

Connections Newsletter

The Ohio State University South Centers, Piketon Ohio

Spring | 2016



Participants at The Dirt on Organic Matter preconference workshop listen to Dr. Rafiq Islam give a talk about the importance of soil health. (Photo by Sara Graca Cooper, Palamedes Photography)

Dirt on Organic Matter >>Pages 1-2

Expanding Cooperative
Knowledge>>Page 3

Wang is featured speaker>>Page 4

Endeavor Center>>Page 5

Manufacturing Roundtable>>Page 6

OSU Business Dev. Blog >>Page 7

Direct Marketing>>Pages 7-8

Super Berry Workshop>>Pages 9-10

Market Maker>>Pages 10-11

Business Security Forum>>Page 11

Composting Workshop>>Page 12

Strawberry Field Night>>Page 13

Fresh Market Tomato>>Page 14-16

“The Dirt on Organic Matter” – Organic Farmers learn about Soil Organic Matter & Soil Health

By Rafiq Islam, PhD, Soil and Water Specialist and Vinayak Shedekar, Research Associate II

On Feb. 12, Dr. Rafiq Islam, Soil, Water & BioEnergy Program leader at OSU South Centers organized “The Dirt on Organic Matter,” a special preconference workshop before the Ohio Ecological Food and Farm Association’s (OEFFA) annual conference in Granville OH. This was one of the three pre-conference workshops offered by OEFFA to provide in-depth learning opportunities. The day-long workshop covered topics such as how to increase soil organic matter levels by using compost, manure, cover crops, and soil amendments such as gypsum, zeolite and leonardite, or black carbon. *(continued on page 2)*

The Dirt on Organic Matter... *(continued)*

The presenters' team included farmers, experts from the college's outreach and research arms, Ohio State University Extension and the Ohio Agricultural Research and Development Center; and experts from the U.S. Department of Agriculture's Natural Resources Conservation Service in Michigan.

The workshop started off with opening remarks by Dr. Islam about the importance of soil health in organic production systems. "Organic farmers often opt for intensive tillage-based practices in an effort to manage weeds, reduce operating costs, and increase farm profits," Islam said. He further explained, "Tillage may provide short-term yield gains but results in loss of soil organic matter and productivity over time. Soil organic matter SOM is the cornerstone of soil health. As with any agricultural production system, maintaining a healthy and productive soil is the foundation of sustainable organic farming."

In the first session of workshop, Dr. Islam further presented an overview of soil quality/health indicators and their assessment, and explained ways of soil balancing with organic and inorganic amendments. Dave Brandt, no-till farmer from Carroll, Ohio and a nationally recognized speaker presented "Having fun with cover crops and economics." Dave shared the practical and economic considerations of using cover crops for improving soil health. Dr. Harit Bal from the Ohio State University Department of Entomology explained the role of soil management for healthy agro-ecosystems through her presentation. She presented findings and recommendations from a recent USDA-funded research project focused on long-term organic and transitioning farming systems, and further described the role of nematodes. Following on the biological aspects of soil health, Dr. Ye Xia from the Department of Plant Pathology at OSU gave a presentation about the importance of beneficial microbes for plant and soil health. Dr. Xia explained the vital role played by various micro and macro organisms in the soil with respect to nutrient recycling, suppression of soil-borne pathogens and parasites, and synthesis of enzymes, vitamins and hormones beneficial for plant growth. Jerry Grigar, state agronomist with the USDA-NRCS in Michigan, shared the practical aspects of soil organic matter management for healthy soils. Mr. Grigar's key message to organic farmers was to "focus on C (carbon) instead of T (tillage)." Vinayak Shedekar from OSU South Centers demonstrated the OSU Soil Organic Matter Calculator, and showed farmers how to use prediction tools for effectively managing soil health. Jim Hoorman, OSU Extension, explained the economics of cover crops and organic matter through real life examples.

The workshop was attended by more than 60 organic farmers and educators. The attendees also received the OSU Soil Quality Field Test Kit, free samples of cover crop seeds (courtesy, Dave Brandt), and a copy of Building Soils for Better Crops – sustainable soil management produced by Sustainable Agriculture Research and Education (SARE). A few student volunteers and Dr. Tom Worley, Director of OSU South Centers assisted with the organization of the workshop, and participated in the discussion forum. The workshop was well received, and workshop organizers received excellent feedback comments from the attendees.

Contact Rafiq Islam or Vinayak Shedekar for more information.



Dr. Ye Xia, Department of Plant Pathology at OSU, giving a presentation about the importance of beneficial microbes for plant and soil health. (Photo by Vinayak Shedekar)



Jerry Grigar, state agronomist with the USDA-NRCS in Michigan, shared the practical aspects of soil organic matter management for healthy soils. (Photo by Vinayak Shedekar)



Dave Brandt sharing the practical and economic considerations of using cover crops for improving soil health. (Photo by Vinayak Shedekar)

Expanding Cooperative Knowledge at the 2016 Cooperative Leadership Forum

By Hannah Scott, OCDC Program Manager

Ohio Cooperative Development Center (OCDC) staff, along with representatives of credit unions and agricultural co-ops, convened in Oxford, Ohio in March for Mid America Cooperative Education, Inc.'s 2016 Cooperative Leadership Forum. The forum provided emerging leaders from across the Midwest the opportunity to learn from one another and experts in the field about the co-op model and cooperative leadership.

The forum was hosted at the Miami University Marcum Center in Oxford, Ohio and included tours of nearby cooperatives. At Butler Rural Electric Cooperative, Inc. and CHACO Credit Union, speakers highlighted their “cooperative difference,” including their prioritization of members’ needs and participation, education efforts, and concern for community – which derive from the cooperative principles originally created by early cooperative movements.

Cooperative Principles: What Makes Co-ops Different?

The Rochdale Pioneers formed a cooperative society in mid-19th century England, outlining a set of principles for their business that would set them apart and place power among their members. The twelve principles outlined by the community are now recognized as the first set of co-op principles.

To varying degrees, cooperatives today often follow a set of seven cooperative principles outlined by the International Cooperative Alliance that can be traced back to the Rochdale Pioneers. These principles include:

- Voluntary and open membership
- Democratic member control
- Member economic participation
- Autonomy and independence
- Education, training and information
- Cooperation among cooperatives
- Concern for community

(Zueli, K. & Cropp, R., *Cooperatives: Principles and practices in the 21st century*, UW Extension)

Kimberly Roush, OCDC Program Assistant, explained the inspiration she gathered from these co-op visits. “Attending the Cooperative Leadership Forum was very inspiring. Cooperatives are unique, often pulling together to solve a problem that otherwise they could not solve alone. I also noticed another interesting result of the cooperative environment during the leadership forum—the overall culture of the cooperative employees who spoke with us. The staff explained specific details about the reason for and the function of their cooperatives. Then they shared something more—talking about member activities and interaction with the community. It was exciting to learn how the cooperative principles permeate the local culture through individual cooperation in community support and resolutions.”

The forum also included visits from representatives of the Miami University Credit Union, Dairy Farmers of America, and COBA/Select Sires about how their co-ops benefit members, how they are governed, and the services they provide to members. Hannah Scott, OCDC Program Manager, shared, “I enjoyed hearing from co-op representatives about their specific businesses. Even though co-ops share similar characteristics, each one is unique. Listening to these leaders share the ways their businesses carry out the cooperative model highlighted the varied possibilities for co-ops. Understanding these possibilities will be extremely helpful as I work with new and emerging cooperatives throughout Ohio and West Virginia.”

Finally, the program wrapped up with a hands-on, team project in which participants worked to create a business plan for a new cooperative. The activity provided a great opportunity to network with and learn from other co-op leaders in the program. “It was interesting to discuss with other class members how each of the cooperatives they were a part of were unique and how they were created to serve their members and work through problems that otherwise could not be solved on their own. Some class members even shared that working in the cooperative world compared to other business structures is much more rewarding and self-gratifying because they are a part of something so community-minded,” explained Chris Smalley, Business Development Specialist with OCDC, of the chance to learn from other Cooperative Leadership Forum participants.

Welcome to South Centers Matthew Smith

Matthew joined the aquaculture South Centers team as an Extension Aquaculture Specialist in March 2016. For the last year, Matthew worked in Extension in a fish health laboratory in Lonoke, Arkansas. He received his Master's degree from the University of Arkansas at Pine Bluff in Aquaculture and Fisheries in 2015 and his Bachelor's from Auburn University in 2012.

His Master's research focused on comparing traditional golden shiner (baitfish) culture methods to an alternative production system that has already been commercially accepted on catfish farms. With Arkansas being such a large and diverse aquaculture industry, Matthew was exposed to a wide variety of species that are applicable to the Ohio industry. His primary interests include pond culture and management, alternative production technologies, water quality, fish health, and overcoming hobby to commercialization barriers.

As Extension Aquaculture Specialist, his number one priority is to work toward expanding sustainable and profitable fish farms in the state of Ohio. Primary responsibilities include visiting fish farms to understand the industry's needs, develop Extension fact sheets and workshops that will help address the needs found, conducting applied (farmer-friendly) research when necessary, and assisting those who are interested in becoming an aquaculturist. To expedite the dissemination of information to current and potential farmers, Matthew and Sarah Strausbaugh are updating the Ohio State University South Centers Aquaculture Extension website to make it easier to navigate for those who are brand new to aquaculture. Additionally, Matthew is working to develop extension workshops geared toward exposing OSU Agriculture and Natural Resources Extension Educators to the world of aquaculture so that they will be prepared when tasked with fish farming questions in the future.



(Photo by Sarah Strausbaugh)

Dr. Hanping Wang was an invited speaker on aqua genomics/genetics/breeding at National Strategic Planning Workshop

OSU South Centers Senior Scientist, Dr. Hanping Wang, was invited by the USDA Aqua Genomics/Genetics Coordinator to speak on "Genomics, genetics, and breeding programs in the Midwest" at The National Strategic Planning Workshop for Aquaculture Genomics, Genetics and Breeding," which was held March 24-25, 2016 in Auburn, Alabama. The workshop brought researchers, government officials and industry leaders together to review the current status in aquaculture genomics, genetics, and breeding and discuss existing problems, future goals, gaps, and application of genome-based strategies for breeding. The topics included traditional selective breeding, genome-based breeding strategies such as marker-assisted selection, genome selection, genome editing, and analysis of associations of phenotypes and genotypes. A strategic whitepaper is being prepared and will be published based on the workshop.



(Photo by Beth Rigsby)

Endeavor Center and Small Business Development Center

By Ryan Mapes, Business Development Program Leader and Endeavor Center Manager

The Endeavor Center and its partners are off to a great start in 2016! As cleanup work continues at the Piketon Uranium Enrichment facility, so does activity in the Endeavor Center as we continue to operate at an occupancy rate of 100%. Many partners are either contractors who work directly with Fluor or companies that provide services to those contractors. We have also added three new partners since the fall of 2015. Those partners are Steve McCain and Associates, LLC. (Acentus Capital), Visiting Angels Home Health Care, and Swift & Staley, Inc.

The Endeavor Center has small, medium and large size training and meeting rooms as well as a 16-station computer lab available for lease. Our smallest room will accommodate 12 people, the medium room up to 30 and the large room will seat 75 comfortably. These rooms are a great asset to the Endeavor Center as they bring close to 2,500 visitors through the doors annually. This also provides an opportunity for those attendees to learn more about the services and programs available at the South Centers.

The primary business development technical assistance program affiliated with or housed within The Endeavor Center is the District 7 Small Business Development Center. The SBDC provides consulting services to area businesses at no direct cost to the client. These primary services cover a very broad range of topics from business planning to access to capital to starting your business in Ohio. The SBDC also provides access to an Export Assistance specialist and a Manufacturing and Technology Small Business Development specialist who are also housed at the Endeavor Center. These programs provide technical expertise and training to the small businesses in Southern Ohio.

The staff of The OSU South Centers SBDC continually engages community organizations to maintain awareness of changing needs in the regional entrepreneurial ecosystem and develop solutions to combat any negative impact to the economy. Counselors volunteer time to serve as board members on chambers of commerce, a regional board established to support economic development, and advisory boards for business organizations to increase awareness of business issues and identify solutions to problems. Two specific examples of this continuous communication with the business community are featured on pages 6 and 7.

Manufacturing Roundtable

By Mick Whitt, Manufacturing Business Development Specialist

After spending eighteen years in manufacturing I am aware of the exciting accomplishments and possibilities that exist for companies as they develop new products, new technologies, and new processes that improve production and quality of current product. These types of improvements can lead to greater profits, a better work environment, and of course the potential to reach new and larger markets. However, I am also aware of the challenges and obstacles that many manufacturers face, and the frustration that comes with not being able to find the answers you seek.

To begin to identify the issues and problems of local manufacturers, I invited companies and individuals from a wide range of industries to participate in a Manufacturing Roundtable held at South Centers on March 8, 2016. The idea was to give manufacturers a voice and an open forum to discuss their specific needs and how we might collectively address and solve those needs.

A few of the topics and concerns discussed during the forum were: training (maintenance, soft skills, ISO), workforce availability and development, and current workforce dependability.

With the information and input I received in this roundtable I am currently researching and coordinating with other SBDC offices, as well as partners such as the Appalachian Partnership for Economic Growth (APEG), to develop training events, schedule speakers to address specific topics, and work with local schools to somehow bridge the gap between education and employers.

Going forward we will continue the quarterly roundtable in hopes of engaging even more manufacturers and growing the program to increase the direct impact we can have on companies in our region.



(Photo by Matt Hoyng, MEP Program Manager)

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OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
OHIO STATE UNIVERSITY EXTENSION

Ohio State University Direct Marketing

Food & Agriculture

2016 Webinar Series

One-hour webinars will be offered to bring exceptional speakers to your home, office or local Extension center. If you're interested in finding out more about marketing issues, visit the website for details.



2016 Direct Marketing Webinar Series All webinars begin at 12 noon

Date	Topic	Lead Presenter	Connection
Feb. 18	Marketing Trends Learned from the Super Bowl	Eric Barrett & Rob Leeds	http://carmenconnect.osu.edu/marketingtrends2016/
Mar. 2	Using All Your Senses in Branding Your Business	Eric Barrett & Rob Leeds	http://carmenconnect.osu.edu/brandingyourbusiness/
Apr. 21	Enhancing Your Web Presence	Melissa Carter	http://carmenconnect.osu.edu/enhancingwebpresence/
May 26	Product Recall & Traceability	Eric Pawlowski	http://carmenconnect.osu.edu/productrecallandtracability/
June 16	Product Labeling	Emily Adams	http://carmenconnect.osu.edu/productlabeling/
July 21	Celebrate Ohio Local Foods Week	Heather Neikirk & Patricia Barker	http://carmenconnect.osu.edu/localfoodsweek/
Aug. 18	Produce Auctions	Brad Bergesford	http://carmenconnect.osu.edu/auctionsforproduce/
Sept. 15	Pricing Your Products	Megan Leffew	http://carmenconnect.osu.edu/pricingproducts/
Oct. 20	Cooperatively Marketing Your Products	Hannah Scott	http://carmenconnect.osu.edu/marketingyourproducts/
Nov. 17	Using Facebook for Your Business	Duane Rigsby	http://carmenconnect.osu.edu/facebookforyourbusiness/
Dec. 15	Survey Results for Ohio Produce Marketers	Direct Marketing Team	http://carmenconnect.osu.edu/surveyresultsformarketers/

For recordings of all webinars go to go.osu.edu/DirectMarketingWebinars



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<http://directmarketing.osu.edu>

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Dr. Dong Qin, an associate professor of Northeast China Agriculture University and a visiting scholar at OSU South Centers with Dr. Gary Gao, demonstrated pruning techniques for black currants. Dr. Qin conducts research on black currants and honeyberries. Welcome to OSU, Dr. Qin! (Photo by Gary Gao)

Super Berry and Wine Grape Workshop on March 18th in Piketon

By Gary Gao, PhD, Extension Specialist and Associate Professor

It was a beautiful, sunny and mild day in Piketon for our Super Berry and Wine Grape Workshop on March 18th. We could not have asked for better weather! We had a very good turnout for the program, with quite a few people driving several hours to get to the event. Ohio Department of Agriculture (ODA) Director Dave Daniels was in Piketon that day and stopped by the workshop. He shared with our program attendees many exciting developments in the world of Ohio Agriculture.

The Ohio Wine Hall of Famer Dave Scurlock talked about how to assess bud survival rate of wine grapes. Gary Gao talked about how to assess winter injuries in blackberries and raspberries.

Gary Gao and Ryan Slaughter, the research and Extension team members at OSU South Centers, would like to thank Christy Eckstein, Executive Director of Ohio Grape Industries Program, and members of Ohio Grape Industries Committee for their strong support of the wine grape research and Extension programs at OSU South Centers in Piketon. We would also like to thank Director Daniels, Ms. Lori Panda, and Ms. Janelle Meade for their strong support of Super Berry research and Extension programs at OSU South Centers in Piketon. Please email Gary Gao at Gao.2@osu.edu or call him at 740-289-2071, ext. 123, if you have any questions. *(continued on page 10)*

Super Berry and Wine Grape Workshop on March 18th in Piketon *(continued)*



Ryan Slaughter, a research assistant for the small fruit program at OSU South Centers in Piketon demonstrated pruning techniques for thornless blackberries and elderberries. Here, Ryan discusses thornless blackberry pruning. (Photo by Gary Gao)



Dave Scurlock presented winter injury assessment techniques to program attendees. (Photo by Gary Gao)



ODA Director Dave Daniels spoke to the attendees of the Super Berry and Wine Grape Workshop. (Photo by Gary Gao)

Container Fruit Production

By Gary Gao, PhD, Extension Specialist and Associate Professor, OSU South Centers

Container fruit production is underway at the OSU South Centers. We have researched possible container types and sizes, potting mixes, nutrient fertility programs, and other factors. Since we do not have unlimited funds, we will focus on one or two container sizes and potting mixes. Seven- to ten-gallon containers seem to be a happy medium for container sizes and commercial nursery mix with mostly pine bark fines might be a good starting point for potting mixes.

While I was researching for grape production techniques, I came upon a really neat raspberry cultivar. It is called raspberry Shortcake 'NR7.' My good friend Bob Maddox, president of Delhi Flower and Garden Center (<http://www.delhigardencenters.com/>), told me about this new dwarf thornless raspberry cultivar. It seems to be a good cultivar for patio fruit production. This cultivar should also be good for commercial production.



Pictured here are Bob Maddox (right) and Kerry Goode (left) with a pot of raspberry Shortcake 'NR7.' (Photo by Gary Gao)

Business Security Forum held at University of Rio Grande

By Patrick Dengel, OSU - Rio Grande Collaboration Coordinator/Business Development Specialist

On March 16, 2016, a Business Security Forum was held at the University of Rio Grande. This Educational program was sponsored in part by Ohio Valley Bank, The Ohio State University South Centers, OSU-OARDC and OSU Extension Programs, and University of Rio Grande & Rio Grande Community College.

Participants were welcomed by Dr. Michelle Johnston, President of the University of Rio Grande & Rio Grande Community College. We were pleased to have staff members from State of Ohio Attorney General Mike DeWine's office on campus to be a part of this program.

In addition to the live presentations of the speakers, all presentations were individually recorded to be shown on the Rio Grande Cable Access (Time-Warner Channel 17) Educational TV as well as on Blog Talk Radio in the near future. During March and April, these pre-recorded shows have been shown at different times on the OSU-RIO Collaboration TV/radio programs. All programs are archived on the URG or OSU YouTube Channel and Radio Shows.

Listed to the right is an overview of the presenters. Full YouTube and Internet Radio Addresses will be available when they are aired on the channel Broadcasts.

Presenters included:

- Introduction to Business Forum with Dr. Michelle Johnston and Attorney General Mike DeWine. Radio: <http://tobtr.com/s/8544113>
- Ryan Lippe, Consumer Educator, Consumer Protection Section Office of Ohio Attorney General Mike DeWine - Ryan discussed Fraud Prevention and awareness of Cyber Scams. Ryan Lippe is a Consumer Educator for Ohio Attorney General Mike DeWine's Consumer Protection Section. As a consumer educator, Ryan conducts presentations to groups across the state to teach Ohioans about their rights and how to avoid scams. Radio: <http://tobtr.com/s/8589181>
- Gabe U. Stewart, CISSP, CRISC AVP/CISO, Ohio Valley Bank - Gabe discussed cyber security measures in the banking world. Gabe is the Chief Information Security Officer at the Ohio Valley Bank and has nearly twenty years of banking IT experience, the last 14 specifically in IT Security. Radio: <http://tobtr.com/s/8589263>
- Thomas E. Saunders, Attorney-at-Law Law Office of Thomas E. Saunders - Thomas discussed legal aspects in keeping personal information and assets protected. Thomas attended Capital University Law School and graduated cum laude with his J.D. in 2013. Thomas was a class representative in the Student Bar Association. During one summer of law school, Thomas attended classes at the University of Oxford in the U.K., through a program with the Ohio State University's Mortiz College of Law. Radio: <http://tobtr.com/s/8544045>
- Scott Borden, Chief of Police University of Rio Grande Police - Scott discussed how to keep safe on and off campus. Scott started in law enforcement in 1978 as a cadet for the Ohio State Highway Patrol at the Xenia post. During his career with the State Highway Patrol, Scott earned numerous awards. Scott ended his Ohio State Highway Patrol career in 2001, after almost 33 years and has been the University of Rio Grande Campus Police Chief for five years.

OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
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Food Waste Composting for Homeowners, Businesses, and Communities

Agenda:

- 5:30 pm** Registration and welcome
- 5:45 pm** Comments—Mary Sibole, Pike SWCD
- 6:00 pm** Dinner
- 6:15 pm** Composting— *Dr. Fred Michel Jr., Professor FABE, OSU*
- 7:45 pm** Questions

Speaker: Dr. Frederick C. Michel Jr.

Associate Professor in the department of Food Agricultural and Biological Engineering, and member of the Compost Research Center at OARDC, Wooster. His research is focused on improving the processing of agricultural and industrial organic byproducts. Specific research activities include investigation of microbial communities in composts and amended soils; efficient conversion of dairy and hog production wastes into composts; and characterizing the effects of composting and other waste management processes on microorganisms, antibiotics and human and animal pathogen persistence. Fred has delivered several talks and authored publications on composting for home gardeners.



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Thursday, May 19, 2016

5:30 pm - 7:45 pm

Location: OSU South Centers

1864 Shyville Rd., Piketon, Ohio 45661
Large Auditorium (Research Building)

Cost: No Charge

To register and for more information:
Contact Mary Sibole at 740.947.5353

Deadline to register is May 12th

Sponsors:

Ohio State University, Pike County SWCD,
Pike County Solid Waste District



OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
OHIO STATE UNIVERSITY EXTENSION

Strawberry Field Night

At OSU South Centers

Hosted by Brad Bergefurd

Wednesday,
May 25, 2016
5:30 — 8:30 P.M.

Location: OSU South Centers
1864 Shyville Rd., Piketon, OH

Cost: \$20.00 per person
(Includes handouts and dinner served from 5:30 to 6:00)

To Register:
You must register
Contact Charissa Gardner at
Gardner.1148@osu.edu
740.289.2071 ext. 132

DEADLINE to Register:
May 23, 2016

For more information go to
<http://go.osu.edu/strawberryfieldnight2016>



Plasticulture and matted row strawberry field research will be showcased

Topics to be covered will include:

- winter protection techniques
- Israeli drip irrigation demonstration and management
- fertigation and nitrogen management
- row cover management
- June bearing, day-neutral, ever-bearing cultivar evaluations
- pest and disease control
- integrated Pest Management (IPM) techniques
- petiole sap analysis demonstration



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Grafted plant research conducted at Piketon and Wooster has shown to reduce fruit disorders. (Photo by Thom Harker)

“Fresh Market Tomato fertility – the never-ending battle against fruit physiological disorders”

By Brad Bergefurd, Extension Educator Horticulture/Agriculture and Natural Resources

Not only was the 2015 growing season one of the wettest on record, but the season had some of the lowest average temperatures for an extended period of time in recent years. The season-long extreme environmental conditions caused many problems for all vegetable growers, but fresh market tomato growers were particularly affected due to high percentages of fruit physiological disorders with some farms experiencing up to 50 percent of fruit affected. Thanks to greatly appreciated grant funding from the Ohio Vegetable and Small Fruit Research and Development Program (OVSFRDP), researchers have shed some light on reducing the economic impact of these tomato fruit disorders through cultural management and fertility research.

Yellow shoulder disorder and other tomato fruit disorders are a wide-spread problem annually, especially with extended hot and dry growing conditions at blossoming and fruit development. Yellow shoulder disorder seems to impact all-sized fruit and is characterized by areas at the top of the fruit and shoulders of fruit that stay green or yellow and as the fruit ripens, tend to turn a more intense yellow color. These areas never will ripen properly, even if left to hang on the plant for an extended time. The area beneath the yellow shoulder is firm and poor tasting which makes the fruit unmarketable and not desired by consumers. Unfortunately, the cause of this problem is complex and researchers have been investigating cures for almost thirty years with limited success. The complexity of the disorder is increased since environmental conditions as well as tomato plant physiology lead to the disorder and there is no real solution. *(continued on page 15)*

Fresh Market Tomato fertility (*continued*)



The Ohio tomato crop is valued at \$52,000,000 annually. (Photo by Brad Bergefurd)

Factors that can increase the severity of these disorders include cloudy weather, wet and cool conditions, high nitrogen, low potassium, and compacted soils. Some of the cultural and crop management practices that fresh market tomato growers can do to ease the symptoms and possibly reduce crop losses will be covered here.

One of the main causes of this disorder, that we have limited control over, is intense heat. High temperatures prevent lycopene production, the red pigment in the tomato fruit, most often in the shoulders of tomato, as this part is more commonly exposed to the direct rays of the sun. Researchers have measured fruit temperatures of between 86 degrees and 105 degrees Fahrenheit morning through evening hours in July 2012, one of the hottest months on record for southern Ohio. When temperatures are greater than 85 degrees, lycopene production begins to cease, whereas at temperatures below 85 degrees, lycopene consistently produces.

Inside the plant we see a reduction in potassium (K) just before yellow shoulders are seen. This year in our tissue testing we saw drops in K of 3-4% in a matter of weeks going from 4-6 percent, which is in the good range, to 2-3 percent which is in the poor range. Usually within a week or two of this drop, yellow shoulder will be expressed. Therefore, early detection and management are critical for control. Drops in

calcium (Ca), nitrogen, and at times magnesium (Mg) have also been observed as we move into mid-July and early August, the hottest months of the year. We also have observed this disorder in high tunnel tomatoes; however, it is usually a month or so earlier, when temperatures in the tunnels begin to climb around Memorial Day. High tunnel tomato growers will apply a 10 to 15 percent shade cloth to tunnels around this time in an attempt to reduce the heat stress in the tunnels. This disorder is expressed in plants that are under some stressful growing conditions when the plant is under a heavy fruit load. These stresses can be too little water, too much heat or high amounts of plant disease or insect infections.

For now, recommendations from our research conducted at the OSU South Centers over three years is to closely monitor plant nutrient levels, especially nitrogen and potassium levels, on a regular basis throughout plant development beginning around the time of first flower cluster formation. Timeliness is so important to take the necessary corrective actions to avoid or reduce this disorder. A major limitation is getting the plant nutrient analysis results back in a timely manner. A considerable amount of time is required to collect leaf petiole samples, dry samples, send them to a commercial lab for analysis and then receive the results, which could take several days, and more typically a week.

Plant sap extraction and analysis can be completed in the field using a quick-test method to speed up the collection of tissue testing results and to help make more timely fertilizer program adjustments. Instruments are commercially available that can be used to directly measure nutrient concentration and that do not require a laboratory setting for accurate calibration and use. These pocket-sized meters currently cost about \$500 and are simple to use. We have taught and demonstrated the use of these instruments at workshops and field days over the years. A sample size normally collected for petiole testing with conventional methods will yield more than sufficient sap to obtain a reading with this type of meter. Using the plant tissue test results as a guide, necessary and timely adjustments should be made to nitrogen, potassium and calcium fertilizing programs to keep fertility levels within sufficiency ranges. Plants respond well to fertigation of fertilizer directly through drip irrigation with higher amounts better applied through this method. Foliar fertilizing may help, but it is difficult to raise the potassium levels 2-4 percentage points as would be needed in most cases through foliar applications alone and plant injury could result. More information on plant petiole sap testing for vegetable crops along with plant nutrient charts which show nutrient sufficiency ranges can be found on the University of Florida fact sheet <http://edis.ifas.ufl.edu/cv004>. This fact sheet explains the testing process in more detail. (*continued on page 16*)

Fresh Market Tomato fertility (*continued*)

Yellow shoulder disorder is also a varietal problem, as some varieties have been observed which express the symptoms more than others. Bergefurd and other members of the South Centers horticulture research team partnering with Dr. Matt Kleinhenz of the OSU Horticulture & Crop Science Department have conducted important tomato variety evaluations, especially on new variety releases and the use of grafted plants, to observe resistance or tolerance to yellow shoulder and other tomato fruit disorders. Many tomato evaluations, including research performed at the OSU South Centers, are available for comparison annually in the Midwest Vegetable Variety Trial report published by Purdue University. This publication is a compilation of vegetable variety research performed throughout the Midwest United States and makes for easy comparison between trials. The Midwest Vegetable Variety Trial report is available at the Purdue University vegetable crops web site <https://ag.purdue.edu/hla/fruitveg/Pages/MVVTRB.aspx>



Major economic losses have occurred to Ohio high tunnel tomatoes due to fruit disorders. Tomato fruit disorders cause an estimated \$2 million in crop loss annually to Ohio tomato farms. (Photo by Thom Harker)

From our extensive tomato physiological fruit disorder research conducted at the South Centers over three years, we recommend that for most growers the best practices to prevent yellow shoulder will be to intensively tissue test tomatoes from first flower cluster for Calcium, Potassium and Magnesium levels. From this information, growers could apply Potassium Nitrate, Sulfate of Potash, Potassium Carbonate, Calcium Nitrate, Calcium Chelate, and Magnesium Oxide to reduce the potential for this disorder. Our experience has proven that nutrients applied through fertigation are necessary to prevent yellow shoulder disorder of tomato.

Full research reports of this and past years' fruit and vegetable experiments are available on the OSU South Centers website at <http://southcenters.osu.edu/horticulture/>. For more information on the tomato research or other horticulture field trails, contact Brad Bergefurd, Extension Educator Horticulture/Agriculture & Natural Resources at bergefurd.1@osu.edu or at 740-289-2071 ext. 136.



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