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for Wisconsin

Cranberry

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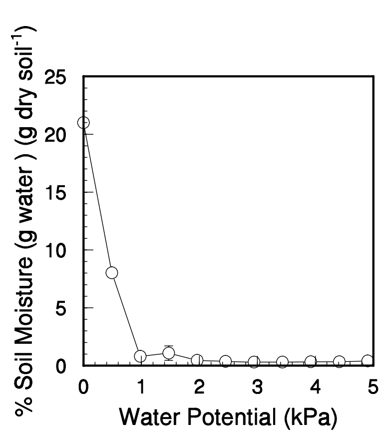
CRANBERRY BEDS WITH A HIGH WATER TABLE CAN BE SUBJECT TO DROUGHT

How can a cranberry bed experience drought when there is plenty of water- maybe even too much water? This seems to be a contradiction in terms. Here is the short answer. Cranberries typically have a shallow root zone in a bed with a high water table; if the water table drops, the plants will quickly deplete the water in this shallow root zone, and will experience drought. Now for the longer explanation. There are several key factors behind this.

First, where are the roots? Cranberry roots will not grow into soil without oxygen. Root growth will be shallow in a bed with a very high water table, since the soil below the water table is basically oxygen-free.

Why? Within the saturated zone in the soil, microbial activity will use up whatever oxygen is available. The diffusion of oxygen from the surface of the soil though the flooded region is too slow to replenish the oxygen supply. We have not measured soil oxygen use in cranberry beds, so we don't know exactly how long it will take to deplete the oxygen- but a few days of soil saturation are likely to be enough. Soil that is not totally saturated will support root growth. Any open soil pores act as channels to supply oxygen from the surface to the soil depths (the diffusion of oxygen is 10,000 times faster in air than in water).

Second, how much water is held in the root zone? This is determined by two factors- the volume of the root zone, and the water holding capacity of the soil in the root zone. The more soil volume in the root zone, the more water is held there. The water holding capacity of a soil is determined by the soil pore size. Sand has very large pores, which do not hold water tightly- sand goes from wet to dry very quickly (Figure 1).



Placing a tensiometer in the rooting zone gives you a measure of the soil water potential, on the X-axis of this graph- older literature refers to this as water tension, or suction. TDR sensors give you a measure of soil water content- on the Y axis of this graph. The L-shaped line on this soil moisture release curve tells you what you already know- that sand dries out very fast. This is a soil moisture release curve from a medium –textured sand.

Third, how is water supplied to the plant? Obviously, water can reach the root zone from the top, by irrigation or rainfall. Water can also reach the root zone from below, by capillary rise. Soil pores are small enough they act like capillaries. The capillary force can act to sucking water up against the pull of gravity, far above the water table level. The smaller the pore size, the higher the capillary rise- think of a layer of peat vs. a layer of sand. The peat acts like a sponge, drawing the water up higher than the sand. This capillary force is also the factor that determines the relationship between soil pore size and water holding capacity.

In a bed with a high water table and cranberries growing in sand, we are combining a shallow rooting zone with a soil that holds little water. This is okay as long as the water table is close enough to reliably supply water to the root zone by capillary rise. In our greenhouse studies, both Stevens and Ben Lear cuttings grew best with a high water table- but this was <u>totally stable</u>. We have limited information on the stability of water tables in cranberry beds- the ones my lab has tracked can be highly variable.

What if the water table is not stable? Whenever the water table drops enough that the capillary rise is below the root zone, the crop is left to rely on the water stored in the root zone- not very much water if the plants are growing in sand. Older beds with duff layers built up on the surface and buried under the sand will have more water stored in the root zone, because these organic layers have greater water-holding capacity than sand.

Grab a shovel and take a look at rooting depth in your cranberry beds. If you can find healthy roots 6 to 12 inches below the soil surface, you have a pretty typical cranberry bed. If the root zone is very shallow in any of your cranberry beds, you might consider monitoring water table depth with a water table float (e.g. a "Lampinometer", named after the designer, Bruce Lampinen, U.Mass cranberry extension specialist), and keeping a close eye on water management in those beds. To the cranberry plant, what matters isn't how much water is in the bed—it's how much water is available in the root zone.

Kevin Kosola, UW-Madison Dept. of Horticulture

It isn't always others who enslave us. Sometimes we let circumstances enslave us; sometimes we let routine enslave us; sometimes we let things enslave us; sometimes, with weak wills, we enslave ourselves. Sometimes we partake of detrimental things that we think will soothe our nerves, minds, or imaginations—things we think will help us escape from reality. But no man is free if he is running away from reality. And no man is free if he is running away from himself.

Richard L. Evans

Tissue Testing and White Fruit Harvest

The recommended time to take tissue samples for tissue analysis is in late August through mid-September. This is also the period of time when harvest occurs for white fruit. We wondered if the results of tissue analysis of samples taken after white fruit harvest would be different than samples taken before harvest. This could be an important consideration for growers harvesting white fruit. Would it be best to sample before or after white fruit harvest or would it simply be best to not sample from white fruit beds?

We collected samples from four different properties both before and after white fruit harvest. Samples were collected per normal recommendations. We harvested current season growth above fruit. We did not include any fruit in our samples. The samples were dried in a forced air oven, finely ground, and then analyzed at the UW Soil and Plant Analysis Lab in Madison.

For most required nutrients there were no statistically significant differences between samples collected before or after harvest (Table 1). Exceptions include Nitrogen, Magnesium, Sulfur, Boron, Manganese, and Iron. For the macronutrients (listed in percent dry weight) in each case where differences existed concentrations were lower after white fruit harvest than before. For micronutrients Boron was lower while Manganese and Iron were higher after white fruit harvest. This suggests that Iron and Manganese (particularly Iron) are external contaminants and are not inside the vine tissue.

While there may have been differences between the concentrations of nutrients in uprights the question that is really important is whether this would make a difference in interpretation of concentrations compared to the standards. The answer to this question clearly is no. Comparisons of nutrient concentrations in tissue either before or after white fruit harvest to the standard shows that in each case nutrients are within the appropriate range.

Does it make a difference if samples for tissue analysis are taken before or after white fruit harvest? The answer is clearly no. However, since nutrient concentrations of the important macronutrients were lower after harvest when differences were found it seems prudent to take samples prior to white fruit harvest rather than after harvest.

Teryl Roper, UW-Madison Extension Horticulturist

Table 1. Comparison of tissue samples collected prior to white fruit harvest and those collected after white fruit harvest in Wisconsin.

Nutrient	Before harvest	After harvest	Standard	Significance
Nitrogen (%)	1.13	0.988	0.9-1.1	0.02
Phosphorus (%)	0.156	0.152	0.1-0.2	ns
Potassium (%)	0.472	0.452	0.4-0.75	ns
Calcium (%)	1.05	1.05	0.3-0.8	ns
Magnesium (%)	0.33	0.26	0.15-0.25	0.001
Sulfur (%)	0.124	0.107	0.08-0.25	0.02
Zinc (ppm)	33.8	30.9	15-30	ns
Boron (ppm)	81.8	71	15-60	0.05
Manganese (ppm)	249	311	>10	0.02
Iron (ppm)	208	859	>20	0.06
Copper (ppm)	4.63	6.22	4-10	ns

SPILL PREPAREDNESS

With harvest approaching now is the time to prevent oil spills and to have a plan for dealing with any mishaps that might occur. Except for crankcase oil in engines, all lubricants on harvesters should be food grade oils that are approved by the Food and Drug Administration. These are designated as H-1. Food grade oils have a residue tolerance of 10 ppm, non-food grade oil and fuel have a zero tolerance.

Have a spill kit handy to the harvest and cleaning operations. Make sure your spill kit contains: floating booms to contain the spill, absorbent materials to sop up the spill, worker protection supplies such as gloves and coveralls to protect workers, and containers to receive the spent absorbents and booms. Make sure you have a plan to deal with spills and that your employees and supervisors each know what their responsibilities are within the plan.

Inspect your crankcase housings for oil residues and evidence of leaks and clean them, and if necessary, install a pan to collect leaks. Inspect all hydraulic hoses, connections and power units for cracks, leaks and weak spots and replace those that may not survive the harvest season.

WISCONSIN CRANBERRY SCHOOL

The annual Wisconsin Cranberry School will be held January 18-19, 2005 at the Chula Vista Resort in Wisconsin Dells. This is a significant change from our traditional locations of Wisconsin Rapids and Stevens Point. The school has again outgrown the facilities at Hotel Mead. Chula Vista has ample room that is of good quality. There should be good seating and plenty of space for exhibitors. Please put these dates on your calendar and plan to attend cranberry school in 2005.