

# Cultivar Influences Cranberry Response to Surface Sanding

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*Additional index words.* *Vaccinium macrocarpon*, yield, upright density, barge sanding

**Abstract.** Surface sand application to cranberry (*Vaccinium macrocarpon* Ait.) is commonly practiced for a combination of vine and insect management. However, the efficacy of sanding on crop production has been poorly documented. This study determined the effect of three rates of sand application using a barge sanding technique on two different cultivars—‘Early Black’ and ‘Stevens’. Beds were sanded to a depth of 0, 1.3, or 2.5 cm in November and monitored at the end of the following three growing seasons for yield, berry weight, and upright distribution. The 2.5-cm sanding rate adversely affected yield in ‘Early Black’ during the first two growing seasons. In ‘Stevens’ yields were not reduced until the third season and then only by the 2.5-cm rate. Although the 2.5-cm sanding rate increased vegetative upright density in both cultivars in the first growing season, yield and number of fruiting uprights were not significantly influenced the next year. Application of 1.3 cm of sand could improve insect pest management without negatively impacting yields of ‘Early Black’ and ‘Stevens’.

Applying 0.6 to 2.5 cm of surface sand to cranberry beds every 3 to 5 years is a common practice in commercial cranberry production on the majority of cranberry acreage in North America. The techniques used for sand application vary from applying dry or slurry forms of sand directly to the soil surface, flooding the bog and applying the sand directly through the water (barge sanding) or, in cold areas and years, waiting for ice to form and applying sand to the ice and allowing it to fall to the soil surface when the ice melts (DeMoranville, 1997). Sand is applied to cover old runners to stimulate new root development and upright production, and to control pests (Eck, 1990). Control for the insect pest cranberry girdler (*Chrysoteuchia topiaria* Zeller) is the best documented use of surface sanding for pest control (DeMoranville, 1997; Franklin, 1913; Tomlinson, 1937). Regular applications of surface sand can effectively reduce populations of spotted fireworm (*Choristoneura parallela* Robinson) to levels where chemical control is not economically effective (D. Schiffhauer, unpublished data). Although older published literature suggests that sanding may actually stimulate weed growth (Eck, 1990), more recent information indicates that sanding can suppress the plant parasitic weed dodder (*Cuscuta gronovii* L.) (Sandler et al., 1997).

The impact of sanding practices on cranberry yield is not well documented. Results from early trials showed inconsistent responses to sanding (Beckwith, 1941; Franklin, 1913). More recently, Strik and Poole (1995) reported that the yield response to sanding ‘Stevens’ cranberry varied with rate of sand, years after sanding, and bed age. Their work suggested that applying 1.3 cm surface sand can increase crop yields, but that heavy sanding (2.5 cm) can reduce yield, particularly on a young bed. A study on the cultivar Searles in Wisconsin showed a 9% yield increase over 3 years with light (1.3 cm) surface sand applications (Davenport, 1994).

Current management practices in New Jersey are to apply a 2.5-cm layer of barge sand every 4 years. Using the lower rates of sand suggested by Strik and Poole (1995) would reduce cost, but whether this reduced rate of sanding would be effective when applied by barge rather than by dry surface application remains unknown. This study examined the effects of different sand rates applied by barge on yield and yield components of two cranberry cultivars.

## Materials and Methods

Two similarly aged commercial cranberry beds sanded regularly on a 4-year cycle were selected for this study. These beds were on the same farm and were planted to either ‘Early Black’ or ‘Stevens’. In Nov. 1993, the beds were flooded. Sand was applied using a commercial barge sander to a depth of 0-, 1.3-, or 2.5-cm in strips 4.9 m wide (two barge widths) across the width of each bed. Three replicates of each treatment were made in a modified block design; each block contained one strip of each treatment and the blocks were sepa-

rated by a zone that was sanded conventionally (2.5 cm sand). The remainder of the bed was sanded with 2.5 cm of sand.

Prior to commercial harvest, vine samples were clipped from five 900-cm<sup>2</sup> areas in each strip. Both vegetative and reproductive (fruit-bearing) uprights were counted. The fruit was then removed, counted, and weighed to determine the average berry weight and to estimate yield. This evaluation was conducted for three growing seasons after the sand was applied (1994–96). Analysis of variance was performed using the PROC GLM of PC SAS (SAS Institute, Cary, N.C.), and means were separated by Duncan’s multiple range test.

## Results and Discussion

The yield response to sanding differed between cultivars. Yields of ‘Early Black’ fell in response to sanding in seasons one and two, whereas those of ‘Stevens’ were reduced only in year three (Table 1). Regardless of cultivar or year, yield was reduced with the highest sand rate (2.5 cm). Light sanding (1.3 cm) never affected yield. The various sanding treatments did not significantly effect berry weight until season three (Table 1), when average berry weight of ‘Early Black’ was highest in the 2.5-cm sand treatment. The negative effects of heavy sanding on yield is consistent with results obtained in Oregon with dry sand application (Strik and Poole, 1995).

The highest rate of sanding increased the number of vegetative uprights in season one (Table 1). Research on bearing patterns indicates that increasing vegetative uprights one year will increase the number of fruit bearing uprights the next year (Roper et al., 1993). However, neither yield nor number of fruiting uprights increased in season two, and the sanding treatments were without effect. In season three, the 2.5-cm sand treatment reduced the number of vegetative uprights treatments in both cultivars as well as the number of fruiting uprights in ‘Stevens’ (Table 1). Since the uprights are the fruit-bearing part of the plant, the negative impact of this heavy sanding treatment should carry over in ‘Stevens’ in future years.

## Conclusions

The impact of sanding on yield was immediate in ‘Early Black’ and carried over into the second growing season. In ‘Stevens’, yield was not affected until the third season. In both cultivars, yield was suppressed with heavy sanding (2.5 cm), which is consistent with previous results using dry sand application (Strik and Poole, 1995). Although fruit size was increased in season three by heavy sanding, neither larger fruit size nor increased number of vegetative uprights the previous year were sufficient to increase yield.

Thus, our results suggest that reducing sand application from 2.5 to 1.3 cm might be advantageous. This rate will not negatively affect yields and would still maintain the insect pest management advantage gained through surface sand application.

Received for publication 12 May 1999. Accepted for publication 9 Sept. 1999. We thank W. Haines for providing a site for this experiment and B. Parker for technical assistance. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked advertisement solely to indicate this fact.

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Table 1. Effect of surface sand treatments on yield and yield components of two cranberry cultivars over 3 years.<sup>2</sup>

Cultivar	Growing season after sanding	Depth of sand applied (cm)	Yield (Mg·ha <sup>-1</sup> )	Avg berry wt (g/berry)	No. of uprights per 900 cm <sup>2</sup>	
					Vegetative	Fruiting
Early Black	1	0	15.06 A	0.969	166 B	126
		1.3	15.02 A	1.005	158 B	126
		2.5	11.27 B	0.961	210 A	111
	2	0	9.61 ab	0.869	229	97
		1.3	10.62 a	0.897	231	102
		2.5	8.67 b	0.904	215	103
	3	0	14.31	0.901 B	171 A	126
		1.3	15.20	0.896 B	172 A	143
		2.5	13.47	0.942 A	144 B	131
Stevens	1	0	21.72	1.492	70 B	121
		1.3	22.68	1.559	59 B	123
		2.5	21.72	1.453	91 A	130
	2	0	23.14	1.611	90	117
		1.3	22.55	1.660	96	125
		2.5	20.29	1.603	110	118
	3	0	24.48 A	1.408 B	92 A	125 A
		1.3	24.32 A	1.454 AB	96 A	122 A
		2.5	14.20 B	1.507 A	70 B	70 B

<sup>2</sup>Mean separation within cultivars, columns, and years by Duncan's multiple range test,  $P \leq 0.05$  (lower case letters) or  $\leq 0.01$  (capital letters). All other differences nonsignificant.

## Literature Cited

- Beckwith, C.S. 1941. The sanding of cranberry bogs, p. 10–13. In: Proc. 71st Annu. Mtg. Amer. Cranberry Growers Assn., Chatsworth, N.J.
- Davenport, J.R. 1994. Practical practices. Harvest 16:10.
- DeMoranville, C.J. 1997. Cultural practices in cranberry production: Sanding and pruning, p. 6–10. In: H. Sandler (ed.). Cranberry cultivation: A guide for Massachusetts. Cranberry Expt. Sta. and Univ. of Massachusetts. Ext. Publ. SP-127.
- Eck, P. 1990. The American cranberry. Rutgers Univ. Press, New Brunswick, N.J.
- Franklin, H.J. 1913. The cranberry girdler, p. 27–28. In: 25th Annu. Rpt. Mass. Agr. Expt. Sta., 1912.
- Roper, T.R., K.D. Patten, C.J. DeMoranville, J.R. Davenport, B.C. Strik, and A.P. Poole. 1993. Fruiting reduces fruit set the following year in cranberry uprights. HortScience 18:228.
- Sandler, H.A., M.J. Else, and M. Sutherland. 1997. Application of sand for inhibition of dodder (*Cuscuta gronovii*) seedling emergence and survival on cranberry (*Vaccinium macrocarpon*). Weed Technol. 11:218–223.
- Strik, B.C. and A.P. Poole. 1995. Does sand application to soil surface benefit cranberry production? HortScience 30:47–49.
- Tomlinson, B. 1937. Proper sanding of great importance in good bog management. Cranberries 1(9):4, 8–11.