Temporal and Spatial changes in soil pH of Cranberry Beds

Teryl R. Roper[1]
Dept. of Horticulture, University of Wisconsin-Madison

Cranberries are acidophilic. The optimum soil pH for cranberries is between 4.5 and 5.5. Growers have long been encouraged to take soil samples in the spring or the fall. However, no good research data supported this timing. This research was undertaken to document temporal and spatial changes in the soil pH of cranberry beds.

This research was conducted at five cranberry marshes in Wisconsin. At each location a 15 x 15 meter grid was established in a single bed and flags were set at the intersections. GPS readings were taken at each point so the identical grid could be taken the second year. Soil samples were collected monthly to a depth of six inches. Soils were air dried. Soils were mixed with equal amounts of deionized water into a slurry. Samples sat for 30 minutes then were measured for pH just above the soil:water line with a pH electrode. Data were subjected to spatial statistics that allowed inference to be made as to soil pH between the actual sample points. The work was continued into a second year.

Soil pH was found to vary both over time and space. The average pH for Wisconsin soils we sampled across both years was 5.47. The overall range of individual samples was between 7.55 at Marsh 4 in May of 2001 to 4.4 at Marsh 2 in 2002. With the exception of marsh 4, most of the samples were between 4.5 and 5.5.

The mean at each property varied over time (Table 1). The typical pattern was that spring and fall measurements were similar, but summer samples tended to be lower than the spring or fall samples. This supports the standard protocol of taking soil samples for pH in the spring and the fall rather than mid-summer. Samples taken in June and July may give artificially low readings.

Soil pH varied widely between properties at a given date (Table 1). This reflects the environments the marshes were created in. Properties one and two are older with well established beds that were created from wetlands. Water quality at these locations is excellent. Property three was created from an upland, but has good water quality. Property four was created from an upland and water quality is not as good as at other locations. Property five was created from a transitional area and has excellent water quality.

Soil pH also varied within a bed. Figure 1 shows changes in soil pH at one property over 2002. These figures were produced in color and unfortunately didn't translate well to grays. However, the spatial variability in soil pH is obvious. There is more spatial variability in soil pH in July and August than in May, June, or September. This also supports collecting samples in spring or fall. The variability encountered also underscores the need to collect samples from through a bed and not along one edge or in one corner. Doing so may give you poor data.

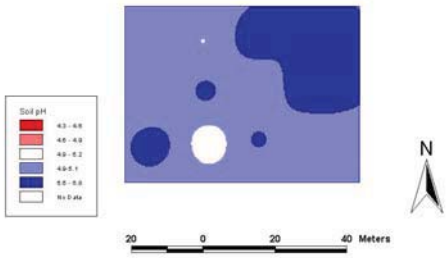
The results of this research show the importance of taking samples at the recommended time and to take samples randomly throughout an entire bed. The data also show the effect of parent material and water quality on soil pH and its management.

[1] I thank Armand Krueger and Bill Schmitt for technical assistance in this study and to Joan Davenport who did the spatial statistics and produced the figures.

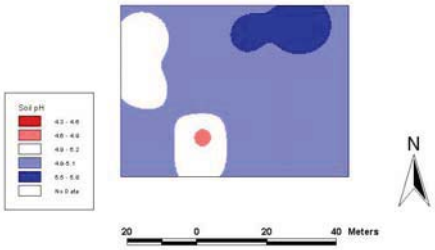
Table 1. Changes in soil pH at five Wisconsin cranberry marshes during 2001 and 2002.

Property	May	June	July	Aug	Sept
			2001		
1	5.29	5.22	5.06	4.98	
2	4.79	4.79	4.77	4.59	
3	5.47	5.35	5.00	5.10	
4	7.29	7.09	6.87	6.96	
5	5.3	5.15	5.08		
Mean	5.7	5.59	5.42	5.53	
			2002		
1	5.29	5.29	4.92	5.25	5.32
2	4.64	4.68	4.4	4.72	4.78
3	5.29	5.34	5.1	4.9	5.41
4	6.72	6.69	6.2	6.36	6.52
5		5.04	4.99	4.96	5.12
Mean	5.49	5.42	5.12	5.24	5.43

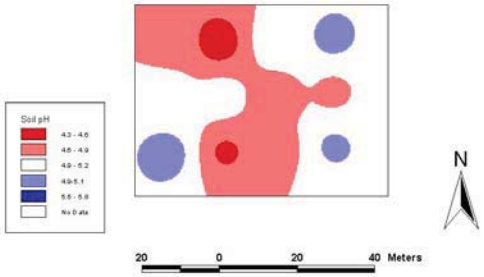
6" Soil pH May



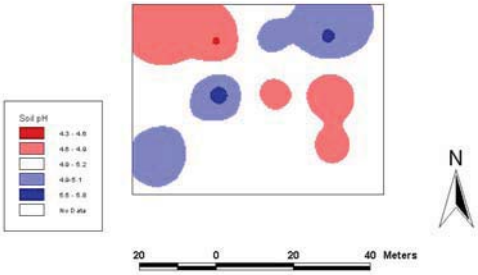
6" Soil pH June



6" Soil pH July



6" Soil pH August



6" Soil pH September