registration and reporting under FIFRA).

New Jersey requires that Private and Commercial Applicator candidates become both certified and licensed to use pesticides. Certification as a Private Applicator is accomplished by successfully passing the DEP —Private Applicator Exam", based on the corresponding training manual available through County Extension offices. The core subject matter covers pesticide safety and handling, applicable State/Federal laws and regulations, understanding and correctly interpreting the label and labeling information. There are no licensing fees for Private Pesticide Applicators and the license is valid for five years. Private Applicators are required to maintain their certification by attending courses awarding recertification credits.

New Jersey pesticide regulations may be found at Routine inspections, compliance assistance, and complaint investigations are conducted by DEP and EPA at farms and commercial applicator businesses (such as pest control operators and lawn care companies). Environmental sampling is conducted to determine violations and to decide if any pesticide contamination must be removed.

Employers of farming operations must also be aware of requirements of the Worker Protection Standard. The WPS regulations are designed to protect agricultural workers and pesticide handlers. It contains requirements for pesticide safety training, notification of pesticide applications, use of personal protective equipment, restricted entry intervals following pesticide application, decontamination supplies, and emergency medical assistance.

EPA's —Worker Protection Standard for Agricultural Pesticides How to Comply Manual- What Employers Need to Know". This provides detailed information on who is covered by the WPS and how to meet regulatory requirements. An EPA CD-ROM including the manual and other worker protection resources will be made available during the session.

Information on the NJDEP Pesticide Control Program regulations and requirements are located on the web at www.state.nj.us/dep/enforcement/pcp/. They may be contacted at 609- 984-6507. Cooperative Extension provides extensive assistance to growers in understanding and complying with these regulations. One important resource is the NJAES Pesticide Applicator Training website at www.pestmanagement.rutgers.edu/pat/. The Extension Pest Management Office provides assistance to applicators, and may be reached at 848-932-9802.

ORGANIC TRACK
"MANAGING COMMUNITY SUPPORTED AGRICULTURE (CSA)"

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Overview
2014 will be my 12th year working full-time at a CSA – 4 at Brookfield Farm in Amherst, MA and 8 at Fernbrook Farm CSA in Chesterfield, NJ. In that time I have grown to strongly believe in the merits of the CSA system to the farmer and the customer (shareholder). I have also seen how the success of the CSA model had spawned more and more CSA operations and the definition of a CSA has changed in that short time as well. Today some —CSAs" don't grow any food rather they coordinate, buy-in and distribute food from various farms. I will talk about our farm, give a brief overview of our beginnings and evolution, highlight important successes and failures and offer guidelines and strategies that we employ in the management of our CSA.

History
Our CSA began in 2007 on the grounds of Fernbrook Farm which was a working farm owned by Larry Kuser and family – mostly as a tree nursery – and had been for many years. We started with 65 shares on about 4 acres in 2007 and sold 350 shares on about 15 acres in 2013. In addition we have 14 acres of newly leased land from a neighbor the large majority of which we spent cover cropping and composting in 2013. CSA sales provide the bulk of our income which is augmented by pork sales (pastured hogs), off-farm veggie sales, winter sales and selling goods in our small farm shop.

Planning
We thumbnail our growing capacity at 25 shares per acre. Our distribution is for 26 weeks and we distribute an average of about 17.5 pounds per week (that includes u-pick veggies but weight doesn't include u-pick flowers and herbs). Currently all of our shares are distributed on farm. So in our system we invest more in things like the farmshop and parking rather than transportation, packaging and labor for off-site distribution. We utilize crop planning software available from Brookfield Farm which we have tweaked to do our crop planning, seed order, greenhouse planning etc. (info@brookfieldfarmcsa.org) We spend the winter months doing all of the aforementioned planning, selling shares (we hope to sell out by mid-February), hiring staff, getting seeds, equipment and supplies and getting ready to start the greenhouse which we do about March 1st with sweet onions and bunching leeks!

Growing

We are not a USDA certified Organic farm although we grow using OMRI products and methods and we generally bill ourselves as chemical-free. Our basic philosophy is to grow healthy plants by growing healthy soils. (Books such as The Biological Farmer by Gary Zimmer and The Soul of Soil by Smillie and Gershuny are a great reference for us). We try to achieve this through diligent cover cropping with various leguminous and non-leguminous cover crops, under-sowing current crops where possible, utilizing straw mulch where practical, composting, rotating pastured pigs (on a few fields), adding high calcium lime and maintaining a healthy balance of nutrients and pH, rotating crops (we aim for a 4 year rotation for crop families) and fallowing fields every 4th or 5th year for a 12 to 18 month fallow. To control insects and disease we try to grow appropriate varieties, release and attract beneficial predators, be diligent with our planting calendar to avoid certain insect and disease rushes, use floating row cover, hand pull infected plants, control populations by hand picking when practical and finally spraying OMRI approved materials when need be. Weed cultivation is achieved (usually…) via tractor cultivation, hoeing, handweeding, flame weeding, stalebedding, mulching, fallowing, smothering with cover crops and more handweeding.

Labor

Apprentices – 4 for the 2014 season (one 12 month three 8 month terms). We employ a thorough farmer training program and the Apprentices are in turn the —engine that makes the farm go.” We give them a lot of responsibility and many of our former Apprentices are now farming full-time in and outside of New Jersey. Apprentices have ample opportunities to go to other farms, courses and workshops to enhance their overall agricultural knowledge. We also use hourly labor especially May – September as well as 10 workshares who trade labor for a share at the CSA.

Costs / Expenses

We create an annual budget and to the best of our abilities determine how many shares we can grow, and how much to charge for shares based on our overall costs. Our share price is also determined by our previous price and those of regional CSAs. One benefit of the CSA model is that if you can create a good budget and sell the shares you need to sell, you can bring in the money you‘ll need to run your business for the year (knowing that the unexpected can and will happen!) And have much of that income early in the year to help you in the area of cash flow.

Shareholders

I believe that a good CSA doesn‘t give the sense of community rather it is a community. We know that for many of our members, the farm is a very important part of their overall community providing healthy food, a peaceful & interesting place, connections with others in their community, and a place to learn, grow, volunteer, and explore. It is our job to build connections to the farm. We try to do this via weekly share emails, monthly newsletters, cooking demos and classes, potluck dinners, special events (guided walks for instance), workdays, winter sales and other means. At the end of the day the food

has to speak for itself; shareholders must get quality food in sufficient quantities with ample choices available to them to make the share worthwhile. But everything else the farm offers weighs in to why shareholders renew or don't renew their shares. Honesty and customer service are very important in our contact with all farm members. We get great / honest feedback year round and via end of the year surveys which help us plan future seasons.

Documentation
We keep detailed records on harvest, distribution, planting dates and varieties, and field histories which help us determine how we did at years end in terms of things like food pounds per dollar, pounds per acre grown, row feet per crop grown, compost spread and so on. It is often tedious especially during the height of the season but we try to be thorough and find the information very valuable.

Conclusion
In my opinion, managing a CSA will be helped by keeping a few things in mind:

- Creating sound, thorough plans and constantly executing and altering those plans in good, timely fashion throughout the season
- Hiring great, hard-working, enthusiastic people
- Orchestrating the flow of food. The share should grow and change and peak at the right times and every week answer that frequent question –What's new this week?"
- Learning from other farms and farmers. A tremendous network of growers exists and has been an extremely valuable resource to me in a whole host of ways.
- Blend the nengw and the old. Work hard to produce the known things folks love while bringing in a few new elements every season – good for you and your customers
- Checking your –microscope", "telescope" and —stethoscope" daily….That is be good on the small details, keep your eye on the long view, and check your own pulse….the farm manager often has to provide the spark and enthusiasm that others will follow!

—They Will Take Nothing From The Ground They Will Not Return" – Wendell Berry

COVER CROPS IN ORGANIC MANAGEMENT SYSTEMS

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Cover crops are an important part of an organic farming system and provide multiple ecological and economic benefits, but their success in fulfilling their role is dependent on multiple factors. The National Organic Program, the regulatory program of the USDA Agricultural Marketing Service that administers organic certification program standards, recognizes cover crops as a tool for crop nutrient management, pest management and soil quality improvement. Organic farmers must use certified organic cover crop seed and cannot use prohibited products to prepare the seedbed, add fertility or terminate the cover crop – this generally includes synthetic herbicides, fertilizers and seed treatments, but a producer should consult the National List of Allowed and Prohibited Materials, and his or her certifier, before choosing a product. As the market for organic food increases and season extension technology gains popularity, it becomes more challenging for organic farmers to incorporate cover crops into their high-density, intense production schedule. It is increasingly important for organic farmers to creatively incorporate cover crops into their crop plans without compromising the ability of the plant to perform its function.

Whether a cover crop is expected to decrease weed pressure or add fertility to the soil, the plant must be suited for the soil, climate, crop rotation and planting method in order to be successful. It is important to determine the needs of the cover crop – soil drainage, pH, bed preparation, growing days – and match it with the needs of the field – weed control, nutrients, soil protection – to maximize the benefits of the cover crop. It is also important to match the available equipment and management abilities of the farm. Some cover crops must be mowed multiple times per season or require a specific-sized drill for successful germination – ignoring these management considerations may create undesirable field conditions for the cash crop, such as low nitrogen availability or a high residue seed bed, or a waste of time and money, due to poor germination or intense weed pressure. For intensive vegetable operations, and operations using season extension technology, the timing of cover crop sowing and termination is critical – what is the benefit afforded by this crop: root growth, biomass, ground cover, nodulation? Can the cover crop be planted early enough or terminated with enough time afforded to its growth and development? If not, the intended result of the cover crop may not be realized. In addition, the performance of cover crops will depend on the unique characteristics of the production area and prevailing weather conditions. This means

that desirable results, whether the results are weed suppression or nitrogen fixation, can be variable. Relying on a replication of performance, without planning for the vagaries of nature, may disrupt well-laid plans. It requires a degree of flexibility and the use of multiple tacks for any organic production issue.

Adequate nitrogen supply is generally cited as one of the most challenging production issues that organic farmers face. The variability of immediate nitrogen release from cover crops and their investment in future fertility is a good illustration of the importance of using multiple tacks in organic production in order to be successful. Legume-derived nitrogen, as an alternative to chemically derived fertilizers – which are prohibited in organic production – and commercial organic amendments – which are costly, can either be stored in the soil or converted into inorganic nitrogen. Organic nitrogen is converted into inorganic nitrogen under warm, moist conditions and this process occurs in the presence or absence of a cash crop‘s nitrogen demand. Inorganic nitrogen is the nitrogen form that is most often used by crops but is also highly mobile in soil, undergoing multiple chemical transformations, and can be easily lost. Therefore, loss is another possible pathway for the nitrogen provided – in addition to crop uptake and soil organic matter storage. The storage pathway is a significant one in organic systems: the immediate value of legume-based nitrogen, or quantity of inorganic nitrogen released after termination, and also the future contributions of nitrogen over time, through the mineralization of organic nitrogen from soil organic matter, should both be considered during nutrient management planning. It can be challenging to quantify or predict the potential nitrogen contribution from a legume, but researchers have established methods – whether it‘s estimating the amount of biomass based on growing degree days or estimating the amount of nitrogen based on biomass. Farmers can use these calculations to create —what-if” scenarios and budget for the appropriate quantity of other nutrient amendments.

Cover crops are a wonderful resource for farmers, but market considerations and economic returns understandably direct production plans. Organic farmers must be able to recognize the advantages, and short comings, of their cover crop options in order to fulfill their commitment to regenerative agriculture while respecting the market demands on their business. Short time windows, tight spacing and high expectations present an opportunity to experiment with new cover crop varieties, combinations and technologies in organic management systems.

CONSIDERATIONS OF ORGANIC CERTIFICATION

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By now, just about all American farmers are familiar with the term ―organic" in some fashion or another. This term has made its way towards the top of our modern lexicon, and is used to describe everything from a person's lifestyle to dry cleaning services! Even when narrowed to encompass only agriculture (*the growing and/or harvesting of crops, or the rearing of livestock and production of livestock products*), being able to simply state what organic agriculture is truly about is not easy for most.

This presentation will provide a clear definition for the term ―organic" when used to describe agriculture and agricultural products. It will give a glimpse into the process of organic certification and some of the requirements within the USDA's regulations, and dispel some of the myths and misconceptions concerning organic farming and becoming certified as an organic operation. The information and resources provided will hopefully aid growers in deciding if an organic approach is right for them and the operation.

Organic is a labeling term for food or other agricultural products that have been produced according to the USDA organic regulations. These standards require the integration of cultural, biological, and mechanical practices, which foster cycling of resources, promote ecological balance, and conserve biodiversity. This means that organic operations must maintain or enhance soil and water quality, while also conserving wetlands, woodlands, and wildlife.

This definition is from ―Is Organic An Option For Me?", an on-line brochure from USDA; August 2012. It captures the current meaning of *organic agriculture* in the USA perfectly. ―Organic" is, in fact, now a labeling term used to describe food and other agricultural products. The USDA's National Organic Program (NOP) has been regulating this labeling term since they first published the national standards over a decade ago. This definition provides for the very basic tenants of organic agriculture and shows that they must be followed per the regulations; feed and care for the soil; establish as natural a system as possible so that system can help regulate itself. The definition also shows certain elements of sustainability are woven into the concept of

organic agriculture, and are required per the regulations (*such as fostering the cycling of resources and the conservation of biodiversity*). These basic tenants of organic agriculture and sustainability are what enable organic systems to be successful, and what separates organic agriculture from current, typical —conventional" chemical farming methods.

Another basic tenant of organic agriculture dictates the types of **inputs** allowed for use (*the fertilizers, herbicides, insecticides, and other materials used by farmers to successfully produce quality organic crops*). As much as possible, organic farmers must rely on cultural and management techniques to feed and protect crops; however, inevitably, even the best organic farms are going to have situations where added fertility is required, and/or when pesticides are needed to react to a situation. In general, a material is allowed for organic crop production if it is natural, it is not allowed if it is synthetic, and the exceptions are specifically listed within the regulations.

Organic farms can use natural materials to grow crops, unless that particular natural material is listed in the regulations as a ~~*p*~~*prohibited natural*". Strychnine is an example of a prohibited natural. Likewise, synthetic or man-made materials are not allowed to be used, unless specifically listed in the regulations as a synthetic allowed for organic crop production. Insecticidal soaps are an example of allowed synthetic materials. It is not always easy to determine if a material is natural or synthetic or if it can be used on organic farm Land or not. Third party review agencies do exist to help farmers make these determinations, and if seeking certification, the accredited certifier would be providing tools to help in making those determinations.

If you think you know the requirements, and you want to use the word —organic" to describe your crops, can you? As stated earlier, organic is a labeling term governed by the regulations published by the NOP. To use the word —organic", in ANY way to describe a crop or livestock product, that product must be produced and handled in accordance with the NOP's regulations.

The regulations do have provisions for exempting very small farms and handling operations from having to be <u>certified</u>; **however, even those exempt from certification must know about and follow all of the production and handling requirements in the regulations** if using the word —organic" to describe products. Most organic growers and farmers who participate in weekly farmer's markets and/or who sell products to consumers through direct marketing scenarios such as a —CSA" model typically exceed $5,000 in annual sales (note – not profit, but actual sales), and would have to become certified to make the organic claim.

While certification is much easier to approach and accomplish then it was only a few years ago, the thought of being entangled in yet another regulatory process is not appealing for most farmers. That notion, coupled with lingering misunderstandings of what is actually required can dissuade farmers from wanting to get involved with the certification process.

Certification does require certain commitments from the farmer including an involved application and inspection process. The terms used in the regulations and on certifier's forms can take a little time to get used to. The certification system relies upon farmers to keep clear records of many farming activities. While seemingly burdensome and meaningless at first glance, many farmers realize that the records of their field activities and harvests enable them to look back through the seasons and see which management strategies have worked, and what has not worked as well. Record keeping systems do not need to be fancy or modern. If it is easier to make hand-written notes on a calendar then it is to generate a computer record, then use a calendar. The form of the record does not matter as long as a record of some type exists (*and can be accessed during inspections or upon request of the certifier*). If you are a farmer who absolutely hates any type of paperwork and/or record keeping, you may wish to think about finding an employee and/or family member who can assist in these areas before engaging in the certification process.

Since the regulations were first published back in December of 2000, the organic sector in the USA, and worldwide, has seen incredible growth and continues to grow after a decade. Organic sales more than tripled between 2002-2010. From 2009 to 2010, sales of organic foods grew by 8 percent. (*Source: Organic Trade Association 2011 Organic Industry Survey, 2010*.) Given the burden of having to learn organic techniques, *plus* the burden of becoming certified, why would a farmer choose to go the route of organic certification? Why does organic agriculture continue to grow? What is the draw, what are the benefits?

Some growers come to organic agriculture to escape some of the harshest / most toxic chemicals commonly used in conventional agriculture. I met a potato farmer from Maine while at college. The farmer explained that he must don a full Tyveck suit and wear a respirator when applying pesticides to his commercial conventional potato crop. The farmer then admitted that he keeps a few small fields near the house where he does not use any strong chemicals, and while not certified, he was convinced those smaller plots could qualify for organic certification. Those were the fields where he and his family, and some neighbors, harvested the potatoes that they eat.

Some growers come to organic agriculture because they are attracted to the price premiums often enjoyed by organic foods. It is not uncommon to see higher prices for organic vegetables. A bushel of organic field crops can fetch twice as much, or more, as their non-organic counterparts in some years. The USDA's ERS (Economic Research Service) publishes data on organic crop prices that can be accessed through the internet. Farmers who are encouraged by the price premiums for organic crops should research the growing techniques and requirements before deciding to jump into transition and organic certification. Use of proper seeds and proper materials are not the only requirements for certification. A good way to describe it is to say that organic agriculture is not simply —input substitution". Often, farms who attempt to simply switch out the types of fertilizers and sprays they use and neglect the other requirements within the regulations struggle and do not remain organic for long.

My main reason for getting involved with organic agriculture was in reaction to information I read many years ago about problems with the loss of tremendous amounts of top soil in the US. Farmlands that had been productive for generations were no longer productive, and surrounding environments (mainly rivers and streams) were suffering. It was environmental health and the sustainability of American farms that drew me into organic agriculture.

Whether for personal health reasons, environmental health reasons, or for the price premiums (*or a combination of all these factors*), the most important thing to do if considering organic agriculture is to find out how it works, and what is actually required. Rumors abound, and often those rumors are partially or completely false.

Some farmers think that to be certified organic, the entire farm has to be managed organically. This is false. Farms can be —dual use", producing both conventional and organic crops on the same operation. There will be a need to describe how you prevent contamination, as well as preventing comingling of organic and conventional crops, within the organic farm plan, but it is commonly done. In fact, if just beginning along the path of organic agriculture, it may be desirable to bring in parts of the farm over time to allow the natural system to build up and become viable. It will also give you time to get used to the new management techniques before changing over the entire operation.

Municipal water is often, if not always, treated with chlorine. Some farmers believe that they cannot become certified because they use ~~-city water~~" to irrigate crops. As long as water additives do not exceed the limits found in the Safe Drinking Water Act, municipal water can be used to irrigate your organic production areas.

Mr. George C. Kalogridis works with a certification agent in Indiana. He often hears the repeated myth that organic farms must use draft horses. This is false. Most modern

organic farmers would find it extremely difficult to operate without mechanization. Farm equipment must be well maintained so that they do not pose contamination risks from leaking fluids, however, non-leaking tractors are an approved organic input!

Mr. Adam Watson, an organic certifier from the Kentucky Department of Agriculture, has often heard a rumor that I have heard repeated as well - that organic livestock producers cannot treat their animals with medicines if they get sick. This is not only misleading, it is opposite of what is required for organic livestock production. In the regulations, if organic management and subsequent approved methods of treating illness are not effective on organic livestock, the organic producer MUST remove that animal from certification and treat them with —prohibited" materials; they cannot let the animals suffer and die.

These are just some of the myths that circulate concerning organic farming. If you truly wish to know what organic farming is, what makes it work, or how to begin transitioning your farm to organic production, there is a growing wealth of information available to you, often for free.

If learning about organic systems for the first time, you should learn about the production methods involved (*how to make your organic system work*). This is a way to discover if that type of farming will be appealing to you. Links to the ATTRA web site and the eOrganic web site will be provided below. Both of these sites contain information on how to make organic systems work.

If you already know about organic techniques and are ready to know more about organic certification, then you can find a lot of information on the National Organic Program web site (*link provided below*). It may be easier to obtain information on certification specific to your type of farm / farming from an accredited certifier *(they can sift out the information you may not need*). Your local Co-Op Extension Office should also be consulted on the latest, effective methods used for organic production. Once fact is separated from fiction, and once the requirements are known and the terms become familiar, organic production becomes second nature and can be a very rewarding occupation for the men and women who choose to pursue it.

Helpful links:

https://attra.ncat.org/ = Appropriate Technology Transfer for Rural Areas; One of the best resources for crop-specific fact sheets for organic and sustainable producers. The national sustainable farming information center is operated by the private nonprofit National Center for Appropriate Technology (NCAT).

http://eorganic.info/; eOrganic is the organic agriculture community of practice with eXtension. Our mission is to foster a research and outreach community, engage farmers and ag professionals through trainings and publications, and support research and outreach projects.

http://www.ams.usda.gov/AMSv1.0/nop = The National Organic Program (USDA); Full text of the federal organic standards, the NOP Handbook, fact sheets, examples of labels, compliance and enforcement information, list of accredited certifying agents, list of certified operations, and more.

Looking for USDA programs and services that support the growing organic sector? USDA has created a centralized web resource center at USDA.gov for all the programs, services, and data we have that support organic agriculture. Visit (and bookmark) the organic web resource center at: http://usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=organic-agriculture.html

NOFA-NJ BEGINNING FARMER TRAINING PROGRAM & ORGANIIC RESOURCES

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Who is NOFA-NJ?

Northeast Organic Farming Association of New Jersey is a 501(c)(3) committed to assisting in the development of a sustainable agriculture system in New Jersey. Working with farmers, landowners, consumers, retailers, processors, educators and researchers, NOFA-NJ achieves its mission through education, technical assistance and advocacy work. In 2011, NOFA-NJ opened The Center for Working Lands on Duke Farms in Hillsborough, NJ to further enrich the State's relationship with the land. NOFA-NJ presently offers a range of workshops, technical support, and information services to both organic and progressive conventional farmers; reaches out to the general public, the media, and policymakers; participates in research projects; and organizes community-building events and activities. NOFA-NJ is working to see that we become "An Organic Garden State."

NOFA-NJ's work addresses both the why and how of organic and sustainable food systems in New Jersey, and is based on the belief that it will take both appropriate public policies, skilled practitioners, and informed consumers to be fully realized. We believe that truly sustainable agriculture addresses the environmental, economic, and social impacts of the food system. We address the role of food production, distribution and consumption in both human and community health. Sustainable and organic agriculture, at its best, supports the development of healthy communities built around the production, preparation and distribution of locally grown foods. This community-based view stands in opposition to the globalized food system, which is organized around commodities and operated with little regard to environmental or social impacts.

Our Farmer Incubator program:
NOFA-NJ has developed a way for serious beginning farmers using organic methods to —testtheir business plans in a low-risk environment. The Beginning Farmer Program is the first –nicubator" support system in New Jersey. With funding from the U.S. Department of Agriculture, NOFA-NJ offers land access, practical mentorship, and scholarships for classroom instruction.

NOFA-NJ is working to increase the number of small-scale, viable farms through our Beginning Farmer Program. This program supports new farmers from apprenticeship to business owner through education, technical assistance and land linkage.
The USDA Beginning Farmers and Ranchers Development Program (where our seed

money came from for this project) is a comprehensive approach to encourage, grow, and empower new small scale organic farmers in the Garden State. The long-term goal of this effort in coordination with partnering agencies will ultimately yield a steady flow of skilled independent farmers with ready access to land in which to farm. An additional benefit will be an increase in the number of acres of public and privately held land under organic and sustainable food production. The impacts of this program will transform how farming is done in New Jersey and make it a viable, affordable profession, and will also bolster an already-expanding local food system in the state.

In order to address the growing concern that new farmers lack experience and access to land, NOFA-NJ has developed a program with the goal of increasing the numbers of farmers while bringing more farmland into sustainable agricultural production. The program is based on four principles of becoming a farmer: Exploring, Planning, Learning and Practicing. Mixing training and experiential learning opportunities with technical and networking support, this program has five main objectives 1) Offer a toolbox of classroom learning opportunities for all levels of farmers, 2) Create a formal network of existing farmers who will offer hands-on learning experiences, 3) To expand NOFA-NJ's Incubator farms around the state 4) Provide technical assistance to new and existing farmers, and 5) work with partners to increase access to farmland.

Objective 1: Continue to offer classroom opportunities for all levels of interest from experienced to beginning farmers to the home gardener.

NOFA-NJ offers educational workshops and courses for farmers, gardeners, and consumers at various sites around the state. The Beginning Farmer curriculum focuses on the realities and pitfalls associated with starting an organic farm in New Jersey. The first course "*Exploring the Small Farm Dream*" works to answer the question: Is Starting an Agriculture Business Right for You? "*Tilling the Soil of Opportunity*," allows individuals to clarify their agricultural goals, assess their resources, and create a viable business plan, and "*Road to Organic Certification*" outlines the steps and incentives available for those pursuing certification.

Programs to the general public include such topics as organic garden preparation, composting, season extenders, beekeeping, and pest and weed management. NOFA-NJ also hosts professional certification courses in partnership with The Permaculture Project and NOFA Organic Land Care.

NOFA-NJ continues to host the Annual Winter Conference, the region's premiere organic agricultural event, in January of each year. The Winter Conference draws over 600 farmers, gardeners, policy-makers, and consumers together for three days of inspiring speakers, educational break-out sessions, the latest research and policy updates, and technical demonstrations.

Objective 2: Formalize a network of experienced farmers to support and mentor beginning farmers through experiential learning.

Since its inception, NOFA-NJ has partnered with certified organic farmers throughout the state to be "living classrooms" for others interested in learning to farm organically. Building on those relationships, NOFA-NJ has established a formal Apprenticeship Program. This approach focuses on hands-on learning that will help beginning farmers learn additional core competencies as well as connect them with a supportive established-farmer network. Participants also receive stipends and scholarships to attend NOFA-NJ's classroom training programs.

In addition, NOFA-NJ regularly offers Twilight meetings and hands-on farmBASE (Farm Based Agricultural Skills Education) field days focusing on season specific technical and management issues on the farm. Recent topics include BioIntensive Bed Prep, Drip Irrigation, Hoop Houses, Tractor Maintenance, Creating a Rain Garden and Grazing Chickens.

Objective 3: Expand NOFA-NJ's Incubator farms throughout the state.
In October 2012 NOFA-NJ in partnership with the Duke Farms Foundation in Hillsborough, NJ, launched the State‘s first farmer incubator. This Incubator Farm hosts and trains beginning farmers as they grow food, share equipment, establish markets, and learn from each other. This program provides beginning farmers with the opportunity to use earnings accrued from their incubator plot to leave and invest in their own farming business after three years. All of the beginning farmers who are accepted to the program are supported by an experienced farmer mentor, scholarships, access to equipment and courses designed specifically for their needs. However we now need to expand the program to bring in more farmers and are actively looking for more property around NJ.

Objective 4: Deliver technical assistance to beginning farmers.
NOFA-NJ provides technical assistance that supports farmers committed to organic production. The Organic Farming Conservation and Technical Services Specialist is a direct resource for farmers interested in USDA Farm Bill programs targeting organic producers, or farmers confronted with organic production issues, interested in organic certification, or looking for funding information. Our Technical Specialist provides bi-weekly news emails targeting organic producers, with information on National Organic Program policy, pest or disease updates, educational/training events, and funding opportunities.

Objective 5: Improve Access to Land through Model Leases and Contracts.
This final stage of the program is the most critical in New Jersey -- access to land and is unique to the region. Working with our land preservation partners, we developed a set of land leases and contracts that can be used by beginning farmers to gain access to land. Educational efforts are also geared towards landowners to raise their awareness of the need and benefits to farmland access. Jointly with the SADC, NOFA-NJ conducts informational meetings to increase awareness among landowners of the potential lease opportunities to beginning farmers.

Peppers

EXOTIC PEPPER PROJECT AT RUTGERS' NEW JERSEY AGRICULTURAL EXPERIMENT STATION: 2014 UPDATE

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Abstract: Twelve pepper subpopulation selections were made from the results of 2011 field studies at Rutgers Ag Research and Extension Center (RAREC), Bridgeton, NJ, for further field evaluation in 2012 at RAREC and repeated in 2013 at Rutgers Horticultural Farm 3 (HF3), East Brunswick, NJ. The 12 subpopulations embody a combination of plant and fruit characteristics that have potential as commercial products. Selections cut across four species: *Capsicum annuum* (long/large fruit types, 2 selections), *C. baccatum* (long/moderate size fruit types, 2 selections), *C. chinense* (Habanero/corrugated skin types, 6 selections), and *C. frutescence* (African birdeye/small fruit size types, 2 selections). At HF3 sweet bell pepper ("California Wonder") and jalapeno ("Jalapeno M") were added as standards. Results showed that *C. annuum* (EPV12-08 & 09) and *C. baccatum* (EPV12-16 & 17) selections were medium size plants comparable to jalapeno, consistently high yielding, early/medium maturing and indeterminate at both RAREC and HF3. Two of the six *C. chinense* selections (EPV12-03 & 13) were also outstanding at the two locations, but the remaining four (EPV12-05, 06, 10 & 12) performed poorly primarily due to phenotypic instability and late maturity. *Capsicum frutescence* selections gave excellent performance at RAREC based on yield and life cycle but poor performance at HF3 due to late maturity and phenotypic instability. In our future studies we plan to use some of these selections to develop uniform, true-breeding OP populations and inbred lines for future F1 hybrid variety development for the ***Jersey Fresh*** basket.

Introduction: In previous presentations we reviewed the significance of peppers in human societies around the world as spices, medicinal herbs and ornamentals. In particular, hot peppers (chilis or chiles) are highly valued for their therapeutic capacity and nutritional quality. In New Jersey and the Mid-Atlantic region these roles are relatively unknown. The growing ethnic population in the United States presents a market opportunity, which needs to be explored. We therefore initiated the Exotic Pepper project at Rutgers New Jersey Agricultural Experiment Station (NJAES) at RAREC in 2010 to explore hot peppers for their roles and promote production and utilization in and beyond the state (Ayeni & Orton 2013). From our investigations between 2010 and 2011, we confirmed that several exotic peppers would thrive under New Jersey conditions which prompted further studies to compare selections from several subpopulations examined in previous studies. We are currently working with 12 distinct subpopulations of the original pool of variability and our objective is to hone these subpopulations in true-breeding, uniform entities that can be released for

commercial production. We are also going further to inbreed selections for prospective F1 hybrid varieties. In 2011, we observed compelling differences in attractiveness to brown marmorated stink bug (BMSB) feeding, but populations have been inadequate to test this observation since then.

Materials & Methods: Pepper selections for the 2012 and 2013 field experiments were seeded in the greenhouse at RAREC and HF3 in early April and transplanted to the field during late May/early June (not later than June 10 in any year). In the field the peppers were numbered as exotic pepper variety (EPV) followed by the last two digits of the study/selection year and the serial number allocated to the pepper selection (e.g. EPV12-01). At RAREC, seedlings were transplanted into a 5-feet wide black plastic mulched bed at 24 inches apart. Each bed was long enough to accommodate 25 pepper stands. There was a spacing of approximately 6 feet between pepper rows. Drip/trickle irrigation was used to supply water as necessary. Fertilizers (N-P-K) were applied through irrigation (fertigation) at planting in May and at two-week intervals starting on or about July 1. Weeds were controlled using preemergence application of Dacthal + Dual at the time of plastic mulch laying. No other pesticides were applied throughout the field trial. At HF3 seedlings were transplanted on bare ground shortly after land preparation (conventional tillage) using spatial arrangements similar to those at RAREC. Fertilizer (NPK 10-10-10) was applied four weeks after transplanting as side dress and weeds along the crop row were controlled manually while those between rows and along borders were controlled with glyphosate (Roundup) using a hand-held sprayer. The two operations were carried out at three and six weeks after transplanting. No other pesticides were applied.

Visual observations were made on pepper plant size/habit, phenotypic stability, life cycle, fruit yield, and fruit size; and skin texture for *C. annuum* and *C. baccatum.* A scale of 1-5 was used for the parameters evaluated where 1 represented low and 5 high for quantitative parameters and poor or best/excellent for qualitative parameters.

Results & Discussion:

Capsicum annuum and C. baccatum: Selections from *C. annuum* (EPV12-08 & 09) and *C. baccatum* (EPV12-16 & 17) showed significant stability in performance across locations and agronomic practices. At both RAREC and HF3 yields were high (≥4,5 out of 5 points), plant size/habit compared favorably with the standard jalapeno at HF3. They were early maturing and plants were indeterminate and remained productive until frost in November. The selections also produced fruit with smooth skin. Only EPV12-08 showed a few cracks on the skin with a score of 4.5 out of 5, the other selections scored 5 out of 5 on skin texture. The jalapeno standard used at HF3 scored 1 on the skin texture trait. In jalapeno pepper types, the skin texture is a trait that matters to different consumers, some like it cracked and some like it smooth. This study showed we could develop cultivars that meet the needs of different consumers in NJ/Mid-Atlantic based on visual appearance. This will be explored further along with other important traits in peppers developed for culinary and other purposes.

Capsicum chinense: Two of the six selections from *C. chinense* (EPV12-03 and EPV12-13) expressed the same level of stability and performance as the *C. annuum* and *C. baccatum* selections. EPV12-03 is a bright yellow habanero type pepper with extraordinarily high yielding capacity, compact size and early maturing. It is indeterminate, fruiting continuously until the frost in November. EPV12-13 is a bright red African habanero type with an attractive flavor. It is very high yielding, highly vegetative with a tendency to lodge. Such a plant will benefit from plastic mulch to reduce pathogenic infections. The remaining four selections (EPV12-05, 06, 10 & 12) performed poorly at RAREC and HF3 primarily because of phenotypic instability (≤3 out of 5) and late maturity. They were excessively vegetative and the earliest maturing fruits occurred at the close of fall about the time of the frost in November. The consistency in poor performance across locations and agronomic practices was evidence that these selections may not be adaptable to NJ/Mid-Atlantic conditions. We therefore do not plan to consider them for future improvement studies.

Capsicum frutescence: The two selections from *C. frutescence* showed outstanding performance at RAREC in terms of yield and life cycle but performed poorly at HF3 primarily due to phenotypic instability and late maturity. At both locations the plants were much larger than other pepper types evaluated which was an advantage at RAREC but possibly a disadvantage at HF3. At RAREC EPV12-01 produced the highest yield followed closely by EPV12-02. At HF3 the two selections gave the smallest yields due to late maturity. Both started fruiting close to the end of the season, which did not give enough time for the fruit to mature. The reason for the variation in performance across locations and agronomic practices is unclear. We speculate that these selections probably benefitted from plastic mulch at RAREC but we do not have any data to support this position. It must also be noted that *C. frutescence* is a recent introduction to New Jersey with the germplasm yet to adapt effectively to our ecosystem. It is of interest to study these selections further to understand their response to various cultural treatments in our environment.

Conclusion: From the 12 subpopulation selections we made in 2011, we discovered that the selections from *C. annuum* (EPV12-08 & 09) and *C. baccatum* (EPV12-16 & 17) species are stable across locations and agronomic practices. Also two of the *C. chinense* selections (EPV12-03 and 13) showed significant stability. These selections will form a significant component of the foundation for our future breeding and crop improvement efforts. Their culinary, nutrition and health qualities will be evaluated as we proceed in our studies. *Capsicum frutescence* still presents significant challenge in determining phenotypic stability across locations under varying agronomic cultures. Since this pepper species has significant consumer preference in the ethnic market, it is our desire to continue to explore which selection will respond best to consumer preferences and the production requirements under NJ/Mid-Atlantic conditions. This study has moved us closer to developing hot peppers we can add to the ***Jersey Fresh*** basket.

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SUMMARY OF 2013 PEPPER WEEVIL TRAPPING AND MOVEMENT

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In 2013, we were funded by a second SARE of about $15,000 and $6,000 from the Charles Maier's Research Fund, NJ Vegetable Growers Association, for determining how pepper weevil is transported into New Jersey. We suspected that produce handling businesses and migrant laborers coming in from southern states and Mexico were the primary avenues, though we did not know the timing or the numbers of weevils that might be introduced. In 2012, we did recover adult weevils on a yellow pheromone trap next to a dumpster at one repacking facility in the end of April and again in mid-May.

Procedure: We selected five produce handling facilities around southern New Jersey, placing traps either on the facility premises or nearby beginning in late March. Additional traps were set near migrant housing and other sites where farm vehicles might congregate, including a parking lot and a produce box distributor. Finally, traps were placed in or on the borders of pepper fields, as was deemed necessary. All traps were checked twice a week or nearly so.

Results: Beginning in late April traps at the five produce handling facilities were catching adult pepper weevils. The facility producing the largest number was in western Gloucester County, but it should be emphasized that all locations produced weevils. The capture of weevils on these traps continued until mid-June though the numbers were in decline from mid-May.

During this time period, May 21st, the first weevil adult was captured in a pepper field border trap. It was soon determined that the field was only 1 ½ miles from one of the processing facilities and in between were fields of tomatoes and peppers. The pepper fields in this line were heavily infested and remained so for the duration of the season. Some of the fields that were heavily infected with phytophthora and bacterial speck were abandoned in early September because of both disease and weevils.

By October 1, weevils had been trapped at many farms, from central Burlington County to Cape May County, westward to Pedricktown, including a community garden and a

greenhouse pepper production system. This reemphasized our findings from 2012; that weevils can be easily spread about from farm to farm by many means.

Some of these farms were isolated from infested farms and it remains to be determined how these became infested, although it seems likely the infestation came from produce brought from the Philadelphia terminal market.

No weevils were found at traps near migrant housing until weevils were trapped in fields.

Conclusions: It appears that produce handling facilities; processors, repackers, terminal markets, and possibly auctions are the primary means of introduction of pepper weevils into New Jersey. The theory of movement of migrant labor contributing to the introduction of pepper weevil was not supported.

The presence of a relatively large number of produce handlers in a small area, compounded with a relatively large acreage of solanaceous crops creates a perfect setting for the repeated introduction and establishment of pepper weevil infestations. Earlier biological studies of pepper weevil in Florida indicate that tomatoes and eggplant along with solanaceous weeds such as nightshade, jimson weed and horsenettle provide sustenance for pepper weevils, although they only reproduce on peppers and nightshade.

Recommendations: We will work with the produce handlers to see what management practices can be done on-site to reduce the number of pepper weevils that escape into the surrounding environs. For farmers there are a number of potential recommendations, but with each farmer deciding what is economically practical.

1) Do not plant any solanaceous crop within a mile of any produce handling facility
2) Do not plant solanaceous crops in contiguous blocks – that is, separate the plantings of peppers, tomatoes and eggplant as far apart as possible
3) Do not immediately reuse produce bins taken from repacking or processing facilities without steam cleaning or pressure washing first before taking the bins to the field
4) Steam clean or power wash any shared equipment with other farms that have pepper weevil infestations
5) Do not tank mix insecticides for the sole purpose of controlling pepper weevils. Insecticide trials and pesticide records of local farmers show that tank mixes do

not enhance control of weevils. Tank mixing for weevil control becomes an unjustified expense.

6) No current insecticide regimen can eliminate established infestations. Insecticide applications can only suppress population growth of the weevils. However, timely application of an insecticide, preferably Actara, at initial bloom may prevent or slow establishing populations in a field.
7) After the initial spray of Actara, other less expensive insecticides can be rotated weekly with applications of Vydate. Insecticide trial data from Florida shows the best results with alternating a neonictinoid insecticide with Vydate.
8) Immediately destroy solanaceous crop fields upon last harvest depriving weevils of both food and breeding sites

Going forward: Even under the best of circumstances, it may take time to determine the best management practices for produce handlers to incorporate to reduce or eliminate the release of pepper weevils into their local environs. Because of this, farmers are urged to monitor for pepper weevil through the growing season, at least, until mid-September. Farmers and other ag fieldmen can be trained to use pheromone traps and to be able to recognize pepper weevils. Trap kits including sticky cards and lures can be purchased from Great Lakes IPM. Other options include contracting, individually, with the Vegetable IPM Program or private consultant for monitoring for weevils, or, possibly a check-off system which could provide funding for the hiring of either the Vegetable IPM Program or private consultant to monitor the traps.

Early season vigilance is important as the earlier the establishment of a pepper weevil infestation, the greater the yield loss and the greater the expense of control.

UPDATE ON DISEASE CONTROL IN PEPPERS

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Controlling anthracnose fruit rot in bell pepper.

Anthracnose fruit rot has been an increasing problem in pepper production during the past few years in NJ. The pathogen, *Colletotrichum* spp., also causes a fruit rot in strawberries and tomatoes. The pathogen can infect pepper during all stages of fruit development resulting in serious losses if not controlled properly. Symptoms of anthracnose fruit rot include sunken (flat), circular lesions. In most cases, multiple lesions will develop on a single fruit. As lesions enlarge, diagnostic pinkish-orange spore masses develop in the center of lesions. During warm, wet weather spores are splashed onto healthy fruit through rainfall or overhead irrigation.

Managing anthracnose fruit rot begins with good cultural practices. The pathogen overwinters on infected plant debris and other susceptible hosts. The fungus does not survive for long periods without the presence of plant debris. Pepper fields should be thoroughly worked (i.e., disced, plowed under) after the season to help break down and bury old debris. Heavily infested fields should be rotated out of peppers for at least three years. Do not plant or rotate with strawberries, tomatoes, eggplant or other *solanaceous* crops. Once areas in fields become infested, management of the disease can be difficult. Prevention is key to controlling anthracnose fruit rot.

Beginning at flowering, especially if fields have had a past history of anthracnose.

Alternate:

chlorothalonil at 1.5 pt/A or OLF, or
Manzate Pro-Stik 1.6 to 3.2 lb 75DF/A

with a tank mix of chlorothalonil at 1.5 pt/A plus one of the following FRAC code 11 fungicides:

Quadris (azoxystrobin) at 6.0-15.0 fl oz 2.08SC/A, or
Cabrio (pyraclostrobin) at 8.0-12.0 oz 20EG/A, or
Priaxor (boscalid + pyraclostrobin, 7 + 11) at 4.0 to 8.0 fl oz 4.17SC/A.

Prevention is critical to controlling anthracnose fruit rot. Infected fruit left in the field during the production season will act as sources of inoculum for the remainder of the season, and therefore, should be removed accordingly. Thorough coverage (especially on fruit) is

extremely important and high fertility programs may lead to thick, dense canopies reducing control. Growers have had success in reducing the spread of anthracnose by finding 'hot spots' early in the infection cycle and removing infected fruit and/or entire plants within and immediately around the hot spot.

Controlling Phytophthora crown and fruit rot.

Phytophthora blight (*Phytophthora capsici*) is one of the most destructive soil-borne diseases of pepper in the US. Without proper control measures, losses to Phytophthora blight can be extremely high. Heavy rains often lead to conditions which favor Phytophthora blight development in low, poorly drained areas of fields leading to the crown and stem rot phase of the disease. Infections often occur where water is slow to drain from the soil surface and/or where rainwater remains pooled for short periods of time after heavy rainfall. Always plant phytophthora-resistant/tolerant cultivars, such as Paladin or Aristotle, to help minimize losses to the crown rot phase of the disease. For an updated cultivar list please see the 2014 Commercial Vegetable Recommendations Guide.

For control of the crown rot phase of Phytophthora blight, apply:

Ridomil Gold (mefenoxam, 4) at 1.0 pt 4SL/A or 1 Ultra Flourish (mefenoxam, 4) at 1.0 qt 2E/A, or MetaStar (metalaxyl, 4) at 4.0 to 8.0 pt/A. Apply broadcast prior to planting or in a 12- to 16-inch band over the row before or after transplanting. Make two additional post-planting directed applications at 30-day intervals. Mefenoxam is still effective against sensitive populations of the pathogen. However, DO NOT USE mefenoxam, if mefenoxam-insensitive strains are present on your farm.

Ranman (cyazofamid, 21) at 2.75 fl. oz 400SC/A may be applied via transplant water (see label for restrictions)

Presidio (fluopicolide, 43) at 3.0 to 4.0 fl oz/4SC/A can be applied via drip irrigation (see supplemental label); PHI: 2 days

For prevention of the fruit rot phase of Phytophthora blight, alternate the following on a 7 day schedule:

Ridomil Gold Copper (mefenoxam + copper, 4 + M1) at 2.0 lb 65WP/A.

with one of the following materials.

Presidio (fluopicolide, 43) at 3.0 to 4.0 fl oz 4SC/A plus fixed copper at labeled rates, or

Revus (mandipropamid, 40) at 8.0 fl oz 2.08SC/A plus fixed copper at labeled rate, or

Ranman (cyazofamid, 21) at 2.75 fl oz 400SC/A *plus* a non-ionic surfactant

Forum (dimethomorph, 40) at 6.0 oz 4.18SC/A, plus fixed copper at labeled rate.

Tank mixing one of the above materials with a phosphite fungicide (FRAC code 33), such as K-Phite, Rampart, or Prophyt will also help control the fruit rot phase of Phytophthora blight.

Vine Crops

WATERMELON VARIETY TRIALS TO EVALUATE YIELD AND QUALITY

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The University of Delaware Extension Vegetable Program has been testing seedless watermelon varieties at the Georgetown Research Farm for more than twenty years. Each year's trial results are available online at http://extension.udel.edu/ag/vegetable-fruit-resources/vegetable-small-fruits-program/variety-trial-results/. Using the trial reports to determine which varieties performed well in a given year is fairly straight forward, but it is better to base variety selection decisions on more than one year's data. Since the same varieties do not appear in every trial, making comparisons based on multiple years' data can be difficult to do when just looking at the reports.

Yield data for varieties that were tested in more than one of the trials conducted since 2005 is compiled in the table below. Three high yielding varieties that were included in all five of the trials since 2005 are used as standards in the analysis: Crunchy Red, SS 7187, and Tri-X 313. The other varieties are compared to these standards. For example, Sugar Heart was trialed in three of the five years. Its average yield for those three trials was 60,361 lbs/A. The average yield for Crunchy Red for those same three trials was 73,651 lbs/A. The *p*-value for the difference between the standard variety and the variety being compared is given in italics below the yield values for the standard varieties. The lower the p-value, the more likely it is that there is a real difference in yield between the two varieties. *P*-values that are less than 0.05 are considered statistically significant. The p-value for the difference between the yields of Sugar Heart and Crunchy Red is 0.0802, so the yields of these two varieties should not be considered significantly different in the trials.

The three standard varieties were not significantly different than one another in terms of yield for the five years that they were tested. None of the varieties tested had yields that were significantly higher than the standard varieties. Six varieties were not significantly different than the standard varieties and are considered equivalent to the standards in terms of yield: Sugar Heart, Crisp n Sweet, SugaRed, Declaration, SS 7197, Sweet Delight. Six varieties had yields that were significantly lower than Crunchy Red, but not significantly lower than SS 7187 or Tri-X 313: SS 7167, Liberty, Troubadour, Fascination, Gypsy and Sugar Coat. Melody, Sorbet and Ruby had yields that were significantly lower than all three of the standard varieties. This information can be used to choose varieties that have produced high yields over multiple seasons in our trials. Of course, other important characteristics, such as fruit size, appearance and days to maturity, will also need to be considered when choosing a variety. Information

on these characteristics is available in the individual trial reports, which are available at the web address listed above.

Comparison of Yields of Watermelon Varieties Tested in the University of Delaware Trials for Multiple Years

Variety	# Years Tested	Yield (Melons/A)	Standard Variety Yield (Melons/A)			Yield (lbs/A)	Standard Variety Yield (Lbs/A)		
			Crunchy Red	SS 7187	Tri-X 313		Crunchy Red	SS 7187	Tri-X 313
Crunchy Red	5	**5070**		5060	4807	**84742**		80052	74488
p-value				*0.9766*	*0.4588*			*0.3835*	*0.0627*
SS 7187	5	**5060**	5070		4807	**80052**	84742		74488
p-value			*0.9766*		*0.4765*		*0.3835*		*0.3025*
Tri-X 313	5	**4807**	5070	5060		**74488**	84742	80052	
p-value			*0.4588*	*0.4765*			*0.0627*	*0.3025*	
Sugar Heart	3	**4042**	4659	4218	4319	**60361**	73651	66134	66959
p-value			*0.2068*	*0.7133*	*0.564*		*0.0802*	*0.4312*	*0.3696*
Crisp n Sweet	3	**3812**	4296	4299	4077	**59893**	69424	69324	65175
p-value			*0.2798*	*0.277*	*0.5491*		*0.1911*	*0.1956*	*0.4613*
SugaRed	2	**4322**	4598	4391	4183	**70350**	73566	69214	61163
p-value			*0.5678*	*0.8864*	*0.7749*		*0.6937*	*0.8892*	*0.2641*
Declaration	2	**4218**	4598	4391	4183	**61800**	73566	69214	61163
p-value			*0.4331*	*0.7209*	*0.943*		*0.1549*	*0.366*	*0.9378*
SS 7197	2	**4079**	4598	4391	4183	**58236**	73566	69214	61163
p-value			*0.2867*	*0.5206*	*0.8295*		*0.0665*	*0.1837*	*0.7199*
Sweet Delight	2	**4780**	5294	4840	4992	**82573**	91108	77622	80425
p-value			*0.4391*	*0.9263*	*0.7472*		*0.4531*	*0.6608*	*0.8485*
SS 7167	5	**4738**	5070	5060	4807	**70440**	84742	80052	74488
p-value			*0.3504*	*0.3655*	*0.8444*		***0.0114***	*0.0799*	*0.4513*
Liberty	4	**5119**	5491	5581	5266	**79055**	96244	89275	83103
p-value			***0.3529***	***0.25***	***0.7112***		***0.0074***	***0.095***	***0.4977***
Troubadour	2	**4667**	4598	4391	4183	**56472**	73566	69214	61163
p-value			*0.8861*	*0.5676*	*0.3198*		***0.0418***	*0.1244*	*0.5661*
Fascination	2	**3872**	4598	4391	4183	**54919**	73566	69214	61163
p-value			*0.1389*	*0.287*	*0.5206*		***0.0272***	*0.086*	*0.4458*
Gypsy	3	**5485**	5465	5163	5125	**75312**	96871	83504	81049
p-value			*0.9685*	*0.5304*	*0.4845*		***0.0205***	*0.3473*	*0.5077*
Sugar Coat	2	**3526**	4598	4391	4183	**56018**	73566	69214	61163
p-value			***0.0317***	*0.0799*	*0.1792*		***0.037***	*0.112*	*0.5293*
Melody	3	**4477**	4921	5206	4685	**56691**	80498	81672	70530
p-value			*0.3145*	*0.1064*	*0.6341*		***0.001***	***0.0007***	***0.0353***
Sorbet	2	**6283**	5687	6322	5540	**63234**	101379	100928	85781
p-value			*0.4175*	*0.9571*	*0.316*		***0.0012***	***0.0013***	***0.0277***

Ruby	2	**5264**	6111	6716	6050	**72758**	100702	101803	91941
p-value			*0.1492*	***0.0215***	*0.1779*		***0.0016***	***0.0012***	***0.0169***

UPDATE ON IDENTIFICATION AND CONTROL OF CUCURBIT DISEASES

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In recent years downy mildew has become a significant problem in cucurbit crops throughout the US. Symptoms of downy mildew include irregular, chlorotic (yellow) spots which develop on the upper leaf surface of cucurbit crops. These lesions expand and cause leaves to turn from yellow to brown often resulting in a scorched appearance in a few days if left untreated. Diagnostic characteristics of downy mildew are the purplish-brown spores which develop on the bottom side of infected leaves. Spores can easily be seen with a 10x hand lens. Control of downy mildew begins with the early recognition of symptom development and preventative fungicide applications. Fungicide resistance to downy mildew has been reported and there is some evidence that a new race(s) of the pathogen may be present in the US. Since fungicide resistance to other important cucurbit diseases, such as powdery mildew and gummy stem blight already exist in our area, proper preventative fungicide application programs must be followed.

Powdery mildew (*Podosphaera xanthii*) continues to be one of the most important foliar diseases of cucurbit crops in New Jersey. Symptoms of powdery mildew include white _fluffy' colonies which develop on upper and lower leaf surfaces, vines and handles of fruit. Control of powdery mildew begins with planting powdery mildew resistant/tolerant cultivars and early detection of symptoms along preventative fungicide maintenance programs. Fungicide resistance to powdery mildew has been detected in NJ and growers need to follow fungicide labels and restrictions accordingly.

Fusarium fruit rot (*Fusarium* spp., *Fusarium solani* f. sp. *cucurbitae* race 1) is an important soil-borne disease in cucurbit crops. Fusarium fruit rot is often a problem in fields which have been in continual cucurbit production or with little rotation. Symptoms caused by Fusarium fruit rot include reddish-purple circular lesions with tannish-white centers which develop on the _belly' side of the fruit which is in direct contact with the soil. Symptoms often go unnoticed until harvest. Control of Fusarium fruit rot begins with a proper crop rotation of at least 3 to 4 years. Unfortunately, fungicide applications will not give adequate control due to the difficulty of getting proper coverage. Cover crop mulches, such as winter rye (*Secale cereale*), killed and left on the soil surface have been shown to reduce Fusarium fruit rot development by keeping fruit from direct contact with the soil.

Phytophthora blight caused by *Phytophthora capsici* is an important soil-borne disease of cucurbit crops. Symptoms of Phytophthora blight include the collapse and wilting of

developing plants and vines and white ‗greasy' spore development of infected fruit. Phytophthora blight development is favored by wet conditions and saturated soils. Control of Phytophthora blight begins with proper crop rotation. Since the pathogen can survive in the soil for many years, fields should be rotated out of all susceptible crops, which include pepper, tomato, and all other cucurbits. Avoid planting in fields with low lying areas and/or with a history of standing water.
Plectosporium blight (also known as white speck) formerly known as Microdochium blight is a soil-borne disease which causes white to tan spindle shaped lesions on leaves, petioles, vines, stems and fruit. Infected stems become dry and brittle which can cause death of leaves and complete defoliation if left untreated. Fruit infections will cause cosmetic damage to fruit making them unmarketable. Control of Plectosporium blight begins with the early diagnosis of symptoms and preventative fungicide applications.

The diagnosis and control of these diseases and other important diseases of cucurbit crops will be discussed. An update on the newest fungicide chemistries available for controlling important diseases in cucurbit crops will also be presented.

LARGE GOURD VARIETIES FOR FALL SALES AND AGRITOURISM

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Unique products for farm market and agritourism sales in the fall can attract customers to your business. Most all farm direct marketing operations in New Jersey and other areas sell pumpkins as a fall product. Some also sell small sized gourds and other aesthetically pleasing ornamental crops, like multicolored dried corn. Similar to displaying pumpkins, large gourds can be used for decoration. Many large gourd, winter squash and pumpkin-like cucurbits have unique colors, shapes and textures. Some of the cucurbits that are attractive for decoration are also edible.

During the 2013 growing season a variety trial was conducted in Richwood, NJ in a commercial farm field. A field trial with 11 varieties and 3 replications with 9 plants per plot was planted on June 27, 2013. Two seeds per hill were planted with a spacing of 3 ft. between plants in a row and 5 ft. between rows. Once seeds germinated, the weaker seedling was removed to leave one viable plant per hill. Varieties included in this trial consisted of "Big Apple", "Short Handled Dipper", "Duck", "African Warty", "Indonesian Bottle", "Maranka" (aka "French Dolphin"), "Bottle Gourd", "Rouge Vif D'Etapes", "Uchiki Kuri", "Queensland Blue", and "Boston Marrow". The field was treated the same way as the commercial pumpkin field that was adjacent to the trial area. Standard insecticide, fungicide and herbicide treatments were applied as recommended in the 2013 Rutgers Commercial Vegetable Production Recommendations. Yields per acre, recorded in marketable fruit per acre can be found in Table 1 below.

Variety	Number of Marketable Fruit Per Acre
Big Apple	4,840
Short Handled Dipper	4,195
Duck	4,195
African Warty	3,872
Indonesian Bottle	2,904
Maranka (French Dolphin)	6,776
Bottle Gourd	6,131
Rouge Vif D'Etampes	1,936
Uchiki Kuri	2,581
Queensland Blue	1,936
Boston Marrow	968

Farm Safety Family
Farm Management

FARM SAFETY: PESTICIDE STORAGE AND SPILLS

Patricia Hastings
Rutgers NJAES

Pesticide storage facilities should be designed to prevent accidental releases to the environment and to protect the safety of personnel working within them. Properly designed pesticide storage areas are also theft-proof, child-proof, fire-proof, and environmentally safe, protect product, and minimize the risk of spills.
For the protection of others, and especially in case of fire, the storage area should be posted as Pesticide Storage and kept securely locked.

Ventilation of storage areas is important to prevent accidental respiratory exposure of workers. Also, venting must be sufficient to keep fumes and/or any potential fumes from intruding into occupied areas. If restricted use pesticides are stored in a wholly or partially occupied building, New Jersey regulations require that the storage area must be in a structurally separate room and adequately vented. Consult local building code ordinances for more specific design requirements including fire safety.

Always read the label. Special storage recommendations or restrictions will be included. Some pesticides require protection against freezing or extreme heat and have suitable warnings on the label. Keep in mind that temperature extremes may pose safety hazards and may impact product efficacy. Plan pesticide purchases so that supplies are used by the end of the growing season. When pesticides are stored for the winter, keep them at temperatures above freezing, under dry conditions, and out of direct sunlight.

When storing pesticides take measures to protect product from accidental spillage by routinely inspecting containers for tears, splits, breaks, leaks, rust, and corrosion. Rather wood/dirt flooring or shelving, store product on epoxy coated surfaces. All drums and bags should be stored off the floor on top of plastic pallets. Chemicals should be stored on sturdy metal shelving with the heaviest containers and liquids on the lowest shelves. Place opened bags of dry material in sealable plastic bags or other suitable containers to reduce moisture absorption and reduce the possibility of a spill. . To minimize cross contamination and avoid crop loss, segregate herbicides from other pesticides.

In the event of breach of a container, keep adequate and accessible cleanup supplies and equipment to handle any spill that may occur. New Jersey regulations require that your storage area have at least a shovel or dust pan & brush for dry spills and adequate

sorbent to control liquids that may be spilled. See NJAC 7:30 for specifics; URL: www.nj.gov/dep/enforcement/pcp/pcp-regs.htm.

In case of an emergency, keep your local fire department informed of the location of all pesticide storage locations. Keep an inventory of all pesticides held in storage and locate the inventory list in an accessible place away from the storage site, so it may be referred to in case of an emergency. The people of an area or community may have to be evacuated if the smoke from a pesticide fire drifts in their direction. In New Jersey, applicators are required to annually send an inventory with the exact location of pesticides in storage to their local fire department by May 1st each year.

In the event that a spill does occur, reporting to the DEP is only required above certain thresholds. This applies to both general and restricted use pesticides. For example, in agricultural operations, a spill of any pesticide outdoors that contains one pound or more of active ingredient is reportable. But, spills inside a structure of any pesticide are reportable when more than one gallon liquid (pesticide and/or diluent). If dry pesticide formulations were spilled indoors, reporting is required for more than one pound or more of active ingredient.

Reportable spills should be called into the DEP immediately at 877-WARNDEP. This report should then be followed up with a written report to the DEP within 10 days. In both cases, the following information is required: 1) name/address/phone of dealer, applicator, operator; 2) name/address/phone of commercial business, dealer; 3) incident location; 4) pesticide name & EPA registration number; 5) Estimated amount & dilution rate of pesticide; and 6) corrective action(s) taken.

One of the best strategies to minimize the probability and impact of pesticide spills on the farm is to develop your own spill contingency plan. Maintain product information (labels, SDS). Assign responsibilities. Provide routine training in how to control, contain, cleanup spills.

Sources:

Information on the NJDEP Pesticide Control Program regulations and requirements are located on the web at www.state.nj.us/dep/enforcement/pcp/. They may be contacted at 609- 984-6507. Cooperative Extension provides extensive assistance to growers in understanding and complying with these regulations. One important resource is the NJAES Pesticide Applicator Training website at www.pestmanagement.rutgers.edu/pat/. The Extension Pest Management Office provides assistance to applicators, and may be reached at 848-932-9802.

DEALING WITH VISION ISSUES ON THE FARM

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Common sense precautions can go a long way to prevent impairment and loss of vision. Learn the value of using UV protection. Understand the need for other forms of eye protection.

Common eye conditions are often made worse by wind, UV light, chemicals, dust, and dirt. All things that can be found in a field. Learn common sense ways to lower the exposure and promote better eye health.

Ways to deal with eye health issues as well as accommodations to help workers deal with existing problems will be explored

AgTourism Risk Management

EMPLOYEE MANAGEMENT FOR A BETTER CUSTOMER EXPERIENCE

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They key to a successful business can be described or written out in many ways. However, people and their relationships can generally determine success or failure. Making people feel valued, important and welcome are all ways that make for a good relationship. With direct marketing of your agricultural products through a farm market, agritourism, or other direct to the public sales, making the customer feel welcome and appreciated will go a long way.

Surrounding yourself with good people and making sure employees are well trained is the first step in creating a successful direct marketing business. In hiring employees it is important to make sure they have the credentials and personality to work with the public on the farm. Sometimes, agreeing to hire a "friend of the family" or giving someone a job because you feel sorry for their situation, will hurt your business in the long run if they are not qualified. After you find a potential employee fit to hire, it is important that they know the rules and procedures of your business, and follow them. Providing a written work contract and giving the starting employees the rules in writing is a good way to ensure they understand what is expected. Sometimes it can be tough to be "the boss" and enforce the rules. However, if employees are goofing off or the reason that customers do not want to return, you will lose money, turn away customers and your business will fail. Remember, this is your business, your family's livelihood, your future and your reputation on the line.

Think of the last time you visited a new store or a new restaurant. Did the employees make you feel welcome? Did you say to yourself, "I want to come back"? Would you recommend this establishment to friends or family? Worse yet, would you tell others to stay away? Good or bad publicity from a customer can mean good advertisement through word of mouth, or can result in preventing other people from coming to your establishment. Having the right people working for you and having them portray your business in a positive manner can create a successful outcome.

Rather than learning as you go, there are some good tools out there for preparing for hiring employees and for employee management. It is always a good idea to put things in writing, so that the employee can't say, "I didn't know that. You didn't tell me that.

Etc.". Also if you need to terminate an employee, it makes it easier to point out what they agreed to do and what rules they were given and needed to follow.

Below is a checklist to use when considering employee rules and for managing employees.

Agritourism Employee Assessment Checklist

Has the farm operator…	Yes	No	Priority Ranking	Comments
…assessed how many employees are needed for regular farm visitor traffic?				
…assessed how many employees are needed for special events?				
…evaluated if employees are competent in utilizing cash registers?				
…evaluated if employees are able to count back change to customers and not just rely on the cash register to determine change?				
…made sure employees know who in is charge/who is the manager?				
…informed employees on who to ask if they have questions regarding certain tasks?				
…made sure employees are easily recognized by customers via an employee uniform, nametag, etc?				
...trained employees to answer certain customer questions about products?				
…made sure employees are dressed neatly, cleanly and appropriately?				
…clearly communicated work schedules, start and end times of work day, and when breaks should be taken?				
…made sure workers are taking breaks required by law?				
…covered the policy on the use of cell phones, hand held video games, reading magazines, or other personal recreational uses during work?				
…covered the policy on personal visits during work time?				
…followed state pesticide laws pertaining to workers and US EPA Worker Protection Standards regulations and training for employees who work or may work in fields?				
…posted federal and state wage and hour laws pertaining to minimum wage and workers rights?				
…made sure workers are performing tasks that are				

allowed according to labor laws for their age?				
…made sure workers are being paid appropriately according to payroll laws for overtime?				
…made sure if young workers are not working more than the maximum hours allowed by law?				
…acquired emergency contacts for each employee?				
…provided the employer's policy on substance abuse?				
…provided each employee with a written job description?				
…provided the employee with the length of hire? (seasonal, part time, temporary, etc.)				
…given instructions on how and who to contact when calling out from work, or if going to be late to work?				
…provided a list of reasons for dismissal from the job? (being late, not showing up for work, poor work habits, inappropriate behavior, theft, etc.)				
…made sure employees who are under age are not operating machinery that is restricted for their age?				
…provided a schedule of when and how the employee's pay will be dispersed (weekly, bi-weekly, paper paycheck, direct deposit, etc.)				
…given details about any additional benefits provided by the employer to the employee.				
...evaluated employee customer service habits to see if they are appropriate?				

FARM SAFETY ADVICE TO PROTECT AGRITOURISM FARMS FROM LEGAL LIABILITY

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Agritourism has become an increasingly important strategy for New Jersey farmers to expand farm income and employment opportunities for family members. By opening farms to the public for educational and recreational purposes, agritourism also raises public awareness and appreciation of farming and agricultural issues. It is estimated that 1 in 5 New Jersey farms currently provide some form of agritourism activity such as on-farm direct marketing, educational tours, entertainment, outdoor recreation, or farm accommodations. Several years ago, revenue from these activities was estimated to be $57.5 million (Schilling et al., 2007).

Inviting members of the non-farm public, often by the thousands, to one's farm provides promising business opportunities. However, guests visiting an agritourism farm will face safety risks and, in turn, the farm operator will face greater legal liability exposure. As part of a Northeast Sustainable Agriculture Research and Education grant (Award No. ENE11-121), training materials were developed to assist current and developing agritourism operations manage safety risks and liabilities. This presentation highlights practical steps a farm operator can take to protect farm guests and manage the legal liabilities associated with agritourism. More detailed guidance information may be found online at: http://agritourism.rutgers.edu/training/.

Steps to Protect Agritourism Guests (and Yourself from Legal Liability!)

Safety hazards can never be fully eliminated from a farm. Further, many visitors will be unfamiliar with farming and unaccustomed to safety hazards present on a commercial farm, increasing the likelihood of a farm injury for which the farmer may be found to be legally responsible. The unfortunate reality is that some visitors will place themselves in harm's way by disregarding farm safety rules, while others may even falsely claim that they suffered an injury on the farm.

Agritourism operators are well-advised to view farm safety holistically as a **program** encompassing steps to prevent exposure of visitors to farm hazards and respond to accidents when they do occur. Critical elements of a safety program should include:

(1) identifying and managing known safety hazards through the completion of a comprehensive assessment of potential risks on the farm and development of a farm safety plan;

(2) training employees to identify and mitigate farm safety risks, as well as enforce farm safety rules;

(3) communicating risks and expectations to farm guests; and,

(4) establishing emergency response procedures to effectively handle on-farm emergencies.

Identify Risks to Farm Visitors

Inspect your farm regularly to identify potential hazards that could jeopardize the safety of visitors and employees. A farm walk-through should include all areas that could be accessed by visitors, even those that are supposed to be off-limits to guests. During these inspections it is imperative to look at your farm through the eyes of a guest. You may be well familiar with potential hazards on your farm, but what might a child encounter? Do not rely on the common sense of visitors to keep them safe; it is your responsibility to be conscientious about identifying and addressing possible risk factors. It may be useful to invite an Extension professional or emergency responder to conduct a farm walk-through to help identify safety problems that you may overlook. Keeping a log of farm inspections is good protocol and may be useful documentation for showing proactive steps for maintaining a safe visitor environment in the event of a lawsuit filed by an injured guest.

Each farm has its own unique safety factors to consider. Common ones that often warrant attention include:

- The safety of parking areas (as well as entering and exiting the farm);
- Storage of equipment and machinery that may pose a danger to visitors;
- "Attractive nuisances", which are areas or features of the farm that may attract the interest of visitors, especially children (e.g., farm ponds, tractors, or farm animals);
- Safe storage of farm chemicals (fertilizers, pesticides, etc.);
- Plans for accommodating people with limited mobility or disabilities;
- Appropriate lighting, if needed;
- Guest access to/interactions with farm animals;
- Safety of food served on the farm (by you or a vendor);
- Contingencies for inclement weather;
- Safety of buildings and structures that may be accessed by the public.

Each farm attraction (for example, a hayride) should have a "plan of operation" that details potential safety risks inherent to the attraction and specific procedures for safely managing the attraction for guests. Where appropriate, rules by which guests need to abide should be posted for each attraction.

A farm safety plan should carefully outline areas of the farm that are strictly off-limits to visitors, and farm employees should be trained to routinely monitor these areas. The plan should include contact (and emergency contact) information for the farm owner(s), manager(s), and employees. It should also include a farm map detailing important farm features (e.g., buildings, water, location of animals, chemical storage, farm roads/lanes, parking, etc.).

Train Employees

Farm staffing should be adequate to accommodate anticipated numbers of farm visitors. All employees should be trained generally to understand the farm and expectations the owner/manager has of employees. Importantly, each employee should understand the farm safety plan and specific plans of operations for farm activities, as well as emergency response procedures. The owner/manager should conduct a full staff training for new employees and hold a refresher training session for returning employees.

Communication with Farm Visitors

Guests on your farm should be made aware (through signs, staff and other means) that they are visiting a working farm and that certain inherent risks exist. It is advisable to post an indemnification sign informing visitors that by entering the farm they accept such risks and must exercise reasonable caution.

Farm rules should be clearly posted. Areas not intended for the public should be clearly delineated and marked as "off limits". Parents should be advised to always accompany and closely monitor children. Rules specific to each farm attraction should be clearly displayed (e.g., "No Standing on the Hay Wagon" or "Wash Hands After Touching Farm Animals"). Rules should also be communicated to guests by farm staff, and enforced as needed. It is a good idea to post farm rules and recommendations for ensuring a safe farm visit (e.g., appropriate clothing to wear) on the farm's website.

A legal professional and the farm's insurance provider should be consulted about the adoption of a release agreement/liability waiver as a strategy for limiting a farm owner's legal exposure resulting from agritourism visitors. An attorney and/or insurer may offer advice on specific language, but the key element of a waiver is the "indemnity by user"

clause which essentially states that a farm guest agrees to indemnify and hold harmless the landowner from any claims made by the user arising from his or her use of the land. Such documents may help limit risk but do not afford a farm owner 100% protection in the event of a lawsuit, nor do they protect a farmer from any negligent behavior that results in a farm injury. It is imperative to understand that a waiver may be adopted as part of a farm's liability management program, but it cannot be the farm's sole method of risk management nor does it absolve the owner of responsibility for guests‘ safety.

Emergency Response

Despite a farmer's best efforts, accidents will happen on the farm. All farm businesses should have emergency response procedures that are reviewed regularly, posted, and incorporated into staff training. These procedures are essential for protecting the welfare of farm guests and employees, facilitating emergency response, and minimizing personal and business damages that may result if a farm owner is found liable for an injury occurring on the farm.

There are several proactive steps a farm owner can take to prepare for an emergency situation on the farm. These include:

- Invite emergency responders (fire department, EMS) to tour the farm;
- Post current emergency contact information for farm owners, managers and staff, as well as key business contacts;
- Post the physical address, entrance, and GPS coordinates for the farm;
- Sketch a map of the farm and important features;
- List locations of emergency response equipment (e.g., first aid kits, fire extinguishers, personal protective equipment);
- Maintain Material Safety Data Sheets;
- Establish visitor capacity limits (buildings, attractions/rides, etc.);
- Train employees on emergency response roles;
- Post —In Case of Emergency” signs;

It is strongly advised that a farm owner develop an incident response form for documenting accidents/incidents on the farm. Even a seemingly minor injury may result in the filing of a lawsuit. This may occur several months after the incident when details of the event are forgotten by farm staff. Documenting in real time all farm accidents is an important component of emergency response, and one that may be important if the incident evolves into litigation. Elements of a simple 1 or 2 page incident response form should include the name, address, and contact information of the injured person, a detailed description of the incident (e.g., time, location, nature of accident), a description of any medical assistance provided or offered, witnesses, and the name/contact information of the person completing the report.

For More Information

Keeping farm visitors and employees safe must be a primary goal of any agritourism operator. Good record keeping and documentation of efforts to promote farm safety and effective emergency response can be valuable if a farm accident results in a lawsuit. It is recommended that the farm owner/manager develop written farm safety and emergency response plans, maintain farm inspection and employee training logs, and carefully file all incident response forms. It is also advisable to document (via photographs or video recording) the farm premises to demonstrate the existing state of the farm and installed safety practices.

A variety of practical resources for promoting agritourism safety (e.g., training materials, farm safety videos, farm safety checklists) are available on our project website: http://agritourism.rutgers.edu/training/.

Insects & Disease
Hot Topics

UPDATE ON THE CONTROL OF BASIL DOWNY MILDEW WITH FUNGICIDE APPLICATIONS AND BREEDING FOR RESISTANCE

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Sweet basil (*Ocimum basilicum*) is an economically important fresh culinary herb grown in the United States. In fall of October 2007, a new disease of basil, downy mildew (*Peronospora belbahrii*) was first reported in FL. Since then, basil downy mildew has resulted in significant losses throughout the United States. The epidemiology of the pathogen is still unknown. However, it is believed that the pathogen has spread globally via the shipment of infested seed and through natural weather cycles. Unfortunately, there are currently no effective seed treatments for basil downy mildew.

The main diagnostic feature of the pathogen is the production of purplish gray sporangia that appear only on the abaxial (i.e., underside) surfaces of infected. Symptoms include yellowing of foliage and eventual necrosis of leaf tissue. Once basil develops symptoms, plants are no longer marketable.

During the summers of 2010-2014 at the Rutgers Agricultural Research and Extension Center (RAREC) in Bridgeton, NJ, a number of conventional and biological fungicides were evaluated for efficacy in field trials.

Our studies over the past 4 years have shown that phosphite products, such as K-Phite, Rampart, and Pro-Phyt (FRAC code 33) provide the best season-long control if initiated before the pathogen appears in the region and/or prior to the onset of symptoms. Of the products tested, the only currently registered products for control of basil downy mildew to-date are K-Phite, Pro-Phyt, Rampart, Quadris and Ranman. Future registrations are in the pipeline and will be discussed.

In each year of the study none of the organic fungicides tested provided an adequate level of season-long control.

Current recommendations for basil downy mildew disease control include using an integrated pest management (IPM) approach and a fungicide resistance management program. Growers should know the symptoms of basil downy mildew and monitor the field daily for detection of the pathogen.

If the pathogen is detected in the region, growers should make frequent protectant fungicide applications before the pathogen enters the field before symptoms appear.

In 2010 a basil variety and breeding line trial was conducted as an initial screen for potential sources of genetic resistance to downy mildew, *Peronospora belbahrii*, a

destructive pathogen of basil introduced in the US in 2009. This trial was expanded from 30 to over 40 varieties representing six different *Ocimum* species in 2011. Varying levels of disease susceptibility were observed with the highest tolerance associated with *O. americanum*, *O. citriodorum*, *O. gratissimum*, and *O. tenuiflorum* varieties and USDA-GRIN accessions. In contrast, the most severe symptoms and extensive sporulation were consistently observed in *O. basilicum* accessions, including the popular commercial sweet basil varieties.

In 2011 an advanced breeding program for developing resistance to downy mildew in sweet basil was initiated at Rutgers University. Using data collected from field trials over the past 2 years highly tolerant *Ocimum spp*. were selected for interspecific hybridization with Rutgers' sweet basil breeding lines and a popular commercial variety. F1 hybrids were generated through purposeful crosses to transfer resistance from non-traditional basil species to the commercially important sweet basil varieties. A method for screening basil seedlings for susceptibility to downy mildew was developed under controlled conditions so as to confirm transmittance of resistance in progeny. Currently, a backcross breeding strategy is being pursued to breed out undesirable traits, but retain disease resistance. Crosses between species present issues of sterility, thus, a parallel strategy includes screening of new germplasm in order to identify a sweet basil (*O. basilicum*) genotype or mutant conferring resistance. This past summer at the Rutgers Agricultural Research Center (RAREC) in Bridgeton, NJ F2 and backcross breeding populations were evaluated for susceptibility to basil downy mildew. The purpose of this study is to determine the heritability of downy mildew resistance in basil and begin to characterize the gene action controlling its inheritance. Results will aid in effective selection for downy mildew resistance and improve effectiveness of future breeding strategies.

SPOTTED WING DROSOPHILA –
LITTLE FLY, BIG PROBLEM!

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In 7 July 2011, the first adults of the spotted wing drosophila (*Drosophila suzukii*) were found in New Jersey. Spotted wing drosophila is an invasive insect pest of fruit that has spread in the past four years from California to Oregon, Washington, British Columbia, North Carolina, South Carolina, Michigan, Virginia, Florida, and throughout the Northeastern states. The greatest economic impact is in blueberries, cherries, strawberries, raspberries, and blackberries because soft-fleshed fruit are easier for the flies to lay eggs in and for the larvae to develop. This pest has also been reared out of other fruit crops, and from berries of wild plants.

Spotted wing drosophila flies are small, around 2.5-3 mm in length, with light brown bodies and darker brown bands on the abdomen. Adults have characteristic bright red eyes, and the males have a prominent dark spot on each wing that can be easily seen with a hand lens. Females are less distinctive, but their serrated ovipositor is a distinguishing feature. This fly is native to Asia and is also reported in Hawaii.

Spotted wing drosophila is not a true fruit fly like blueberry maggot or cherry fruit fly. It is a vinegar fly similar to the other small flies that infest ripe fruit during the summer, but with some important differences. This species attacks intact fruit, using the saw-like ovipositor to lay eggs under the skin. Female flies can lay hundreds of eggs and this species develops quickly, completing a life cycle in about three weeks during our typical summer temperatures, allowing buildup of the populations through the season.

In 2013, my lab group took part in a multi-state trap comparison experiment (Led by Hannah Burrack, North Carolina State University). The traps used were all of the clear ~~d~~deli cup" design. The bait types were:

1) Apple cider vinegar (ACV) with a drop of unscented soap.
2) Yeast and sugar – yeast, sugar, and water, + unscented soap.
3) Fermenting bait – whole wheat flour, water, sugar, ACV and yeast in a separate ventilated specimen cup within the larger deli cup containing a drowning solution of ACV, ethanol and unscented soap.

4) DroskiDrink – ACV, red wine, brown (muscovado) sugar, and soap.
5) A synthetic lure over ACV. And,
6) A synthetic lure over drowning solution.

Experiments were conducted by Rodriguez-Saona's lab to test new baits for spotted wing drosophila.

The fermenting bait and synthetic lure over ACV captured more flies than the other baits. Comparable numbers of males and females were captured in fermenting baits and synthetic lures over ACV, and more females were captured overall. While the ACV-baited traps have been the standard for monitoring spotted wing drosophila, and were used in previous years, all baits/lures captured flies earlier than ACV.

Growers, scouts, consultants, and processors should become educated about spotted wing drosophila and what signs to look for in ripe fruit. A good central source for information on this pest has been developed by Oregon State University, available online at swd.hort.oregonstate.edu and by Michigan State University, available online at http://www.ipm.msu.edu/invasive_species/spotted_wing_drosophila.

Summer student helping bait traps for spotted wing drosophila.

Sweet Corn

SWEET CORN VARIETIES FOR 2014

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Modern day plant breeding techniques, both traditional as well as GMO, are making an abundance of sweet corn varieties with excellent eating quality available to the grower and public alike. Higher sugar content, extended storage life, high yields, and tenderness have all been improved in recent years not to mention the introduction of newer genetic types which add up to high quality and additional marketing opportunities. The strong consumer preference for local grown sweet corn and other vegetables is being touted by some food connoisseurs as the new organic for many people. Consumers are becoming more concerned with the somewhat alarming increase in the amount of imported foods from undeveloped that have either lax or non-existent food quality standards.

This study was designed to investigate newer types of sweet corn varieties adapted to eastern US growing conditions that will satisfy consumer interest in more locally, fresher fruits and vegetables. The study was conducted at the newly established Burlington County Agricultural Center which presents a unique opportunity to market local grown vegetables with additional acreage available for both extension research and demonstration projects of interest to growers and consumers alike. The trials consisted of 16 commercial white sweet corn genotypes in a large scale plot consisting of 400‘ rows encompassing 2/3 of an acre. The varieties were planted with a commercial scale precision planter with the addition of 20 lbs. of N in the form of liquid 8-0-10. All subsequent activities such as spraying and fertilization were performed by a John Deer Gator.

I would like to thank the following companies and organizations whose support made this study possible on a very limited budget: Rutgers Cooperative Extension, the Burlington County County Freeholders, the Burlington County Board of Agriculture, Growmark Inc, Plant Food Chemical, Stokes Seeds, and Abbott & Cobb.

The trial was established as a late planting on June 6, 2013 and harvested from August 13-20, 2013 with the man power source of the Burlington County Master Gardeners.

The summation here will consist of ranking the specific results such regarding yield, tip cover, overall eating quality, ear length, and SPAD readings. No one variety excelled in

all categories therefore it is important for growers to determine which of these characteristics are the most important for their farm and choose varieties that best fit their needs. I wish I could tell everyone that varieties X,Y,Z are the best ones to grow however we all know that life is not that simple nor is growing sweet corn.

Results:

Ear Characteristics

Above Average Ear lengths (long ears): Illusion, 7401, Mattipoisett, Avalon

Average Ear length: ACZ 1441, 3174, Devotion, 378 A, 3674, GS 3474, Tahoe,

Below Average Ear length (too short): XTH 3075, Munition, 382 A

Tip Cover (bird protection):

Above Average (longer tip cover): 382 A, Mattipoisett, Avalon, Munition, 378 A, 3674

Average tip cover: Devotion, GS 3474, 3174, Tahoe, XTH 3075, Illusion, 7401 IMP

Below Average (open ear tips): ACX 1441, 372 A, GS 372 A

SPAD Meter Readings (the higher the reading = the greener that plants):

Above average (greenest): Illusion, Munition, 3674, XTH 3075

Average: GS 372 A, 372 A, Avalon, 382 A, GS 372 A, 378 A, mattipoisett, 3174, 7401 IMP, Tahoe

Below Average (yellower plants): Devotion, ACZ 1441

Yields

Outstanding- (400 to 500 crates per acre): XTH 3075, Devotion, GS 3474, Mattipoisett

Above Average- (300 to 400 crates per acre): 372 A, Illusion, ACX 1441, 378 A

Below Average- (300 to 350 crates per acre): Munition, 3174, 7401 IMO, 3674

Unacceptabpe- (less than 200 crates per acre): Tahoe, 382 A

Overall Eating Quality

Above Average Rating: GS 3474, 3674, Devotion, Mattipoisett, 3174

Average Rating: Avalon, Tahoe, 382 A, ACX 1441, GS 373 A, 372 A, XTH 3075

Below average Rating: Illusion, 7401 IMP, 378 A

Despite record rainfall which was as much as 17.9 inches in the month of June which resulted in record fertilizer losses form the soil, overall yields in this study were outstanding. This was the result of adjusting the traditional sweet corn fertility program to the reality of new climactic extremes. It also incorporated the use of new SRN (slow release nitrogen) fertilizers to limit fertilizer losses. Despite significant losses to birds and deer, we were able to harvest and donate more than 2,700 lbs. of sweet corn to local charities such as Farmers Against Hunger, the St Vincent DePaul society, and a local Willingboro soup kitchen.

Each of the varieties evaluated in this study has many more notes, observations, and comments regarding them that are too encompassing to present in this summary. If you have a specific interest in any variety I am more than willing to check the data notes. Some of these observations were presented in the formal talk given at this conference. For the sake of easier digestion of the data here, I decided to group the varieties into relative categories so that specific numbers or rating did not become the focus of the attention but rather how they compared to each other.

Leafy Green and Herb Production

LEAFY GREENS PRODUCTION

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Produce buyers in the region have expressed an interest in buying more fresh greens demonstrating the potential for expanding fresh market production for local and regional distribution. In particular, there has been an increased consumption of Kale. There are also increased opportunities for oriental greens for ethnic markets. In addition, there has been an interest by regional processors in sourcing ethnic greens from the Mid-Atlantic area. This would provide processors and growers a new specialty crops market opportunity in processed collard greens, mustard greens, turnip greens and kale for national distribution. Lettuce demand in the region has also increased.

Research was conducted from 2010-2012 at the University of Delaware Carvel Research and Education Center near Georgetown, DE on spring, fall and overwintered production of kale, collards, mustard, turnip, and Asian greens. Research in 2012 included spring and fall lettuce trials.

Spring Planting Date, Yield and Variety Trials

Trials were conducted on the University of Delaware Research Farm near Georgetown, DE in 2010 and 2011 on loamy sand soils. Planting dates were March 5, March 19, April 2, and April 16 in 2010 and March 21, April 8, and April 29 in 2011. In 2010 varieties tested included Seven Top and Alamo turnip; Southern Giant Curled, Savannah, and Florida Broadleaf mustard; Georgia Southern and Vates collards; and Vates kale. In 2011 varieties tested included Seven Top and Alamo turnip; Southern Giant Curled, and Savannah mustard; Champion and Top Bunch collards; and Siberian and Vates kale.

Results showed variety by planting date interactions. Yields were higher in 2010 due to more favorable weather. Results for 2010 showed that Georgia Southern and Vates collards had yields around 9 tons per acre in the early April planting. Vates kale yielded similarly in the early April planting. March plantings bolted. Highest yields for mustard were with Savannah in the early April planting with a remarkable 36 tons per acre total Savannah was far superior to Southern Giant Curled or Florida Broadleaf which had bolting problems in the early plantings. Alamo turnip was superior to Seven Top with over 30 ton per acre yields in the early April planting.

In the 2011 planting the only crop that had a satisfactory harvestable yield in the March planting was Siberian kale, all others bolted due to the cold weather. The early April planting most crops performed poorly again due to the cold spring. Only one harvest could be made before bolting. Siberian kale, Southern Giant Curled Mustard and Sevin Top turnip had over 6 tons per acre yield in the second planting. The late April planting gave good yields in an number of the greens tested. Siberian kale and Vates kale performed similarly. Top Bunch collards was superior to Champion collards. Sevin Top and Alamo turnip performed similarly as did Savannah and Southern Giant Curled mustard.

The spring planting trials showed that kale and collards were lower yielding and slower growing than mustards or turnips. For all greens, April planning dates were higher yielding and had less bolting that March planting dates. In general, Alamo turnip and Savannah mustard were best adapted (both are hybrids). Open pollinated mustards could be used but only in later plantings and there still was a risk of bolting. Vates and Siberian kale were adapted for April plantings but only Siberian could be used for March plantings. Georgia Southern, Vates, and Top Bunch collards performed similarly in April planting dates. These results verified recommendations in the Mid Atlantic Vegetable Production Recommendation Guide.

Fall Planting Date, Yield, And Variety Trials

Larger scale fall trials were conducted on the University of Delaware Research Farm near Georgetown, DE in 2010 and 2011 on loamy sand soils. Large commercial size plots were used for fall studies. Plots were seeded with a precision planter (Monosem) at a seeding rate to give a target spacing of 1 inch between plants. Planting dates were July 15, July 30, August 16, and August 30 in 2010 and August 1 and August 15 in 2011. In 2010 varieties tested included Seven Top turnip; Southern Giant Curled mustard, Champion collard, and Vates and Siberian kale. In 2011 varieties tested included Seven Top turnip; Tendergreen mustard; Champion collards; and Siberian kale. Low cost open pollinated varieties were tested because that is what the industry is using in other areas of the country.

Insect pressure from Harlequin bugs and Lepidoptera larvae was heavy in the July planting causing losses, even with insecticide sprays in 2010. In the 2010 trial, collards had the highest yields in the July planting. Mustard and turnip gave the highest yields from a early August planting date. Siberian Kale performed best from early and mid-August planting dates. Vates kale did not perform well in the fall of 2010 in the large plot trials. In 2011, Collard yields were lower than the other greens tested in large plot trials. Siberian kale, Tendergreen mustard, and Seven Top turnip performed well. In general, fall yields were lower than April planted greens.

A fall trial population trial was conducted on the University of Delaware Research Farm near Georgetown, DE in 2010 on a loamy sand soil. Large commercial size plots were

used for the fall study. Plots were seeded with a precision planter (Monosem) at seeding rates to give target spacings of 1-2 inches, 2-4 inches, 4-5 inches and 5-6 inches between plants. Planting date was August 17. Varieties tested included Seven Top turnip; Southern Giant Curled mustard, Champion collard, and Vates and Siberian kale.

Champion collard had the highest yields with a 4.5 inch spacing between plants as did Vates Kale. Seven Top Turnip had the highest yields at 6 inches between plants. Southern giant curled mustard had the highest yields at 3 inches between plants. Results show that current recommended planting rates may be too high (giving a spacing of about 1 inch between plants). However, this needs to be balanced against cutting height as closer spacing produces more upright leaves.

Fresh Market Greens Variety Trials – Spring and Fall

Fresh market greens trials were conducted on the University of Delaware Research Farm near Georgetown, DE in 2011 and 2012 on loamy sand soils. Plots were one row wide rows with 30 inches between rows. Plots were seeded with a push planter at a seeding rate to give a target spacing of 3 inches between plants except for transplanted plots which were planted at a spacing of 12 inches between plants. Spring planting date was April 25 in 2012. Fall planting dates were August 23 in 2011 and August 9 in 2012 for direct seeding and August 15 in 2012 for transplants (kale and collards only).

In Fall 2011, with the hybrid kales, Reflex was the most productive, with over double the yields of other varieties. However, the open pollinated Siberian was far more productive with over 21,000 lbs. compared to 8223 lbs./a for Reflex. If packaged greens are the market, Siberian would be the best choice. If fancy curled greens for garnish are desired then Reflex would be the best choice. Hi Crop collards out-yielded all other hybrid collards and had over 3 times the yield of the open pollinated Champion. With Turnips, the highest yielding varieties were Southern Green and Alamo with 29900 and 27000 lbs/a respectively. This compared to 22000 lbs/a for Seven Top. Mustard yields were highest with Savannah (28400 lbs/a) but were not significantly different from Tendergreen (26100 lbs/a).

In spring 2012 there were no differences in yields of mustard or turnips between varieties. Bulldog collards and Blue Ridge kale had the highest yields of those crops. Yields of these crops was reduced in 2012 due to weed pressure.

Fall 2012 trials with fresh market greens showed that All Top and Southern Green turnips performed the best and Tendergreen and Savannah mustards have the highest yields. For Kale, Winterbor and Green Curled have the best yields when stripped on green types and Red Russian has the highest yields for a red type. Collard yields were similar across varieties; however, Hi Crop Collard had the highest yields. Asian greens trials showed that Mizuna varieties had the highest yields along with Tokyo Bekana Chinese leaf cabbage and Vitamin Green mustard with over 20 ton per acre yields with harvests from August through December in unprotected field conditions.

For lettuce, nearly all of the varieties tested looked very good in early spring trials. Only two varieties had some bolting in the early trial: Alkindus and Roxy, however quite a few varieties in the early trial developed a bitter flavor. Bolting and bitterness became more of a problem in the late spring trial. Only a few varieties maintained good flavor and did not bolt or had minimal bolting in all trials: Forlina, (Butterhead); Acropolis and Spartacus (Iceberg); Starfighter (Leaf); and Dov (Romaine). Several other varieties demonstrated some heat tolerance, resistance to bolting and reduced bitterness in either the late spring, or early or late fall trials: Harmony, Hungarina, and Skyphos (Butterhead); Excalibur and Keeper (Iceberg); New Red Fire (Leaf); Rubicon, Camino Verde, Rio Bravo and Musena (Romaine).

Conclusions and Recommendations

For Spring, greens plantings should be delayed until mid-April to reduce the chance of bolting and to obtain highest yields. For fall production, the best planting window is the first three weeks in August. With turnips, Alamo is the most reliable for spring processing. For fall processing, Sevin Top performs well. Savannah mustard is the most reliable for spring processing. For fall processing, Southern Giant Curled or Tendergreen are recommended. Siberian kale performed well in spring and fall for processing and Champion collards are recommended for spring and fall processing. Plant population recommendations are to obtain a final plant population of 4 plants per foot.

For fresh market greens, Savannah mustard, All Top Turnip, Bulldog Collards, and Blue Ridge kale are good performers in the Spring. In the fall Siberian, Reflex, and Winterbor are recommended kales depending on the market. Hi Crop collard is the best fall variety. Fall turnip varieties with the highest yields are Southern Green, Alamo, and All Top. Fall mustard varieties recommended are Tendergreen and Savannah. For lettuce, Forlina, (Butterhead); Acropolis and Spartacus (Iceberg); Starfighter (Leaf); and Dov (Romaine) had minimal bolting and bitterness in spring and fall trials.

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DESERT LEAFY GREEN PRODUCTION

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Because of the region-wide combination of weather, available irrigation water, deep rich soils, ample labor and highly skilled producers, the desert southwest has always been a mecca for agricultural production. Unknown to many US consumers, Yuma County, Arizona is one of the most important agricultural areas in the country. And while more than 180,000 acres of land are cultivated annually in the region, the multi-crop pattern of production has essentially doubled the use of available land. Prior to 1975, agricultural production has been mainly increased by cultivating more land, but now there is limited scope for this since unused land, particularly for the high-value vegetable industry, has rapidly reached its threshold (Fig. 1). Accordingly, there has been greater emphasis on increased yield per unit area and growing more crops per year on the same available land area. Truly a remarkable display of efficient land use and a production model that many envy worldwide.

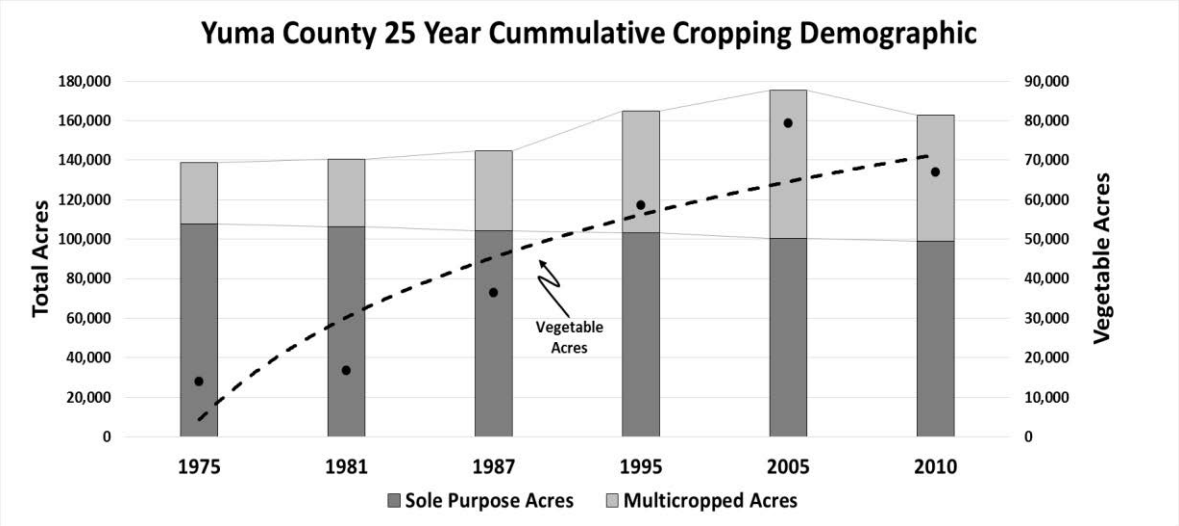

Figure 1. A 25 year summary of crop production in Yuma County, Arizona, highlighting the significance of multicropped and vegetable acreage in the region.

In fact, agriculture contributes to a year-round economic influence in the region and is the major sector of the Yuma County economy. According to the U.S. Commerce Department, Yuma's 2012 gross domestic product alone was $5.4 billion, with $3.8 billion derived directly from agriculture, the largest private sector contributor to the Yuma economy and over 9 times the national average comparing all US agricultural counties. Amazingly, if the desert southwest was a country all within itself, it would economically outperform over 50 countries in the entire world!

As Yuma is a national center of agricultural production, it is no surprise to learn that agriculture accounts for one in five jobs in Yuma County. It ranks in the top 1 percent among U.S. counties in the sale of all agriculture products and is in the top 0.1 percent for vegetables and melons. Yuma has by far the most significant agriculture production in the state, with the county's crop sales about equal to the next three counties in Arizona combined. As for crop acreage, it's among the top 0.1 percent of U.S. counties for vegetables, 0.2 percent for lettuce, 14 percent for wheat, 16 percent for forage and 24 percent for cotton.

"Yuma is to Agriculture what Silicon Valley is to Computers and Electronics"

For decades after it was built, the Colorado River Canal system was considered an engineering marvel around the world. Water travels down the network of canals and ditches entirely by gravity flow, eliminating all electricity costs normally associated with pumping. This energy savings is passed on to canal customers in the form of lower water rates. In fact, the water that flows through these canals travels several hundred miles, beginning at the Imperial Dam, located 18 miles north of Yuma.

Head lettuce plays a major role in Yuma economy and the area supplies much of the US with fall and winter grown head lettuce, leaf and Romaine lettuce, broccoli, cauliflower, spinach, peppers, dates and citrus. The growing season for lettuce starts about the last week of August and ends no later than the second week of April. Bulk harvesting of lettuce has become more popular in recent years, because of the popularity of prepackaged salads. Specific fields are grown for bulk harvest, where bins of high quality cored lettuce are transported to salad plants where they are sorted, washed, and chopped for ready-made salads in sealed plastic bags.

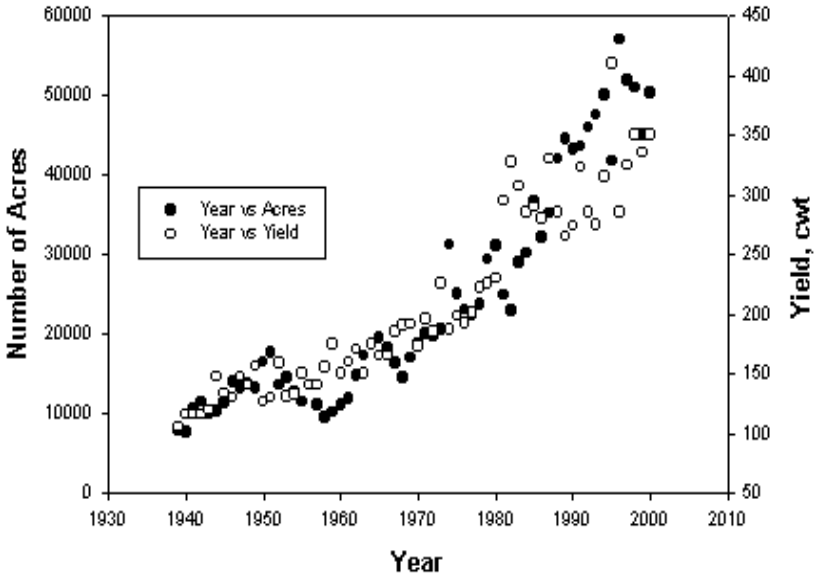

Figure 2. Lettuce acreage and yields in Yuma County, Arizona during the last 70 years of production.

As shown in Yuma County from 1939-2005, lettuce acreage and yields (cwt) increased from less than 10,000 acres in 1939 to over 59,000 acres in 2000, highlighted by a 4-fold increase in yield during the same period (Fig. 2). While the increased yields and acreage were slower from 1939 to 1960, lettuce production and yields exploded exponentially during the early 1980's.

Depending on variety, planting slot, temperature, salts and other abiotic and biotic factors, lettuce will generally be ready for harvest in approximately 65 for fall-planted crops and 100 days winter-planted crops. Lettuce is timed for harvest when quality is at its peak. However when demand for lettuce exceeds supply, the harvest timing may be slightly shifted toward an early or later harvest by as much as 7 days. Because of the extensive labor involved, harvesting is the greatest expense in lettuce production. Lettuce in Arizona is harvested using three handling techniques: naked packed, film wrapped, or bulked. Field packaged lettuce may be packed "naked" in the carton, meaning they have no plastic wrapper; film-wrapped in perforated or non-perforated cellophane; or bagged in perforated plastic bags. Perforated cellophane is used to prevent moisture accumulation and extend shelf life. Bagged lettuce is packaged in perforated plastic bags, with usually six heads per bag.

Most of the lettuce grown in Arizona is field packed, meaning that the product is harvested, packaged in the field, and shipped to market with no further processing. Because most lettuce undergoes little processing, great emphasis is placed on producing a high quality product. It is essential that the product be free of pest damage and contamination at harvest.

Figure 3. Lettuce harvest requires field labor to select, cut and pack lettuce.

Regardless of the field packaging technique used, harvesting methods are essentially the same (Fig. 3). A harvesting crew consists of eight groups of three individuals, working behind a harvest aid or wrapping machine. Each group consists of two people cutting heads, and one person packaging. Harvesters cut the lettuce near the soil surface with a long knife then trim unwanted leaves usually leaving 4 to 5 wrapper leaves. The packer will package the lettuce in a cardboard carton. Each carton will contain two layers of lettuce heads. Each layer is usually composed of 12 heads. The bottom layer is package butt-down or cut side down, while the upper layer is packaged butt-up to prevent latex sap from dripping onto the foliage. A typical carton of lettuce will weigh about 50 lbs. The packer is also responsible for wrapping the lettuce with cellophane or bagging when required. After harvest, the lettuce is transported to a cooling shed and distribution center where it is stored at 35 to 36° F. Although lettuce storage life under these conditions is 16 to 20 days, almost all lettuce is shipped with 48 hours.
Bulk harvesting of lettuce has become more popular in recent years, because of the popularity of prepackage salads. Specific fields may be grown for bulk harvesting, or in many cases, bulk harvesters will follow the wrapping machines, harvesting heads not

suited for field packaging. Bulk harvesters consist of large crews of people who cut heads and place them in large cardboard or plastic bins. Bins of high quality bulked lettuce may be slated for the fast food restaurant industry. However, most are transported to salad plants where they are sorted, washed with a dilute chlorine solution or fumigated with ozone, and then chopped for prepackaged or ready-made salads in sealed plastic bags. This type of processing is known as "value-added" packaging. Similar to non-processed lettuce, value-added packaged lettuces are stored prior to transport at 35 to 36° F. Value-added lettuce has a shelf life of 12 to 14 days, and are usually shipped from the salad plant within 1 to 2 days. And, all value-added packaging has an expiration date printed on it.

Yields of lettuce grown in Arizona vary widely from 850 to 1000 cartons per acre, depending on demand, supply, and quality. When demand is high and supply short, harvesters will often cut heads of lesser size or quality that would normally be bulked or left in the field.

Lettuce market prices vary wildly depending on demand and availability because it has a short shelf live and is sold at harvest. Growers do not have the luxury of waiting for a favorable price. The lettuce market ultimately determines how much insect damage and contamination a packer will accept. When the lettuce price is low and there is an abundance of lettuce being harvested, packers are very discriminating and only high quality lettuce with no insect damage or contamination is accepted. However, when the price is high and lettuce availability is low, packers will often accept lettuce that is of poorer quality, or has some cosmetic maladies. Because the price of lettuce at harvest is unpredictable, growers manage their crops as if only high quality lettuce will be accepted. For Yuma lettuce growers, lettuce prices are traditionally best from early-November to early-December, and towards the end of March and in April when lettuce harvesting activity in the Salinas, Huron and Bakersfield areas of California is low. Arizona growers will commonly alter planting and harvesting schedules to exploit times when weather or other factors have hampered lettuce production in California. Unlike fiber and grain crops, the lettuce market is much more volatile and is not as globally driven.

The desert agricultural industries have developed many of the production practices used in the region and, above all, growers have something rare to offer the world. Because lettuce is a perishable commodity, growers cannot store their product when prices are undesirable. Thus, lettuce growers are at the immediate mercy of the current price in the lettuce market. Lettuce production is a high risk, high capital endeavor that requires keen planning, marketing, and production practices to be successful.

Farm Labor

HEALTHCARE REFORM:
KEY ISSUES FOR AGRICULTURAL EMPLOYERS

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Preparing for Healthcare Reform's Employer "Play or Pay" Mandate

While nearly every aspect of Healthcare Reform is overly complex, it seems that one of the most complex and confusing aspects for employers—particularly agricultural employers—is counting employees for purposes of determining whether the employer "play or pay" mandate (the "Employer Mandate") will apply. This analysis is commonly referred to as the "50 or More Test."

The 50 or More Test

Beginning in 2015, the Employer Mandate applies to so called "large employers" that employed an average of at least 50 full-time employees ("FTs") and "full-time equivalents" ("FTEs") on business days during the preceding calendar year. Current IRS guidance provides that this average should be calculated by (1) determining the total number of FTs and FTEs for each calendar month of the preceding year, (2) adding up the totals for all calendar months (including fractions) and (3) dividing the total for the year by 12. If the result (rounded down to the nearest whole number) is less than 50, then the Employer Mandate does not apply for the current calendar year. Alternatively, if the result is "50 or More," then the Employer Mandate does apply for the current calendar year. In either case, the application or non-application of the Employer Mandate during the current calendar year will continue throughout the entire current calendar year, regardless of what happens to the employer's employee count during such current calendar year (*i.e.*, the employee count during the preceding calendar year is the only count that matters for purposes of whether the Employer Mandate applies in the current calendar year).

For purposes of the 50 or More Test, an employee counts as an FT for a particular calendar month if he or she is employed for at least 130 hours of service for the month. For employees who do not meet the 130 hours of service threshold for a particular calendar month, their total hours of service for the month (but no more than 120 hours of service for each such employee) must be added up and divided by 120 to determine the number (including fractions) of FTEs for the month.

The following is an example of the counting of employees for purposes of the 50 or More Test:

ABC Farms has the following employee and hours of service counts for the month of January of 2014:

38 employees with 173 to 217 hours of service each (*e.g.*, roughly 40 to 50 hours of service per week)—this results in 38 FTs for the month (note that an employee's hours of service in excess of 130 do not affect the result).

6 employees with 120 to 129 hours of service each—this results in 6 FTEs for the month (note that no more than 120 hours of service are taken into account for purposes of determining FTEs, so if you add up 120 hours of service for each of these 6 employees and then divide the total by 120, you will get 6 FTEs).

5 employees with 65 hours of service each (*e.g.*, roughly 15 hours of service per week) and 8 employees with 43 hours of service each (*e.g.*, roughly 10 hours of service per week)—this results in 5.58 additional FTEs for the month (325 (5 x 65) + 344 (8 x 43) = 669 and 669 / 120 = 5.58).

The total number of FTs and FTEs for January is 49.58 (38 FTs + 6 FTEs + 5.58 FTEs = 49.58).

ABC Farms has the following FT/FTE totals for the months of February through December of 2014:

February:	40.21
March:	39.83
April:	41.50
May:	42.62
June:	43.33
July:	53.30
August:	65.41
September:	68.22
October:	71.65
November:	42.44
December:	51.75

ABC Farms' total number of monthly FTs/FTEs for 2014 (including factions) is 609.84.

> If you divide the total number of monthly FTs/FTEs for 2014 by 12, you get an average of 50.82. After rounding 50.82 down to 50, you get an average employee count of 50 FT/FTEs for 2014.
>
> Therefore, because ABC Farms' average FT/FTE count for 2014 is at least "50 or More," ABC Farms will be subject to the Employer Mandate in 2015. Note that this is the case, despite the fact that ABC Farms' average FT/FTE count for seven of the twelve months in 2014 is less than 50 (*i.e.*, the counts in the other five months are large enough to bring the monthly average above 50).

It is important to remember that closely related employers, such as those with a parent-subsidiary relationship or those with material common ownership, will be treated as a single employer for purposes of the 50 or More Test. Accordingly, when counting employees as described in the above example, in most cases it will be necessary to aggregate the employee counts of all related employers. In addition, if an employee works for two or more related employers during a particular calendar month, his or her hours of service for all related employers during the month will need to be aggregated for purposes of counting him or her as an FT or as part of the FTE count.

Are There Any Exceptions?

Based upon the current IRS guidance, there is one very limited exception that may permit an agricultural employer to avoid application of the Employer Mandate even if the employer has "50 or More" FT/FTEs under the 50 or More Test.

"Seasonal Worker" Exception

If (1) an employer's workforce exceeds 50 FT/FTEs for 120 days or fewer during the preceding calendar year (or four calendar months or fewer, noting that in either case it is not necessary that the days or months be consecutive) and (2) the employees in excess of 50 who were employed during such days or months were "seasonal workers," then the Employer Mandate will not apply in the following calendar year, even if the employer averaged "50 or More" FT/FTEs taking into account the entire preceding calendar year.

The current IRS definition of a "seasonal worker" for purposes of the seasonal worker exception to the 50 or More Test incorporates the DOL regulations that interpret the Migrant and Seasonal Agricultural Workers Protection Act, which provide as follows:

> Labor is performed on a seasonal basis where, ordinarily, the employment pertains to or is of the kind exclusively performed at certain seasons or periods of the year and which, from its nature, may not be continuous or carried on throughout the year. A worker who moves from one seasonal activity to another, while employed in agriculture or performing agricultural labor, is employed on a seasonal basis even though he may continue to be employed during a major portion of the year.

Accordingly, unless the IRS later modifies the existing guidance, it appears that most seasonal farm laborers will be considered "seasonal workers" for purposes of the seasonal worker exception to the 50 or More Test.

Appling the seasonal worker exception to the ABC Farms example above, there are five calendar months where ABC Farms' FT/FTE count exceeds 50 (July, August, September, October and December). If (1) ABC Farms were to reduce its FT/FTE count in December to 50 or less, thus leaving only four months where its FT/FTE count exceeds 50 (July, August, September and October), and (2) the employees causing the FT/FTE counts to exceed 50 in July, August, September and October qualify as "seasonal workers" (*e.g.*, they are seasonal harvest workers), then ABC Farms would not be subject to the Employer Mandate in 2015 because of the seasonal worker exception to the 50 or More Test (noting that ABC Farms' average FT/FTE count for 2014 would likely still be "50 or More").

It is important to note that there is no blanket exclusion of "seasonal workers" for purposes of the 50 or More Test. In other words, an agricultural employer may not simply exclude all "seasonal workers" when counting employees for purposes of the 50 or More Test. Rather, if the agricultural employer's workforce exceeds 50 FT/FTEs for 120 days (or four calendar months) or fewer during a calendar year, and the employees in excess of 50 who are employed during such period qualify as "seasonal workers," then the Employer Mandate will not apply in the following calendar year.

* * *

When counting employees for purposes of the 50 or More Test, it is important to remember that "the devil is in the details." For example, you may have three separate operations of roughly 45 employees each and assume there is no need to worry about the 50 or More Test. However, if all three operations are owned by the same common owner, you will likely need to aggregate the employee counts of all three for purposes of the 50 or more Test, after which you end up with the exact opposite result that you expected. Alternatively, you may assume that the Employer Mandate applies in 2015 because your average FT/FTE count for 2014 is 53, not realizing that if you were able to make use of the "seasonal worker" exception, you could be exempt from Employer Mandate obligations in 2015.

Both of the situations described above are examples of how if you do not understand the overly complex employee counting rules and apply them correctly to your own facts and circumstances, you could easily make the wrong conclusions and end up subjecting your organization to Employer Mandate liabilities or expenses. Whether you are going to determine your Employer Mandate obligations on your own or seek professional assistance to do so, be sure to overcome the complexity and pay close attention to the details in order to protect you organization from unnecessary risks and costs.

* * *

This article was written by Sheldon J. Blumling, a partner in the Employee Benefits Practice Group of the national labor and employment law firm Fisher & Phillips LLP. The information provided in this article is for general education purposes only. This information is not intended to provide legal or tax advice and cannot substitute for the advice of your own legal and tax professionals.

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RETHINKING YOUR LABOR "RELATIONSHIP"

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Evaluating and improving your season agricultural labor recruitment/employment practices can minimize the impact of tight labor supplies. With an 8.4% unemployment rate in New Jersey why would you worry about labor supplies? In the words of one seasoned ag worker recruiter, "All the good [ag] workers have a job. The only workers I can find are those who do not want to work."

Working with several Michigan operations, through a near zero crop in 2012 and a near record crop in 2013, surfaced employment procedures/practices that were effective in maintaining skilled ag workers as well as attracting new people willing to work in agriculture. The employee "relationship" developed with workers appeared to be a consistent key factor to success. I define the "relationship" as the willingness of the worker to get the job done.

To review a farm's employment practices, look beyond wages. My approach uses some or all of the following depending on the commodities, current/projected workforce composition and management style(s):

- ✓ Learn What the Worker Wants – Meeting employees' "wants" can strengthen the "relationship" for both new and seasoned agricultural workers. For example, many local youth, who are interested in farm work, have other summer commitments including travel teams/sports conditioning, college tours and social events. Youth may respond more to flexible schedules rather than wages while migratory workers may respond to more work hours and housing benefits.
- ✓ Employment Package – Know what you are offering and what you could offer – "monetize" what is offered considering the impact on individuals, families, "new ag workers," and other significant worker groups. Assess the farm's cost (out of pocket, management, and social) versus the perceived "value" by the worker?
- ✓ Know Your Costs – Electronic data collection can minimize production and labor cost when the farm sets the data points rather than using default software settings – time study both production and harvest to determine the "true cost per unit" then ask the workers what could be improved. For example, what is the "cost" of cross-row container loading versus an over-the-row collection device?
- ✓ Know Your Labor Needs – Do you need a person with dexterity or one that can move volumes? Job descriptions are essential to direct your recruiting and provide your workforce with their job responsibilities. "Do whatever I tell you to do" management can easily destroy employment "relationships."
- ✓ Know the Rules – Compliance can be a significant motivator when properly used.

- ✓ Recruitment – Establish or update a recruitment program in traditional and non-traditional areas.
- ✓ Safety – Productivity is directly proportional to worker safety. What has the operation done to increase safety? Have injuries been tracked and properly controlled? Do the employees believe in your safety program?
- ✓ Business Integration or De-integration – There are some things you do well and others not so well.

Labor ~~c~~osts" should be re-evaluated in terms of net cost per unit rather than wages per hour. Creating an employee ~~r~~elationship" can maximize productivity while reducing net per-unit labor costs.

Field/Forage Crops

FIELD/FORAGE CROPS

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Winter canola is planted in September and harvested in late June or July in time for 2nd crop soybeans in south Jersey. National Winter Canola Variety Trials were conducted at the Rutgers Ag Research and Extension Center - Bridgeton in 2010 and at the Snyder Research and Extension Farm - Hunterdon in 2011 and 2012. The data collected include yield, winter survival, 50% bloom date, plant height, percent moisture, test weight, and percent oil content. Yields were as good as other locations in the area, ranging from 3900 to 2000 lbs./acre in 2013. Percent oil content range from 44.0 to 39.9%. New Jersey's oil content averaged slightly higher than other Eastern locations. There is a lot of shatter and hard seed thus volunteers will be a problem if not activity controlled by tillage or herbicides. Canola is a very small round hard seed and can easily leak out of a gravity wagon or grain truck. This crop is very susceptible to White Mold, (*Sclerotinia sclerotiorum).* Farm-sized oil extract units are available and can add income from the sale or use of oil. The cake left after extracting the oil is an excellent cattle feed.

In 2013, soybeans were planted in the same field as the canola was the year previous to increase the potential that the soybeans would get White Mold. This project was funded by the NJ Soybean Board. On May 20th, 69 varieties of soybeans were planted. All of which were donated by five seed companies. White Mold was present in 54 of the varieties; however, due to a very dry late August, September and October none of the varieties appeared to have major yield loss. However, a United Soybean Board report indicated that approximately 11,762,263 bushels of soybeans succumbed to white mold in 2011. The fifteen varieties had no white mold. This observation is not a positive sign of varietal resistance without additional testing. The overall soybean yields were good with the high yield at 75 bu/a and the low at 36 bu/a, with most varieties yielding in the 60‘s.

Alternative liming for field corn:

Aragonite is a mineral that is made up of a calcium carbonate that is commonly located in the white seashells. It is usually a white or a grey mineral that is often traced in sedimentary rocks and deposits from hot springs. It is ready available in several places in the western US. In a field trial at the Snyder Research and Extension Farm its liming potential was evaluated as compared to pelletized lime. There were no significant differences in the corn yields over any of the treatments. Aragonite did increase the pH of the soil at the same rate as the lime treatments.

Alternative Liming Treatments		change in pH
Pelletized Lime	2000 lbs/a	1.4 a
Pelletized Lime	3800 lbs/a	1.3 a
Aragonite	1200 lbs/a	1.4 a
Aragonite	1600 lbs/a	1.3 a
Aragonite	2000 lbs/a	1.5 a
Aragonite	2400 lbs/a	1.5 a
Untreated Check		0.6 b

Alternative fertilizers for field corn:

Pelletized Chicken Manure, Liquid Fish Waste, Raw Milk, and conventional fertilizer were compared in a field trial at the Snyder Research and Extension Farm during 2012 and 2013. The overall results were the same in both years. The conventional fertilizer and the pelletized chicken manure both produced significantly higher grain yields than the other three treatments, which were not significantly different from each other

Alternative Fertilizer Treatments		2012	2013
Conventional	yield bu/a	208 a	219 a
600lbs of 20-10-10 per acre in 2012 600lbs of 20-10-10 per acre plus 217lbs of 46-0-0 per acre in 2013			
Pelletized Chicken Manure	yield bu/a	207 a	230 a
10,000 lbs/a pre-plant plus 10,000lbs/a sidedress in 2012 4,400 lbs/a pre-plant plus 4,000lbs/a sidedress in 2013			
Liquid Fish Waste	yield bu/a	149 b	96 b
4 gal/a preplant plus 4 gal/a sidedress in 2012 16 gal/a preplant plus 16 gal/a sidedress in 2013			
Raw Milk	yield bu/a	159 b	105 b
4 gal/a preplant plus 4 gal/a sidedress in 2012 16 gal/a preplant plus 16 gal/a sidedress in 2013			
Untreated Check	yield bu/a	156 b	99 b

Tomatoes

UPDATE ON DISEASE CONTROL IN TOMATOES

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Tomato diseases such as Early blight, Late blight and White mold can cause serious problems in field and high tunnel tomato production. It is important to remember that disease development is driven by environmental conditions. Relative humidity (RH), air temperature, soil temperature and leaf wetness will greatly influence disease development in the field and high tunnels.

Septoria leaf spot will only infect the foliage and stems of the tomato plant. Symptoms to scout for are small, circular lesions with a dark outer edge and brownish-tan center. Black spore-producing bodies will develop in the center of these lesions. When scouting, look on the lower foliage of the tomato plant early in the season. The disease will cause premature defoliation, and left uncontrolled can cause 100% defoliation.

Early blight will affect the foliage, stems and fruit. Early blight will produce brown, concentric lesions on the foliage and stems and are much larger than lesions produced by Septoria leaf spot. Early blight, like Septoria leaf spot, can also cause premature defoliation. Early blight can also infect green and red fruit through the stem attachment. Lesions that develop on the fruit also produce brown, concentric rings.

Although Anthracnose fruit rot can infect green fruit and foliage, symptoms only appear on ripe fruit during the growing season. Anthracnose lesions begin as slightly depressed circular lesions. As lesions enlarge they become more flat and develop black, speck-like fruiting bodies in the center of the lesion.

Control of all three diseases should begin with a weekly regular fungicide maintenance program of alternating chemistries. Field grown tomatoes in higher elevations (i.e., north Jersey), that are not rotated away from tomatoes, and in late planted fields, should be sprayed shortly after transplanting. In all other areas, begin sprays when crown fruit reach one-third their final size. This can include chlorothalonil or manzate fungicide alternated with a strobilurin (Quadris, Flint or Cabrio which are FRAC group 11 fungicides). Strobilurin fungicides have a maximum-season usage and should not be mixed together in a single application or used in back-to-back applications by itself or together. The alternation of fungicide chemistries helps to reduce the potential for the build-up of fungicide resistance. Remember that any fungicide maintenance program should begin with scouting and identifying the disease. Scouting on a regular basis will help growers stay on top of potential problems and may reduce the high cost of fungicide use. Always remember to read the pesticide label before using any product.
Late blight (*Phytophthora infestans*) is an important disease of fresh-market and processing tomato and potato in the Northeast. In recent years the pathogen has been

active throughout the region. The pathogen, *Phytophthora infestans*, is an oomycete, or water mold, with free-water favoring its development and spread. Cool, wet weather with high relative humidity is ideal for its development. Left uncontrolled, Late blight can spread swiftly from plant to plant and field to field. Late blight survives between seasons on infected plant material left in the production field, in cull piles, and in homeowner's gardens. The fungus can infect all aboveground parts of the tomato plant causing circular, water-soaked lesions on leaves. Gray to white "fuzzy" growth develops on the margins of leaf lesions which produce masses of sporangia that are spread during rainfall. Infections in fruit often begin when green fruit are maturing. On green fruit, dark, blackish-brown lesions remain firm as lesions expand. Control of Late blight begins with removing sources of potential inoculum, such as plant material left in the field and cull piles. Plant material should be disked under thoroughly or buried. Preventative fungicide programs should be followed during the growing season to help reduce the chances for infection. A disease forecasting system, such as Blightcast, can be followed to help time fungicide applications according to predisposing weather conditions. Fields should be monitored and scouted on a weekly basis. If Late blight has been diagnosed in surrounding areas fungicide applications need to be adjusted accordingly.

Bacterial diseases of tomato such as canker, spot and speck can cause serious losses in tomato crops if left uncontrolled. All three bacterial diseases of tomato can be seed-borne and great care should be taken in planting certified, disease-free seed and/or treating seed prior to seeding. These bacterial diseases can start in the greenhouse during seedling production and be carried into the field. Cultural practices in the greenhouse, such as using hot water seed treatment, keeping greenhouse space free of weed species, and proper sanitary practices can be used to help reduce the chances for bacterial disease development. Symptoms of Bacterial canker on infected leaves include marginal leaf necrosis and dieback. On fruit, Bacterial canker causes distinct "bird's eye spots" on green and red fruit which appear as a small, raised, scabby, circular spot with a white margin. Symptoms of Bacterial speck (*Pseudomonas syringae* pv. *tomato*) on infected leaves include small, blackish-brown lesions with an irregular chlorosis (yellowing). On infected fruit, Bacterial speck causes a distinct, pin-point black lesion. Symptoms of Bacterial spot (*Xanthomanos campestris* pv. *vesicatoria)* on infected leaves include small, blackish-brown circular lesions which produce a chlorotic (yellow) "halo". On infected fruit, Bacterial spot produces large brown, raised, circular, scabby lesions which are distinctly different from Bacterial speck lesions. In the case of both Spot and Speck, heavily infected foliage will cause premature defoliation leading to potential sunscald and fruit infections if left uncontrolled. Regular applications of copper containing compounds can help suppress bacterial infections. If infected plants are suspected in the greenhouse or the field great care should be taken to help reduce the chances of spreading all three diseases. For example, plants that are suspect to bacterial infections should be removed and destroyed. In the field, rotate between fields to avoid a carryover of disease on volunteers and crop residue. Maintain proper weed control and remove any plants suspected with disease. Avoid working in fields when foliage is wet because harvesting, pruning and tying can spread bacterial diseases. Disinfest all stakes and equipment prior to and after use.

Grain Marketing

CELEBRITY PRODUCERS SEARCH FOR A PRE-HARVEST MARKETING ADVANTAGE

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Early sales could be our best sales in pre-harvest marketing. Consider several different marketing styles – think of them as very simple marketing plans - designed to capture a pre-harvest pricing advantage. I want to know if these different approaches to marketing can secure a measurable pre-harvest marketing advantage, and which style works the best.

To help us in this search for a pre-harvest advantage, we will meet six celebrity producers. Each of our producers represents a different pre-harvest marketing style. For corn and soybeans, we will test their pre-harvest marketing performance using actual market data from Southwestern Minnesota over a 24 year period, 1990-2013. The question to ask is —Can our celebrity producers find a dime in pre-harvest marketing?" Let's me introduce you to our celebrity producers.

Barney Binless is a reluctant producer who refuses to do any pre-harvest marketing, regardless of the opportunity presented. He simply has no interest in pre-harvest marketing. Barney is our benchmark for comparison of other marketing styles - his price is the harvest price each year. Every year Barney Binless gets the cash price for corn and soybeans that falls on the Friday between October 12 and 18.

Grandma likes to keep her marketing plan simple. She prices 10% of her expected new crop corn, soybeans, and spring wheat each month from January through July, for a pre-harvest pricing total of 70% of her expected crop. She is so dedicated to her simple approach that she makes each sale *regardless of price*, i.e.

Grandma sells December corn futures or November soybean futures on the Tuesday between the 4th and 10th of each month, January-July. Futures prices are converted to cash prices using the actual harvest basis each year. For corn and soybeans, the harvest basis is defined as the actual cash price less the futures price on the Friday that falls between October 12 and 18.

Justin Price only pays attention to prices in making new crop sales. For his corn production in 2014, he is willing to sell 25% increments at prices of $5.40, $6.10 and $6.80 in the December futures contract for a total of 75% sold if all three of his price objectives are met. In soybeans, Justin is willing to sell 25% increments at prices of $11.60, $13.10 and $14.60in the November futures contract. Justin is price driven

because he knows his costs of production. His initial pricing objective is close to his cost of production. Justin's window for pricing is longer than any other celebrity producer. He is willing to start pricing new crop grain as early as one year prior to harvest.

Terry Timer is concerned with the timing of her sales. She is keenly aware of the seasonal price charts that show the tendency for new crop futures to be at their highest in the months of March, April and May. Terry is willing to sell 25% of her expected production in each of these months for a total of up to 75% sold. The distinction between Grandma and Terry's marketing styles is that, unlike Grandma who made sales regardless of price, Terry has a minimum pricing objective under which she is unwilling to take action. Her minimum pricing objectives are $5.40 December corn and $11.60 November soybean futures.

Terry prices her grain with futures market on the Tuesday that falls between the 4th and 10th of each month, March, April and May. Her cash price is calculated later, using the actual harvest basis on the Friday that falls between October 12 and October 18.

Peter Paperfarmer likes Terry's approach to pricing, focusing on the March-May selling period for new crop pricing opportunities. But Peter also likes to keep his "options" open on the possibility of higher prices in the growing season. Peter "re-owns" each new crop sale with the purchase of an at-the-money call option on new crop futures. At harvest, Peter's price will be the same as Terry's price, plus any profit or loss from buying an at-the-money call option and selling it on September 15.

Darla Discipline uses a blended approach that incorporates Justin's price objectives and Terry's decision dates for pricing. Her plan starts one year in advance of harvest (like Justin), and she makes pre-harvest sales whenever a price objective or decision date is reached, *whichever comes first*. Darla uses the same minimum pricing objectives as Terry.

Details about the search for a pre-harvest advantage:
The 1990-2013 cash price data used in the search for a pre-harvest advantage in corn and soybeans came from Pipestone, Minnesota. Futures prices used are all closing prices from the Chicago Board of Trade. Pipestone is located in Southwestern Minnesota, about 30 miles north of the Iowa border and 10 miles east of the South Dakota border. Prices in this area are a fair representation of grain prices found throughout much of the southern and western quarter Minnesota, the northern and western quarter of Iowa, and a good part of Eastern South Dakota.

While Barney's price is the harvest benchmark price, it is important to remember that each of other players has a piece of the harvest price in their final price. For example, Grandma's average price for the year will be a blend of a seven month average price (10% each month, 70% total, January – July) from pre-harvest marketing and 30% of her crop priced at the harvest price. The harvest price will make up at least 25% of Justin, Terry, Peter and Darla's price, and possibly more if their price or minimum objectives are not met. Why not assume that the other celebrities would use their

marketing style to price 100% of their expected crop? Selling 100% of your expected crop is a very aggressive pre-harvest approach. Production risks still exist (What if Grandma only gets 50% of her expected crop?) and my assumption of 70-75% pre-harvest sales matches up well with the level of crop insurance purchased by a large number of producers.

Government support payments of any type, including loan deficiency payments, were not considered in the analysis. Policies and benefits changed several times over the period of this analysis. I think it is safe to say that the benefit from these programs would apply equally to our celebrity producers. By leaving out support programs, we are left with a clearer view of —marketing" benefits.

Table 1: Celebrity Producers Search for a Pre-Harvest Advantage in Corn

crop year	Barney Binless	Grandma	Justin Price	Terry Timer	Peter Paperfarmer	Darla Discipline
1990	$1.98	$2.19	$2.15	$2.22	$2.11	$2.24
1991	$2.15	$2.15	$2.15	$2.22	$2.13	$2.18
1992	$1.83	$2.21	$1.95	$2.23	$2.10	$2.24
1993	$2.20	$2.16	$2.22	$2.20	$2.20	$2.23
1994	$1.83	$2.09	$2.06	$2.14	$2.03	$2.14
1995	$2.78	$2.36	$2.42	$2.31	$2.46	$2.32
1996	$2.46	$2.78	$2.51	$2.82	$2.66	$2.53
1997	$2.38	$2.26	$2.35	$2.38	$2.25	$2.31
1998	$1.64	$1.94	$1.98	$2.01	$1.85	$2.05
1999	$1.38	$1.62	$1.52	$1.38	$1.38	$1.43
2000	$1.56	$1.80	$1.67	$1.91	$1.74	$1.86
2001	$1.57	$1.77	$1.68	$1.68	$1.62	$1.62
2002	$2.23	$2.07	$2.29	$2.23	$2.23	$2.28
2003	$1.80	$1.97	$1.89	$1.89	$1.85	$1.89
2004	$1.77	$2.36	$2.30	$2.59	$2.36	$2.35
2005	$1.41	$1.63	$1.54	$1.41	$1.41	$1.61
2006	$2.69	$2.32	$2.45	$2.30	$2.14	$2.36
2007	$3.06	$3.26	$3.10	$3.35	$3.06	$3.06
2008	$3.58	$5.01	$3.68	$5.04	$4.50	$3.70
2009	$3.42	$3.77	$3.91	$3.83	$3.41	$4.04
2010	$4.77	$3.57	$4.06	$4.38	$4.52	$3.69
2011	$5.98	$5.85	$5.23	$5.95	$5.98	$5.28
2012	$7.34	$6.09	$6.16	$5.78	$7.17	$6.12
2013	$4.05	$4.83	$5.04	$4.87	$4.54	$5.33
1990-2013 Average	$2.74	$2.84	$2.76	$2.88	$2.82	$2.79
Worst price*	13	3	1	4	6	1
Better than (or equal to) Barney*	#N/A	15	18	18	16	17

* Out of 24 years

Table 2: Celebrity Producers Search for a Pre-Harvest Advantage in Soybeans

crop year	Barney Binless	Grandma	Justin Price	Terry Timer	Peter Paperfarmer	Darla Discipline
1990	$5.79	$5.79	$5.72	$5.86	$5.74	$5.84
1991	$5.20	$5.50	$5.54	$5.67	$5.55	$5.60
1992	$5.00	$5.49	$5.35	$5.53	$5.28	$5.57
1993	$5.75	$5.70	$5.68	$5.62	$5.60	$5.62
1994	$4.85	$5.46	$5.28	$5.50	$5.29	$5.60
1995	$5.92	$5.53	$5.70	$5.51	$5.45	$5.51
1996	$6.30	$6.70	$6.30	$6.88	$6.80	$6.26
1997	$6.38	$6.26	$6.24	$6.48	$6.17	$6.21
1998	$4.93	$5.46	$6.06	$5.48	$5.23	$6.06
1999	$4.17	$4.21	$4.43	$4.17	$4.17	$4.44
2000	$4.05	$4.48	$4.27	$4.78	$4.44	$4.65
2001	$3.80	$4.02	$3.80	$3.80	$3.80	$3.80
2002	$5.03	$4.48	$5.05	$5.03	$5.03	$5.11
2003	$6.81	$5.48	$6.07	$5.55	$5.68	$5.53
2004	$4.72	$6.05	$5.72	$6.61	$6.10	$5.72
2005	$5.17	$5.38	$5.48	$5.37	$5.05	$5.39
2006	$5.24	$5.40	$5.40	$5.37	$5.15	$5.45
2007	$8.62	$7.41	$6.78	$7.15	$7.57	$6.93
2008	$8.24	$11.24	$8.73	$11.08	$9.95	$8.73
2009	$9.30	$9.10	$9.59	$8.87	$8.54	$9.48
2010	$10.80	$9.06	$9.40	$8.97	$9.56	$9.16
2011	$11.93	$12.45	$11.21	$12.52	$12.00	$11.38
2012	$14.68	$13.30	$12.32	$13.25	$15.60	$12.51
2013	$12.40	$12.31	$12.69	$12.04	$12.26	$12.42
1990-2013 Average	**$6.88**	**$6.93**	**$6.80**	**$6.96**	**$6.92**	**$6.79**
Worst price*	9	2	5	4	8	2
Better than (or equal to) Barney*	#N/A	14	15	16	13	15

* Out of 24 years

We started our search with a simple question, —Can our celebrity producers find a dime in pre-harvest marketing? Clearly they can, as most of our celebrity producers with their different marketing styles found an advantage over Barney, our benchmark harvest price.

Blueberries

FOLIAR CALCIUM APPLIED TO RABBITEYE (*VACCINIUM ASHEI*, READE)

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Introduction

In South Georgia, blueberry fruit can have an unfavorable physiological response at harvest; the fruit softens dramatically while removing field heat. To elevate this response, growers have applied calcium in foliar formulations with mixed results. Starting in 2013, a multi-year study of foliar calcium chemistries was initiated at UGA's Alapaha blueberry farm. The data presented is a summary of the first year.

Materials and Methods

Three calcium salts, calcium nitrate [$Ca(NO_3)_2$](Cell Force™ N= 6%, Ca= 10%, B= 0.2% Miller Chemical & Fertilizer Corp. Hanover, PA), neutralized calcium carbonate (CaCO3) (Calexin® Ca = 2% Miller Chemical & Fertilizer Corp.), and chelated calcium (calcium glucoheptonate) (KeyPlex® Calcium Plus, Ca = 9%, KeyPlex, Winter Park, FL) were applied via backpack sprayer to two rabbiteye blueberry cultivars, 'Alapaha' and 'Powder Blue'. All applications were at 2 pt/A (2336 ml/ha) at 20 gals of water per acre (187 l/ha). All applications were to run off. Three plants of 'Alapaha' or 'Powder Blue' were used for each treatment and two guard plants between each treatment. The first application included all treatments and was on 14MAY13. On 22MAY13, a second application of chelated calcium was applied followed by a second application of calcium nitrate and calcium carbonate on 29MAY13. All plants were managed according to standard commercial practices for blueberry in Georgia.

The first harvest was at 40% ripe with a second harvest a week later. 'Alapaha' was harvested on 6JUN13 and 12JUN13. 'Powder Blue' was harvested on 19JUN13 and 26JUN13. All harvests were in the morning after the dew had evaporated. The harvested fruit were transported in an air-conditioned vehicle (65° F) to the Vidalia Onion Lab at the University of Georgia, Tifton Campus. Two hours after harvest, collected fruit was graded, separated, and evaluated for quality or stored. The grading consisted of removing any damaged or unripe fruit. The fruit was then divided into three groups: one to be immediately analyzed and the other groups were placed into storage. Each treatment of stored fruit was put into 1 pint plastic clamshells and place into a controlled atmosphere chamber [33° F (0.6° C) at 85% relative humidity]. Fruit were stored up to two weeks and evaluated for quality weekly. Fruit quality analyses consisted of 100 count fruit weight (g), firmness (g/mm)(FirmTech2, Bioworks, Inc. Wamego, KS) at fifty fruit per plant, color (Konica-Minolta CR400) as L* a*b* CIE and reported as L* and Hue (10 fruit per repetition), sugars as soluble solids (SS) (Cole

Palmer, BrixStix), and acidity [(0.1 N NaOH) Mettler Toledo DL15 Titrator] . For SS and acidity analyzes, the fruit were pulped and centrifuged. The liquid portion was collected and evaluated for SS and acidity .The sugar and acidity is reported as a ratio (sugar/acid).

Hue was calculated using the formula described by McGuire (1992). Hue is represented as a 360° color wheel, the calculation uses a* and b* values gathered from the Konica-Minolta CR400 colormeter. This gives a single value to identify fruit color. The L* value is the shade of the fruit, 0 being black and 100 white, and is gathered from the raw data without further calculation.

All statistical analyses were calculated using SAS 9.3 (SAS Institute INC., Cary, NC) as proc glm $P<0.05$.

Results

„Alapaha" harvested on 6JUN13. Firmness was not significantly greater in the treatments when compared to the untreated fruit. However, fruit treated with chelated calcium weighed 11% more than untreated fruit (Table 1). Fruit firmness and fruit weight after one week in storage were similar in treated compared to untreated fruit. After two weeks of storage, firmness of fruit treated with calcium nitrate was significantly increased compared to the other treatments, although its fruit weight was reduced. The color, sugar and acidity analyses at harvest for all harvest timings were similar in maturity (data not shown).

„Alapaha" harvested on 12JUN13. Firmness was unaffected by treatments. However, fruit treated with chelated calcium application weighed 8% more than the untreated fruit. Fruit firmness was similar among treatments after the first week of storage. However, fruit treated with chelated calcium weighed 13% more than the untreated fruit (Table 1). After two weeks of storage, there were no treatment effects on firmness or weight when compared to the untreated fruit. Again, there was slight to no variability in color and sugar/acid ratio.

„Powder Blue" harvested on 19JUN13. Calcium carbonate was significantly firmer than the untreated fruit. However, the calcium carbonate, though not significant, was 7% less in weight than the untreated fruit. Further, none of the treatments weighed significantly more than the untreated fruit (Table 2). After one week of storage, the chelated calcium and the calcium nitrate weighed 11% more than the untreated fruit. After two weeks in storage, the treatments were not statistically greater than the untreated fruit. The color and sugar/acid ratio analyses were similar between treated and untreated fruit, suggesting that there were no differences in maturity (data not shown).

„Powder Blue harvested on 26JUN13. All treatments were statistically similar. At the end of one week of storage, fruit treated with calcium nitrate and chelated calcium

applications weighed 18% and 17% more than the untreated fruit, respectively. At two weeks of storage, none of the other treatments were significantly greater than the untreated fruit. The color and sugar/acid ratio analyses were similar in maturity compared to the untreated fruit.

Conclusion

The three foliar calcium chemistries evaluated did not significantly impact fruit firmness nor did they adversely affect quality. Harvest for both ‗Alapaha' and ‗Powder Blue' were at similar maturity across the treatments when compared to the untreated fruit. Where firmness was greater than the untreated fruit the fruit weight was less than untreated fruit. However, calcium glucoheptonate (KeyPlex®) and calcium nitrate (Cell Force™) increased fruit size suggesting further research.

Table 1. Alapaha fruit quality measurements of firmness and weight for harvest timings 6JUN13 and 12JUN13. Each analyses reflects harvest or storage period independent of each other. A different letter indicates significant difference at $P<0.05$.

Alapaha Fruit Quality Measurements of Firmness & Weight								
Harvest Date	6/6/2013				6/12/2013			
Treatment	Firmness (g/mm)		100 Fruit Wt (g)		Firmness (g/mm)		100 Fruit Wt (g)	
Harvest								
Control	227	a	121	b	215	a	128	b
Calexin®	228	a	125	b	206	b	125	bc
Cell Force™	228	a	119	b	215	a	119	c
KeyPlex®	230	a	136	a	219	a	139	a
1 Week of Storage								
Control	217	a	122	ab	204	a	117	b
Calexin®	214	a	119	ab	201	a	115	b
Cell Force™	220	a	114	b	197	a	118	b
KeyPlex®	216	a	129	a	202	a	134	a
2 Weeks of Storage								
Control	222	bc	111	ab	206	a	110	ab
Calexin®	217	c	107	b	196	bc	108	b
Cell Force™	234	a	100	c	191	c	109	b
KeyPlex®	225	b	114	a	204	ab	121	a

Table 1. ‗Powder Blue' fruit quality measurements of firmness and weight for harvest timings 19JUN13 and 26JUN13. Each analyses reflects harvest or storage period independent of each other. A different letter indicates significant difference at $P<0.05$.

Powder Blue Fruit Quality Measurements of Firmness & Weight								
Harvest Date	6/19/2013				6/26/2013			
Treatment	Firmness (g/mm)		100 Fruit Wt (g)		Firmness (g/mm)		100 Fruit Wt (g)	
Harvest								
Control	215	b	146	ab	197	a	148	ab
Calexin®	226	a	136	b	211	a	142	b
Cell Force™	210	b	152	a	195	a	158	a
KeyPlex®	216	ab	149	a	191	a	152	ab
1 Week of Storage								
Control	201	a	130	b	165	c	122	b
Calexin®	201	a	132	b	174	ab	149	a
Cell Force™	192	a	145	a	176	a	148	a
KeyPlex®	193	a	146	a	167	bc	147	a
2 Weeks of Storage								
Control	179	a	128	a	164	a	134	b
Calexin®	179	a	126	a	163	a	145	a
Cell Force™	172	a	135	a	159	a	134	b
KeyPlex®	175	a	135	a	151	b	145	a

Reference

McGuire, R., G. 1992, Reporting of Objective Color Measurements. HortScience, 27(12) December, p. 1254-1255

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NEW JERSEY AGRICULTURAL STATISTICS

Bruce Eklund, State Statistician
NJ Field Office
National Agricultural Statistics Service

USDA's National Agricultural Statistics Service will not conduct a number of statistical surveys in Fiscal Year 2014 (October 1, 2013-September 30, 2014). Because we are starting the new Fiscal Year with the FY2013 sequestration-level funding under a continuing resolution, we are not able to reinstate the programs that were suspended in March 2013. NASS modified its fruit and vegetable report estimates rather than suspend them entirely as it did for some commodities:

- NASS will publish the Non-Citrus Fruit and Nut Annual Summary; however, there will be no forecasts, no preliminary summary and no monthly prices in FY2014.
- NASS will publish the Vegetable Annual Summary; however, there will be no forecasts or monthly prices in FY2014.

NASS) will release preliminary results of the 2012 Census of Agriculture on February 20, 2014. The release, which will provide an initial look at national and state findings, will take place at the Ag Outlook Forum. NASS will release the full Census results at a later date and is working to set a revised schedule that ensures the highest-quality data. The release date was delayed by the work stoppage caused by the lapse in federal funding in October 2013.

AN OVERVIEW OF RESEARCH ON SPOTTED WING DROSOPHILA

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In 2011, the first adults of the spotted wing drosophila (SWD) were found in the northeastern US. Since then, this insect has become a serious pest of blueberries, strawberries, raspberries, and blackberries in our region. To control this pest, we are currently evaluating various insecticides with different modes of action. In 2013, we conducted studies to: a) determine the efficacy of various insecticides with and without a phagostimulant against adult SWD, and b) determine the efficacy of these insecticides against SWD larvae inside the fruit (curative control).

Efficacy of insecticides with and without a phagostimulant against adult SWD

An experiment was conducted to compare the efficacy of Exirel (a diamide), Danitol (a pyrethroid), Delegate (a spinosyn), Assail 30SG (a neonicotinoid), Bifenture (a pyrethroid), Movento (a tetramic acid derivative), Malathion (an organophosphate), and Imidan (an organophosphate) against SWD in highbush blueberries in New Jersey. Insecticides were applied with and without sugar as a phagostimulant at 2 lbs. per 100 gallons. The experiment was conducted in the mid-season cultivar ‗Bluecrop,' located at the P.E. Marucci Blueberry/Cranberry Center in Chatsworth, New Jersey. Treatments were applied to single bushes and were replicated four times. Applications were made with an R&D CO_2 backpack sprayer, using a 0.5 liter plastic bottle. The sprayer was calibrated to deliver 50 gallons of volume per acre at 35 psi, using a single ConeJet TXVS 4 nozzle, yielding 5.29 fl oz per bush. Treatments were applied on 30 June. A single cluster of ripe blueberries with an 8-10 cm stem attached was taken from each treated bush 1 and 3 DAT on 1 July and 3 July. The clusters were placed in a 32 oz deli container with a hole cut in the bottom in which a florists water pick fit tightly, with stems watered, and the number of ripe/ripening berries counted. A total of ten spotted wing drosophila adults (5 females and 5 males) were removed from a laboratory colony and kept in rearing tubes in a 25°C incubator for 2-3 h before being released into the containers. Flies were 1-3 days old at the time of use to ensure sexual maturity and were anesthetized with small puffs of CO_2 injected into the tubes prior to placing them in the containers. The containers were then placed on a light bench in the laboratory under a 14:10 L:D photoperiod, and were kept at 25-28°C during the 7 days of observation. Adult fly mortality data were collected on day 1 and 3. Data on fruit infestation were collected 5-9 days after the last adult mortality observation via a salt

water extraction method and then counting larvae and/or pupal cases that exited the fruit. The salt water extraction method consisted of submerging fruit samples in warm salt water approx 1000 ml of salt to 5 gal water. Number of larvae per 100 berries was calculated from the number of larvae and ripe/ripening fruit in the cluster. Data were analyzed using ANOVA and means separation by Tukey tests at $P = 0.05$. Percent mortality data were arcsine square-root transformed. Count data were natural log (x+0.5) transformed prior to analysis. Exirel, Assail, Imidan, Malathion, Bifenture, and Delegate provided the best control 1 DAT (see Figure 1). The efficacy of Exirel, Assail, Imidan, Bifenture, Danitol, and Delegate increased when sugar was added. All treatments, except for Movento, reduced the number of larvae in fruit (see Figure 2).

Figure 1. Effect of various insecticides with and without sugar (sucrose) on SWD mortality

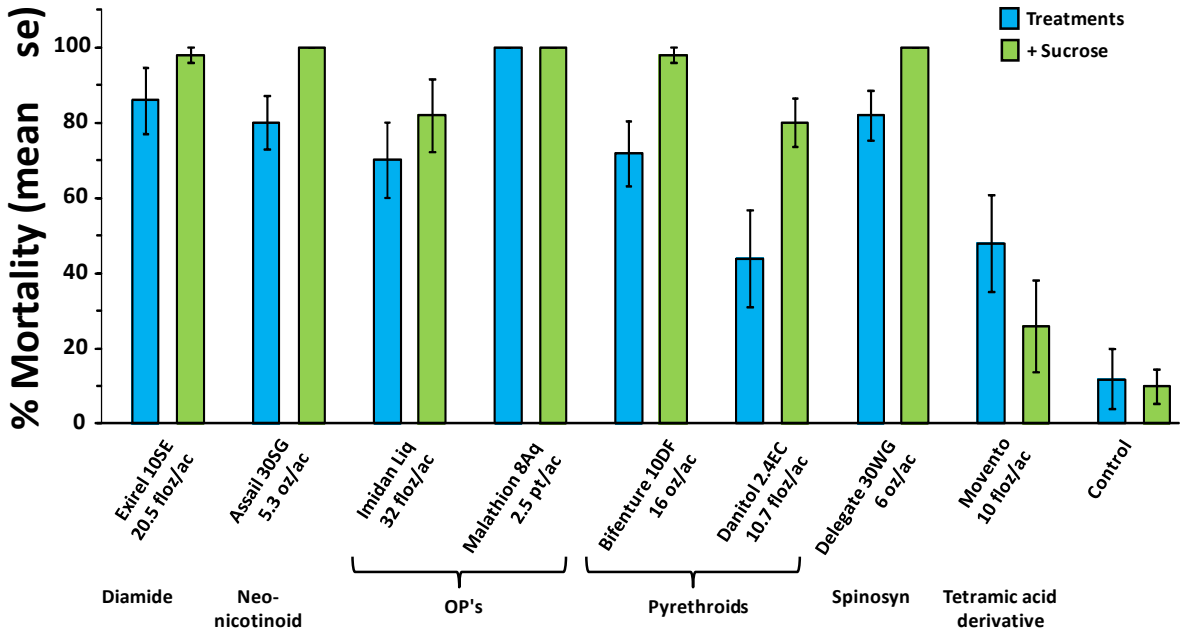
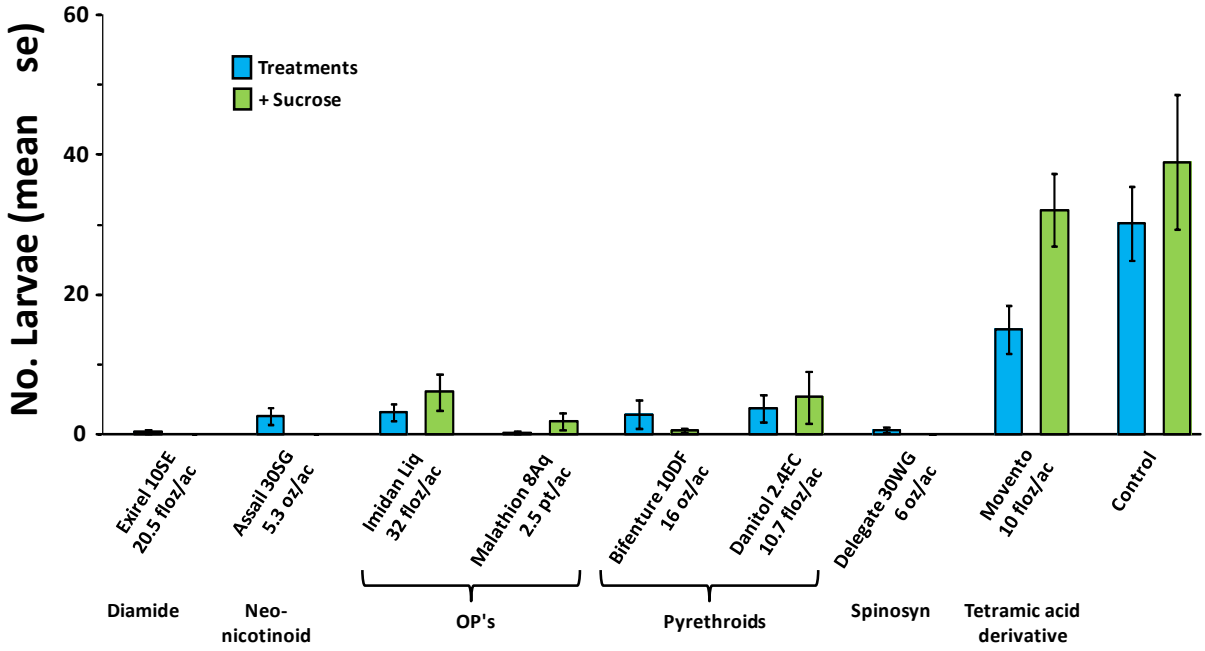


Figure 2. Effect of various insecticides with and without sugar (sucrose) on SWD larvae in fruit



Efficacy of various insecticides against SWD larvae inside the fruit (curative control)

This experiment tested the efficacy of Exirel, Assail, Imidan, Malathion, Bifenture, Danitol, Delegate, and Movento for curing existing SWD infestation in blueberries. On 6 July, 3600 ripe undamaged berries were obtained from an untreated field of the mid-season blueberry cv. ‗Bluecrop' located at the Rutgers P.E. Marucci Center in Chatsworth, New Jersey. Picked berries were divided up into eight groups of 450 berries each and each group was spread in a single layer on each of eight clear polypropylene trays. Four of the trays were placed in a 15°C incubator for later exposure. The remaining four trays were placed in 1 ft cube cages and exposed to >500 spotted wing drosophila adults (mixed sexes) in each cage. Flies were approx. 4-9 days old, and were from a laboratory colony kept at the P.E. Marucci Center. Berries were left in cages for two days (from 3 July until 5 July for the 4-5 day old group and from 6 July until 8 July for the 0-2 day old group). Cages were kept on lab shelves at 25°C, under lights on a 15:9 L:D cycle. At 48 hours, trays were removed from the cages and any flies remaining on the berries were aspirated off to stop oviposition. The four exposed trays were then placed in a 22°C incubator until the treatment date. On 6 July, the remaining four trays were moved from the 15°C incubator and given an hour to warm to room temperature before being placed in the same exposure cages. Berries

were left in cages for two days as was done with the first set of berries. On the day of treatment, berries from the 4-5 day old group were degraded too far to be able to handle them, and were not able to be treated. On 10 July, berries from all four trays from the 0-2 day old group were evenly divided into 36 groups (9 treatments x 4 replicates), of 50 berries each for treatment that day. On the day of treatment, 10 July, each group of berries (36) was spread out on a 12”x12” wire-mesh tray formed from 1/4”gap hardware-cloth prior to treatment. Applications were made with R&D CO_2 backpack sprayer, using a 1-liter plastic bottle. The sprayer was calibrated to deliver 4.3 mL/sec at 30 psi with a single ConeJet TXVS 4 nozzle. Trays were gently shaken during application to cause berries to roll and be coated on all sides. Application took 3-4 seconds yielding 12.9-17.2 mL per group. Treated berries were left on trays for 3 hours to dry. Larvae in berries were to be allowed to develop and emerge before evaluation, so each group of treated berries were placed in a 16 oz clear plastic deli container over approx. 1 cm of clean dry playsand. All cups were capped with ventilated lids and kept on trays in a 24°C incubator on a 15:9 L:D cycle to allow any surviving larvae to develop. Samples were evaluated at 10 days post-treatment on 18 July. Fruit was allowed to incubate for 10 days to allow most surviving larvae enough time to develop and exit the berries, at which point larval data were collected using the salt water extraction method (salt water extraction method = submerging sample in warm salt water approx 1000 ml of salt to 5 gal water causing any larvae to leave fruit). Larvae and pupae floating to surface were removed and counted, and the remaining berries were then dissected to ensure no developed larvae/pupae were overlooked. The number of larvae per 50 berries was totaled for each sample. Data were analyzed using ANOVA and means separation by Tukey test at $P \leq 0.05$. Count data were ln-transformed prior to analysis [ln(x+0.5)]. All insecticides provided > 90% curative control. Exirel and delegate provided 100% control. Movento provided the weakest curative control of all insecticides tested.

Table 1. Curative control

Treatment	Rate	No. Larvae / 50 fruit (Mean ± SE)		% Curative Control
Exirel (10SE)*	20.5 floz/ac	0.00 ± 0.00	d	(100.0)
Assail 30SG	5.3 oz/ac	0.75 ± 0.48	cd	(99.7)
Imidan (liquid formulation)	32 floz/ac	0.25 ± 0.25	cd	(99.9)
Malathion 8Aquamol	2.5 pt/ac	0.25 ± 0.25	cd	(99.9)
Bifenture 10DF	16 oz/ac	4.00 ± 1.41	c	(98.6)
Danitol 2.4EC*	10.7 floz/ac	2.25 ± 1.03	cd	(99.2)
Delegate 30WG	6 oz/ac	0.00 ± 0.00	d	(100.0)
Movento 240SC**	10 floz/ac	23.75 ± 5.23	b	(92.0)
Control	-	295.75 ± 25.09	a	0.0

*Adjuvant=0.25% Dynamic, **Adjuvant=0.25% MSO

Means within a column followed by different letters are significantly different (Tukey test, P≤0.05)

Count data were ln(x+0.5) transformed prior to analysis

% Curative Control = [1-(No. Larvae in insecticide-treatment / No. larvae in control)]*100

RUTGERS HIGHBUSH BLUEBERRY SELECTIONS FOR MACHINE-HARVESTABILITY: EFFECT OF SELF VS. CROSS-POLLINATION ON FRUIT SET, FRUIT SIZE, AND RIPENING INTERVAL

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The Rutgers', New Jersey Agricultural Experiment Station, highbush blueberry breeding program is focused on the development of machine-harvestable varieties for the fresh market. New Jersey growers have relied largely on available migrant hand-labor for harvest. Increasing restrictions on management options, e.g., labor availability, increased pesticide re-entry periods, etc., have placed additional burdens on farm sustainability, making machine-harvestable fresh fruit varieties highly desirable. Moreover, hand harvest is a major cost for the grower. Varieties with increased fruit firmness, ease of fruit disarticulation from the pedicel, small fruit scar, and tolerance to bruising are traits that are advantageous for machine-harvestability. Another critical trait is self-fruitfulness for adequate productivity where plantings are large blocks of a single cultivar. In New Jersey, highbush blueberry production typically relies on large plantings of a single cultivar.

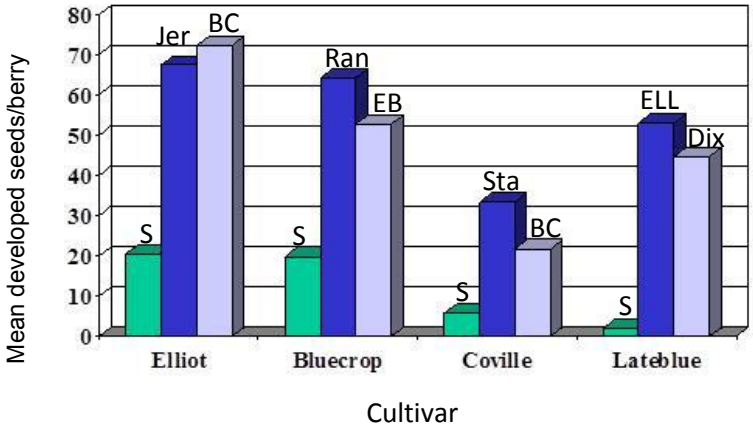

Fig. 1. Mean developed seed set in four highbush blueberry cultivars when self (S) versus crossed pollinated. Crossed pollen sources are: Jersey (Jer), Bluecrop (BC), Rancocas (Ran), Earliblue (EB), Stanley (Sta), Elliott (Ell) and Dixie (Dix).

In large blocks of a single cultivar, most ova would be self-fertilized. However, many if not most highbush blueberry cultivars do not achieve maximum production in large single cultivar plantings, where self-fertilization predominates. All highbush cultivars set more developed seed with cross-pollination than with self-pollination (Fig. 1). For example, Bluecrop set over 60 developed seeds when flowers were pollinated with Rancocas pollen, and only 20 developed seed when self-pollinated with Bluecrop pollen (Fig. 1). Even though Bluecrop sets about one-third as many developed seed

when self-pollinated, that appears sufficient to achieve adequate crop production. In contrast, Coville and Lateblue set less than five developed seed/berry when self-pollinated resulting in much smaller berry size and later ripening. The main cultivars currently grown in New Jersey are Duke, Bluecrop, and Elliott. These three cultivars have sufficient self-fertility to achieve adequate production with self-pollination. One practice by growers was to plant alternate rows of two cultivars, e.g. Jersey and Elliott, to promote cross-pollination. However, honey bees would often be seen working only one cultivar even in this type of planting.

Unfortunately, due to the high varietal diversity in blueberry breeding blocks, virtually all blueberry breeding programs measure fruitfulness in a fairly cross-pollinated environment. In our breeding program, we are evaluating the self-fruitfulness of progeny selected for their machine-harvestability in an open-pollinated environment. This study evaluated 30 progeny (selections R1 - R30), representing 15 crosses, for self-fruitfulness in controlled greenhouse crosses, as measured by fruit set (Fig. 2), fruit weight (Fig. 3), and ripening period (Fig. 4).

Respective flower clusters were pollinated with either the selection‘s own pollen or pollen from the ‗Sierra‘ or ‗Bluecrop‘ cultivar. Cross-pollinated flowers typically yielded larger, earlier ripening fruit for most selections. Relative to cross-pollinated clusters, fruit ripening was delayed by an average of 3.4 days, and fruit size reduced by an average of 18% in self-pollinated clusters. However, self-fruitfulness varied widely among the 30 selections, with some exhibiting only a small effect, and others exhibiting a severe reduction in fruit size, delayed ripening and reduced fruit set. Variation for self-fruitfulness between progeny of a given cross was observed; reduction in fruit size with self-pollination ranged from 7% (R26, Fig. 3) to 59% (R28, Fig. 3), ripening was delayed from 2 to 23 days among the progeny of one cross (Fig. 4). In a number of selections, fruit set, fruit size, and ripening season under self-pollination all appeared to be comparable to cross-pollinated flowers, suggesting they would have adequate productivity under a New Jersey cultural management environment. However, several selections exhibiting severe self-unfruitfulness would likely not be suitable for the NJ commercial grower.

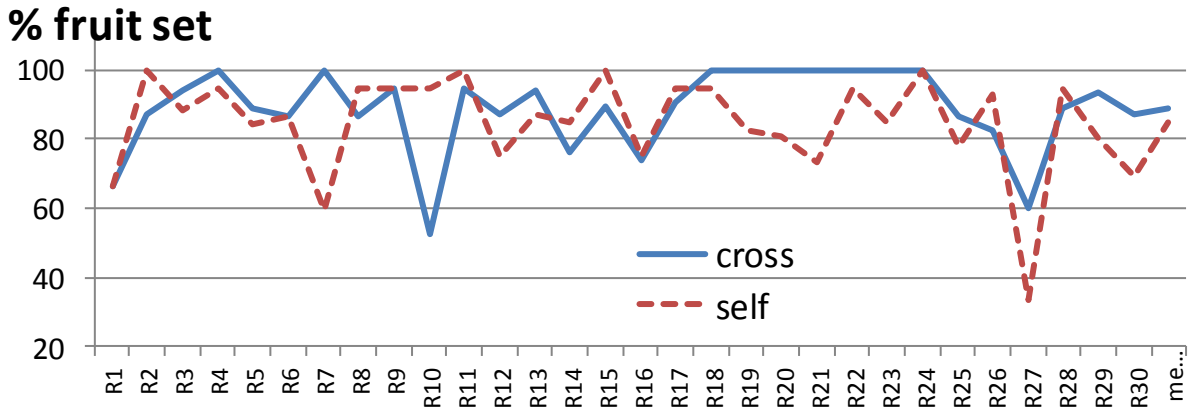

Fig. 2. Fruit set in 30 advanced highbush blueberry selections (R1- R30) with self versus cross pollination.

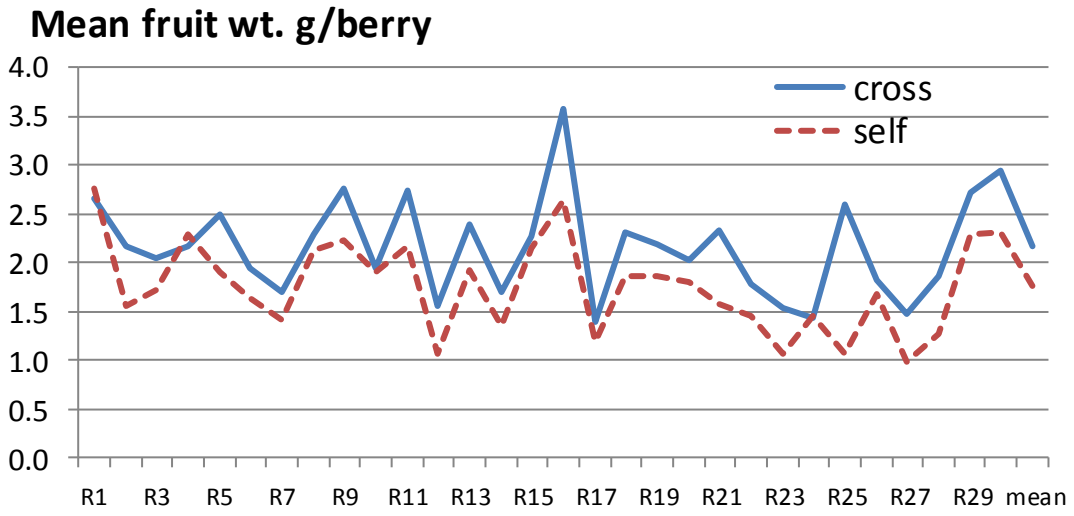

Fig. 3. Mean fruit weight in 30 advanced highbush blueberry selections (R1- R30) with self versus cross pollination.

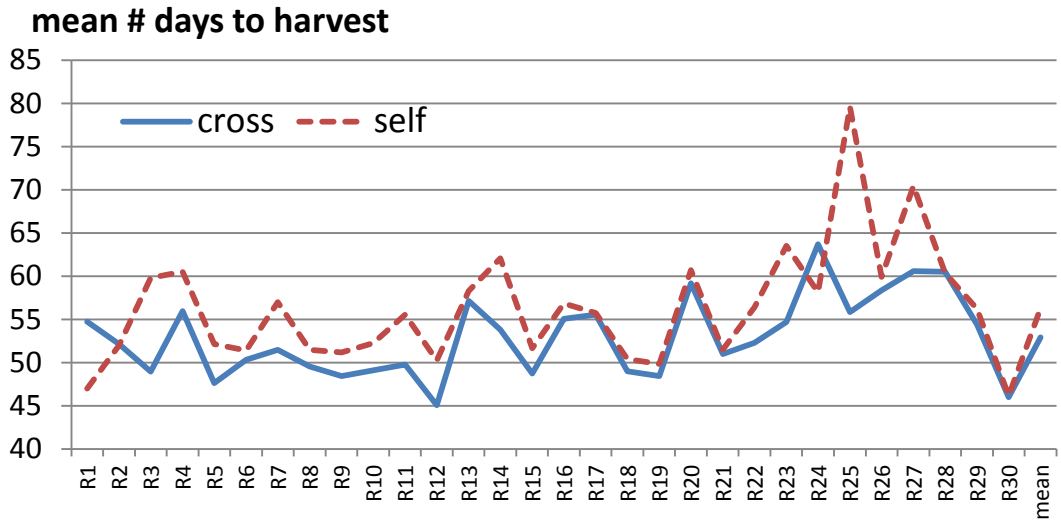

Fig. 4. Mean days to harvest in 30 advanced highbush blueberry selections (R1- R30) with self versus cross pollination.

Direct Marketing

FOOD SAFETY CONSIDERATIONS FOR DIRECT MARKET LOCATIONS

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Food safety should be a priority for farms of all sizes. According to the FDA produce accounted for 37.3% of reported food borne illness in humans between 1996 and 2006. Produce was the largest food category to be linked to food borne illness. Producing a quality product that is safe to eat is the foundation of a robust produce industry in New Jersey.

Consumers are learning more about food safety through increased educational efforts and media attention to food borne illness outbreaks. Growers selling through direct market methods are already faced with increasing questions regarding the quality of their product. This will increase as consumers become more aware of food borne illness outbreaks and federal regulations affecting fresh produce. Growers should be prepared for food safety related questions from consumers and have answers specific to their farm practices regarding the reduction of risk of produce contamination.

Risk assessments are a means of evaluating the potential risk at the farm. Hazards should be identified and the potential risk for each hazard should be evaluated. Existing hazard control measures in place should be explained. Document any time you change a practice, a procedure, or equipment to reduce risk. If you make changes to your operation due to an evaluation of potential risk you should document this. Any identified hazards should be monitored and reviewed annually to determine if additional changes should be made.

Specific areas of risk assessment should include:

- Land use history (including adjacent land)
- Farm water use
- Animal activity (both wild and domestic)
- Soil amendment use
- Packing house facility and activities
- Distribution points

Good agricultural practices (GAPs) are standard practices that farms should use to reduce the potential risk of product contamination. This begins with worker health and hygiene training and monitoring. Employees should receive annual training focusing on:

- Proper hand washing
- Personal hygiene

- Reporting illness
- Injury reporting
- Proper bandaging for cuts, scrapes, and open wounds

GAPs also include farm policies that ensure consistent management of potential risk at the farm. Farm policies should cover:

- Proper location, stocking and monitoring of restroom facilities
- Proper location, stocking and monitoring of hand washing facilities
- Irrigation source water
- Water used for chemical controls
- Animal based soil amendment management and use
- Farm animal locations and potential runoff
- Petting zoo areas
- Sanitation of harvest tools and equipment
- Wash water use and sanitation
- Sanitation of washing and packing areas
- Cleaning, use and storage of produce packing/storage/transportation container
- Building maintenance and sanitation
- Traceability of produce one step forward and one step back
- Transportation of produce
- Sales locations of produce
- U-Pick visitor policies
- Customer pets

A farm food safety plan is an invaluable tool for growers to assess risk and develop farm policies to reduce those risks. For additional resources regarding farm food safety, the Food Safety Modernization Act, third party audits and developing your farm food safety plan please visit:

Rutgers Vegetable Crops – Food Safety Page
http://www.njveg.rutgers.edu

Rutgers Plant and Pest Advisory – Food Safety Tab
http://www.plant-pest-advisory.rutgers.edu

UC Davis Small Farms Program – Food Safety
http://sfp.ucdavis.edu/food_safety/

AN EXCITING NEW STATEWIDE WEBSITE TO PROMOTE FARM MARKETS, AGRITOURISM AND CSA'S

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Agritourism is the business of establishing farms as travel destinations for educational and recreational purposes. A growing number of farmers are developing agritourism enterprises to increase farm income, diversify their businesses, and increase their customer bases. Additional benefits can include building positive community relations and raising educational awareness of agriculture. Agritourism can include a wide-range of innovative activities such as on-farm direct marketing, entertainment, farm accommodations, outdoor recreation, and educational programming. In 2006, it was estimated that one out of five farms in New Jersey offered some form of agritourism, generating revenues exceeding $57.5 million for this industry (Schilling et al. 2011).

Recognizing its potential, in 2004 the New Jersey State Board of Agriculture identified agritourism as an economic development strategy for farming in New Jersey. Given that marketing is the lifeblood of a successful agritourism enterprise, a statewide, centralized marketing platform called Visit NJ Farms! was developed by Rutgers Cooperative Extension specialist Brian Schilling and NJAES Office of Research technology director Lucas Marxen in partnership with the NJ Department of Agriculture. This website provided any agritourism enterprise in the state a web presence and the ability to market their products, services and activities to the public in real-time. The site provided a platform to showcase the state's top agritourism enterprises as well as provide smaller farms just starting in agritourism and direct marketing the opportunity to better market themselves to the public.

The site provided key features such as the ability for farmers to advertise special events on their farm, search features for the public to find farms by location or product/activity, and the ability to create an itinerary to visit multiple farm locations during a single trip. Once registered on the site, a farmer could update the information on their agritourism enterprise as frequently as they wanted, with all changes appearing on the site in real-time. The site has attracted tens of thousands of web visits annually since its release in the Fall of 2006. While the site was cutting-edge during the time of its release and inspired many other state agritourism marketing websites, lack of funding and limited personnel support caused the site to fall behind the industry and its needs.

This year, day-to-day management of the website was transferred to the New Jersey Farm Direct Marketing Association. Rutgers NJAES is making crucial updates to the Visit NJ Farms! platform and has rebuilt the site from the ground up to provide a better user experience and provide a resource to the agricultural community that can adapt with the ever changing landscape of agritourism. This partnership with the NJFDMA will allow the management of the site and its farm accounts to be handled by an industry group that's mission is focused on helping farms succeed in agritourism and direct marketing in New Jersey. Rutgers NJAES and the New Jersey Farm Bureau will be ongoing partners in the administration, maintenance, and marketing of the website.

While carrying over key components of the original Visit NJ Farms! website, the new site will provide some new features to allow farmers to better market their enterprises. In addition to farmers being able to enter contact and descriptive information about their farm, multimedia enhancements have been made to allow operators to upload photos and link to online videos of their agritourism operations showing the public what they can look forward to when visiting. This feature can also provide farmers with the opportunity to better distinguish themselves from other farms listed on the site. Another important update to the site is the inclusion of new social media outlets being utilized by farmers in New Jersey. Farmers can now provide links to their Facebook, Google+, Twitter accounts, as well as their own standalone websites through their farm profile, providing users with the ability to further connect with the farm. Additional features that have been added to the site are the ability to expand the list of activities and products that farmers can indicate they provide to allow the site to grow with the ever expanding agritourism industry, and enhancements to the special events feature allowing farmers to now upload an event photo and downloadable flyers.

Updates were also made to enhance the user experience when visiting the site. A new interactive search feature allows visitors to find farms by location, farm type, products/services provided, or any keyword. All results are updated immediately on a Google Maps interface so users can visually see where farms are located. Also, as a user explores the map interface for farms, a list of upcoming special events is continually updated based on the geographic area specified by the user. A "What's in Season" page has also been developed which provides users with a quick visual chart of what farm products are available at what points during the year. This chart can be updated by the site administration to more accurately show availability dates based on that year's weather and growing conditions. Another significant change to the website is the replacement of the itinerary feature with a new smartphone-based directions system which allows visitors to have the farm location sent to their smartphone via SMS text message, allowing the phone's built in GPS navigation to provide point-to-point driving directions for the user. Traditional directions via Google Maps is still available for users without smartphones.

Two additional features that are under development and expected to be completed when the site goes live in the Spring of 2014 are the Featured Farmer and Local Foods

tabs. The Featured Farmer component will showcase a single farm on the homepage of the site and provide visitors with a more in-depth profile of the farm, its history, and the products and activities it offers the public. This will allow the site to promote some its best operations and provide those farms with a great marketing opportunity. The Local Foods component will allow farms to create linkages with off-farm markets and businesses that feature their farm products, providing consumers with additional venues to support their local farms. These linkages will include Community Farmers' Markets, restaurants, supermarkets, and retail stores that sell or use that farm's products. Visitors to the site can also use this component to discover farms in their area that sell their products at local food retailers that they may frequent.

In conclusion, the redesign of the Visit NJ Farms! website will provide a new and unique centralized marketing platform for agritourism enterprises in New Jersey that will be a key component in promoting economic development in the agriculture sector of the state. The partnership between Rutgers University, the New Jersey Farm Direct Marketing Association and the New Jersey Farm Bureau will ensure that the site is successful in meeting the needs of the industry and continues to be the premier site for agritourism and direct marketing in New Jersey.

References

Schilling, B. Sullivan, K, Komar, S., and Marxen, L. (2011). The economic contributions of agritourism in New Jersey. Rutgers Cooperative Extension Fact Sheet E333.

TIPS TO MANAGE LIABILITY AND HELP AVOID CONFLICTS IN AGRITOURISM OPERATIONS

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One in five New Jersey farms offer on-farm activities related to direct marketing, public education about agriculture, entertainment, or outdoor recreation. Known as "agritourism", these activities are increasingly popular among farmers in New Jersey and elsewhere in the United States seeking to increase farm income, diversify products, and expand farm employment for family members. Agritourism also enables farmers to educate the non-farm public about farming and agricultural issues.

The development of an agritourism operation is an enticing business opportunity for many farms. However, attracting hundreds or even thousands of people onto the farm greatly increases the likelihood that a guest or employee will be exposed to farm safety risks and potential injury. Further, increased "non-production" activity on farms related to agritourism and direct marketing may irritate neighbors to the point of legal conflict or elicit opposition from local officials charged with implementing land use and other regulations passed to protect public welfare. These are realities with which agritourism operators must contend and are potential liabilities that could interfere with business success.

To assist farmers engaged in agritourism - or contemplating the development of an agritourism enterprise - a series of training resources were developed as part of an agritourism development program supported by a regional Northeast Sustainable Agriculture Research and Education grant (Award No. ENE11-121). This presentation highlights several strategies that a farm operator can adopt to reduce conflicts with neighbors and local government, and mitigate legal liabilities that may arise due to increased farm visitation. More detailed guidance information may be found online at our project website: http://agritourism.rutgers.edu/training/.

Liability Protection - "Dress in Layers"

Anytime someone enters your property, invited or not, you have some level of responsibility for that individual's safety. Yes - it is conceivable that a landowner may be found liable for an injury to a trespasser if effort is not made to alert the trespasser (and

others) of a known hazard through, for example, warning signs. Further, liability for an injury to any farm visitor can apply to both the owner and the _possessor' of the property, the latter meaning the person who is _incontrol' of the property area where an injury occurred. It is important to understand the nature of liability laws in your state, as they do vary.

Generally, the highest "duty of care" (think of this as a legal obligation to provide a reasonable level of care to prevent others from being injured on your property) is owed to those guests visiting your farm for commerce (e.g., farm market patrons, visitors to your corn maze, etc.). For these guests, you have the obligation to search for hazards on your farm and take efforts to protect visitors from being harmed by them. An example relevant to an agritourism farm may include ensuring that farm animals with which visitors may come into contact are healthy and of appropriate temperament. Another is ensuring safe ingress, egress, and parking for a farm market. Yet another is ensuring that a lane used for hayrides is reasonably smooth and free of obstructions. Failure to remediate known hazards on a farm may be viewed as your negligence if a guest is injured - and you may find yourself accountable for damages.

So what can an agritourism operator do to protect the well-being of farm visitors and himself when a lawsuit is filed by an injured guest? There is no single action a business operator can take, but clearly taking every reasonable effort to create a safe environment for farm patrons is an essential one. Developing and implementing a comprehensive farm safety plan is advisable. Not only will it help the operator and staff identify farm hazards and address them (e.g., removing them, identifying them as "off-limits" to farm guests, or posting rules/warnings), it demonstrates a level of proactivity that may provide an element of protection to the farmer in the event of a lawsuit.

Despite taking precautions, there is a high likelihood that an accident or injury to a guest will occur when hundreds or thousands of people visit a farm. This is where the concept of liability protection being akin to the need for dressing in layers in cold weather comes into play. As previously noted, there is no single strategy for effectively protecting a farm against liability. Speaking to an attorney and your insurance provider is certainly recommended. You will likely be advised to approach liability management holistically, as a program or series of activities that demonstrate a proactive, responsible, and comprehensive approach to farm safety. Here are some potential "layers" of protection to consider:

- Consult with a legal or other qualified professional to determine which form of legal business formation is appropriate for your farm. A sole proprietorship or general partnership will offer less liability protection than, for example, a corporate structure or limited liability partnership.
- Have an emergency response plan in place to facilitate effective handling of an emergency situation occurring on the farm.

- Document any accident on the farm. A farm should have an incident response form that details the nature of an accident (who was injured, what happened and where, who was present, was medical assistance offered/administered, etc.) that is filed any time a person is injured on the property.
- Know applicable laws and regulations. This is admittedly more easily said than done. However, ignorance of a law is never an accepted defense against its violation. Consult with knowledgeable parties - farm bureau staff, department of agriculture personnel, Extension, other farmers, etc. - to discuss applicable statutory and regulatory provisions that may affect your operation.
- Understand the extent to which your current or contemplated agritourism activities are protected under your state right to farm statute. In New Jersey, this continues to be an evolving area. An On-Farm Direct Marketing agricultural management practice (or AMP, a document that defines the practices or bounds within which a farmer must operate to receive right to farm protection) is in the final stages of development. However, consultation with staff from your county agricultural development board or State Agriculture Development Committee is advisable whenever you have questions about your right to farm protections. A site-specific AMP may be an option to pursue.
- Consider the use of indemnification/liability waivers. Before allowing access to the farm, you may have a farm guest sign an agreement whereby s/he "agrees to indemnify and hold harmless the landowner from any claims made by the user or third parties arising from the use of the land or activities." Waivers do not remove landowner responsibility for the safety of farm visitors, but they are legal documents in the eyes of the court system.
- Post rules and warnings regarding known safety hazards. Warnings should be appropriate and tailored to the circumstances of each farm, but examples may include:
    - —No consumption of alcoholic beverages allowed"
    - —No smoking on farm"
    - —This is a working farm - exercise caution!"
    - —Caution electric fence"
    - —No swimming in pond"
    - —Do not touch animals – they may bite"
- Keep good records. As discussed above, maintain a file of all accidents/injuries on your farm (incident response forms). Document efforts to identify and minimize farm hazards. Consider some form of visual documentation (photos, video) of your farm to show its condition and efforts to make it safe for guests. Keep a log of farm safety inspections/walk-throughs and employee trainings.
- Be adequately insured. Consult with a farm insurance provider about the types and levels of insurance that are appropriate for your enterprise. And review your insurance with your provider regularly (at least annually). It is important to consult with your insurance provider before changing the type(s) or extent of activities offered, or if anticipated visitation levels change significantly. You want

to avoid the risk of having a claim denied because an activity was not specifically included in the farm's insurance policy.

- Also discuss strategies for transferring risk to any third-party vendors that may be operating on your farm (e.g., a vendor selling food or pony ride operator). Be sure that such vendors demonstrate proof of appropriate insurance and name you (the farm/operator) as an additional insured. It is advisable to have a written agreement with vendors that detail each party's responsibilities

Be Mindful of Neighbors' Concerns!

Bringing large numbers of visitors to a farm - with the associated traffic and noise - may ruffle the feathers of neighbors expecting only rural tranquility from the farm next door. Even if a farm's activities are protected under the state Right to Farm law, tensions among neighbors and local municipal governing and land use bodies are not good for anyone - time, cost and ill-will are incurred. Many successful agritourism and direct marketing operators acknowledge that "the best right-to-farm protection often amounts to just being a good neighbor." Toward this end, the State Agriculture Development Committee compiled the experiences and recommendations of farmers into a useful guidance booklet titled "Farmer-to-Farmer Advice for Avoiding Conflict."

The easy-to-read booklet is recommended reading for agritourism operators. Among the advice of farmers:

- Get to know your neighbors – "People who know each other are more likely to approach each other when problems arise" (versus complaining to the township or filing a legal complaint)
- Help neighbors get to know you! – Invite neighbors to tour the farm, educate them about what you do.
- Communicate - Listen to neighbors when they express concerns and respect the view points of others. As one farmer notes, "Respect goes both ways."
- Use common courtesy – Make efforts to minimize noise during certain hours; promptly remove litter generated by farm/visitors
- Be involved in the community. Strive to make the farm an asset in the eyes of the community.
- Keep the farm clean and attractive.

For More Information

Each farm has its own unique circumstances: safety factors, potential legal liabilities, insurance requirements, and optimal business organization. **Anyone engaged in agritourism, or thinking of developing an agritourism enterprise, should obtain advice from qualified legal and insurance professionals.**

You are responsible for the safety and welfare of individuals the moment they walk onto your farm. Keeping them safe is of paramount importance; but accidents invariably happen. Protecting your personal and business assets is therefore an important risk management strategy. This presentation outlines several practical steps a farm operator can take to manage legal liability. For more resources for managing liability, visit our project website: http://agritourism.rutgers.edu/training/.

THE GMO CONTROVERSY, RESPONDING TO YOUR CUSTOMERS CONCERNS AND UNDERSTANDING THE BASICS

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One of the first steps in any discussion of GMO's and genetic engineering is to understand the basics of genetics and the science behind the discussion. When consumers ask questions about GMO's, it is wise for growers to have a basic understanding of the science.

Understanding Genes (Genetics) and DNA

The smallest living component of plants and animals are cells. Scientists estimate that an average person could have over 37 trillion cells in their body. Within each microscopic size cell is a nucleus. The nucleus acts as the control center or director for all activities in each cell. The nucleus contains the long strands of DNA which contain segments called genes. The overall DNA contains the codes and information which determine every characteristic of the overall plant or animal. Genes are segments of the DNA that determine the individual or specific characteristics of any plant or animal. Genes can code for specific characteristics such as height, yield, color, taste, nutritional components, as well as disease and pest resistance for plants. Think of the DNA as the overall plans for a building, the detailed structure of each room and overall components are determined by individual or multiple sets of genes. The genes are the detailed specs for the organism and determine how all of the pieces fit together into one functioning structure as a plant or animal. If we insert new genes, we change the detailed plans and therefore the characteristics of the organism. Genetic Engineering is a precise insertion of desired genes into an organism, in order to modify the characteristics of the plant or animal species.

What is a (GMO) genetically modified organism or genetically engineered plant?

The term genetically modified can describe new plant species or genetic variability created by using traditional breeding methods, precise genetic engineering techniques

or a range of natural genetic modifications. Natural plant genetic modifications can occur from factors such as solar radiation, environmental influences or invasion by viral, by bacterial or other pathogens. Specific chemicals can also induce mutations or changes in the genetics or gene expression of an organism. Environmental factors also influence which genes are expressed and how genes are modified and passed on to future generations of plant or animal species.

Generally, when the public, the media and some scientists talk about Genetically Modified Organisms (GMO's), or GMO foods, they are not talking about traditional breeding or crosses of one similar plant Genus and species with another. What they are really talking about is genetically engineered or transgenic plants or animals. Genetically engineered (GE) foods are created when specific gene sequences, with desired traits or characteristics are attached to carrier particles that are used to insert specific gene sequences into the plant DNA. These new genes are then expressed by the new GM or GE organism to produce a specific protein. In some cases, these inserted genes would not normally exist in the plant genome unless they were artificially inserted into the plant DNA using molecular biological techniques. In genetic engineering, molecular biologists have found ways of manipulating natural bacterial plasmids as well as an assortment of other tools to insert new gene sequences into an organism's DNA. Genetic engineering can provide a rapid and precise insertion of new genes into the DNA of plants and animals.

Are GMO's and examples of genetic re-engineering found naturally?

Genetic modification occurs naturally in many forms. Without natural and man-made genetic modification, the variety of organisms we see on our planet, would not exist. A common food, such as corn, bears little resemblance to its origin from Teosinte. Modern corn is more than 1,000 times more productive than its long lost relative, and as a result, helps to feed the world. The origin of the tomato from its Solanaceous ancestors from South America also bears little resemblance in size and flavor to the great Jersey tomatoes we now enjoy. Over 10,000 years of selective breeding has led to many of the crop plants, we now enjoy.

Much of the science around GMO's and genetic engineering in plants has evolved from our scientific understanding of a natural phenomenon that occurs in plants affected with *Agrobacterium tumefaciens* or crown gall. Crown gall is a common disease found in nature whereby bacterial cells invade a plant and cause tumor like growths on the plant. You can find this very common disease in many wooded areas on susceptible tree species where you can observe large tumor like galls on the trunks or on branches. The invading bacteria of crown gall have unique circular DNA called plasmids that move

out of the bacterial cell and invade the plant cell. The bacterial plasmids invade the plant cell‘s nucleus and insert its foreign genes into the plants DNA. The foreign bacterial genes reprogram the plant cell to produce compounds called opines. The bacteria then feed on the plant produced opines for its survival. Scientists observed this phenomenon and began inserting their own genes into the bacterial plasmid to re-engineer plants to produce unique new proteins. Scientists have found that viruses, bacteria and other micro-organisms have been able to insert their foreign DNA into non-related plant and animal species. Ongoing changes in the DNA and genetics of organisms occurs constantly in nature.

Are genetically modified plants safe to eat?

There are already many GMO‘s or genetically engineered foods and plant based products in the marketplace. Currently 70% or more of the processed foods in the USA contain GMO foods as part of the ingredients. As much as 85% of the corn grown in the United States is a GMO or genetically engineered crop. We have had GMO foods in the US markets for the past twenty years, so chances are very high that many, if not most consumers have had GMO or genetically engineered foods in their diets for some time.

Just as some people prefer Organic or locally grown foods that may have less traditional pesticides, some refuse to eat anything that is clearly a GMO or more accurately, a genetically engineered plant or food product with GMO components. Choices are not always based on scientific evidence but on public perception of the safety of a product. Each GMO product should be evaluated separately based on current knowledge gained by valid scientific studies. Genetically modified foods are more vigorously tested than food plants produced by typical breeding techniques. The approval process for a GM food to hit the market can be as much as six years. The proteins produced by genes introduced in the genetic engineering process must be shown to be easily digested by the stomach and pose no additional risk to the person or animal to which it is fed.

Should GMO or Genetically Engineered Foods be Labeled ?

Some people argue that all foods containing GMO ingredients should be labeled in the United States. Currently twenty states have laws pending, requiring the labeling of GMO foods. Others argue that labelling GMO foods, will scare consumers away from these foods, increase food prices and reduce the potential for future development of this new technology. Some possible solutions for concerned consumers may be to simply label foods that do not contain GMO ingredients, or consumers can purchase locally grown

foods or USDA certified organic foods that are not genetically engineered. This would allow choices for the consumer and let the market place decide the fate of GMO‘s.

Respect for the Concerns of Others regarding GMO’s

In any discussion concerning sensitive issues, such as GMO‘s and genetic engineering, there are many strong opinions and feelings. It is important that all concerns be listened to and respected in the GMO debate. There are valid concerns among people about limited genetic diversity among plants and animals. Each genetically modified food or product should be evaluated for its own merits or potential negative impacts. It is important to understand the rigor of testing that GMO products go through before they are released. It is wise for people to be concerned and involved in helping to shape science and policy in a manner that benefits all of mankind. A critical first step in the discussion should be ongoing education based on non-biased sources of research based information. Therein lies the challenge in a world of copious misinformation along with valid scientific information.

Summary for Discussion of GMO foods with Consumers:

1. Listen and respect the concerns of others
2. Learn as much as you can about the subject matter from reliable sources
3. Genetic changes occur all of the time in nature
4. There are clear benefits from genetic engineering to increase a plants ability to tolerate drought, cold or heat and provide resistance to disease and insect problems while reducing the need for pesticides.
5. Some GMO crops have enhanced nutritional value, which is critical for developing nations with limited food choices.
6. Some scientists are concerned about limiting diversity in plant genetics if a small number of GMO cultivars dominate the market.
7. Some scientists and the public are also concerned about GMO genes moving into natural ecosystems.
8. Each GMO or genetically engineered product is thoroughly tested and can take up to 6 years to receive approval through FDA and USDA.
9. Each GMO product should be evaluated independently.
10. USDA certified organic foods by definition should not contain any transgenic or3 genetically engineered products.

Agribusiness

IMPROVED EFFICIENCIES WITH IN-FIELD CROP DATA ACQUISITION

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Who is Aaron Hutchinson?
Aaron is the president and co-founder of Cogent3D, Inc.
Since 2009, Cogent3D has been making award winning mobile farming data applications such as GISRoam, PrecisionEarth, and iCropTrak.
Aaron comes from a multi-generation family of Florida produce farmers.
Has military experience working with 3-D GIS and imagery exploitation from space and UAV based platforms and holds degrees in Computer and Electrical Engineering from University of Central Florida.

Farming is Data Management.
The days are passing fast where farming is just based on a basic understanding of the crops you are growing and the corner café conversations.
New varieties of crops, increasing government reporting, and more technical farming methods require more atomic level information to achieve the returns that offset the ever-increasing costs of farming.
You need to know the 5 W's (Who, What, Where, When, and Weather) for every type of information you collect in your fields from soil to seed, to pests and weeds, to water and finally harvest.

Why so Much Data?
This data is the basis for a majority of your reporting/tracking requirements such as Primus/GAP Food Safety, Governmental reporting, Organic and Biodynamic farming certification, and sustainable farming.
This data also provides you the basis to make informed decisions on the practices you applied this year and to duplicate those decisions to support incremental improvements in farming by repeating the successes in the following years.

Why In-Field Data Acquisition?
With all the technical advancements in Agriculture, walking in the field is still the best method to understanding and document the crop, *~~–~~To See it, To Collect it, and To Understand it"* as my grandfather would say.
It is easier to collect missing data to make a better decision when you're in the field and have questions about why the crop is doing what it is doing.
It is faster in the long run to spend a little more time getting what you need right then versus having to coming back later.

Not to mention for all the advances in technology, it may be awhile to when not walking into a field can tell you things like infestations of corn leaf aphids and corn earworms at VT growth stage

Does More Data Mean More Work?
Not necessarily!
Technology has made it easier to collect a significant amount of information about a specific location easily. Like *loading* tractor, irrigation, sensor, and other data automatically so you have it at your fingertips.
Technology is making *parsing* this vast amount of information into decisions easier as well, turning a 4 inch GreenBook of information into 4 or 5 chemical suggestions or automatically applying the 5 W's to everything you capture.
Using things like Humidity and Temperature at time of pest scouting to *scale* pest pressure values based on observations.

Not Just Data But Precision Data!
Data you collect has to be better than field level information you get most times with paper processes. It needs to be precision data, meaning exactly where in the field the problem or benefit is being observed.
The why is all that data you have at your finger tips is less useful if you cannot co-locate your position in multiple data products. Fancy way of saying that when I want to know more than I can see with my eyes about my plants at a location in the field, I can call up my EC/VARIS to find out the soil type and clay content, what and how much I sprayed recently, possible plant population and variety difference, number of GDD, last years harvest number for this location, and much more.
In iCropTrak we call this —walking in your data."

Data Collection Needs To Be Flexible
Farming is like an opinion; everyone has a method that works for him or her. Said simply —One Size Does Not Fit All." Because your goals for farming will be different from your neighbors, the collection of data needs to fit your farming goals.
Therefore, you need to make sure the system you employ will let you configure and automate the information that is important to your goals.
Being an organic biodynamic farmer may mean you need to collect moon phase and constellation per documented farming task.
Being Vegan organic you need to have a list of nutrients and alternative pest controls available locally.
Make sure the collection system meets your needs.
In iCropTrak we had to build the system from the ground up with this in mind since it affects everything about the system from collection to reporting.

So What Are These Efficiencies in-field Data Collection?

a) Data Automation
Collecting one type of information manually causes automatic collection and establishment of the relationship to other appropriate information at the same time.

Things like automatically collecting temperature, slope, elevation, and SSUGRO soil reference at the time of soil sampling.
Associating the number of heat units (GDDs), total precipitation, and crop growth stage at a field during a nematode survey.

b) **Crop Comprehension**
Choices available to the user during scouting and field documentation are filtered by the growth stage, GDDs, soil type, color, size, and much more.
Question and Answer based systems (like automobile diagnostic systems) walk you through the problem by having you answer simple questions you can see while looking at the plant such as Top, stem, or root problem area, what color is it, has holes or white lines, and so forth until you get to the problem.
Prepopulated answers from your local agronomist, chemical, and Seed Company based on common problems found in your area, so you can quickly move through identification and solution.
All these steps are about speed and reduction of mistakes, by reduction in answers.

c) Data Comparison "Below the Crop"
Using soil data from VARIS, SSURGO, soil lab results, previous nematode pressure, and other soil based results to see if the problem is soil type unique or some other area based result.

d) Data Comparison "Top of the Crop"
Using UAVs, airplanes, and space-based systems to identify areas in your fields to focus your efforts of identification of issues you may not be able to see just with your eye. Compare identified problem areas to this information at your location to help you identify a larger problem or root cause of the problem.

e) Data Comparison "Look at Crop and Field History"
Quickly compare crop rotation, spray history, planting information, elevation, and more about your crop location and field to identify the area as a —low producers" or new problem area.

Walk Off the Problem Area
Because the new mobile systems like iCroptrak have GPS, walking off the areas of problems allows you to mark them for the future, determining their size and impact on profitability, and creating zones where you can track progress on improving these areas. Next year you can compare them to see if the problem persists or you solved it, so you can focus on improving some other part of your fields.

To ask questions about the content, please feel free to contact me at the email above.

THE BENEFITS OF CROP WATER USE EFFICIENCIES

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Technology today holds strong potential to improve operational efficiencies. In this presentation, we will discuss how using leading edge decision support system is capable of impacting profitability and manageability by impacting fertilizer and energy consumption through the technological means of improving water use efficiencies. An overview of where we are and where we are going will be discussed.

Water, Energy and Fertilizer Nexus- For some time now we have been going down the road of improving irrigation water management by means of changing and improving the delivery method of irrigation. Things like higher efficient sprinklers on center pivots and drip irrigation have improved the delivery of irrigation which has impacted mostly energy. Since we have been on this track to find out how well our crop is responding to water and to find out how better to apply the water for the benefit of the crop, we are just starting to learn how important the water, energy and fertilizer connection is.

It has been proven now over and over to me that unless we are doing some type of soil moisture data collection and analyzing that information we are not irrigating correctly and it has a big impact to the success of our crop. With using our Ag Management Strategies approach we have cut water usage time and time again by as much as 50 to 60% at times while increasing the efficiency of crop water uptake every time. This has given us back at times results like, better crop uniformity throughout the season, increase yield and better shelf life. This approach of increasing water use efficiency has also contributed to the energy efficiency of course. Now we have the other important component that goes hand in hand with water and energy… fertilizer.

Fertilizer has been on our radar now for some time. Since water is the mechanism of which fertilizer gets introduced to the plant through the roots, we have to start to look at how we apply fertilizer in conjunction with water. We have been working with some of the areas fertilizer suppliers on putting our knowledge together while trying to achieve better performance, uptake efficiency, with crop fertilizer use. Some of the results where we have taken this fertilizer and water approach we have also had the same results as we did with water, increasing fertilizer usage efficiency while decreasing overall use. Some results are as much as 30 to 35% reduction of fertilizer.

Moving forward into 2014 we will be working closer with the fertilizer suppliers to —marry” the application of water and fertilizer to a higher level approach. Some of the ways by

doing this is while automating the irrigation we are automating the application of fertilizer. Taking a —spoon feed" approach of applying.

For further and future information you can contact a Lee Rain Inc., Ag Management Strategies Representative or go to our websites, www.leerain.com, www.earthtecsolutions.com and www.natreseye.info.

HUMIC ACIDS IN AGRICULTURE

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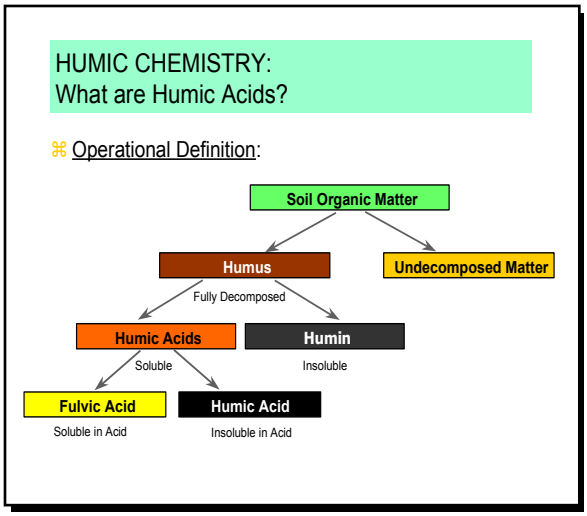
Humic acid products, which were once considered —snake oils" by most researchers and agronomists, are now attracting the serious attention of research agronomists, consultants, agricultural fertilizer companies and farmers. An increasing number of field trials have demonstrated the benefits of the commercial use of humic acids in agriculture. Humic acids enhance nutrient uptake, improve soil structure, and increase the yield and quality of various crops. At the same time, the on-farm use of humic acids products has steadily increased each year. Humic acids are not a —cure-all" for agriculture, however, proper use of a good quality humic acid product/program can promote plant growth substantially beyond what is possible through mineral nutrition alone. The practical implications of this discovery for today's agronomists and farmers are tremendous. Farms that already have nearly optimum fertilization practices are seeing significant improvements in nutrient uptake, plant growth and yields by incorporating humic acid products into their fertilizer and soil amendment programs.

What are humic acids? Humic acids are the water-soluble organic acids naturally present in soil organic matter. Humic acids are not a singular compound. Rather, they are a large family of organic compounds with similar characteristics. They are defined by the process through which they are isolated, rather than by a particular chemical structure. Figure 1 shows a diagram of this operational definition for humic acids. Organic Matter in the soil exists in 3 different forms or states. They are:

Figure 1



Living plant and animal matter.

Dead plant and animal matter.

Decomposed plant and animal matter (Humus).

What do Humic Acids Do?

I. Physically modify and improve the soil.
II. Chemically improve the fixation properties of the soil.
III. Biologically stimulate the plant.

I. PHYSICAL BENEFITS:

A. Increases water holding capacity.
B. Increases aeration of soil.
C. Improves soil workability.
D. Helps resist drought.
E. Improves seedbed.
F. Makes soil more friable or crumbly
G. Reduces soil erosion.

II. CHEMICAL BENEFITS:

A. Retains water-soluble inorganic fertilizers in the root zones and releases them to plants when needed.
B. Promotes the conversion of a number of elements into forms available to plants.
C. Possesses extremely high ion-exchange capacities.
D. Participates in the decomposition of rocks and minerals.
E. Increases buffering properties of soil.
F. Chelates metal ions under alkaline conditions.
G. Rich in both organic and mineral substances essential to plant growth.
H. Increases percentage of total nitrogen in the soil.

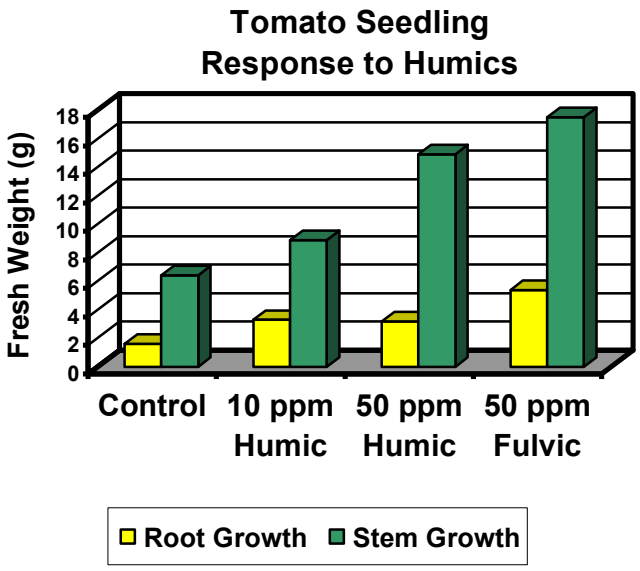
III. BIOLOGICAL BENEFITS:

A. Stimulates plant growth by accelerating cell division, increasing the rate of development in root systems, and increasing the yield of dry matter.
B. Increases germination of seed and viability.
C. Increases vitamin content of plants.
D. Increases the permeability of plant membranes; promoting the uptake of nutrients.
E. Stimulates root growth, especially lengthwise.
F. Increases root respiration and formation.
G. Stimulates growth and proliferation of desirable soil microorganisms as well as algae and yeast.
H. Aids in photosynthesis.
I. Stimulates plant enzymes.
J. Acts as an organic catalyst.
K. Has no detrimental effects on quality of product

Humic acid products are being used increasingly on farms throughout the world. The most widely accepted use for liquid humic acid products is in pre-plant and starter phosphorus bands. This growing acceptance stems from the fact that humic acids can greatly improve phosphate availability. It has also been shown that humic acids can stimulate the respiration rates of seedlings which leads to quicker germination and faster root and shoot growth. Here are some recommendations on how to best utilize humic acids in pre-plant and starter fertilizers.

Plants have a difficult time taking up phosphates in soils with high pH levels. This problem is greatest in high-lime (calcareous) soils. The abundance of calcium in these soils leads to the precipitation of calcium phosphates that become nearly as insoluble as human teeth.

Figure 1



Phosphorus fertilizers are often banded in order to minimize the tie-up problem. Nevertheless, a great deal of the liquid phosphorus fertilizer growers apply still gets tied up in the soil and never makes it to the plant. This problem is especially critical for annual crops that are planted in the spring when soils are cool. Phosphorus problems lead to slower, uneven growth, poorer stands and delayed maturity in many crops.

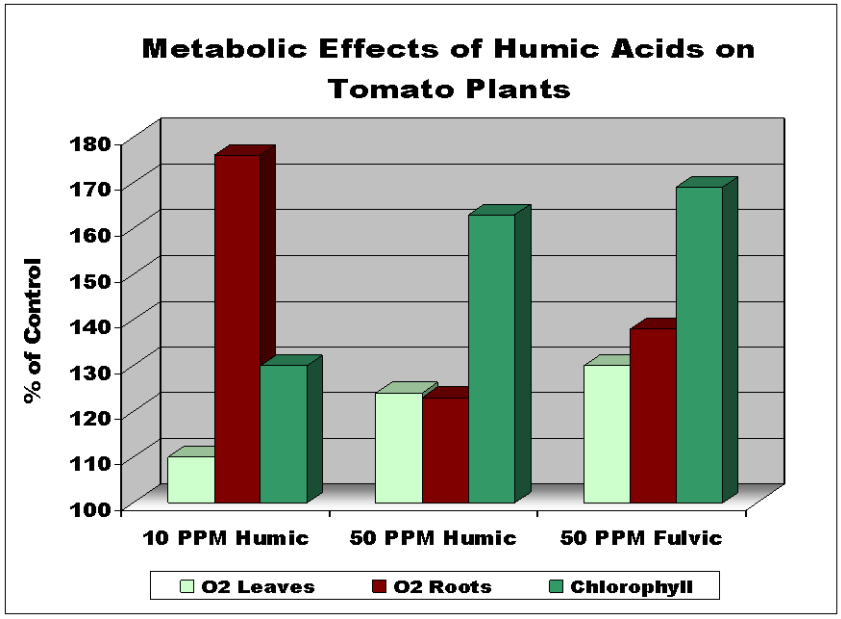
Humic acids can improve the uptake of phosphates from banded fertilizers. There are two reasons for this. First, humic acids sequester (chelate) soluble calcium and protect the phosphates from the calcium-phosphate interaction. Second, the amine functional groups on humic acids can adsorb the phosphate anions, improving its availability for plant uptake.

Achieving Optimal Humic Acid Concentrations

Many researchers have correlated plant growth with different concentrations of humic and fulvic acids in the soil water solution. For most crops, the greatest plant response to humic and fulvic acids runs anywhere from 10 to 300 ppm. The response of melons to

humic acids in nutrient solutions is shown in figure 3. Melons peak out in response at about 37 ppm in the soil. Cucumbers have a peak response at 100 ppm. In order to ensure that plants will respond optimally to humic applications, a soil concentration of 50 to 100 ppm should be achieved in the fertilizer band for most crops. Application rates of ½ to 1 gallon of Humic acids per 10 gallons of fertilizer assure that this concentration will be reached in the treated soil.

Figure 2



Reducing the Salt Index of Starter Fertilizers

An added benefit of applying humic acids with liquid fertilizers is their ability to buffer the salinity and toxicity of fertilizers. Most phosphate fertilizers are formulated with ammonia. Seedlings are very sensitive to ammonia toxicity as well as salt burn from applied fertilizers. By adsorbing ammonium and sodium cations, humic acids reduce the toxicity of these fertilizers.

The possible benefits of supplementing a sound fertility program with quality humic acid products are great. It is important for today‘s agronomists, field-men, and growers to learn how to best utilize these products to improve fertilizer efficiency, yields, and farm profitability.