



Cranberry Station Newsletter

FEBRUARY 2007

UMASS CRANBERRY STATION

1 STATE BOG ROAD

P.O. BOX 569

EAST WAREHAM, MA 02538

<http://www.umass.edu/cranberry>

FROST PROTECTION AND SENSOR TECHNOLOGIES

At our recent Management Update Meeting on January 31, we held a Mini Workshop regarding frost protection and sensor technologies.

After an introduction to the principles behind sprinkler protection from frost and intermittent sprinkling in orchard crops, panel members Aaron Berndt (Morse Brothers) and Chris Severance (AD Makepeace) discussed their experiences using intermittent sprinkling on frost nights. Kevin Connolly of KC Enterprises also provided information regarding auto-starting sprinkler systems. We then moved to a discussion of thermometers and sensors, including a presentation by Pierre Ballester of Environmental Sensors Inc. in British Columbia on soil moisture sensing. There was excellent audience participation and good information exchange. A review of some of the points from the discussion follows.

Sprinkling for frost protection works because as the applied water cools, heat is released, with a large burst of heat released as the water freezes. As long as enough liquid water is present and cooling, the plants are protected. Generally, if no wind is present, delivering 0.1" per hour is enough to protect to about 25°. The drier the air and the more wind movement, the more water needs to be applied to achieve the same degree of protection. Generally on cranberry frost nights, the air is still so wind is not a big factor during the sprinkler run.

In traditional frost protection, sprinklers are started some few degrees above the bud or fruit tolerance (to allow for non-uniformity in temperatures and thermometers) and are stopped when the temperature is well above tolerance (at least a few degrees) and ice is melting. Generally this will be by 7:30 am. As the ice melts, heat

is taken back from the plants, which is why the stop temperature should be above tolerance. It is important not to stop sprinkling if the ice is not melting. If the ice is solid and the wind picks up, the ice will evaporate. Evaporating ice robs ~7x more heat from the plant compared to melting ice!

These concepts are important if intermittent sprinkling is to be used for frost protection. This technique has been used in orchard systems, but in those cases, the system is run for 2-3 minutes then shut off for no more than 3 minutes. Such cycling in a computerized system saved 75% of water applied in an orchard system but did not always keep the buds above the critical temperature. The investigators noted that start temperature selection was critical (they used wet bulb temperatures) and that sensors in the orchard became sluggish in their response as ice built up during the night.

Cranberry growers have been experimenting with intermittent sprinkling using automated systems with set start and stop temperatures. Two growers shared their experiences.

Aaron Berndt reported using intermittent sprinkling on both spring and fall frost nights. Both fuel and water were saved by setting start and stop parameters on an auto starting sprinkler system. However, Aaron did note that he monitored these systems all night, not being ready to entirely depend on the technology in the first season. He felt that the system worked well on all frost nights, running for more hours on a truly cold night and less on marginal nights. For example on one marginally cold night, the system ran for 3 of the 9 hours from first reaching the set start temperature until dawn. Aaron also noted the importance of choosing the correct start and stop temperatures. If he set the two with a 10° differential, the system just ran all night, never shutting down until morning. He settled on a start temperature

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3-4° above tolerance and a stop when the temperature had risen by 3°. Using these parameters, he achieved up to 60% savings of water and fuel. Generally the sprinklers cycled 7 to 8 times per night.

Chris Severance noted that when using automated cycling, the system shut down when clouds came in and the temperature rose. He also emphasized that at some locations, the temperature on-bog jumped more than 10° when the system started, likely due to warm water at that site – most of his sites only rose 4-7° on initial start up. However, when this happens, the system can shut down immediately if you do not set a parameter for a minimum length of run time before cycling off. Chris liked the idea of an expert system making the start-up decision on marginal nights, taking some of the guesswork out of when to commit to protecting.

Both Aaron and Chris pointed out the advantage of the auto starts in that they are programmed to correctly idle the pump motor then gradually bring it up to speed. Often when manually starting impatience to get to the next pump dictates a less than ideal starting protocol. They also noted that they have gas, diesel, and electric pumps running on auto-starts.

Kevin Connolly noted that the currently used temperature sensors in the auto-start systems provided by KC Enterprises are thermistor types that behave as wet bulb thermometers. Audience members raised the issue of temperature sensor and thermometer calibration stating that even when two devices calibrate correctly in an ice water bath, they behave differently in the field. Pierre Ballester explained that each device will have a different response curve and while they might behave equally at 32°, they could easily deviate at other temperatures. He recommended that all devices should be calibrated at two or more temperatures to compare performance over a range of temperature. It was also noted that ‘instant’ read thermometers could take up to several minutes to give a correct reading even though the display refreshes every few seconds.

Pierre introduced a soil moisture sensor that can be deployed to sense soil moisture and/or water table depth on the bog. These devices can be linked to a computerized data logger or read in the field. Several growers will be field testing these devices in 2007. Look for more information about these as we gain experiences.

I want to once more thank all the panelists and the audience for initiating an excellent discussion. I look forward to moderating more such discussions at future meetings.

CAROLYN DEMORANVILLE

WORKER PROTECTION TRAININGS

Worker Protection Trainings for cranberry workers in the handler category will be offered in the spring of 2007: April 25, May 30, and June 27. There is a \$5 fee to cover the cost of the WPS training manual. If you have a pesticide license you do not need this training.

Contact Martha Sylvia: 508-295-2212, ext. 20 to sign up or for additional information.

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Dr. Carolyn DeMoranville, Director

February 2007 Issue

Deborah Cannon, Editor

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Dr. Carolyn DeMoranville
Station Director

In Memoriam
William E. Tomlinson,
Former Cranberry Entomologist

Bill Tomlinson passed away in November. Many of you will remember him as the Cranberry Entomologist here at the Station from the 1950's through the 1970's. He was a good friend to the industry and to my family. Bill remained interested in cranberries and the Station throughout his retirement. What a grand life he had. Our condolences go out to his wife and family.

Carolyn

SAGAMORE BEACH - William E. Tomlinson, 93, of Sagamore Beach died Thursday Nov. 16, 2006, at home. He was the beloved husband of Barbara (Sykes) Tomlinson.

Mr. Tomlinson graduated with a Master's Degree in entomology from the University of Massachusetts at Amherst. He worked for 26 years with cranberry and blueberry growers on insect control, cultivation, and frost warnings, and was a professor at the University of Massachusetts Cranberry Experiment Station in Wareham, retiring in 1978.

Originally he worked with UMass at the Waltham Field Station, a setup similar to the Wareham station, and for

a period of time, he worked at the experiment station in New Jersey, which was affiliated with Rutgers University.

He was the former North Sagamore Water Department Commissioner, a past member of the Bourne Conservation Commission, and the Bourne PTA.

An avid gardener, his blueberry and vegetable patches were his pride and joy. He also enjoyed reading and music, but most of all, he loved to spend time with his family.

Besides his wife, he is survived by three sons, William E. Tomlinson III of Midwest City, Okla., George Tomlinson and Richard Tomlinson, both of Sagamore Beach; three daughters, Elizabeth Tomlinson of Enfield, N.H., Barbara Blanchard of Chittenden, Vt., and Mary Mahoney of Oxford, Md.; three sisters, Emma Bennett of Freeport, Maine, Grace Murray of Annisquam, and Ann Hulbert of Bayfield, Nova Scotia; 13 grandchildren; eight great-grandchildren; one great-great grandson; and many nieces and nephews. He was the father of the late Philip Tomlinson.

A memorial service will be held at a later date. Memorial donations may be made in his memory to the Visiting Nurses Association of Cape Cod, P.O. Box 370, Hyannis, MA 02601. Burial was private.

Registration Form for Pesticide Safety Training
Elks Lodge, East Wareham
Wednesday, April 4th, 2007 8:00 AM - 12:00 PM

Please register for the meeting using this form.

COMPANY _____

CONTACT _____

PHONE _____

NAMES OF ATTENDEES _____

Attach additional sheets as necessary.

Return with payment by:
March 30th, 2007

Include check made out to: **UMASS**
 In the amount of: **\$50 per person.**

Return to:
UMass Cranberry Station
P.O. Box 569
East Wareham, MA 02538

**Pesticide Safety Training, Elks Lodge, East Wareham
Wednesday, April 4th, 2007
8 AM - 12 NOON**

This meeting will focus on cranberry pesticide issues. The cost is \$50.00.
FOUR contact hours will be offered towards pesticide re-certification.

RETURN Registration form on Page 3

8:00 – 8:50	Pesticide Safety and PPE Review
8:50 – 9:40	New Cranberry Compounds and BMP's
9:40 – 10:10	Coffee Break
10:10 – 11:00	Water Quality and Groundwater Protection Review
11:00 – 11:50	Getting Chemigation Right

OFFICIAL BUSINESS

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