

Southwest Florida
Research and
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Center Director's Corner

On behalf of our center, please accept my sincere wishes for a happy and healthy 2015 holiday season!



Our construction project, which officially broke ground this past March, is nearing completion (see photos)! The work to build a new addition to our main building as well as renovate existing office and laboratory space is on track to be predominantly completed by year's end. In fact, our new building dedication ceremony is slated for Tuesday, January 5, at 10am! The ceremony will feature University of Florida President Dr. W. Kent Fuchs and UF/IFAS Senior Vice President Dr. Jack Payne. In addition, several key elected officials and numerous growers will be on hand for the celebration. For more information, see the invitation on page 4.

Once again, it is important for us to thank our dedicated growers who led the way to secure the \$2 million for this construction project via funds earmarked by the 2014 state legislature.

Now, we are in the process of hiring new faculty members, and this would not be possible without our growers' efforts to encourage the 2015 state legislature to appropriate recurring funds to create these new positions.

Calvin Arnold

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Latest SWFREC Research

Novel Bed Geometry Designs for Vegetable Production

Dr. Sanjay Shukla, Water Resources Engineer, Nathan Holt, Senior Engineer, and Kira Hansen, Ph.D. Student

Vegetables are commonly grown on raised beds covered by plastic mulch in a high-input system known as plasticulture. Dr. Shukla and his team (James Knowles, Nathan Holt) started a novel bed geometry project in 2012 to explore ways to improve plasticulture's production efficiency. The goal was to investigate bed geometry designs that could allow for lower inputs and costs while maintaining or increasing yield. This could help growers remain economically competitive and reduce impacts on surrounding environments.

The idea for looking at new bed geometries came to Dr. Shukla after interacting with vegetable growers who had been looking for economical ways to increase the lateral spread of drip-applied water, nutrients, and fumigant to get better coverage in their traditional 30 to 36 in. wide and 6 to 8 in. high beds. Furthermore, for the past 10 years, Dr. Shukla has

been thinking of ways to make irrigation water stay longer in the bed and protect crops from flooding after seeing vegetable crops damaged from Hurricane Wilma related flooding in 2005. Thus, the idea for compact beds that are taller and narrower was born. Narrower beds would achieve higher coverage with drip compared to traditional beds. Dr. Shukla believed taller beds would have several benefits, including more time for water, nutrients, and chemicals applied by drip to remain in the bed before leaching, as well as improved flood protection.

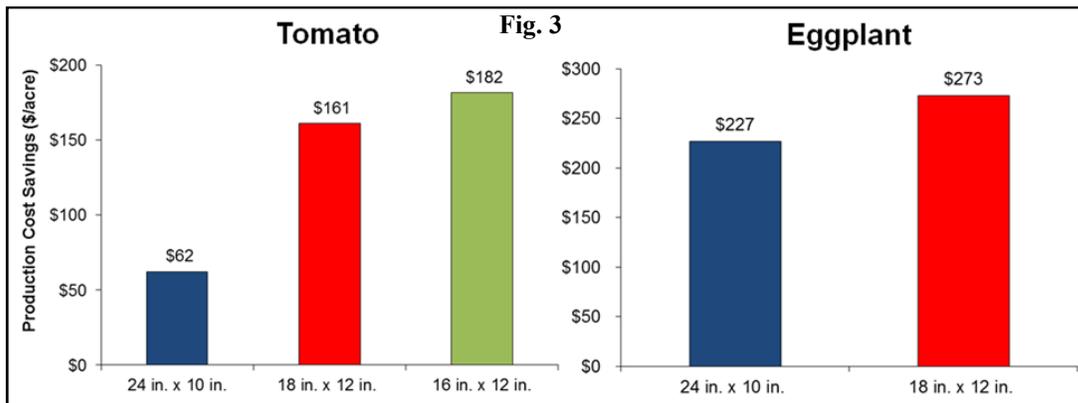
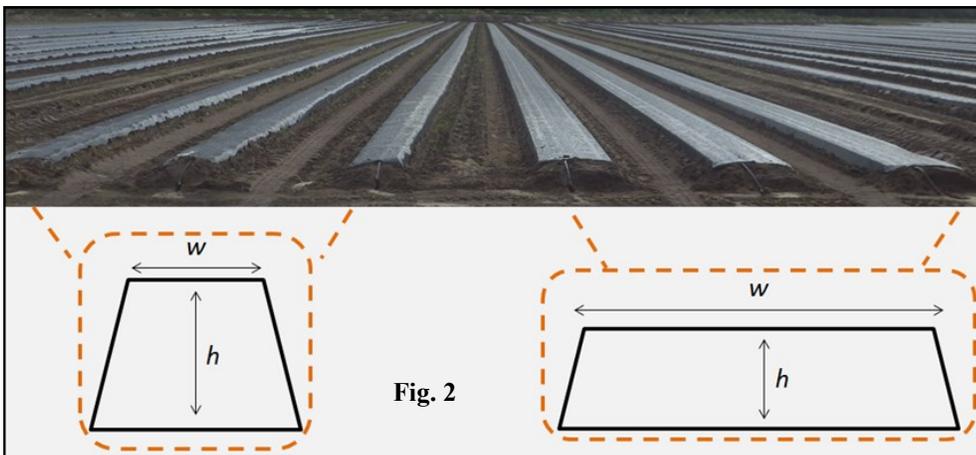
Dr. Shukla submitted a proposal to Sarasota's office of the Southwest Florida Water Management District in 2012 and received funding to test the idea for tomato. After conducting a survey of tomato growers across southwest Florida to determine conventional bed geometries currently used in production, Dr. Shukla came up with three alternative narrower and taller bed geometry designs (width x height): 24 in. x 10 in., 18 in. x 12 in., and 16 in. x 12 in. A two-season study for tomato (springs 2013 and 2014) was then conducted at a commercial farm in southwest Florida

with the three alternative beds evaluated against a conventional 30 in. x 8 in. bed. In addition, a single-season study (fall 2014) was conducted for eggplant at a separate commercial farm where the farm's conventional bed, 36 in. x 6 in., with two drip tapes was evaluated against two of the alternative beds, 24 in. x 10 in. and 18 in. x 12 in., with only one drip tape. Results from both tomato and eggplant indicated the compact bed geometries can be used without sacrificing yield while conservatively saving up to \$270/acre by requiring less fumigant and plastic mulch. Additional savings in fuel, labor, and land lease costs are likely to occur. Compact beds were also found to reduce irrigation by 50% and fertilizer nitrogen and phosphorus applications by up to 15% compared to the traditional bed in the eggplant study.

Findings show that transitioning to taller and narrower bed geometries can help growers become more sustainable by reducing environmental impact while providing economic benefits to help the industry remain competitive and profitable. In 2015, the Florida Department of Agricultural and Consumer Services (FDACS) provided

funding for further evaluation of taller and narrower compact bed geometries, including two more seasons of tomato, two seasons of pepper (a double-row crop), a study evaluating compact beds' impact on flooding and surface flows, and a complete economic analysis to better quantify impact on farm-scale profits. Drs. Fritz Roka (SWFREC economist) and Monica Ozores-Hampton (SWFREC vegetable horticulturist) have joined the research team to better quantify economic and production benefits. Kira Hansen, a Ph.D. student with Dr. Shukla, has also joined the team the team and is working on expanding the evaluation of the compact bed design with regards to economic and environmental benefits as well as production system optimization (including plant density). Holt, who worked on the compact bed project during his master's thesis, continues to work on the project as Senior Engineer.

Figure 1: Dr. Shukla (left) and his team, including Nathan Holt, Senior Engineer (middle) and Kira Hansen, Ph.D. student (right), are continuing studies to evalu-



ate compact bed geometries.

Figure 2: Taller and narrower compact bed geometries (left) were evaluated against traditional short and wide beds (right) for tomato and eggplant. Picture shows compact beds (16 in. x 12 in.) and traditional beds (30 in. x 8 in.) in the tomato study.

Figure 3: Savings in production costs (\$/acre) associated with using taller and narrower compact bed geometries instead of traditional bed geometries in the tomato and eggplant studies. The savings are conservative; actual savings may be higher.

YOU'RE INVITED

SOUTHWEST FLORIDA RESEARCH AND EDUCATION CENTER

TUESDAY, JANUARY 5, 2016

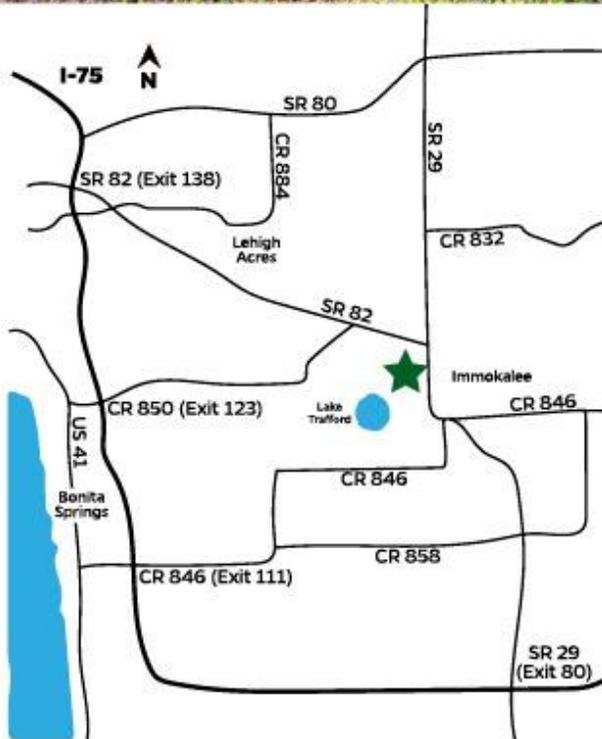
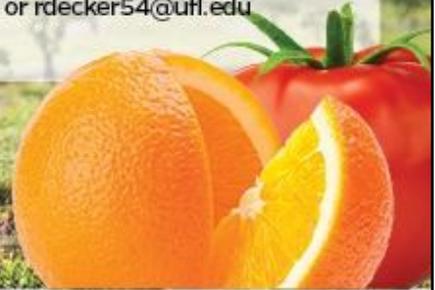
Please join UF President Kent Fuchs and UF/IFAS Senior Vice-President Jack Payne at the dedication ceremony to celebrate SWFREC's new office and laboratory space.

10:00 a.m.

**2685 SR 29 North
Immokalee, Florida**

Please RSVP to Becky Decker at
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**UF/IFAS Southwest Florida
Research and Education Center
(SWFREC)**

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Immokalee, FL 34142
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*(approximately 1 mile
north of Immokalee on the
west side of State Road 29)*

Staff News

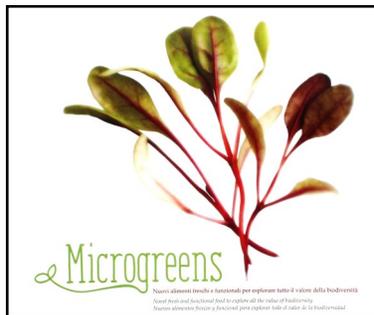
- ◆ To help celebrate National Tomato Month this past October, the wellness company Lycored decided to try



for a Guinness World Record by creating a display of more than 100 varieties of tomatoes at an event in New York City's Times Square. The company tapped SWFREC vegetable horticulturist Dr. Monica Ozores-Hampton to help add to the tomato collection and serve on site as an expert who would ensure that there were, indeed, more than 100 different legitimate varieties. The event included a free tomato

salad lunch. Leftovers were given to City Harvest, a food rescue organization in New York. "I helped Lycored to collect more than 132 different tomato varieties," says Dr. Ozores-Hampton. "And I also talked to the Guinness judges and verified that the varieties were all different."

- ◆ Post-doctoral research associate Dr. Francesco Di Gioia is author of the book titled *Microgreens: Novel, Fresh, and Functional Food to Explore all the Value of Biodiversity*, which was published in October with an ex-



tension project funded by the Italian Ministry

of Agriculture and Forestry. The book, written in Italian, English, and Spanish, is available online on the website of the project: <http://www.gustailbiodiverso.com/wp-content/uploads/2015/11/Microgreens.pdf>.

- ◆ New publication: Ef-

Effects of Nitrogen Rates on Nitrogen, Phosphorous, and Potassium Partitioning, Accumulation, and Use Efficiency in Seepage-irrigated Fresh Market Tomatoes

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Additional index words: *Solanum lycopersicum*, nutrient management, nutrient accumulation, nutrient use efficiency, fertilization recommendation, Best Management Practices

Abstract. Florida had the largest fresh-market tomato (*Solanum lycopersicum* L.) production in the United States, with a value of \$437 million and 13,356 ha harvested in 2014. Despite the development of Best Management Practices (BMPs) and University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) fertilizer recommendations, tomato growers often

accounted for 40% of the national fresh market tomato harvested area and 39% of the national crop value (USDA, 2015). Florida tomato production is concentrated in the central and southern areas of the state on low water-holding capacity sandy soils. Tomatoes are grown on raised polyethylene-mulched beds using predominantly subsurface (seepage) irrigation (Dukes et al., 2010). Seepage irrigation consists of managing a perched water table on top of a slowly permeable soil layer ("spodic layer") located at 40-90 to 150 cm depth. Water is pumped from the ground or surface reservoirs into a series of canals and ditches and is delivered to the plants by capillarity (Samarji and Malhotra-Carpina, 2011). This irrigation method is widely used by Florida tomato growers for its low technology and operating costs (Graziosi et al., 2013). An additional benefit of seepage irrigation is the possibility to raise the water table near the soil surface as an attempt to increase air temperature of 6°C degrees during freezing events (Ozores-Hampton et al., 2010). However, drainage of water after the freeze event or excessive rainfall may remove substantial amounts of nutrients from the root zone. In seepage-irrigated tomato crops, Sato et al. (2012) estimated losses of N and K over 40% and 15% of initial N and K available, respectively. Moreover, seepage irrigation requires large amounts of water and has an average water use efficiency of 30% to 50% (Lecroquis, 2005). Seepage irrigation is hence considered one of the least efficient irrigation methods

fects of Nitrogen Rates on Nitrogen, Phosphorous, and Potassium Partitioning, Accumulation, and Use Efficiency in Seepage-irrigated Fresh Market Tomatoes was published in the November 2015 issue of HortScience. Authors include Dr. Ozores-Hampton, Dr. Di Gioia, and SWFREC soil and water scientist Dr. Kelly Morgan.

New Citrus Horticulturist on Board

Dr. Gurreet Brar arrived at the SWFREC in November as the center's new citrus horticulturist.

He previously worked as the tree nut farm advisor for the University of California Cooperative Extension system.

Dr. Brar earned his Ph.D in horticultural sciences from the University of Florida in 2012. Earlier, he earned his MS Pomology and BS Agriculture from Punjab Agricultural University, Ludhiana, Punjab, India.

His research interests include tree physiology, orchard systems/horticulture, growth and development of nursery trees and controlled environment

systems. He is also passionate about using mass media as an extension tool for his clientele as well as for science communication to cultivate scientific temper among the general public.

Dr. Brar was born and raised in Punjab (North India), the cradle of one of the earliest agricultural settlements, the Indus Valley Civilization, which is considered as one of the most agriculturally productive regions of the world.

He is very excited to be back in Florida to serve the



Florida citrus industry. He is a proud Florida Gator, and needless to say, a huge Gators football fan.

Welcome, Dr. Brar!

250-plus growers and industry representatives participated in the Tomato Institute in September in Naples, Florida. The conference is organized in part by SWFREC vegetable horticulturist Dr. Monica Ozores-Hampton.



Spotlight On . . . Fall Vegetable Field Day

More than seventy growers, industry representatives, and other clientele participated in the UF/IFAS Fall Vegetable Field Day on December 3 at the SWFREC.

Field trials included:

Vegetable Horticulture (Dr. Ozores-Hampton, vegetable horticulturist, and Dr. Francesco Di Gioia, post-doctoral research associate): Anaerobic soil disinfestation on tomato production / Pelletized food waste and biosolids compost in tomato production.

Soil and Water Science (Dr. Kelly Morgan, soil and water scientist, and Timothy Ayankojo, graduate student): Scheduling of tomato drip irrigation with a Smartphone App.

Plant Pathology (Dr. Pam Roberts, plant pathologist): Late Blight on tomato / Bacterial Spot on pepper / Powdery Mildew on squash.

Entomology (Dr. Phil Stansly, entomologist; Dr. Jawwad Qureshi, research associate professor; and Barry Kostyk, senior biological scientist):

Biological control of whitefly with the plant bug *Nesidiochoris tenuis* in tomato interplanted with sesame as a trap crop / Fall Armyworm control with Bt-corn and conventional insecticides / Insecticidal control of Southern Armyworm on tomato / Soil applied insecti-

cides for control of Silverleaf Whitefly and TYLCV on tomato / Control of Broadmite on bell pepper / Insecticidal control of Fall Armyworm on sweet corn / Pepper Weevil control with an experimental insecticide

ples of anaerobic soil disinfestation.

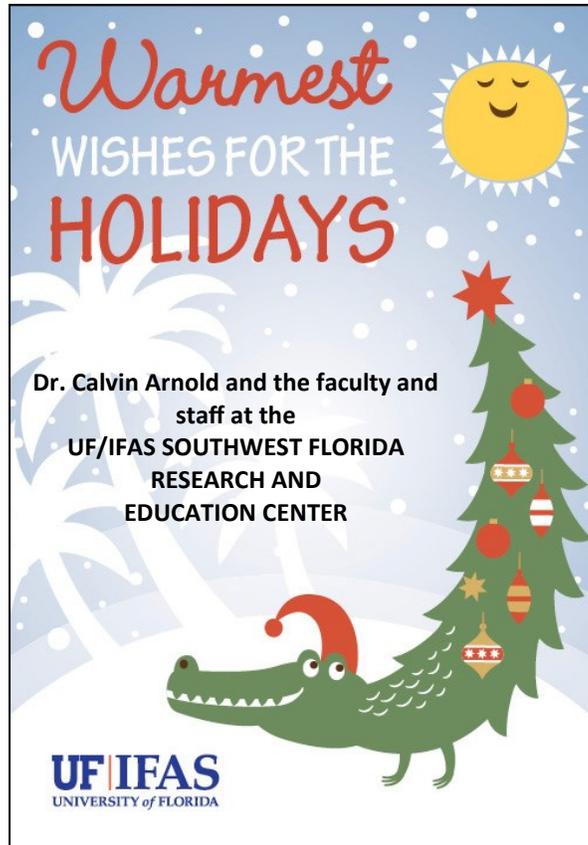
Water Resources Engineering (Dr. Sanjay Shukla, agricultural and biological engineer): Compact bed geometry for drip irrigated tomato and pepper.



on jalapeno pepper / Tray drench vs drip applications of Verimark and reflective mulch for control of Pepper Weevil on jalapeno pepper.

Indoor presentations included: **Vegetable Horticulture** (Dr. Di Gioia and Dr. Ozores-Hampton): History and princi-

Lunch was generously sponsored by Eric Johnson with FMC Corporation. For a complete set of the field day handout, click here http://swfrec.ifas.ufl.edu/about-us/news_updates/ and scroll down to "Field Days and Workshops."



Coming Events

December 25-January 3: *UF Holiday Break.* SWFREC will be closed and will reopen on Monday, January 4, 2016.

January 5: *Building Dedication Ceremony.* 10am. SWFREC. For more information, see page 4.

January 12: *Citrus Squeezer: All You Need to Know about Scouting and Management of Citrus Insect Pests.* 10am-1pm. SWFREC. 2 CEUs for Certified Crop Advisors, 2 CEUs for pesticide license renewal. SWFREC speakers will include entomologist Dr. Phil Stansly, research associate professor Dr. Jawwad

Qureshi, and senior biological scientist Barry Kostyk. To register, contact Mongi Zekri, Hendry County Extension, at 863-674-4092 or e-mail maz@ufl.edu.

January 18: *Martin Luther King Jr. Birthday.* SWFREC will be closed.

February 4: *Certified Pile Burners Course.* 8:30am-4:30pm. SWFREC. Attendance is limited to the first 50 registrants. For more information, contact Mongi Zekri, Hendry County Extension, at 863-674-4092 or e-mail maz@ufl.edu.

February 11: *Citrus Squeezer:*

All You Need to Know about Scouting and Managing Citrus Fungal Diseases. 10am-1pm. SWFREC. 2 CEUs for Certified Crop Advisors, 2 CEUs for pesticide license renewal. Dr. Pam Roberts, SWFREC plant pathologist, will be a speaker. To register, contact Mongi Zekri, Hendry County Extension, at 863-674-4092 or e-mail maz@ufl.edu.

