susceptibility is a variety or species characteristic.

Although a 20.5% loss of trees to bacterial canker had occurred, the 25 plots not treated in 1970 were given herbicide application in 1971. These plots were cultivated on May 18, and herbicide applications were made on June 10, using the same materials and rates as in 1970. Three inches of rain fell within three weeks of application. The 1970 plots were not cultivated or given additional herbicide.

The tolerance of *Prunus* rootstocks to herbicides in the year after planting is markedly greater than in the year of planting (Table 4). No herbicide related fatalities were observed although it must be recognized that plant population for some stocks in some plots was limited due to the missing plants. As in the year of planting, terbacil, especially at the 4 lb. rate, proved to be most phytotoxic. The cherry stocks were again the most susceptible to injury while the established 'Myroblan' stocks appeared more tolerant to herbicides than in the year of planting.

Prunus rootstocks exhibited the least tolerance to the preemergence herbicides terbacil and diuron in the year of planting. Terbacil was also mildly phytotoxic the second season or when used the year after planting. All stocks established for one year showed increased tolerance to herbicides. The cherry stocks, *P. mahaleb* and *P. tomentosa* and the plum stocks 'Myroblan-29C' and 'American' plum were least tolerant to herbicides. By comparison, the peach stocks 'Lovell' and 'Nemaguard' exhibited the greatest tolerance to all herbicides in both years.

The appearance of light or even moderate marginal leaf chlorosis is a manifestation of herbicide phytotoxicity; but at this symptom development state, the herbicide is not debilitating to the plant.

An unexplained relationship noted between herbicide use and lack of bacterial canker development in such *Pseudomonas syringae* susceptible stocks as 'Marianna' plum and 'Myroblan-29C' offers further research opportunities.

Effects of Deflowering on the Highbush Blueberry *Vaccinium australe* Small[1]

J. W. HULL[2]

Deflowering of 3 highbush blueberry cultivars for 1, 2 or 3 years after planting resulted in no within-variety differences of plant size, berry size, yields for 2 years after completion of treatment or total cumulative yields. There were differences in plant and berry size among varieties.

Successful plant establishment and vigorous growth of highbush blueberries are promoted by deflowering in the year of planting. Some growers also deflower the less vigorous bushes in the second year (1, 2). However, crops of the second or even third year often are uneconomical to harvest be-

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cause of the small quantity of fruit. The objective of this study was to determine the advantages of deflowering for 1 or 2 years in addition to the customary first year.

Two-year plants of the cultivars 'Collins' (early), 'Bluecrop' (early-mid), and 'Herbert' (late) were selected for uniform size. They were set in 1966 at 6 x 12 ft. in a silt loam soil previously acidified to pH 5.3-5.5. A 1:1 mix of peatmoss: topsoil was used in the planting holes. A 3-inch sawdust mulch was maintained over the root zone throughout the experiment. The middles were cultivated as needed. Supplemental irrigation was used to augment rainfall to total 1½ inches every 10 days during the growing season. After the first season, 12-12-12 fertilizer at a rate of 200 lb/A in the late dormant season and ammonium sulfate at a rate of 100 lb/A were applied immediately after the harvest period annually. Pruning consisted of removing broken or dead branches and thin, weak twigs. The area was enclosed in 1-inch mesh nylon netting to avoid bird depredation.

The planting was arranged in a randomized complete block design with 3 plants of a cultivar per plot and 3 replications. Measurements of yield, fruit size and plant size were made annually on each plant and data were analyzed by analysis of variance on the annual and/or 4-year cumulative totals of the 3 plants in each plot. Fruit size (number of berries per pint cup) was determined from the largest single harvest of the season for each plant. Fruit size within a variety did not differ significantly from year to year, and the 1969 counts which are presented were typical.

In the first 2 years after all plants were permitted to bear fruit (1969 and 1970), there were no differences in yield that were associated with treatment (Table 1). Further, there were no differences in cumulative yield for the entire period of the experiment, even though there were differences of 2, 3 or 4 years of cropping (Table 2). This lack of significant differences appeared to be associated in part with individual plot variability and in part with the relatively minor additions to the cumulative totals from those plants permitted to bear crops also in 1967 and/or 1968 (compare Tables 1 and 2). The apparent yield trends within a cultivar, e.g., 'Bluecrop', were not significant nor were the cultivar x treatment interactions.

The final plant size of 'Collins' was larger than the other cultivars (Table 3). 'Herbert' bore significantly larger

Table 1. 1969 and 1970 yields of 3 highbush blueberry cultivars after deflowering 1, 2, or 3 years[z].

Treatment	Collins Avg. yield per plant		Bluecrop Avg. yield per plant		Herbert Avg. yield per plant	
	1969 kg	1970 kg	1969 kg	1970 kg	1969 kg	1970 kg
Deflowered 1 year	1.6	2.4	2.5	3.3	2.4	2.4
Deflowered 2 years	2.6	3.9	1.8	2.4	2.3	2.1
Deflowered 3 years	2.1	3.1	1.3	2.2	2.3	2.5
	ns	ns	ns	ns	ns	ns

[z]All plants set in 1966.

Table 2. Cumulative yields, 1967-70, of 3 highbush blueberry cultivars deflowered 1, 2, or 3 years.

Treatment	Mean total yield per plant			Treatment means
	Collins kg	Bluecrop kg	Herbert kg	kg
Deflowered 1 year, harvested 4 years	5.1	6.4	5.0	5.5 ns
Deflowered 2 years, harvested 3 years	7.6	5.2	5.6	6.1 ns
Deflowered 3 years, harvested 2 years	5.1	3.6	4.7	4.5 ns
Cultivar means	5.9 ns	5.1 ns	5.1 ns	

Table 3. Fifth year plant size after deflowering of 3 highbush blueberry cultivars for 1, 2, or 3 years.

Treatment	Means[z] per plant, 1970			Treatment means
	Collins ft.^{3}	Bluecrop ft.^{3}	Herbert ft.^{3}	ft.^{3}
Deflowered 1 year	25.3	25.9	16.0	22.4 ns
Deflowered 2 years	41.7	20.7	21.4	27.9 ns
Deflowered 3 years	30.5	20.1	18.7	23.1 ns
Cultivar means	32.5*	22.3 ns	18.7 ns	

*Denotes significant difference between cultivar means at .05 level.
[z]Length in row x breadth x height.

Table 4. Mean number of berries per cup in 1969[z].

Treatment	Collins No.	Bluecrop No.	Herbert No.	Treatment means No.
Deflowered 1 year	94	107	79	93 ns
Deflowered 2 years	109	105	85	100 ns
Deflowered 3 years	113	108	78	100 ns
Cultivar means	105 ns	107 ns	81**	

**Denotes significant differences between cultivar means at .01 level.
[z]All plants set in 1966.
ft.^{3} = cubic feet.

berries (Table 4). Neither characteristic was associated with the treatment variable.

Except as a sanitation measure to minimize possible insect or disease infestation, we found no advantage in preventing fruiting beyond the customary first year in these vigorous highbush blueberries.

Literature Cited

1. Schwartze, C. D. and A. S. Myhre. 1954. Growing blueberries in the Puget Sound Region of Washington. *State College of Washington Stations Circ.* No. 245.
2. Shutak, V. G. and P. E. Marucci. 1966. Plant and Fruit Development. *In Blueberry Culture.* P. Eck and N. F. Childers (ed.) Rutgers University Press, New Brunswick, N. J. p. 179-198.