

**UMass
Extension**

Cranberry Station Newsletter

APRIL 25, 2014

UMASS CRANBERRY STATION

1 STATE BOG ROAD

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Dodder Management Discussion

Hilary Sandler, Katie Ghantous,
and Dahlia Medeiros

Twenty five growers were invited to attend a discussion group at the UMass Cranberry Station to talk about their experiences managing dodder. The April 9, 2014 meeting was attended by 8 growers with acreage ranging from 2 to 180 acres in locations spanning the Cape to Rochester, MA.

Overall, dodder varies greatly from bog to bog. Some growers reported having dense patches in the same exact spots from year to year, while others had patches in different locations every year. For some bog owners, it is more of a localized infestation, and for others it is much more widespread. Several growers felt that they are holding the dodder in check with their current management techniques, but that any lapse in control would lead to a rapid increase in problem areas.

Crop Loss. When asked to estimate the crop loss caused by dodder, most growers do not have a good sense of the amount damage caused to their crops due to dodder. Some estimated that in dense patches, crop loss could be as high as 80%.

Management Techniques. The predominant management methods included hand clipping early in the season, raking, and herbicide application. Though hand clipping can be effective, it is time-consuming and not practical for bogs with more than small patches of dodder. Although raking can remove dodder biomass and improve light penetration into the cranberry canopy, growers who used raking felt that it was ineffective at impacting dodder seed production, does not impact long term

management of dodder, and is likely not to be cost effective, especially with low fruit prices.

Casoron was used by half of the growers for preemergence control of dodder, and growers reported using a single application of 40 lbs/A applied in early May (7th to 15th). No grower obtained total control with Casoron.

Postemergence herbicide dodder control used by attendees was limited to Callisto. Growers spot-treated dodder patched by backpack sprayer, mist blower, or boom sprayer. Several growers reported seeing an initial whitening of the dodder after treatment with Callisto, but that the dodder seemed to recover. Two growers said they used Callisto with crop oil concentrate, while others used nonionic surfactant (NIS). Those who used NIS reported having better results than those who used crop oil.

Two growers chemigated Callisto with NIS and had satisfactory results. One grower chemigated 4 oz/A in late May and again in mid-July, while the other grower chemigated 8 oz/A at the end of June (timed to control other weeds such as narrow-leaf goldenrod) and again 2-4 weeks later. This grower also reported that tank-mixing Bravo and Callisto led to a decrease in Callisto efficacy because it took a long time to chemigate Bravo and felt that the herbicide may have been “washed off”. Another grower also chemigated Bravo and Callisto together and reported no problems. Only one grower had tried Quinstar (in the first year it was available) and did not have satisfactory results (application was likely made late).

Trash Floods. When asked about trash flood

practices, most growers felt that dodder seed sinks and is not removed in trash floods unless agitation can be used. One grower recounted how “old-timers” used to use flat bottom boats with ribbed bottoms to intentionally agitate waters for trash removal purposes. Researchers noted that dodder seeds are buoyant when they are still inside the seed capsules, but are no longer buoyant once the capsules are open and the seeds are released.

Research Ideas. Growers expressed interest in exploring ideas such as the potential for a lawn vacuum to be used to remove seeds, testing the effects of crop oil and NIS alone, and testing if dodder *seedlings* (germinated seeds) are buoyant (perhaps to remove with a flood). Researchers discussed field-testing growing degree models for Massachusetts conditions. Growers also mentioned using high resolution satellite imagery to detect and locate dodder infestations.

Guest Scientist. Dr. Beth Johnson from the Pennsylvania State University, State College, PA also attended the meeting to share some of her work on dodder with cranberry growers. She has developed an experimental technique that uses a plastic film to filter certain wavelengths out of sunlight. Her experiments have shown that when dodder grows in an environment that has a high red:far red ratio, dodder is less able to successfully find and/or attach to a host plant. She has applied for grant funding to continue this work and to develop technology that can be used in a field situation. She showed a time-lapse video of dodder emerging from the soil and attaching to a tomato host. She also mentioned work done in the PSU lab that identified a wheat compound, (z)-3-hexenyl acetate, which repelled dodder. This was discussed as a possible research avenue.

In-Meeting Survey. Dr. Johnson distributed a survey to the attendees. Three growers said less than 10% of their crop was parasitized by dodder, while four reported 10-25% was affected and one said 50-75% was affected. Monies lost to dodder ranged from \$5,000 (two growers) to \$30,000 (one grower) per year; 3 growers could not estimate and 2 said minimal losses. To prevent dodder, 5 growers used preemergence herbicides, one grower used Callisto, one clipped out affected plants, and one cut and burned host plants. To eliminate existing populations of dodder, 4 growers combined herbicide use with

hand removal, one grower mowed and burned infested fields, one used herbicides followed by raking, and one used herbicides only. Three growers spent most of their monies on *preventing* dodder infestations; 3 growers spent equivalent amounts *preventing and eliminating* dodder. Reported costs ranged between \$800 to 3,000 for each activity.

Dodder Management in 2014

Biology and Control. Dodder is an abundant seed producer. All management efforts should be directed towards **minimizing or eliminating seed production**. The seed bank is very long-lived (>13 yr), so do **everything possible** to reduce this. Dodder is an obligate parasite and must have a host plant to survive. The best management strategy for dodder control is **prevention**.

Scouting. Scout in areas where infestations have occurred and in bare areas previously infested. Newly emerged seedlings are usually yellow in color, very slender, and 0.5 to 3 inches long. If the vine cover is good, move the vines aside so that you can see the duff layer; this is where early emerging seedlings will be seen.



Newly emerged seedling between fingers

Begin scouting for dodder now! Dodder populations emerge slowly at first, but then quickly peak; 50% and 90% of the seedlings emerged from about 30 and 45 days after first emergence, respectively. The most vigorous population is the one most recently seeded (from last year).

Control early emerging hosts and hand-remove dodder. Control succulent weeds (such as goldenrod, loosestrife and asters) early in the season; if dodder seedlings cannot find a host fairly quickly, they will

die. Where dodder infestations are just beginning, scout carefully. Hand removal of dodder seedlings prior to infection is a good practice. Infected vine tips can be cut off and thrown away. Infected weeds should be completely removed from the bed; dodder stems will re-grow if haustoria (the part of dodder that penetrates the host) remain embedded in the weed.

Preemergence (PRE) Herbicides. Casoron, Callisto, and QuinStar may be used as PRE options. Apply 10-14 days after early emergence (applications go out usually around May 10). Apply Casoron when air temperatures are below 60°F and water in immediately to minimize volatilization. Some growers report success using Callisto PRE through chemigation for dodder control (usually followed by spot-treatment for the second application). Time QuinStar applications as described for Casoron, targeting the majority of the seeds as they are germinating and emerging. Two applications are permitted but a minimum of 30 days must elapse between applications. Handlers may be restricting QuinStar so check before using!

Spring Floods. Short (24-48 hr) floods in early to mid-May may be effective for reducing dodder infestations. Floods should cover vine tips adequately. Dodder floods may coincide with floods used to control black-headed fireworm. Flooding dodder 3-4 weeks after early seedling emergence seems to be a good timing. Floods seem to impact seedlings, not seeds, so timing is important (wait until seedlings are emerging)! Late water floods do NOT control dodder.

Postemergence (POST) Control. POST applications of Callisto seem to control dodder, especially if the host is a weed that Callisto can damage. However, dodder may just turn white after application and then re-grow. Applications made before dodder flowers are recommended. Growers also report better success with non-ionic surfactants compared to crop oils.

Hand-held flame cultivators (FC) may control dodder with non-fatal injury to cranberry (effects similar to mowing). Spot treat small dodder patches with FC before seeds are set for best outcomes. We have preliminary evidence that tank mixes of Poast and Callisto will prevent seed formation. We will be testing this during the 2014 season. If you try it, let us know!

Raking seems most beneficial for heavy infestations. Raking is more effective at reducing seed production if it is done before the seeds are formed (flowering) as compared to later in the season. No benefit is gained from raking more than once.

Clean harvest or other equipment as you move from bog to bog to minimize spread. A good trash flow after harvest is also helpful in removing seed capsules from the bed, but is not a replacement for prevention since subsequent infestation occurs.

**Hilary Sandler (x21) &
Katherine Ghantous (x43)**

Low Cost Frost Management Options

The two low cost options available are (i) late water and (ii) intermittent auto cycling. Late water has been used effectively in integrated pest management and although it is incidental to frost management, it can be an effective low cost management option and has been shown to be so. Since we have published information on late water in previous newsletters this spring, this article will focus on intermittent auto cycling. We will present data from our research suggesting that this approach is just as good as conventional frost management in protecting the crop.

For more than 50 years, cranberry growers have used sprinkler irrigation systems to protect the plants from frost damage. Historically, growers manually turned on a sprinkler irrigation system and had it run throughout the night, beginning once the cranberry bog reached a critical temperature threshold. We refer to this as the **conventional approach**, characterized by manually starting and stopping the irrigation pumps. It is generally assumed that this approach is costly with regards to water and fuel, since the sprinklers run continuously throughout the night, once initiated. In recent years, growers who now have installed automation equipment can use the automation to either frost protect conventionally or by running the system intermittently (cycling). The automated start-up can be beneficial in the conventional approach, especially to growers who have multiple pumps and can minimize time losses on a night when temperatures are dropping rapidly, and shutdowns are also prompt with automation.

But automated irrigation has allowed for a new approach for cranberry frost protection in Massachusetts, **automated cycling irrigation**. As with the conventional approach, cycling is started at a set critical temperature determined from readings of sensors placed at the cold spots of a cranberry bog. The automated system can then be set up such that the pumps cycle on and off as temperature fluctuates throughout the night, thereby conserving fuel and water. Because the pumps do not run continuously, the automated intermittent approach is

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hypothesized to be highly economical and efficient as it uses less water and fuel. Several growers, who are participating in our research study of this practice, have shared their set points for cycling. The consensus is to use a start trigger of 2-3°F above tolerance and a stop trigger in the range of 31-31.7°F. One grower mentioned that he raised his re-start trigger temperature by 1-2°F after the first cycle.

Table - Comparison of conventional versus cycling approaches in frost management in 2013.

Input	Conventional	Cycling
Average Water Use (Gallons/Acre/frost night)	30,000	18,500
Average Fuel Use (Gallons/Acre/season*)	53	21
Average Fuel Cost** (\$/Acre/season)	164	80

*Season refers to 24 frost nights in this case.

** Fuel types varied among participants.

Our research in 2013 suggests that cycling results in 38% water savings, 60% savings in fuel use and more than 50% fuel costs savings (Table). Fuel types varied among participants and actual savings will be determined by a grower's pump type and fuel source.

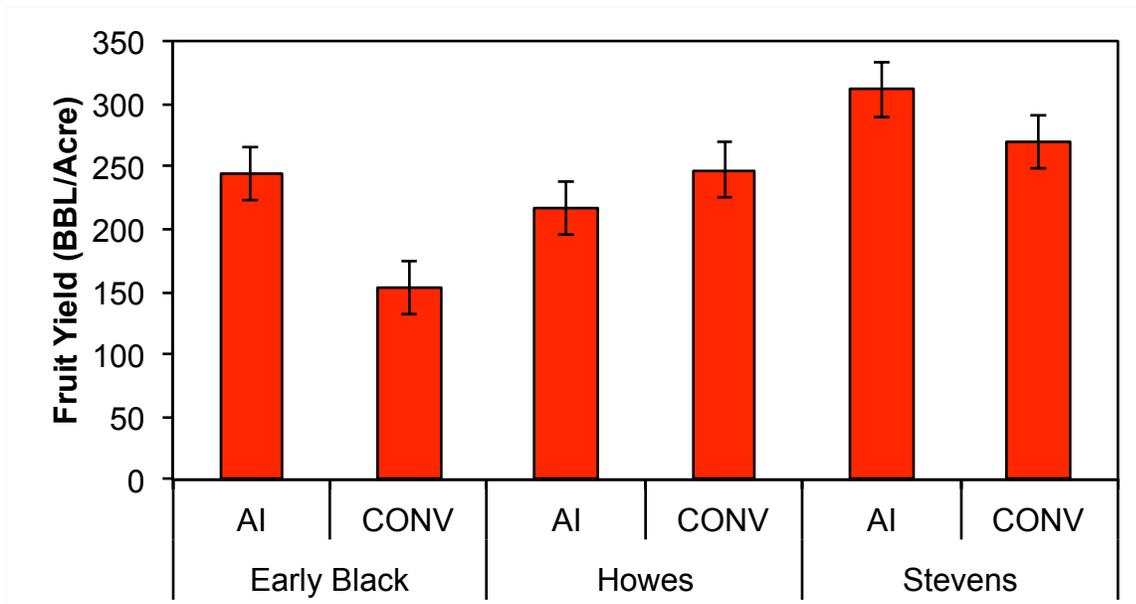


Figure. Fruit yield response to frost management method.

There have not been any significant differences in bud damage between the conventional and cycling approaches throughout the three years of this research. While some damage was observed under cycling, it normally consisted of the loss of one or two floral initials. Because cranberry buds generally have 4 to 6 floral initials, damage in 1 or 2 initials leaves more than adequate capacity for flowering and fruit set since normal fruit load for a cranberry upright is 1-3 berries depending on cultivar. Consequently, we have not seen any yield disadvantages in cycling compared with conventional. In fact in some instances cycling treatments resulted in numerically higher berry yields than conventional (Stevens) and significantly higher yield (Early Black) as shown in the Figure.

The lack of negative impact of cycling is supported by grower testimonials and our research. In fact, cycling looks more attractive in terms of amount of water used and fuel energy savings while showing no reduction in fruit yield compared with the conventional approach. We are therefore suggesting that when the irrigation engine is automated, a grower should consider cycling for this frost season.

Peter Jeranyama

Frost Tolerances

In 1998, the Cranberry Station published a fact sheet with color photos of frost tolerance for the four major cultivars - Early Black (EB), Howes (H), Ben Lear (BL) and Stevens (ST). Since that time, photo technology and digital photography has improved greatly. Taking advantage of these advances, I have been taking new photos of frost tolerance. By the end of the year, these will be used in a new fact sheet authored by me and Peter Jeranyama, including information on tolerance of the buds and berries and frost protection using sprinkler cycling.

In the interim, I will be making mini tolerance fact sheets to post on the Cranberry Station web site as we go through the frost season. So far, I have posted for April 14 and 22. There should be a new sheet each week until sometime in early June. Starting in late August, photos of fruit tolerances will be posted. The photos sheets can be found by going to the Station web site: www.umass.edu/cranberry. Once there, click on the 'Crop Information' heading and choose 'Frost tolerance'. This takes you to a page with links to the current season sheets (click on the date) and a link to historic tolerance photos (2010-2013). Looking at the history shows how much we are advancing in our photography skills!

Carolyn DeMoranville

Here are two photos from this spring.



EB bud from Rosebrook Bog, April 14.
Spring dormant stage, tolerance 18°F.



EB bud from Rosebrook Bog, April 22.
White bud stage, tolerance 20°F.

IPM MESSAGE is now active!

Call 508-295-2212 ext. 60
or visit website homepage to read the message!
<http://www.umass.edu/cranberry>



Carolyn DeMoranville, Director

**INSIDE SEE:
Dodder Management and
Frost Management and Tolerances**

**BOGSIDE WORKSHOP AT THE
STATE BOG**

When: Tuesday May 13th, 2014

Rain date: May 14th, 2014

Time: 9:30 to 12:00 Noon

Where: Bogside at the Station - State Bog

Topics: Insects and Dodder

Pesticide credits: 2 contact hours requested

Join us as Katie Ghanous and Hilary Sandler talk about scouting and managing dodder. Anne Averill and Marty Sylvia will cover a sweep net demonstration and managing early season insects. Call the Station to sign up at 508-295-2212 Ext 10 - Deb or Ext 12 - Dawna.

**WORKER PROTECTION
TRAININGS**

**CRANBERRY STATION LIBRARY,
2-4 PM**

Worker Protection Trainings for cranberry workers in the handler category will be offered in 2014: April 30, May 28, and June 25. 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.