Blueberry Variety Performance in Southern Illinois*

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The growth of the highbush blueberry (**Vaccinium australe**) is reportedly (2, 3) favored by locations where the soil is acid and moist, although the soil must be well drained.

The climatic requirements of the highbush blueberry are similar to those of the peach. Blueberry plants will probobly not survive dormant season temperatures of —20° F. or lower. The flower buds require approximately 800 hours of temperatures below 45° F. to break the rest period —a requirement similar to that of the Elberta peach.

The Hosmer and Stoy silt loam soils which are typical of orchard soils in the Illinois Ozark region of southern Illinois are naturally acid, and range from around pH 5.0 at the surface to pH 4.2 at the 18 inch depth, when agricultural limestone has not been applied. The average annual rainfall of the Illinois Ozark region is about 45 inches, and it is quite evenly distributed throughout the year.

The wholesale markets for fresh blueberries are now supplied primarily by New Jersey, and secondarily by North Carolina and Michigan. North Carolina grows early maturing varieties which are marketed in Chicago about May 25. New Jersey and Michigan production is predominantly of the Jersey variety. New Jersey berries are marketed in Chicago about June 25, and Michigan berries about July 15. The Jersey variety matures about June 20 in southern Illinois, and Illinois growers have a freight advantage over New Jersey and North Carolina growers. The leading commercial blueberry grower in southern Illinois ships the Jersey variety to Chicago, and at present he enjoys a two week period before large shipments of Michigan berries depress prices. If earlier maturing varieties were grown in southern Illinois, an additional marketing advantage could be realized.

Methods

A pilot blueberry variety test was planted in 1954 to explore the commercial possibilities of this crop in southern Illinois. Originally four plants of each of 19 varieties of highbush blueberry were planted, and a few additional varieties were planted in succeeding years. The planting has been maintained under a thick sawdust mulch system of management, with no supplemental irrigation. Ammonium sulfate fertilizer, or a fertilizer mix composed of equal parts of ammonium niturate and powdered sulfur, have been applied inside the drip line of each bush each spring, at the rate of 1 lb. per plant. The bushes have not been pruned. Berries were harvested by hand twice a week until less than 0.1 lb. per bush was picked. Yield per bush, and berry size for each variety were recorded on each picking date. Observations on berry color, firmness, shape, scar and flavor have been recorded annually, and the fruit and bush of each variety have been photographed in color.

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Table 1. Total yield, berry size and season of maturity of 18 blueberry varieties at the Illinois Horticultural Experiment Station, Carbondale, Illinois

	Total Yield[1]									Berry Size[2]					Season[3]			Maturity[5]		
	1958		1959		1960		Avg.			1958	1959	1960	Ave.							
Variety	No.	lbs.	No.	lbs.	No.	lbs.	No.	lbs.	Rank[4]	No.	No.	No.	No.	Rank[4]	Avg. lbs.	% of Total	Rank[4]	Date	Rank[4]	Days
Atlantic	11	7.15	9	2.86	2	.25	7	3.42	3	118	256	177	184	7	.19	5.56	1	6-23	4	55
Berkeley	13	12.31	10	4.97	10	12.17	11	9.82	7	84	132	106	107	10	2.21	22.51	3	6-19	6	48
Bluecrop	13	9.04	9	2.56	9	6.38	10	5.99	4	109	127	97	111	10	1.42	23.71	3	6-19	6	50
Burlington	12	12.15	10	13.21	10	17.25	11	14.20	10	121	173	131	142	9	.14	.99	1	6-30	1	56
Cabot	11	3.39	1	.15	5	.95	5	1.50	1	228	250	345	274	2	.44	29.33	4	6-11	10	54
Concord	11	5.48	12	7.53	10	10.08	11	7.70	6	176	270	178	208	5	2.27	29.48	4	6-28	2	56
Coville	2	.40	3	.30	0	—	2	.23	1	104	254	—	179	7	0	0	1	6-30	1	54
Dixi	9	5.40	1	.10	0	—	3	1.83	2	102	507	—	305	1	0	0	1	6-30	1	58
Herbert	9	7.70	10	3.65	7	3.10	9	4.82	4	89	219	88	132	9	.38	7.88	1	6-30	1	54
Jersey	10	9.45	10	10.00	9	10.70	10	10.05	7	113	187	144	148	8	2.17	21.59	3	6-27	2	55
June	7	2.20	2	.30	2	3.30	4	1.93	2	175	309	168	217	5	1.73	89.64	10	6-11	10	42
Pemberton	4	.62	8	.85	3	.37	5	.61	1	106	224	344	225	5	.11	18.03	2	6-30	1	58
Rancocas	13	10.15	1	.30	9	8.15	8	6.20	5	204	172	245	207	5	2.31	37.26	5	6-13	9	45
Rubel	7	1.98	8	1.31	8	2.85	8	2.05	2	189	311	211	237	4	1.00	48.78	6	6-27	2	55
Scammel	12	5.80	7	1.60	10	5.45	10	4.28	3	185	270	227	227	4	.73	17.06	2	6-23	4	55
Stanley	8	2.43	1	.23	8	3.17	6	1.94	2	164	186	209	186	6	1.06	54.64	7	6-16	8	47
Wareham	7	.95	6	.82	4	.33	6	.70	1	164	207	171	181	7	.11	15.71	2	6-30	1	58
Weymouth	6	1.25	1	.20	2	.90	3	.78	1	137	280	208	208	5	.68	87.18	10	6-11	10	45

[1]Number of pickings in a season and cumulative yield until less than .1 lb. per bush was obtained in one picking.

[2]Average number of berries per ½ pint measuring cup for all pickings.

[3]Average weight of berries picked in the first 4 pickings (2 weeks) of each season for 3 years and percentage of total yield.

[4]Range divided into 10 equal percentile groups: rank 10 assigned to the most desirable percentile group and rank 1 to the least desirable group. High yield, large berries and early maturity were considered most desirable.

[5]Date of first ripe berry and days elapsed from bloom (0 to 25% open flowers) to first ripe berries in the 1958 season.

Table 2. Commercial yield and fruit characteristics of 18 blueberry varieties at the Illinois Horticultural Experiment Station, Carbondale, Illinois

Variety	Commercial yield[1]											Fruit Scores[5]				
	1958		1960		1959		Average									
	No.	lbs	No.	lbs.	No.	lbs.	No.	lbs.	Pints per bush[2]	Rank[3]	Percent yield[4] total	Color	Scar	Firm	Flavor	Qual.
	9	7.08	0	0	0	0	3	2.36	3.93	3	69					
	13	12.31	8	4.67	8	11.77	10	9.58	15.97	10	98					
	12	8.64	8	2.51	9	6.38	10	5.84	9.73	6	98					
	10	11.12	1	1.13	6	11.22	6	7.82	13.03	8	55					
	0	0	0	0	0	0	0	0	0	1	0					
	0	0	0	0	1	.75	1	.25	.42	1	3					
	2	.40	1	.10	0	0	1	.17	.28	1	74					
	8	5.30	0	0	0	0	3	1.77	2.95	2	97					
	9	7.70	3	.55	7	3.10	6	3.78	6.30	4	78					
	10	9.45	1	.30	6	8.85	6	6.20	10.33	7	62					
	0	0	0	0	0	0	0	0	0	1	0					
	4	.62	0	0	0	0	1	.21	.35	1	34					
	0	0	0	0	0	0	0	0	0	1	0					
	0	0	0	0	0	0	0	0	0	1	0					
	1	.05	0	0	2	1.60	1	.55	.92	1	13					
	2	.53	0	0	1	.55	1	.36	.60	1	19					
	0	0	0	0	1	.10	1	.03	.05	1	4					
	4	1.00	0	0	0	0	1	.33	.55	1	42					

[1]Number of pickings and yield of berries larger than a count of 135 berries per standard ½ pint measuring cup.

[2]Conversion factor of .6 lbs. (.3 lbs. per ½ pint cup x 2 cups.)

[3]Range divided into 10 equal percentile groups: Rank 10 assigned to the most desirable percentile group and rank 1 to the least desirable group.

[4]Average commercial yield expressed as percentage of the average total yield from Table 1.

[5]Scores range from 1 to 10: 10 is the most desirable score.

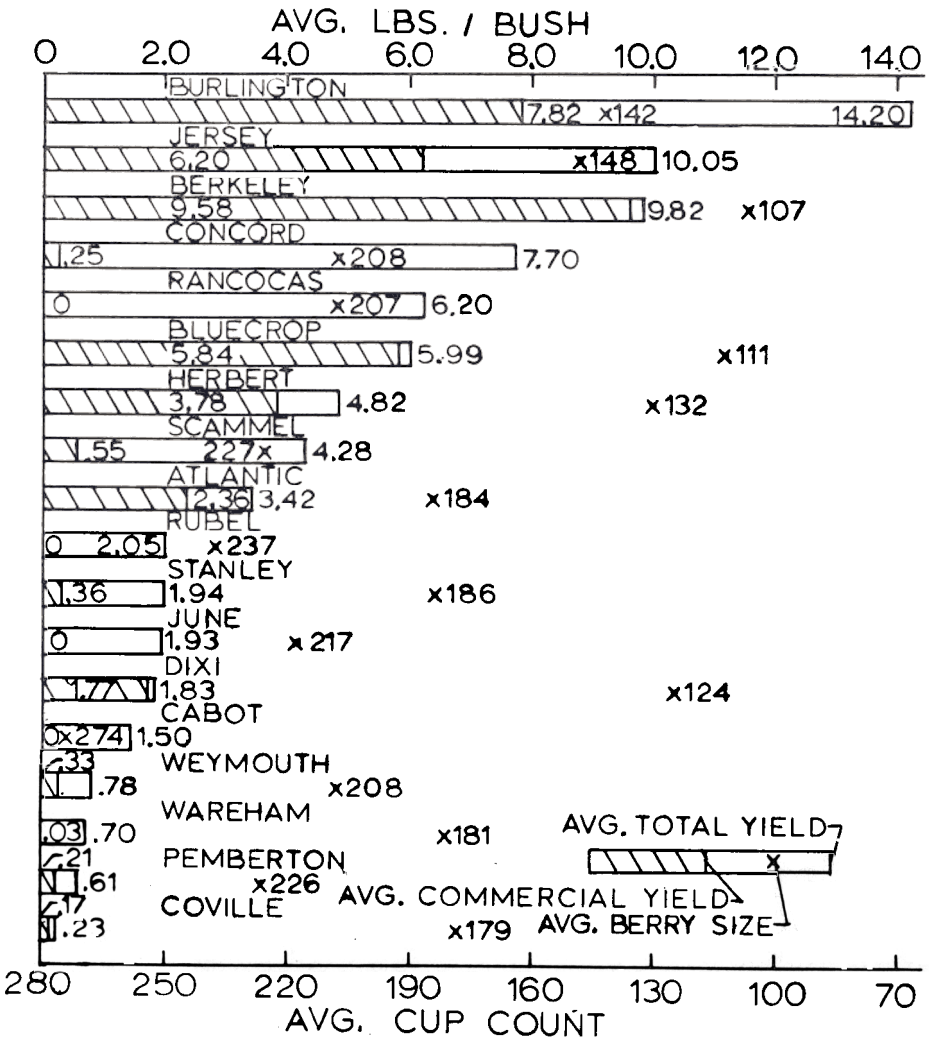

Figure 1. Average total yield, commercial yield and berry size of 18 blueberry varieties for 3 years; 1958, 1959 and 1960; at the Illinois Horticultural Experiment Station, Carbondale, Illinois.

Results

The major cultural problems encountered were control of the wild sweet potato *(Ipomoea pandurata)* and protection from birds. A safe material for chemical control of the weed would greatly ease the need for labor. Bird damage was not noticeable until 1961. In 1961 robins severely reduced the yield of berries.

Most of the varieties have made satisfactory growth, but Earliblue apparently is not well adapted. Earliblue has been planted twice, and both times the plants did not survive the first year. Ivanhoe was planted in 1957, and only one weak plant has sur-

vived. Blueray was planted in 1958, and none of the plants survived. However, Ivanhoe and Blueray will be planted again before a final decision is made. Coville plants were killed by a minimum temperature of −6° F. recorded on February 15 and 16, 1958. All other varieties have withstood minimum temperatures of −10° F. recorded on March 6, 1960, and − 13° F. recorded on January 28, 1961.

The total yield, berry size and season of maturity of 18 varieties for three years are summarized in Table 1. Listed in descending order, Burlington, Jersey, Berkeley, Concord and Rancocas were the five highest yielding varieties. Berkeley, Bluecrop, Herbert, Burlington and Jersey bore the largest berries. The percentage of total yield harvested in the first four pickings of the season gives some indication of the season of maturity for the varieties. However, the date when the first ripe berries were found in 1958 is a more precise indication of the season of maturity. In 1958, the days to maturity indicate the period from the date when 0 to 25 per cent of the flowers were open until the date when the first ripe fruits were noted.

The yield of many varieties was drastically reduced in 1959 as compared with the yield in 1958 and 1960, and the berries were much smaller also. A comparison of detailed temperature and precipitation records for the three seasons failed to account for the reduced yield and size. It may be that an alternate bearing cycle has been established.

The yields of Burlington, Jersey and Concord were not reduced in 1959, although berry size was adversely affected. Herbert, Atlantic and Dixi yielded satisfactorily in 1958, but the 1960 yields were not an improvement on the reduced yields of 1959. Apparently Atlantic and Dixi are not consistent producers and are only marginally adapted to southern Illinois. Other varieties with inadequate yield potentialities in southern Illinois are: Cabot, June, Pemberton, Rubel, Stanley, Wareham and Weymouth.

Yield is not the only important variety characteristic for the commercial grower of fresh market berries. Table 2 summarizes the yield, berry size and fruit characteristics of the portion of the crop likely to be of commercial importance for fresh markets. Listed in descending order, Berkeley, Burlington, Jersey, Bluecrop and Herbert are the 5 varieties with the highest commercial yield (berries larger than 135 cup count). Of this group, it should be noted that the commercial yields of Berkeley, Bluecrop and Herbert are a very high percentage of the total yields. On the other hand, Concord, Rancocas and Scammel have a satisfactory total yield, but they had a very low percentage in yield of large berries. The relationships between total yield, commercial yield and berry size are graphically shown in Figure 1.

The data on season of harvest shown by Darrow (1) was used to calculate the relative season of maturity according to the date of 50 per cent harvest completion. This information shows a 6 week range of harvest from Earliblue to Coville. The range in season is considerably shorter at Carbondale. The range of first harvest dates from Weymouth to Burlington is about 20 days, or about half the range of 42 days indicated by Darrow (1). If this apparent compression in seasonal range continues, a southern Illinois grower might gain a seasonal advantage of approximately 2 weeks by growing the earlier maturing varieties instead of Jersey.

Several of the newer varieties mentioned by Darrow (1) are good possibilities for commercial production in southern Illinois. However, Earliblue, Ivanhoe and Coville are not well adapted. Varieties worthy of trial in commercial plantings of blueberries

for wholesale fresh markets are. Bluecrop, Berkeley, Jersey, Herbert and Burlington.

Summary

Highbush blueberries are a promising new crop and can be successfully grown in southern Illinois to supply wholesale fresh markets.

Recommended varieties for trial in commercial plantings in southern Illinois, in order of season of maturity are: Bluecrop, Berkeley, Jersey, Herbert and Burlington.

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Performance of Apple Varieties on Various Roots and Interstocks*

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A size-controlled root and interstock orchard was planted at the Howell Hort. Field Station, Ogden, Utah, in March, 1956. The trees were planted on a uniform, Ironton silt loam, which is moderately well drained, highly calcareous, with a pH of 7.8-8.0. The planting distances used were 17.5 × 20 feet, except for the trees on East Malling IX (EM IX), which were planted 6 × 18 feet, and attached to wire trellises. The soil has been clean-cultivated, and the trees lightly pruned, and adequately irrigated.

The rootstocks involved in this study are EM II, VII and IX, Columbia (Canadian), and Hopa (from South Dakota). Interstocks include Clark (believed by some to be identical to EM VIII), Robin, O-524 (from Ottawa), EM VII and IX, Bud sports Delicious, Golden Delicious, McIntosh, Jonathan and Winesap are the scion varieties.

The trees are in one block, but are in non-replicated plots. In most cases there are three to five trees with the same variety / interstock / rootstock combination, although in some instances only two trees are alike. The trees have been fertilized annually, with all trees receiving the same quantity of fertilizer except those on EM IX, which received smaller applications because of their smaller size.

The tree growth and yield have been determined each year; however, yields have fluctuated due to spring frosts, which killed most flowers in 1961, and a large number in 1963.

Tree Growth

Rootstocks. Trees on EM II and VII rootstocks show approximately the same trunk circumference and width; however, those on EM II are a foot taller (see Tables 1 and 2). The vari-

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