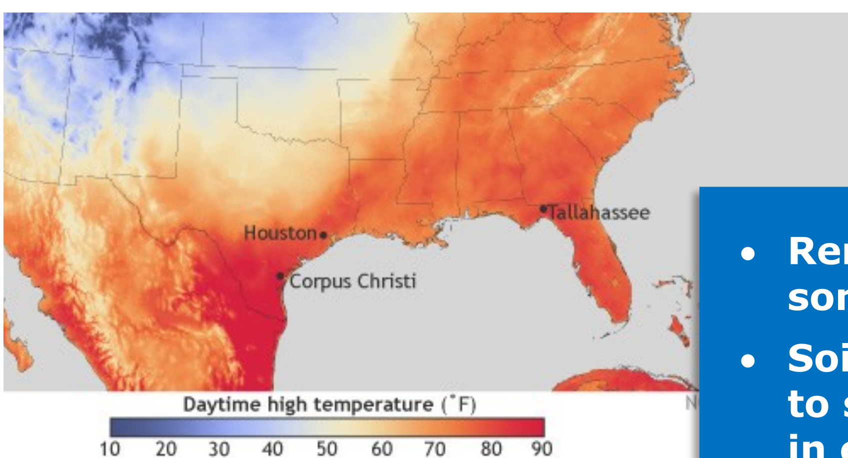
Kentucky Nursery LISTSERV Bulletin

University of Kentucky Nursery Crops Team | **End of February 2017**

Late winter 'heatwave' hits the U.S. in February

On February 24th, **all-time February records were "smashed" across the eastern United States according to NOAA Meterologist Tom Di Liberto**. Above normal temperature probabilities are forecasted to continue for the next three months. While these record highs are expected to continue, short duration freezes are still possible, as we will see on March 3rd and 4th. It is too early to speculate what impacts this warm winter will have on insect pest and diseases during the growing season.

See **UKAg Weather's Long Range Outlooks** for a variety of forecasts of temperature and precipitation probabilities.



Daytime high temperature, Feb 24th, 2017.
Image: NOAA Climate.gov

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Joshua Knight, Managing Editor

- **Remember early season pour-through**
- **Soil moisture sensors to schedule irrigation in container blueberry production**

Remember early season pour-through

Carey Grable, Extension Associate, Nursery Crops

For growers of container stock, monitoring your fertilizer levels and pH is a very important part of your production schedule. A regular pour-through test of your crops can help fine tune your fertilization strategy. A pre-fertilizer application test can show whether to previous season's fertilizer application was too long lasting. It can also help show any issues with pH that may affect plant growth as the growing season begins. Subsequent pour throughs can ensure that your plants are receiving adequate nutrients from your fertilizer. The Southern Nursery Association's "Best Management Practices: Guide for Producing Nursery Crops" suggests an interval of two weeks between readings. Also, be sure to check the functionality of your monitoring device. Most meters require that the probe be kept damp at all times. Probes that have dried out may fail and give inaccurate readings.

For those unfamiliar with the pour-through technique, a video guide is available on the UKRECHort YouTube channel. This is also a good time to have your water quality tested. Water testing is available through your county extension office. If you have questions about the pour-through procedure, please contact Carey Grable at cagrab2@uky.edu or (859) 257-0037.

Soil moisture sensors to schedule irrigation in container blueberry production

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The goal of irrigation scheduling is to provide plants the right water volume at the right time. Plant species and developmental stage, substrate and weather (temperature, solar radiation, precipitation and relative humidity) determine to a large extend any decision regarding watering. Furthermore, the rate of decrease in soil water content is related to plant water use and evaporation, and it must be considered to estimate when to irrigate and how much to water. Irrigation is usually accomplished by timers that are set to provide extra water in order to make sure plants receive more than what they actually need and reduce any risk of under watering. Water excess increases nutrient leaching and disease incidence that put at risk plant growth and quality.

There are several methods to estimate changes of soil moisture content with the purpose of scheduling irrigation. In high technology irrigation, changes in volumetric water content (Volume of water per volume of soil) can be accurately measured by soil water sensors. These sensors actually measure the dielectric of soil (Velocity of electromagnetic waves or pulse through the soil), and then convert it to soil water content.

Figure 1. Sensor-based irrigation installed in overwintered blueberry plants.

Research has shown a 40 and 70% reduction in irrigation water applications with sensor-based set point irrigation control. For one grower, an average 50% reduction in irrigation saved over 43 million gallons of water, and $6,500 in pumping costs in 2012 (Lea-Cox, 2014).

Wireless sensor network (Decagon Devices, Pullman, WA) was installed for production of container-grown blueberry nursery plants and blueberry fruit production in a container system at UKREC-Princeton (Figure 1). Irrigation efficiency and substrate effect on phytoththora root rot infestation and other production factors will be evaluated this growing season.

Wireless sensor technology consists of multifunctional sensors that measure parameters such as soil moisture, temperature, relative humidity, electrical conductivity and pH. Soil moisture sensor nodes (Figure 2) are set at different irrigation sectors.

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Sensors are connected to monitoring nodes (Figure 2) that only monitor environmental factors and soil conditions. The monitoring nodes are connected to the control nodes (Figure 3), which simultaneously control irrigation up to a maximum of four zones. Data are sent wirelessly to a base station (control computer) (Figure 4) at set time intervals. Control nodes receive and send information to and from the base station.

Data are accessible at real time from anywhere, therefore decisions can be made opportunely. In sensor-based irrigation systems, an irrigation set point is previously determined as the lowest limit to start a new irrigation event (Figure 5). In addition, a digital water meter is installed to control a leak in the system or an open solenoid.

Figure 2. A moisture sensor connected to monitoring nodes to monitor environmental factors of that particular zone. Five sensors can be plugged into a monitoring node.

Figure 3. Controll nodes: nC24 can control up to four irrigation zones. It has a solenoid valve to control flow or pressure in the irrigation pipes and can confirm a scheduled irrigation event.

Figure 4. Base station computer generates a website that can be accessed online. This computer is used to control the network and create irrigation settings. The website can be customized to include information specific to the farm, sensor location, and output content.

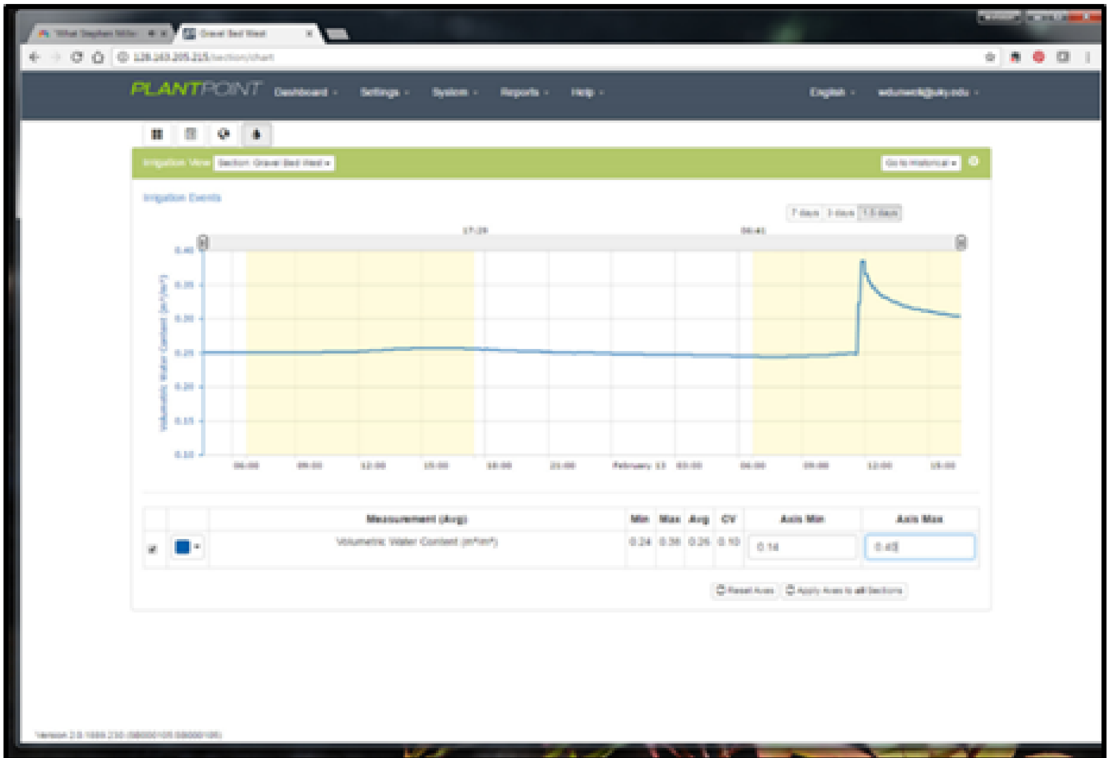

Figure 5. Website generated by irrigation controller shows volumetric water content of pine bark medium determined through a moisture sensor at a set point of 25%.

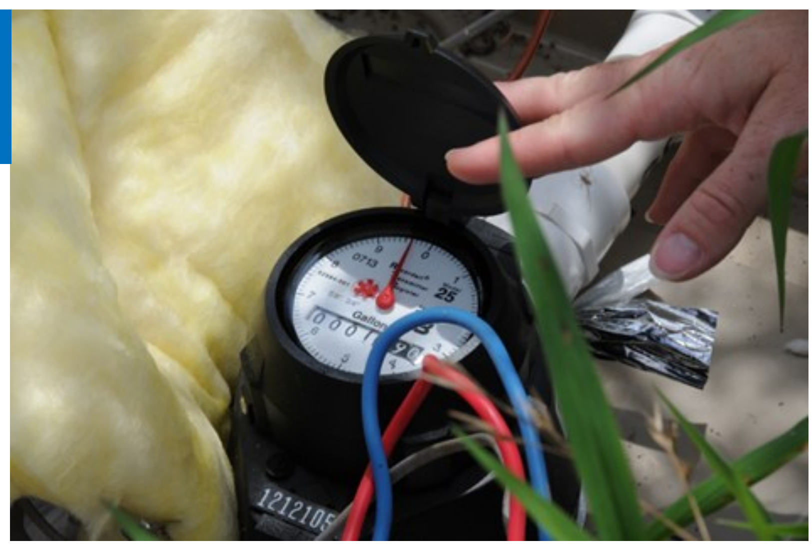

Figure 6. Monitoring irrigation water use with a water meter can provide an alert in the event there is a leak in the system or a solenoid is open.

Additional information

Owen J. Understanding container moisture. http://horticulture.oregonstate.edu/system/files/Digger_July_2011_p41-45.pdf

Lea-Cox, John, et.al. 2014. SCRI-MINDS – Year 5 Final Report: Precision Irrigation and Nutrient Management for Nursery, Greenhouse and Green Roof Systems: Wireless Sensor Networks for Feedback and Feed-Forward Control. http://www.smart-farms.net/sites/default/files/SCRI-MINDS%20Year%205%20Report.pdf

The University of Kentucky's **Nursery Crop Extension Research Team** is based out of two locations across the bluegrass to better serve our producers.

The **University of Kentucky Research and Education Center (UKREC)** in **Princeton** serves western Kentucky producers while our facilities and personnel on main campus in **Lexington** serve central and eastern Kentucky producers.

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