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Soil nutrient interactions and their impact on Cranberry nutrition

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Address Correction

If you have any address corrections, additions, or deletions, please let us know.

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Thank you!

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Editor

Like all plants, cranberry vines need an adequate supply of essential macro- and micronutrients to reach their maximum yield potential. Macronutrients are those required in higher quantities by the plants (e.g. nitrogen, phosphorus, potassium), and micronutrients (e.g. zinc, iron, manganese, boron, copper) are required in far smaller quantities than any macronutrients. Although plants need different quantities of these nutrients, they are all equally important and “essential” to maintain plant health, achieve higher yields and higher fruit quality. However, plants not only require an adequate supply of nutrients, but also require this supply of nutrients to be balanced. When the nutrient supply is imbalanced, interactions among nutrients can happen in the soil (Fig. 1) and affect the availability of certain nutrients for plant uptake. When planning our fertility program for the growing season, based on tissue and soil test results from the previous year, we tend to pay more attention to those nutrients that are deficient or in the low ranges, and we rarely consider the possibility that high levels of a particular nutrient in the soil could have a negative effect on the uptake of other nutrients. Nutrients that behave this way are said to be antagonistic. Some examples of nutrient antagonism and interaction are provided below:

Nitrogen (N): High levels of N in the soil induce accelerated growth rates that can cause levels of micronutrients (manganese, iron, zinc, boron, copper, molybdenum) that would normally be marginal to become deficient. Lower levels of these micronutrients in cranberry plants that have too much N are the result of dilution because the excessive vegetative growth reduces the concentration of those other nutrients in the plant tissue. High levels of N in the soil can also increase the uptake of other macronutrients such as phosphorus and calcium. Low N levels in the soil can reduce phosphorus, calcium, boron, iron, and zinc uptake.

Phosphorus (P): High levels of P in the soil reduce zinc and, to a lesser degree, calcium uptake. In soil with low pH, as in cranberry beds, high levels of P in the soil can reduce the uptake of boron that is essential for pollen germination and fruit production.

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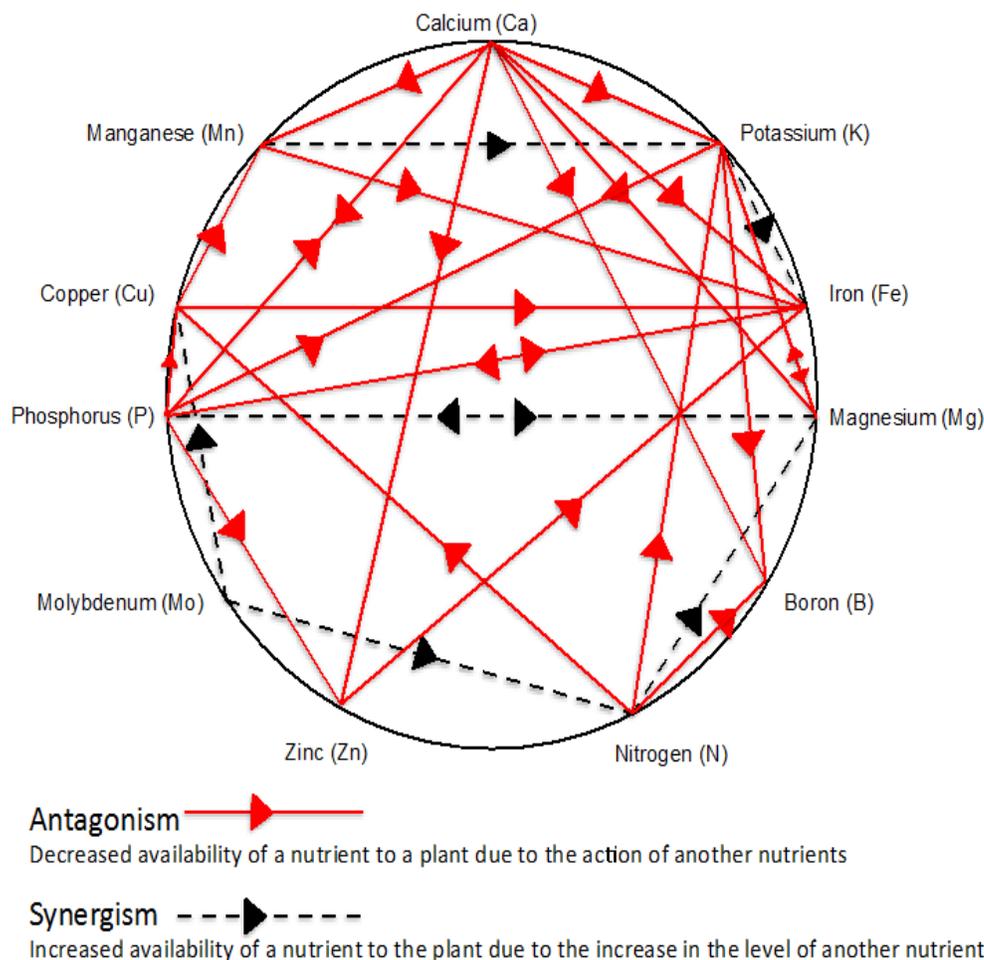
Potassium (K): High levels of K in the soil will reduce magnesium uptake by the plants. Magnesium is essential to produce and maintain chlorophyll for photosynthesis and is also involved in several enzyme systems. High levels of K will also reduce the uptake of calcium, iron, copper, manganese and zinc, contributing to low yields and fruit quality. On the contrary, low levels of K in the soil can accentuate iron deficiency.

Calcium (Ca): Increasing Ca supply has little influence on uptake of other positively charged macronutrients such as potassium and magnesium. However, high levels of Ca in the soil can substantially reduce absorption of manganese, iron, and zinc, which can contribute to a reduced yield and fruit size.

Magnesium (Mg): High levels of Mg in the soil can have an antagonistic effect on potassium absorption. It can affect sugar transportation in the phloem tissue and influence the stomata opening and closing.

Nutrient interactions can occur in the soil naturally or as result of past fertilizer practices, but most often it is the result of imbalances caused by over application of a particular nutrient. When developing your fertility program for the season keep in mind that the addition of one nutrient could have an effect on the uptake of other nutrients as well. Keeping good records of fertilizer application in conjunction with periodical soil and tissue analysis, can help identify nutrient deficiencies/toxicities and avoid nutrient imbalances.

Figure 1. Mulder's chart illustrates how soil nutrients can influence the availability and uptake of each other.



Cranberry Viruses

Lindsay Wells-Hansen and Patty McManus

Two viruses, Tobacco streak virus (TSV) and Blueberry shock virus (BShV), have been detected in Wisconsin cranberries, and are associated with berry scarring (Fig. 1). The berry scarring symptoms associated with each of these viruses are identical and cannot be used to distinguish the viruses. Likewise, TSV and BShV are found in the same growing regions, and in some instances on the same marsh.



Figure 1. Berries infected with *Blueberry shock virus* (left), and *Tobacco streak virus* (right).

BShV has been detected on marshes in both the central and northern growing regions of WI, while TSV has been detected only in marshes in the central part of the state.

Virus testing has been limited on northern marshes, and may account for the lack of detection of TSV in this region.

Despite numerous attempts at transmitting these viruses in the greenhouse, it is still unknown how TSV and BShV are spreading within and between beds. However, scarred fruit associated with both TSV and BShV has been detected in beds NOT visited by crop consultants or researchers. It is important that you continue to scout beds for pests, because the benefits far outweigh risks.

Viruses tend to move toward metabolic “sinks” in plants. As these “sinks” change with cranberry development, the distribution of a virus within a given cranberry upright changes throughout the growing season as well. As such, it is important to sample and test the correct plant parts during various times of the season to ensure reliable detection of the virus(es) if present.

If you see scarred fruit and want to know if the scarring is associated with TSV or BShV, we suggest sampling the following plant parts at the time periods mentioned during the growing season:

Plant part to test	Post-bloom until 4 th week in July	1 st week of August until ~ 3 rd week in August	3 rd week in August until harvest
scarred berries	Ö	Ö	
current season leaves on uprights with scarred fruit			Ö
previous season leaves on uprights with scarred fruit	Ö	Ö	Ö

If you do not see scarred fruit, but are curious to know if a virus(es) is present on your marsh, you should collect samples at any time during the growing season in the following manner:

- Collect ~ 10 uprights from 10 locations representative of a bed. 10 uprights = 1 sample.
- Place each sample (10 uprights) into a single plastic bag.
- Repeat until you have at least 8 samples, each sample (10 uprights) in its own bag. The more samples you test, the better for getting an accurate answer.
- Refrigerate, but **do not freeze** samples until shipping.
- It is ideal to collect and ship samples for testing in the same day, but if this is not possible, keeping samples refrigerated will preserve them.
- Samples should be sent to Agdia, a commercial lab that specializes in virus detection. Agdia has a blueberry and cranberry screen that tests for 11 viruses, including TSV and BShV.
- This lab also offers testing for individual viruses if you wish to test only for TSV and/or BShV. Information on submitting samples can be found on the company's website www.agdia.com or by calling 800-622-4342.

Cranberry Journal—Grower Update

David Bartling

Manitowish Cranberry Co., Inc.

With the very warm temperatures and calm mornings, we have finished our first round of fungicide sprays on our entire farm and our Cranberry Fruitworm spray on the early varieties is complete, hoping to finish the rest of that spray on Monday, July 13. We have been applying fertilizer every week, from 14-14-14 to one application of 21-0-0 and 0-0-50. We will continue fertilizing accordingly depending on the size of the crop we see coming along.

Our two renovated beds are coming along nicely with the plugs on one bed putting out runners quite well, and the mowed vines in the other bed are all green and growing rapidly; there are even numerous flowers on each of the beds.

David Bartling

Manitowish Cranberry Co., Inc.

The Crimson Queen and HyRed varieties are looking very good this year and are close to 100% out of bloom. The Stevens are near or just above 50% out of bloom and seem to have a nice crop coming along, with some hiding under the top vines, making it hard to see the actual size of the crop without getting down in the bed. The bees will not be needed much longer at this rate, especially with the warm weather forecast we have!

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