Integrated
Cranberry Crop
Management
for Wisconsin

Cranberry

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Contents:

Clover in Cranberry Beds

Clover is an increasing problem for cranberry growers. Clover found in cranberry beds is predominately Alsike Clover (*Trifolium hybridum* L.). Alsike clover is believed to have originated in northern Europe and was introduced into the United States in 1839. It is grown as a forage crop in the Great Lakes States, northern California and Oregon. It is adapted to wet soils and will tolerate flooding. It is more tolerant to both acid and alkaline soils than other clovers. It is a perennial, sprawling plant with succulent stems reaching a height of 1-3 feet. Plants have 3 leaves on long petioles. Flowering occurs May through August. Flowers begin a white color and turn a pink color during June and July.

I think there are a number of factors that have led to clover becoming more invasive over the last few years. As growers looked for ways to cut costs mowing dikes was an obvious one. Mowing would have cut off flowers, thus limiting seed production. Clover seeds are relatively long lived in the environment. Once a seed bank has been established in a bed it is likely that clover seedlings will emerge for many years. However, Casoron should keep these seedlings under control—at least in the spring.

The question has arisen whether increased use of potassium (K) fertilizer has contributed to the growth of clover and its spread in beds. That is an interesting question. Clover is able to fix nitrogen from the atmosphere so nitrogen is rarely limiting for its growth. Cranberry beds are relatively low in N compared to other crops so a plant that can fix N has a distinct advantage to other weeds. Once a plants K requirements are met providing additional K will not make it grow more aggressively. (The same is true of cranberry.)

Clover is relatively tolerant of Roundup. A single wiping won't control clover and wiping multiple times is expensive and not always effective. Stinger herbicide will control clover, but sometimes a single application is not sufficient to do the job. Further, Stinger will damage cranberry uprights and will reduce the crop for a year or two after application. We have recommended post-harvest fall applications of Stinger to control clover. In conversations with Brad Majek of Rutgers University he suggests that may not be the best timing to control clover in our climate. He thinks perhaps a late spring application would give better control.

Even if you experience some vine injury and localized crop loss with application of Stinger, the injury would not exceed continued crop loss due to unchecked clover growth. I think some phytotoxicity is a small price to pay to get an aggressive weed under control. I wouldn't recommend making a general broadcast application over a bed, but the damage incurred via spot spraying seems tolerable to me.

Teryl Roper, UW-Madison Extension Horticulturist

Micronutrients

Micronutrients required by plants include iron, manganese, boron, copper, and zinc. As the name suggests, micronutrients are required by plants in extremely small amounts. Normal concentrations for these elements in cranberry tissue range from 4 to 60 ppm.

Table 1. Normal ranges for tissue concentrations of micronutrients in cranberry.

Element	Normal concentration
Boron	15-60 ppm
Iron	>20 ppm
Manganese	>10 ppm
Zinc	15-30 ppm
Copper	4-10 ppm

Unless a tissue test shows that values are deficient or dropping it is not necessary to make annual applications of these nutrients. Much of these elements are retained in the perennial portions of the vines and little is harvested with the crop. Further, our soils typically contain adequate amounts of these elements. If you choose to make applications of micronutrients the question isn't how many pounds per acre, but how many ounces per acre.

If a tissue test shows a deficiency of one of these elements you may consider applying a liquid fertilizer. In this way there may be some absorption through the leaves and the balance will wash off into the soil where it can be taken up by the roots.

Like most things in life if micronutrients are "overdone" problems can ensue. Micronutrient toxicity is a real risk. If tissue tests show concentrations of Boron or Zinc much above 100 ppm and if you are making annual applications you should carefully reconsider your program. Fortunately, micronutrients will leach. Copious irrigation will help move excess ions below the root zone.

I know of no research on cranberries (or any other crop) that shows a yield response to application of micronutrients to obtain tissue test values above the normal concentrations.

Teryl Roper, UW-Madison Extension Horticulturist

Reflections on NACREW

The North American Cranberry Research and Extension Workers Conference was held October 8-10 in Massachusetts. As the name suggests, this biennial event attracts researchers and those who communicate the research to growers. Our hosts at the University of Massachusetts Cranberry Experiment Station and Ocean Spray Cranberries put together a great program and took care of all the details that occur behind the scenes. The meeting was somewhat smaller this year as there are fewer people working on cranberry related issues. Regardless of the size the meetings are very useful to bring people together to discuss issues that face the industry and to coordinate research so the work is done efficiently.

I thought I'd share with you some of what I thought were the high points. Hopefully more details will be coming out in the future from those who are doing the work.

Irrigation. A Massachusetts grower reported on their use of gear driven pop-up sprinkler heads for cranberries. These heads were developed for use in turf. They pop-up about 12 inches from the bed surface when water is pumped into the system. Otherwise they are flush with the bed. They don't have to be removed for the winter. They can be installed with existing buried plastic pipe using saddle taps and a short length of flexible tubing. They work with existing 50 X 60 or 40 X 50 foot irrigation layouts. These heads have much greater uniformity of application than impact type heads. However, they turn slower and that may be a potential problem for frost protection.

Storage. Using controlled atmosphere storage (low oxygen, with various levels of CO_2) did not prolong the storage period of fresh cranberries. High CO_2 reduced rot, but increased the incidence of physiological breakdown.

Phosphorus. Work in Canada is focusing on phosphorus availability as a function of soil pH, calcium, aluminum, and iron. They developed a formula for the relationship between soil P and Al. They found that increasing soil or tissue P did not increase anthocyanin content of fruit. Further they did not find a strong relationship between P fertilization and yield. Beds with high yields removed only about 5 kg P/ha. They found cranberries could be produced with less P fertilizer than previously thought.

Mycorrhizae. Research in Wisconsin showed that cranberry roots are widely colonized by ericoid mycorrhizae. There was not a cultivar effect, but there was a bed age effect with seemingly less colonization in older beds.

Vinegar for weed control. Vinegar showed potential as a weed control agent in Washington. It showed good control for their primary weeds (false lily-of-the-valley) and showed some positive results for Rubus species. Registration and more testing will be required before growers could use this as a weed control agent.

Stem gall. IAA producing bacteria are apparently associated with gall formation on cranberry stems. Species in the Enterobacteriaceae were associated with gall formation and produced IAA in culture. Reducing the incidence of vine damage will reduce the incidence of stem gall.

New plantings. Research in Massachusetts addressed vine density at planting and various weed control and fertilization regimes to determine those that were most economical for establishing new cranberry beds. The combination of low vine density at planting with moderate rates of N and an annual application of a pre-emergent herbicide was the most economical.

Cranberry Girdler trapping. A variety of different pheromone lures were used to increase the efficiency of trapping male cranberry girdler moths. Alternatives to the red rubber septum were not more effective. In addition, the current blend of pheromones in commercial lures was the most efficient at attracting male moths.

Bad men cannot make good citizens. It is when a people forget God that tyrants forge their chains. A vitiated state of morals, a corrupted public conscience, is incompatible with freedom. No free government, or the blessings of liberty, can be preserved to any people but by a firm adherence to justice, moderation, temperance, frugality, and virtue; and by a frequent recurrence to fundamental principles.

Patrick Henry

Wisconsin Cranberry School

Make sure that the Wisconsin Cranberry School is on your calendar. The school will be held January 20-21 at the Hotel Mead in Wisconsin Rapids. This is the primary winter educational meetings for Wisconsin cranberry growers. A trade show will be held on Tuesday January 20 that runs concurrent with educational sessions. Educational sessions will cover topics of interest to both managers and other marsh workers.

The Wisconsin Cranberry School is jointly sponsored by the University of Wisconsin-Extension and the Wisconsin State Cranberry Growers Association.

Cranberries on the Internet

Much information about cranberry production is available on the Internet. This newsletter is available online and it is sent out via e-mail to those who have indicated to me that wish to receive a copy this way. Please send me an e-mail and I'll include you on the mailing list. trroper@wisc.edu We hope to have old issues of the newsletter searchable on the web next year.

Web sites with good cranberry information include:
The growers association page
www.wiscran.org
The newsletter page
www.hort.wisc.edu/cran
The Steenbock Library cranberry page
http://www.library.wisc.edu/guides/agnic/cranberry/cranhome.html

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