# Training and Spacing Trials in Marion Blackberry



Esther Nelson and Lloyd W. Martin[1]

## Introduction

Alternate-year (A-Y) cropping and mechanical harvesting are increasingly common in Marion blackberry production.

The A-Y system requires a two-year period to produce one fruit crop on a given section of the planting. The first year of the two-year cycle is given to production of primocanes, which are trained to a trellis during the growing season. Fruit is produced on these canes during the second year and new primocanes and laterals at the base of fruiting canes, which may interfere with harvesting, are mechanically or chemically removed. Fruit yield in alternate years ranges from 70 to 90 percent of total production from two years of the traditional every year (E-Y) system. Cost savings make the A-Y system an attractive alternative for growers. Trellising and plant spacing in A-Y plantings are similar to trellising and plant spacing in E-Y plantings.

Mechanical harvesters can easily pick fruit from 1½ to 6½ feet above ground, but Marion blackberries are normally trained to parallel wires 3½ and 5 feet above ground. In the traditional training system, canes are bundled together upright to the lower wire and then woven around the parallel wires. Experience with Boysenberry in New Zealand suggests that spreading canes on additional parallel wires to a height of 6½ feet or more could increase yield and berry quality.

Sheets (1972) demonstrated increased yield when Marion plants were spaced 5 feet apart in the row rather than 10 feet apart, but no further increase in yield when plants were spaced 2½ feet apart rather than 5 feet apart.[2] Would training berries higher allow for higher plant populations (closer in-row spacing), more area for bud exposure and fruit development, and increased yield?

## Materials and Methods

A randomized block planting of Marion blackberry was established in May 1978; a second similar planting was established adjacent to the original block in May 1979. Planting in consecutive years allowed for fruit harvesting from the plantings in alternate years.

Plots were single rows 100 feet long and 10 feet apart. Plants were 20, 40, or 60 inches apart in the row. Plots with each plant spacing were planted in each of three blocks. Canes were trellised on parallel wires 20, 40, 60, and 80 inches high at intervals throughout the primocane growing season. Canes were spread out along wires to form a wall or curtain of plant material.

The area planted in 1978 was harvested in 1980 and 1983. An unidentified disease and/or low spring temperatures affected canes in 1982. Canes were removed before harvest and primocanes allowed to develop for harvest in 1983. The area planted in 1979 was harvested in 1981 and 1983 as scheduled. The planting was harvested with a Littau self-propelled harvester, the harvester most commonly used for Marion blackberry.

Yield, representing four to seven harvests per season, and berry size were recorded each year—two harvests from each of the alternate year plantings. Recorded weight of cull fruit was discontinued because no significant differences appeared in 1980 and 1981. Primocane training time was recorded in 1981 and 1982.

Irrigation, fertilizer, and pesticide practices were consistent with recommendations for commecial growers. A preharvest basal dinoseb spray of fruiting canes removed 18 inches of plant material to facilitate operation of the picker catch plates.

## Results

Significant increases in yield occurred with decreases in distance between plants in plots planted in 1978 and harvested in 1980 and 1983 (Table 1). Yields from plots planted in 1979 were not significantly different although they followed the same trend of higher yield with closer in-row plant spacing.

The closer plant spacing caused a reduction in fruit size in only one of the four harvests (Table 1). The percentage of culls (sort-outs from belt on mechanical harvester) was not significantly affected by in-row plant spacing.

As plant spacing decreased, the labor required to tie and weave the primocanes to the trellis increased (Table 2). Labor increased by 76 percent as in-row plant spacing decreased from 60 to 20 inches.

## Discussion

With high (80-inch) trellises and each of the three in-row plant spacings (20, 40, and 60 inches) yield was favorable, representing about twice the average annual yield of 2½ tons

[1]Research assistant and professor of horticulture, respectively, North Willamette Experiment Station, Aurora, Oregon.

[2]Sheets, W. A., R. M. Bullock, and R. Garren, Jr. 1972. Effects of plant density, training, and pruning on blackberry yield. J. Amer. Soc. Hort. Sci. 97(2):262-264.

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**Table 1. The influence of in-row spacing on alternate year yield, berry size, and cull weight of Marion blackberry trellised to 6 feet**

| In-row plant spacing (in) | Yield (T/A) | | | | Berry size (g) | | | | Culls (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1980[a] | 1981[b] | 1983[a] | 1983[b] | 1980[a] | 1981[b] | 1983[a] | 1983[b] | 1980[a] | 1981[b] |
| 60 | 4.3 | 5.5 | 5.3 | 6.2 | 4.4 | 4.4 | 4.2 | 4.3 | 5.0 | 2.2 |
| 40 | 4.5 | 5.3 | 6.0 | 6.3 | 4.3 | 4.2 | 4.4 | 4.2 | 4.7 | 2.0 |
| 20 | 4.8 | 5.8 | 6.7 | 6.6 | 4.2 | 4.5 | 4.3 | 4.3 | 4.5 | 2.1 |
| | ** | N.S. | * | N.S. | * | N.S. | N.S. | N.S. | N.S. | N.S. |

[a]From 1978 planting.
[b]From 1979 planting.
*, ** Significantly different at 5 and 1 percent levels, respectively.
N.S. No significant difference.

**Table 2. The influence of in-row plant spacing on labor requirements for training Marion blackberries on alternate-year production to 6-foot trellises**

| In-row plant spacing (in) | Annual training time (hrs/A) | | |
|---|---|---|---|
| | 1981 | 1982 | 1983 |
| 60 | 123 | 82 | 111 |
| 40 | 147 | 103 | 139 |
| 20 | 205 | 168 | 185 |
| | ** | ** | ** |

**Significantly different at 1 percent level.

per acre for Marion blackberry in Oregon.[3] Decreased distance between plants within the row increased yield. Sheets found no difference in yield between in-row spacings of 60 inches and 30 inches with the traditional trellising system, canes bundled and woven on double wires 40 and 60 inches high. In reducing the in-row plant spacing, the limiting factor may become trellised area in which buds and fruits are allowed to develop. Additional trellis height and spreading of canes to create a curtain provide additional bearing area and may account for yield increases for plantings with high plant populations.

[3]Brown, K. N., and Oregon Caneberry Commission. 1983. 1983 acreage survey for caneberries and interpretations for blackberries and other trailing berries.

The four-year average yield of 5.3 tons per acre from plots with traditional in-row plant spacing (60 inches) and high trellisses (6-foot) suggests that high trellising may be advantageous even without adjustments in in-row spacing.

Despite encouraging overall yields with high trellises and further increases in yield with increasing plant density, the profitability of such a planting depends on covering added costs (longer posts, additional wire, more transplants, and increased labor) through increased average yield. Annual fluctuations in berry price affect profitability of *all* plantings annually. Records (Table 2) suggest significant increases in labor costs as plant spacing and trellising are changed. Reduction in training time from 1981 to 1982 reflects an increase in efficiency gained from experience and the use of plastic ties rather than baling twine for basal ties. Acquiring proficiency in training involves considerable trial and error and is seldom attained in small experimental plots. Professional crews, no doubt, could reduce training time much further.

Costs of establishing and maintaining the planting could be reduced by using three trellis wires (at 25, 50, and 75 inches), rather than four, without losing necessary support.

We conclude from this initial work that high-trellis, high-density Marion blackberry plantings have potential for increasing yields substantially and reducing the unit cost of production. Further testing on commercial acreage and economic analysis are recommended.