Great Lakes Fruit, Vegetable & Farm Market EXPO
December 9-11, 2008
DeVo Place Convention Center, Grand Rapids, MI

Cranberry Production Opportunities and Challenges II

Thursday afternoon 1:00 pm

Where: River Overlook (upper level) Room A-B

CCA Credits: SW(0.5) CM(1.5)

Moderator: Robert Craig, Director, Agriculture Development Div., Michigan Dept. Agriculture

1:00 p.m.	Environmental and Wetland Permitting • Kim Fish, Asst. Chief, Land & Water Management Div., MDEQ
1:40 p.m.	Quality of Irrigation Water for Cranberry Production • Eric Hanson, Horticulture Dept., MSU
2:00 p.m.	Resources Available for Developing New Cranberry Beds and Related Facilities • Erik Johnson, Soil Scientist, Envoronmental Stewardship Div, MDA
2:30 p.m.	Michigan's New Water Withdrawal Legislation • Scott Piggot, Manager, Agriculture Ecology Dept., Michigan Farm Bureau
2:50 p.m.	Potential Federal Assistance for Cranberry Research and Development • Robert Craig, Director, Agriculture Development Div., Michigan Dept. Agriculture

Environmental and Wetland Permitting

Kimberly Fish, Assistant Division Chief, Land and Water Management Divisio
Michigan Department of Environmental Quality.

Environmental and Wetland Permitting

Discussion will include;

How to determine if there are wetlands present on your property,

State and Federal environmental regulations,

What to expect if you need to obtain a wetland, lakes and streams permit,

Resources available to assist you with the planning and permitting processing.

Links: www.michigan.gov/deqwetlands
www.michigan.gov/deqinlandlakes
www.michigan.gov/deqfloodplainmanagement

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QUALITY OF WATER FOR CRANBERRY PRODUCTION

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Water quality is particularly important in cranberry production. Since such large amounts of water are used in production (4-8 acre feet annually), the chemical characteristics of water can affect cranberry soils and plant growth. Cranberries are relatively sensitive to high soil pH and salt levels.

Low quality water can stress or injure plants in several ways. High salinity (total concentration on soluble salts) inhibits water absorption by plants and may cause nutrient imbalances. Salinity levels above 0.4 mmhos may be problematic for cranberries. Alkalinity is a measure of the liming effect of water. Water with high alkalinity can increase soil pH above the desired range for cranberries (4.0 to 5.5). Alkalinity greater than 100 ppm $CaCO_3$ is a potential problem for cranberries. Levels of some elements may be sufficiently high to become toxic to cranberries. Water containing more than 100 ppm chloride or 1 ppm boron, for example, may be toxic to cranberries. High sodium levels reduce the permeability of some soil to water and impede drainage. Levels above 50 ppm are of concern, particularly if calcium and magnesium levels are low.

About 10 years ago, we surveyed water sources on cranberry farms in Michigan, and also obtained water samples from cranberry farms in other production regions. The range and mean levels of several parameters are reported in Table 1. Michigan cranberry water sources were high in alkalinity relative to most production areas. High alkalinity does not preclude cranberry production, but some understanding of how to maintain soil pH in the desired range when alkalinity is high. Alkalinity is a measure of the ability of water to resist pH changes when acid is added. It is usually expressed in ppm $CaCO_3$ or lime. Alkalinity is generally low if water pH is below 7.0, but higher pH levels don’t always mean alkalinity is high.

In evaluating water sources for cranberries, alkalinity is more important than pH. Application of large volumes of very alkaline water would introduce considerable lime to soils, and increase soil pH if acidifying materials were not used to counteract the effect. One approach to managing soil pH where water alkalinity is high is to acidify the water prior to or during application. Alkalinity can be used to estimate how much acid is needed to reduce the pH to near 5.5. A pH of 5.5 is a safe target because acidifying water to this pH removes most of the alkalinity so water use will have little impact on soil. Although a target pH of 4.5, where all of the alkalinity is neutralized, may seem optimal, adjusting water pH to 4.5 is usually tricky since small acid additions can drive the pH down rapidly.

Another approach to managing alkalinity and soil pH is to use sulfur to neutralize the lime introduced to the soil through the water. Sulfur is converted by soil microbes to sulfuric acid, which counteracts the effect of lime. The amount of lime added to the soil depends on the alkalinity and quantity of water used (Table 2). Not all the alkalinity in water applied to cranberry beds will stay in the soil. Flood water that is removed by surface drainage will not leave as much lime in the soil as irrigation water that percolates through the soil.

Although ideal cranberry water sources are low in alkalinity, higher levels are manageable. In evaluating potential new sites for cranberry production, water sources should be tested.

Table 1. Average and range (parentheses) of water characteristics from cranberry farms in different production regions (Hanson et al., 2000).

Region (sample number)	**pH**	**Alkalinity (ppm $CaCO_3$)**	**Soluble salts ($dS \cdot m^{-1}$)**
British Columbia (11)	6.9 (6.5-7.3)	40 (16-61)	0.28 (.11-1.05)
Chile (5)	7.4 (7.2-7.9)	26 (17-32)	0.05 (.02-.07)
Maine (14)	7.0 (5.3-7.4)	31 (17-56)	0.13 (.03-.34)
Massachusetts (50)	6.1 (4.0-6.9)	18 (9-44)	0.12 (.05-.34)
Michigan (8)	7.7 (6.9-8.1)	105 (32-190)	0.32 (.11-.58)
New Jersey (19)	5.2 (4.5-7.1)	14 (8-40)	0.05 (.03-.12)
Quebec (11)	7.0 (4.9-7.6)	46 (16-116)	0.15 (.02-.31)
Washington (12)	7.4 (6.8-7.9)	53 (18-116)	0.20 (.07-.33)
Wisconsin (12)	7.0 (6.2-8.0)	40 (16-128)	0.14 (.02-.46)

Table 2. Sulfur (lbs) needed to neutralize most of alkalinity in different amounts of water with varying alkalinity levels.

Alkalinity	Water Quantity (acre-feet)		
(ppm $CaCO_3$)	4	6	8
40	150	230	300
80	300	450	610
120	450	680	910
160	610	910	1210
200	760	1140	1510
240	910	1360	1820
280	1060	1590	2120