



Cranberry Station Newsletter

DECEMBER 10, 2014

UMASS CRANBERRY STATION

1 STATE BOG ROAD

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

The Weather (as always), Fruit Quality (not just rot anymore), Irrigation, and Pest Management

Notes from the Twelfth Annual Cranberry Summit and Additional Related Information

A group of 46 Massachusetts growers, handlers, and researchers came together at the Cranberry Station on December 1 to discuss the 2014 growing season and upcoming challenges for 2015. Most agreed that horticultural challenges were manageable in 2014 although some old and new issues continue to loom large -- fruit firmness, 'scald', new insect pests, pesky perennial weeds, and changing fruit rot management protocols to avoid the use of Bravo fungicide.

Overall crop volume and quality

Growers and handlers reported that for the most part, crops were larger (and in some cases much larger) or comparable to those in 2013. There were a few exceptions where crops were down but other than the potential winter impact discussed in the next section, causes were not identified. Parker Mauck of Decas Cranberry reported that their deliveries were down 15%, primarily due to growers who chose not to grow in 2014; those that did deliver fruit had crops similar to the previous year. Rod Serres provided Ocean Spray total delivery figures for MA: 1.43 million barrels in 2014 compared to 1.28 million in 2013, more than a 10% increase.

Quality attributes: Fruit received by Decas had fairly good initial quality but pack-outs were below expectation; Parker noted that Howes were small and that Ben Lear had better quality than usual. Ocean Spray saw a similar trend in pack-out and reported that color (TAcy) and Brix were above 2013 levels: TAcy 40.7 vs. 39.4 and Brix 8.8 vs. 8.6 in 2014 and 2013, respectively. Percent poor in Ocean Spray deliveries was higher in 2014 compared to 2013 but while that may have been due to new more stringent standards for designating a berry as 'poor' in 2014, their overall 5-year trend is upward. Growers noted that where they had fruit rot problems, many were associated with young beds where the plant canopy was not fully developed or resulted from hail damage suffered during storms in early August (see below). One grower reported improved quality that he attributed to modification in his irrigation protocols (i.e., less frequent and shorter irrigations in 2014).

Following the session, Joe DeVerna of Ocean Spray provided these data (average bbl/a) for their MA growers.

Massachusetts	2009	2010	2011	2012	2013	2014
All cultivars	142	146	193	177	161	174
Early Black	126	130	171	144	138	135
Howes	117	129	168	148	132	133
Stevens	197	209	233	245	205	216
Ben Lear	202	225	281	255	232	237
Other cultivars	95	121	164	152	171	247

Stevens yields were up a bit in 2014 compared to 2013. Early Black, Howes, and Ben Lear in 2014 were very similar to 2013. The 'Other' category, predominantly new cultivars, is of particular interest. Note the increasing yield trend as each year some of these beds are reaching their full potential.

Weather

Cold: We continue to see extremes in our weather patterns. Last winter was colder than average with 23 inches above normal (based on 30-year average) snowfall. However, there were warm periods between storms so that a deep snow cover never developed. As a result, during a particularly cold period in the first half of January, many bogs that had been flooded initially and then drained were left with neither a flood nor snow cover. Some, but not all, growers associated their poorest production with those unprotected bogs. Interestingly, however, bogs that were never flooded last winter (planned for no crop or renovation) seemed not to be impacted. *Side note:* Samples collected by Peter Jeranyama's group prior to spring frost season for baseline assessment did show some level of bud damage at some locations. This supports the theory that winter injury may have been responsible for crop reduction.

Wet: July was cooler than normal but had record rainfall. From July 4-5, we recorded 5.89 inches of rain in East Wareham, accounting for all but 3 inches of the total for the month. Growers reported 7+ inches for that storm with one receiving 8 inches in a 6-hour period. As a result, many experienced flooding conditions on their bogs, some coinciding with full bloom. At those locations, even the short inundation reduced crop significantly. Others whose briefly flooded bogs had reached early fruit set or where flowers had yet to open, saw little or no impact. Crop stage and length of flood were critical, as we know from experiences with intentional flooding to eliminate crop.

Hot: This was a mild summer in MA with July and August temperatures below normal. Peter Oudemans (Plant Pathologist from Marucci Research Center in NJ), reported that this was also true in NJ until the end of August when they experienced several hot days with sheltered temperatures in the cranberry canopy well above 90°F. Prior to the hot spell, fruit quality was looking good; afterward, quality declined and following the next rainfall, he observed 'splitting' in the Demoranville variety. This was also observed in a MA Demoranville bed in September and by Rod Serres (Ocean Spray) in previous years in Wisconsin. Differing from the splitting seen in other fruits such as tomato, the split was along the berry 'equator' rather than top down. The appearance was described as similar to the splitting seen on berries being cooked in water (to make sauce). Are the Demoranville fruit different anatomically; is the skin thinner or are they responding uniquely to some of our chemical applications? These are unanswered questions at this point but one possibility is that the splitting is a result of a combination of heat stress and physiological maturity (a.k.a. over-ripeness). Carolyn noted that Demoranvilles on State Bog had reached full ripe color by September 10th and that from that point forward, quality began to decline. Further discussions of heat stress can be found throughout this article.

Hail: Hail storms on consecutive days in August (6th and 7th) damaged fruit on bogs in Plymouth and Barnstable counties, some significantly. In many of these beds, the damage resulted in increased fruit rot.

Dry: Once again in 2014, in the later part of the summer and into the fall, lack of rain became a challenge -- during one period from August into September, East Wareham recorded only 0.75 inches of rain in a 42-day period. Many growers delayed harvest due to lack of water.

Extreme: Whatever rain we did get in the summer and fall was predominantly in 'large storm' events. This seems to be a developing and continuing pattern of climate change along with dry conditions for long stretches in the summer. In addition to the event in July discussed above, August and September were very dry; what little rain we recorded came in single events each month. In August 40% of the total for the month was in a 1.09-inch event on the 2nd; in September 50% of the rain was in a single storm (0.72 inches) on the 26th. October was a wet and warm month, but again 40% of the total rainfall occurred in a single 3.26-inch event from Oct 23-24. As a wetland crop grown in systems that include a large capacity for water storage, cranberry can almost always withstand extreme storm events, even if the bogs become flooded. Unfortunately, in 2014, one of those events came during bloom, the least flood-tolerant stage.

Irrigation

Irrigation as it relates to fruit quality, including rot and 'scald', was a hot topic again this year. More growers appear to be implementing soil moisture monitoring with tensiometers or similar devices, but many continue to rely on the 'feel' test. As noted above, one grower implemented sensors, reduced irrigation duration (1.5 hours from the previous 3 hours) and frequency, and saw a marked decrease in fruit rot. But most of the discussion centered on the use of irrigation to cool the fruit on hot days.

Cooling irrigation: There was an extended discussion around the topic of fruit overheating, particularly as relates to the large berries (and large fruit loads) on the new hybrid cultivars. Carolyn explained that all of the older hybrid and native selections had a genetic limitation on the average number of berries per upright stem; there is only enough leaf area to support an average of 2 berries, based on the amount of photosynthesis and resulting carbon compounds that can be produced. Larger leaved plants like Stevens support 2 large berries, while the more spindly Early Black support 2 small ones. This carbon-resource limitation has been overcome in the newest cultivars due to much increased leaf area (larger and more leaves). However, a question has arisen as to whether that leaf area is great enough to support the fruit *transpirationally* during periods of stress. Cranberry **fruit** cannot cool themselves. They are cooled in the process of transpiration in which water is drawn up through the roots and out through the leaves. This process cools the entire plant, including the fruit. So the questions are these: Is there enough leaf area to cool the greater fruit load? Is this only an issue in young beds where the leaf canopy may not yet be fully developed? If the answer to the last question is yes, is the problem too little leaf area, hotter fruit (due to exposure), or both?

The stress caused by heating the fruit is likely a contributing factor to high fruit rot rates in young beds and may be involved in the splitting seen on Demoranville. If fruit heating is an issue, how can it be overcome? There followed a discussion of using in-day irrigation for the purpose of fruit cooling.

In-day Irrigation. Several growers reported using a technique of brief irrigation beginning at a trigger temperature and running for a set period of time or until the sensor temperature dropped by a set number of degrees. These are two of the protocols:

- 10-minute run initiated each time the sheltered on-bog temperature reached 90°F;
- Run when temperature is 90-100°F and stop when temperature drops 20° -- this resulted in 20-30 minute initial run and much shorter subsequent ones over the course of the afternoon.

Both of these protocols and other similar ones noted in the discussion were accomplished using automated systems. During the summer, a grower discussed with Carolyn using these techniques on a few of his bogs. His start trigger was 105°F; run time was 15 min.; and cool-down achieved was 15-20°F. On some of his locations (always the same ones), a single cycle kept the bog cool for most of the afternoon; at others temperature returned to the trigger value in 1-2 hours. Best results were on days with some light wind. A grower doing this technique manually noted that in 8-10 minutes of irrigation, the canopy temperature went from 100°F to 80°F. The growers using the protocols above reported significantly less rot this year after starting this regimen. However, one noted that his was a young bed and the canopy was much thicker than it had been last year and that may have also contributed to the improved quality. *Side note:* Peter Oudemans later reported that cooling irrigation *increased* rot in NJ if the trigger temperature was 90°F but not if it was 95°F or 100°F.

In answer to a question about sheltering the thermometer, Peter Jeranyama reported that in his research the average difference in temperature between sheltered and unsheltered thermometers was 5-6°F. A concern was also raised regarding such short cycles when using an electric pump and how this might overstress the equipment. Finally, the question was raised regarding spotting of fruit due to the drops of water left between the irrigation events when doing brief-burst cooling. No grower reported this to be an issue and Carolyn noted that this ‘magnifying lens’ phenomenon is not supported by any science. However, if puddles are forming as a result of this irrigation, that might lead to heat scald.



Pop-up head issue: Woody Hartley brought in some pop-up heads from his bog that had been in service for about 8 years on a renovated bed. He noted that since this was a renovation, there had already been several sanding events. As a result, heads began to ‘hang up’ following an irrigation (they did not slide back into the housing properly). The pop-up heads have been buried and need to be raised, a very laborious process. But even more concerning was the red vines he was finding around many of his heads. When he investigated, he found scoring on the interior of the risers (see photo next page) due to sand that had gotten in - this was also causing the head to fail to retract. The scoring

was allowing water leakage which he assigned as the cause of his red vines (too much water and chemigated compounds are deposited near the heads due to the leaking - see puddle around the running head). Solutions that have been offered to his problem include, replacing the head with a similar one (approx. \$30 each and will be subject to the same wear issues), coating the riser with resin to repair it (tricky at best), adding an extender before the problem occurs (extenders do not yet exist and the cost to build a mold to make them is ~\$10K), or switching out to more expensive stainless steel risers (recommended by the manufacturer for sandy soils). All of these present enormous cost and time challenges. Other growers in the room noted that they had needed to raise up their pop-ups over time and one indicated that he had built a protective sleeve for his since he preferred to have them deep enough not to interfere with harvesting equipment and still avoid getting sand inside. In all of these situations, changes in the height of the riser relative to the bed surface has the potential to affect spray patterns. This appears to be a problem that won’t be going away soon. Creative solutions are welcome!

Another grower noted that his big problem was coyotes chewing the plastic heads! *Side note:* This led to many sharing coyote stories about lost sensor wires and other equipment. At the end of the session

Peter Jeranyama showed some growers a flexible teflon sleeve that he uses to protect sensor wires at his research sites.



Weeds

As in 2013, the most discussed weed was dodder. Poverty grass was also mentioned as a continuing weed of concern. Other weeds, including poison ivy were covered in a discussion of herbicides and herbicide tank mixes.

Dodder: This weed continues to be a huge issue with no single silver bullet for management. The group was split regarding their success with Casoron, some used it annually with good result, others had poor outcomes. It was noted that relaxing management of this weed leads to long-term problems since the seeds deposited in a given year can continue to germinate for 20+ years. In addition to debilitating the plant in the current year to the detriment of fruit production, the loss of resources to the parasitic weed also

limits bud production for the following year. *Side note:* Dodder in bird seed was discussed. A subsequent internet search indicated that, since the late 1980s, imported bird seed (the culprit) has been required to be heat sterilized to prevent any dodder seed from germinating.

Potential strategies for dodder:

- Take advantage of the naturally occurring fungus that attacks the weed. This has been tried including the development of a bioherbicide based on the fungus. The problem was that the fungicides used for fruit rot (including all but Abound in our current tool kit) also kill the dodder fungus! It was noted that abandoned bogs and organic bogs (no standard fungicides used on either) often have no dodder. This may be worth further validation as we change fungicide protocols, including elucidating a model of the disease development in dodder. Interestingly, NJ, where fungicide use is greater than in MA, has little problem with dodder.
- Late water - this one got mixed reviews in the group. We suspect that floods are more detrimental to seedlings rather than seeds that have not yet germinated and some success may be related to this. However, it is worth noting that some late water users do not use fungicides in the late water year (see the previous bullet).
- Summer flood (3-5 days) - this is a good alternative if you are not producing a crop, but, otherwise it coincides with bloom. A summer flood was used effectively on a mowed (non-producing) bog.
- Back to Casoron. Failures with this product may be due to its short longevity and missing the germination window of the dodder population, which can extend over a long period. Many growers report using Casoron at 40 lb/a for dodder control. Katie Ghantous (Weed IPM lab) described efforts to evaluate higher Casoron rates (60-80 lb/a) applied in a split to bracket the continuously germinating dodder population. Preliminary results look promising.
- Tank mixes of registered post-emergence products. Hilary noted that they are having some success with spot sprays of fairly concentrated Callisto (rates that would allow only about 1/5 of an acre to be treated under the label limitations), with or without Poast. A label change for Callisto to reflect such a use is being pursued. Spot treatment applications made to dodder patches were successful at reducing the amount of seeds produced. Applications PRIOR to flowering were more effective for limiting seed production by dodder than application made after dodder flowers. However, if the bog has an existing seed bank, an effective treatment will need to be deployed over numerous years.
- New compounds are being explored but at present the registrants for the most promising candidates are not interested in adding cranberry to their labels. Discussion with these companies will continue.

- Trash floods and raking trash out of any flood during the season can be another useful strategy. It was noted that much of what is raked out of the flood contains dodder seed.
- Quinstar is working for at least some of those who have used it, particularly when it has been applied 2-3 years in a row. This material still has MRL issues for the European Union but an import tolerance is being pursued. We estimate that we are at least 2 years from completion of that process.

Poison ivy: This weed is a big winner in the climate change game since it responds positively to the increased CO₂ in the atmosphere. Growers and Hilary's group are having success with spot sprays of fairly concentrated Callisto (rates that would allow only about 1/5 of an acre to be treated under the label limitations) with or without Poast or adjuvants (in preliminary data, Callisto + crop oil or NIS looks promising). Once the lowest effective concentration and combination is identified, a recommendation will be made that identifies the amount per gallon of spray mix and the percent of an acre that could be treated with that mix.

Postemergence Applicators: One grower reported excellent results in controlling grasses on new plantings with a boom sprayer-applied mix of Poast and Callisto. It was noted that ground rig (modified Gebhardt) applications of Callisto are much more effective than chemigation applications and can even target difficult weeds like brambles (dewberries).

Miscellaneous Herbicide Notes: Devrinol DF will still be available in 2015 but not likely thereafter as it is being replaced by the XT liquid product. Growers indicated that neither product is particularly effective and definitely less effective than the old 10G granular product. It was speculated that this may be contributing to the increased issues with Poverty Grass.

Use of Callisto is down while use of Poast is up some and use of Select Max is rapidly increasing. This alternative to Poast has a 30-day PHI (Poast is 60 days) and targets both annual and perennial grasses. In addition, Select Max can be used with a nonionic surfactant, while Poast needs to be mixed with crop oil concentrate. However, Select cannot be applied between hook and fruit set. Evital use is very limited.

Casoron use is way down and the few applications that are going out are targeting dodder. Timing appears to be very important for efficacy with this herbicide. Casoron's impact on roots was discussed. Carolyn reported on an Oregon study where plots on an established bog were treated with 50 lb/a Casoron. New root formation was delayed by ~6 weeks. One of the growers who used Casoron extensively for dodder had many beds with Yellow Vine (YV) in 2014. YV is known to relate to impaired root function in excessively dry or wet beds and is also intensified by Casoron use. Casoron does have the potential to control 'volunteer seedlings', off-type cranberries arising from seeds in fruit left behind in the bed (see new planting discussion later in this article).

Insects - insecticides

All in all, 2014 was a fairly 'normal' year for the standard cranberry pest insects. However, two new insect problems appeared. One, a small golden-brown beetle, was new to cranberry and attacked flowers on two beds this summer. The other was scale, an insect described in the past by Henry Franklin and other growing regions but not seen in Massachusetts for decades. Two scale species were identified: Putnam scale (two generations/season observed) was far more common and was confirmed at more than 10 sites throughout the cranberry region while two infestations of Dearness scale (one generation/season) were observed, one in Plymouth and the other in Taunton.

Anne Averill reported that scale could be managed with a diazinon spray timed to the emergence of the juvenile 'crawler' stage. Such a spray killed the crawlers and the adults that remained under the 'shell'.

In other crops, scale is managed with a dormant oil application. This is currently difficult to recommend in cranberry since we have no efficacy data. An efficacy trial would require large infested areas that could not be managed with other means and that represents a huge financial risk!

Sparganothis was briefly mentioned. Anne noted that if only 'soft' chemistries are used, the natural enemies that build up in the system primarily attack Spag. Marty Sylvia pointed out that growers reporting late season infestations would have needed to manage the insect back in its first generation in the spring, as this is the only truly viable way to control Spag.

Insecticides: Use of Avaunt and Delegate was down a bit in 2014, while Altacor use increased. Diazinon use is at about 1/3 of what it was two years ago. A question was asked regarding the recommended length of the interval between Altacor sprays when managing Cranberry Fruitworm (CFW). Anne indicated that she was not comfortable with anything longer than 10-12 days between applications, particularly in the earlier part of the egg-laying season, a time when fruits are forming and enlarging, when populations are highest, and when moths are migrating in from the surrounding uplands and other bogs. The interest in extending the interval between applications is related to the extended bloom periods being seen on new cultivars and the shift for timing the first application early, at 50% out-of-bloom. It was noted that the weather in 2014 dictated some longer intervals in applications due to lack of proper spray conditions.

Flea beetle: This insect remains problematic for many growers and can only be managed with diazinon. This is unfortunate as this insecticide kills beneficials that have built up over the season. The consensus was to use a threshold of 20 or more flea beetles before spraying.

Winter Moth: This moth is flying now, with reports of very heavy flight in the region following recent warm temperatures and rain. This insect lays its eggs on cranberry in the fall. In the very early spring, the larvae hatch and drill into the bud. Damage (unless looking at buds through a microscope) is not apparent until around bloom. Then you will notice areas with no flowers, which on closer inspection, show arrested buds with vegetative side shoots - looking much like the result of spring frost damage. However, inspection of the remaining bud will show the insect-feeding holes that damaged the bud. Since the larvae emerge so early, the consensus was that sprays needed to go on early - if you wait until mid-May, it is way too late! Delegate sprays have been applied as early as the third week of April to manage this pest. Avaunt also provides control.

Bees: Anne reported that bumblebees were similar in their population numbers to those in recent years but that migratory honeybees arrived late due to poor pollination weather in Maine blueberries and were in poor condition due to their travels (beekeepers reported losses with each move to a new crop). Despite that, no pollination deficit in the industry was documented. Several growers noted that although their bees were in poor shape on arrival, bee activity improved over time. Anne noted that her research into impacts of insecticides, fungicides, and combinations on bee survival will continue in 2015 using caged studies followed by observation in the lab. Preliminary results have been concerning.

Diseases

This was the first Crop Summit for Erika Saalau Rojas, our new plant pathologist. She discussed the development of protocols for managing fruit rot in the absence of Bravo for those growers limited by the export restrictions on this material in the E.U. She will be looking at field trials of alternatives including the newly registered Tavano, following up on some preliminary successes by Peter Oudemans in New Jersey. Longer term, she will be looking more closely into the integration of biological controls in fruit rot management.

She is also interested in fine-tuning the diagnostics of rot vs. scald and looking at weather models for predicting critical conditions. With the prevalence of weather equipment out there, including Peter Jeranyama's experiment sites, and other grower weather monitoring, the potential for weather modeling is good.

Footprint disease: Erika plans to work on this disease extensively in 2015, including partnering with Peter Oudemans' group to identify the causal agent. Several growers indicated success using Rampart fungicide drenches against this disease particularly in combination with sanding; vines are recovering and growing back into the gap. But they also noted that they are seeing another problem that was initially thought to be footprint. On some Stevens beds, dead areas appear that do not respond to the Rampart/sand treatment at all or do so only transiently. In these areas, no vines grow back. This may or may not be related to observations of small fruit on these Stevens beds.

Viruses: Erika reported that she had documented virus infestations on three beds in 2014. Tobacco Streak Virus (TSV) and Blueberry Shock Virus (BShV), previously confirmed in WI are now in MA. She is asking for growers who observe the fruit scarring symptoms in 2015 to let her know. For more information and photos of the symptoms see the insert between pages 4 and 5 of the Nov. 1, 2014 Station newsletter. This url (<http://www.umass.edu/cranberry/pubs/newsletter.html>) takes you to a list of newsletters, click on Nov 1, 2014 to view that edition.

Fungicides: A discussion of efficacy in relation to dense canopies included Peter Oudemans indicating that this was a concern in NJ where materials are applied by air and are not penetrating into the canopy to reach the developing fruit. Carolyn noted that in a study of sanding and pruning at Rocky Pond bog, spray applied via chemigation penetrated throughout the canopy even in the untreated densest canopy plots. It was noted that if chemigating dense canopies with pop-up heads, due to the slow rotation times, it is best to pre-run for about 10 minutes to wet the canopy prior to injecting fungicides in order to assure penetration to all of the fruit.

As previously noted, there are MRL issues with Bravo in the E.U. In addition, this material is unlikely to be available for purchase until at least the third quarter of 2015 due to lack of source material from the primary manufacturers in India and China. Stay tuned for alternative recommendations at our winter meeting and through your handler. Erika and the other cranberry plant pathologists are developing these recommendations now. A big concern will be possible development of resistance with the newer chemistries, particularly Indar, Abound, and Proline. In its first available year, use of Proline was extensive in 2014 and Indar and Abound have been in the rotation for several years now. Erika plans to study this in 2015 using fruit from beds that have heavy rot history and that have been sprayed with these compounds. The fungi collected from these beds will then be tested in plates to determine their sensitivity (or resistance) to the fungicides.

Side note: Some growers indicate that they are increasing the number of fungicide applications for fruit rot on their newer cultivars with fairly short intervals between applications. The bloom period on some is extended and since these are young beds, rot can be an issue (potentially brought on by heat stress as discussed in the irrigation section). This may play further into concerns for resistance development, however.

Nutrition and general physiology

There was a specific question and discussion regarding high Mn (manganese) found in tissue tests. Carolyn indicated that this is often a sign of poor drainage since the form of Mn that exists in saturated conditions

is readily taken into the cranberry plant. Peter Jeranyama also noted that in his research into Yellow V ine (YV, often caused by wet soils), the Mn levels in the YV plants were elevated compared to those in the non yellow controls.

Is there an ideal upright density? Carolyn indicated that 500 uprights per square foot was a good minimum number but some growers indicated that it is often much higher in other regions. A discussion followed about the perils of too dense a canopy (lack of spray and bee penetration, breeding ground for fungi) and too thin a canopy (fruit overheating as discussed earlier). Carolyn also noted that beyond a minimum upright density, the length of leafy area above the fruit on the flowering uprights is even more critical. It has been shown in tracer studies (Roper lab from U. Wisconsin-Madison) that the carbon compounds that make up the fruit on an upright come from the photosynthesis that takes place in the leaves above those fruit on that same upright; little is translocated from the surrounding uprights nor from the leaves below the fruit. This in turn led to a discussion of nitrogen (N) rates for newer, high-yielding cultivars.

N rates: As noted in the Weather section, splitting of Demoranville fruit has been observed in MA, NJ, and WI. In addition, all of the newer cultivars have reported incidence of severe fruit rot. Does this relate to high rates of N? All of the Demoranville beds with observed splitting are receiving in excess of 60 lb/a N but that is not evidence of cause and effect. So how much N do these varieties need? Their breeder, Nick Vorsa of Rutgers, describes his selections as being ‘tolerant’ of high N rates, meaning that their yield does not peak and then decline as N rate increases (as is common for older hybrids and natives). However, we should understand that these plants do not necessarily need to receive the highest rates that they ‘tolerate’. A suggestion was made that in addition to a base rate of 15-24 lb/a N selected for soil/bed type, 10 lb/a N should be added per 100 bbl/a of expected fruit production. The lower base rate would be used for older beds and those with a deep peat base. Such beds have a greater potential for N mineralization in the soil, making more N available to the plants from that process in addition to the N added in fertilizer. The side note below looks at this idea further.

Side note: My dissertation included this calculation for Early Black (yes, it was that long ago!!): In that variety, 100 bbl/a of fruit has 5.1 lb N and the leaves that are removed in harvest and detrashing have an additional 13.4 lb N. So for a 150 bbl/a average Early Black crop, 21 lb/a N is removed from the system. The study bed received 1.4x of that amount or 30 lb/a N. Since fertilizer use is not 100% efficient, that made pretty good sense. Using the 15 lb/a N rate from the suggested protocol and 15 lb for the 150 bbl/a production would give the 30 lb/a N used, so a good match. Now lets look at this protocol for a 400 bbl/a potential crop on a new planting of Rutgers hybrids. Here we would use the 24 lb/a base rate (sandy new bed soil) and 40 lb/a for the 400 bbl/a crop potential or a total of 64 lb/a N.

Now lets revisit my dissertation calculations. Percent N in the fruit of all the known cultivars appears to be pretty similar, so the N removed in fruit for different size crops can be extrapolated from the 100 bbl Early Black figure of 5.1 lb N. *But* the leaf area in the newer cultivars is much greater than that in Early Black, perhaps double. So while the percent N in the leaves is similar across cultivars, the newer ones have more leaf mass so more N is needed. If we double the leaf N calculated for Early Black, we get 27 lb/a N for the leaves. Calculating for a 400 bbl/a crop we would get: $5.1 (100 \text{ bbl}) \times 4 = 20.4$ for the fruit plus 27 for the leaves, or a total of about 47 lb/a of N removal in the 400 bbl crop. If we again assume a factor of 1.4 for lack of efficiency, we get 66 lb/a N as the rate for that bed. This should be adequate to support the 400 bbl crop. Higher rates may be ‘tolerated’ but may be unnecessary. On the flip side, N rates that are too low may limit production on these cultivars. In summary, both methods gave approximately the same answer of about 65 lb/a N for a 400 bbl/a hybrid crop on sandy soil.

NOTE - using high N rates on the new cultivars makes it even more critical to use low P in the fertilizer ratio to avoid excessive P application. Recommendations for NJ of a source of N that is high in P is based on a history of P deficiencies in that region - no such history exists in MA where the soil type is distinctly different.

Since to support good fruit set, there is a need for good leaf area above the fruit, fertilizer applications, especially for these large potential crops, cannot be delayed until set. For example, one grower indicated applying at 7-10 day intervals starting at early bloom and continuing through set to reach his total N application rate. On some beds, an even earlier start may be indicated to avoid stunted uprights.

Finally on this subject, the question: Does high N rate have an adverse impact on fruit quality? All the research on this subject included cultivars no more recent than Stevens. Those studies all found, that yes, increasing N application increases fruit rot. Here is yet another factor to consider when determining the vines' actual requirement. Why rot increases is not certain but denser canopies with overly long uprights would provide good conditions for fungal pathogens and the rotten berries found in such studies were often those deepest in the canopy.


Bed establishment practices: This was the concluding topic of the session and revolved around the question of how to deal with the small (or significant) amount of fruit in years 1 and 2 when there is no plan to pick for delivery. Several options are being used:

- Pick it anyway and discard it; this helps to train the vines for pruning later;
- Use fungicides so the fruit is not rotten and leave it on the plants;
- Crush the fruit and leave on the bed (I've heard of this previously);
- Find a chemical thinner to prevent bloom (being looked at in NJ, but no success so far);
- Flood at bloom for three days when flowers are open and before fruit form.

Any method that leaves fruit on the bed runs the risk of introducing 'volunteer seedlings' (aka mongrel vines) - these are individuals that come from germinated seeds of berries that are left behind. If any of these are vigorously vegetative, they can develop into off-type patches that increase in size over time and dilute the genetic purity and productivity of the bed. How big a problem is this? It depends. This has been observed on a small scale already in new cultivar beds in NJ. About 25 years ago, a survey of Stevens in the major growing regions showed good genetic retention in most regions (Stevens had been released for about 25 years at that time but was widely planted then for about 10 years or so). But in WA, after only 7-10 years in the ground, up to 40% of the samples within many Stevens beds did not "type out" as true Stevens. So, the best practice will always be to remove all the berries from the beds each year, even during establishment.

Note: Product trade names are used for convenience and are not meant as an endorsement of any particular product.

CAROLYN DeMORANVILLE,
STATION FACULTY AND STAFF



Carolyn DeMoranville, Director

CRANBERRY STATION NEWSLETTER & REVISED 2015 CHART BOOK RENEWAL
YOU MUST RETURN THIS FORM EACH YEAR TO STAY ON OUR MAILING LIST !!

The Cranberry Station Newsletter is provided **FREE to all MA growers, cranberry researchers and IPM consultants nationwide**. Annual subscription fee of \$15 is required for **out-of-state growers and industry personnel**. All persons wishing to receive this newsletter (whether paying or not) must complete and return this renewal form to maintain a subscription. All out-of-state or industry personnel must include a check (made out to UMass) with the renewal form. **All subscriptions sent by email, including out-of-state and/or industry personnel are FREE .**

**Everyone must respond to this notice by Dec. 31, 2014
or your name will be taken off of our mailing list for 2015!**

NAME _____
COMPANY _____
ADDRESS _____
TOWN _____
ZIP _____
PHONE _____
EMAIL _____

Please check one:

Owner _____
Employee _____
Researcher _____
Consultant _____
Industry _____
Private sector _____

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

Please Choose One!!! Postal delivery _____ or Email _____

Registration Form for UMass Cranberry Management Update
Wednesday, January 14, 2015 7:30 AM - 4:00 PM
Radisson Hotel Plymouth Harbor

Please register for the meeting using this form.

PLEASE PRINT

NAME _____
EMAIL _____
PHONE _____

ADDITIONAL ATTENDEES _____

Return with payment by:
January 7th, 2015

Include check made out to:
UMASS
In the amount of:

\$30.00 PER PERSON
IF POSTMARKED BY 1/7/15
AFTER THAT DATE, REGISTRATION
INCREASES TO \$40.00 PER PERSON

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

*****ALL Meeting attendees (whether receiving credits or not) MUST register and pay *****

**UMass Cranberry Management Update
Wednesday, JANUARY 14, 2015
Radisson Hotel Plymouth Harbor**

- 7:30 Registration (with coffee)
8:00 What's new? Carolyn DeMoranville
8:30 Weed Biology affects Weed Management, Hilary Sandler
9:00 Weed Management Research Update, Katie Ghantous
9:20 Fruit Rot Management, Erika Saalau Rojas
9:40 New Virus Disease and Footprint Disease, Erika
10:10 Coffee break
10:40 Nitrogen Movement in Cranberry Water: Panel
 Buzzards Bay Coalition, Marine Biological Laboratory, DeMoranville, Kennedy
11:40 Drain Tile Management, Nick Alverson
12:00 LUNCH BREAK (on your own)
1:15 Processes of P Loss in Cranberry Floodwaters, Casey Kennedy USDA-ARS
1:45 Recommendations for Frost Cycling, Peter Jeranyama
2:15 Insect Outbreaks in Cranberry, Martha Sylvia
2:45 Cranberry Pollination, Anne Averill
3:30 Advising Adjuvant Use, to be determined
4:00 Wrap-up and Paperwork

REGISTRATION PAGE 11

UMASS CLOSING DATES:

UMass has instituted a policy of closing its facilities for the last two working days of the year. As a result, the **Station will be closed on Tuesday and Wednesday December 30th and 31st as well as on Thursday January 1st**. We will be open December 24th, 26th and 29th and January 2nd, but expect reduced staff due to folks taking holiday leave.

UMASS EXTENSION
UNIVERSITY OF MASSACHUSETTS
P.O. BOX 569
EAST WAREHAM, MA 02538
OFFICIAL BUSINESS