Integrated Cranberry Crop Management for Wisconsin

UW Extension
University of Wisconsin-Extension

Cranberry Crop Management Journal

Volume XXIX • Issue VI

June 27, 2016

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ADDRESS CORRECTION

Contact us if you have any address corrections, additions, or deletions.

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CRANBERRY NURTRIENT MANAGEMENT: NITROGEN

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This is the first in a series of articles on fertilizer nutrients based on extension materials developed for Massachusetts cranberry growers but based on studies conducted over the last 20+ years by a group of researchers from all the cranberry growing regions.

Nutrient management decisions should be based on the needs of the plant. The essential mineral elements are required for the plant to complete its growth and development and for the production of fruit. For maximum crop production, cranberry bed management must optimize photosynthesis by assuring adequate leaf area, provide adequate but not excess water, and provide the required mineral elements in the right amounts, in the right form and at the right time. Management must be flexible, adjusted for changing weather and observations of the plants.

Recommendations for cranberry fertilization focus largely on N, and then on potassium (K) and phosphorus (P). Added nutrients are required to replace those removed in the harvested crop and associated leaf trash. N is the element that is removed in the greatest quantity and that is found in the highest concentration of all of the nutrient elements when plant leaf tissue is analyzed. N compounds are the building blocks of proteins, including chlorophyll and important enzymes, and the genetic material, DNA.

Decades of research trials support the need for added N in cranberry production. Applied N fertilizer is <u>not</u> primarily used to produce fruit in the current year; rather it supports the building of the new growth that is the photosynthesis factory to support future production. In our research, current season N applications correlated to current season yield only 10-15% of the time, while in almost all cases applied N correlated significantly with production in the following two years.

With N fertilization, the aim is to provide enough N each year to produce a stand of uprights with adequate density (at least 400 per ft. sq.) and length (foliage above the flowers/fruit of 1.5-2 inches) that will support an optimal crop of good quality fruit. When the upright stand is too dense or too long, shading occurs, pollinators may be impeded, and conditions are perfect for fungal rot infections. A thin, stunted stand will not support a large crop since there will not be adequate leaf area, leading to a deficit in photosynthesis and a shortage of carbohydrates for making fruit. N rate ranges recommended in Massachusetts can be viewed in the Nutrient Management section of

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our Chart Book at http://ag.umass.edu/cranberry/publications-resources/cranberry-chart-book.

Within recommended N rate ranges, previously observed outcomes, tissue test results, and observations of the plants' color and growth are used to chose a specific rate for each management unit. Some potential yearly adjustments to the selected N rate might be made for these conditions:

- If vines are stunted or yellowed and tissue N is low - use more
- If vines are stunted or yellowed and tissue N is high - look for other limiting factors
- If vine growth is adequate (see above) and tissue test is in the normal range - continue with the chosen rate
- If vines are rank or leggy and tissue N is low - use less or change timing, vegetative growth is being favored over production
- If vines are rank or leggy and tissue N is high or adequate - use less
- If yield potential is limited by pest damage or frost - use less

Most cranberry growers in Massachusetts apply N in NPK fertilizer (aka 'complete fertilizers') primarily to reduce application costs when N, P, and K are all needed. In such fertilizers, the first number on the bag is the percent N in the material. Since P requirements are substantially less than those for N and K, materials with high middle numbers (phosphate) are avoided. This is especially true of materials with the middle number higher than the first. The best available evidence indicates that cranberries often respond poorly to nitrate N, especially in the absence of ammonium N; therefore we recommend the ammonium form be used. Urea formulations are considered ammonium types since urea breaks down into ammonium units. Another advantage of ammonium is that, unlike nitrate, it does not rapidly leach through the sand.

It is best to time N applications by the growth stage of the plants. Cranberries primarily use N during three stages, early season leaf production, fruit set, and bud set. When N is applied pre-bloom, it is rapidly taken into the plant and moved to the new leafy growth. While such applications can assure adequate upright length, adding too much N at this stage can lead to excessive growth. In older beds, where organic matter may be greater, early season applications are not always needed. In such beds, early season N needs may be met by mineralization of N in the organic matter along with remobilization of the stored N in the plants. Early season N applications are in order if upright growth is not adequate to provide sufficient leaf area above the flowers/fruit.

Fruit production is a very high demand period that extends from earliest set to about 3 weeks after the final fruit are set. Bud set is occurring during fruit set, so set applications also support this function. Since the fruit set window is such a high N demand period, it is not unusual to see some loss of green color in the leaves above the fruit as the fruit are drawing N from both those leaves and the soil. Minor yellowing is normal, severe overall yellowing can indicate inadequate N fertilization. Applications planned for the fruit set/bud development period are often split into 2-3 events, allowing for adjustments based on response. By about 3 weeks after all fruit are set, mineral movement into the developing berries is complete. Berry sizing after that point depends on adequate moisture and photosynthesis. If your leaf area is good and your irrigation practices are on target, the plant will take it from there!

A Study on Flower Induction and Differentiation in Cranberry

Amaya Atucha and Jenny Bolivar
UW-Madison Department of Horticulture

The accompanying picture was inadvertently left out of the last issue so this article is being re-run in its entirety.

As many other fruit crops, cranberry uprights alternate between years of high and low fruit production. This phenomenon is called alternate bearing, and it is related to the capability of individual uprights to set flower buds that will support fruit production the following year. Older cultivars (e.g. Ben Lear) show a stronger alternate bearing behavior than recently released cultivars (e.g. HyRed), which have a more consistent yield every year. Uprights from recently released cultivars, such as HyRed, can set a reproductive bud by the end of the summer, independently from the nature of the upright (i.e. vegetative or fruiting uprights). Recently histological studies of apical buds, have revealed that there are differences between cultivars in the time when the floral meristems are observed for the first time in the apices of the uprights. These differences were noticed even before bud set could be visually distinguished (late spring-early summer). Despite this recent findings, little is known about the stage of the meristems during and after the dormant period and what are the process influencing the set of reproductive buds and its difference across cultivars.

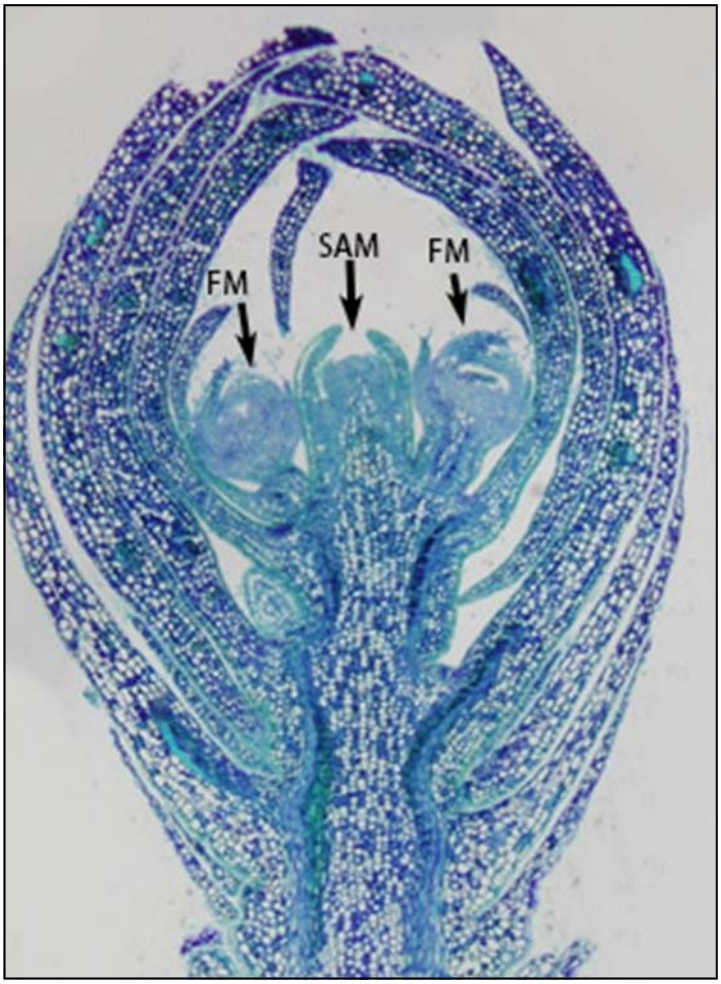

Figure 1. Longitudinal section of cranberry bud during summer on a vegetative upright. Notice the lateral floral meristems in early stages of development. SAM = Shoot apical meristem. FM = Floral meristem.

Based on the previous statements, the Atucha Lab at UW-Madison, is interested in further exploring histological and phenotypical analysis in buds of cranberry to understand when flower induction happens and what are the factors (e.g. plant hormones, nutrients, cultivars) involved in the flower meristem development. Currently, we are exploring flower bud development during fall and winter (Figure 1) to answer the question: do flower buds continue to develop during winter? And what is the relationship between bud size during fall and number of flowers, fruit set, and fruit production. A second study evaluates the effect of applications of plant growth regulators in the development of floral meristems. The results of these studies will help us elucidate which factors are governing flower induction in cranberry, and could potentially help develop management practices to promote flower production.

We want to thank the Wisconsin Cranberry Grower Association, Cranberry Institute, and Ocean Spray for the support and funding of this project.

GROWER UPDATES

Adams 73 Cranberry

Pea size fruit has been showing up on all of the varieties for the last week. Bee activity has been very good this year. Outside of the bee that decided to sting me on the tip of my nose, I have been very happy with the bees this year.

Nitrogen applications have been happening when we want them to happen vs when mother nature allows them to happen. Crop potential is looking good.

One negative from our recent nitrogen applications is that the grass in our bed is flourishing this year. Our spring herbicides seem to be petering out early this year. My guess is that an excessive amount of frost protection in May is the reason for this. I guess we will have to be proactive with our round up wiping over the next few weeks. Job security!

Jeff Hopkins
Adams 73 Cranberry

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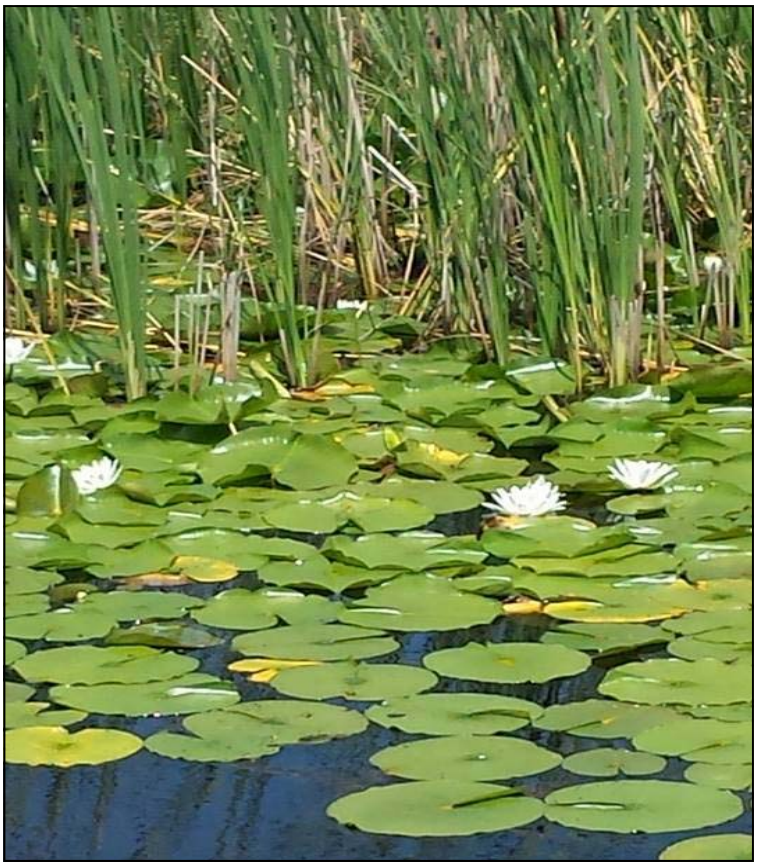
Habelman Bros. Tunnel City

Last weeks weather was hot and humid. The vines were in full bloom and starting to set fruit. We have several applications of fertilizer on. We will be applying more fertilizer through the next couple of weeks. Some of the beds are showing YELLOW VINES we are applying a liquid foliar.

The growing degree days is at 1632. The soil temperature is a 67 degrees. A fruit worm spray will be applied in the coming week.

GO BREWERS!!

Steve Schoonover
Team Habelman



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