Blackberry Breeding Involving Native Pacific Coast Parentage

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Trailing types of blackberries grow along the western slopes of the Sierra and Cascade Mountains and westward to the Pacific Ocean. Brown (1) has classified the native material as *Rubus* sub. *Eubatus* sect. *ursinus*. The species that occur in the central and northern coastal region of California are somewhat variable both in plant characteristics and chromosome numbers, but those found in Oregon and Washington are more uniform. Blackberries of European origin, the Himalaya and Evergreen, occur in the area, but these have naturalized since the advent of the early settlers.

The native blackberries were a delectable addition to the diet of the pioneers before cultivation of blackberries began. They are highly prized for their flavor, and, ever since the settlement of the country, a search has continued for native blackberries that could be cultivated. Attempts at cultivation of the native types were unsuccessful, but no cultivated native varieties have appeared.

The appearance and rapid acceptance of the Loganberry over-shadowed for many years any attempt to use native blackberries in breeding. Although Logan proved to be productive and well adapted, as a commercial berry, to western climatic condtions, it did not meet with sustained consumer acceptance. Marketing difficulties made it evident that a berry of different qualities must be found.

Logan was assumed to have originated as a natural hybrid between a native blackberry and domestic raspberry (2). This stimulated interest in using it in blackberry breeding. When a cooperative Rubus breeding project began at the Oregon Experiment Station with the U. S. Department of Agriculture in 1927, C. E. Schuster started the work by hybridizing domestic varieties, including Logan, with native blackberry selections. Later, many crosses were made by G. M. Darrow, B. S. Pickett and G. L. Rigg, between 1930 and 1932. Since that time, native blackberries have been used continuously in the breeding program at Corvallis.

The search for superior native blackberry parents revealed that natural hybrids were arising. These fertile hybrids are characterized by having perfect flowers, whereas native blackberries are dioecious. These plants were first believed to be new, perfect-flowered native species, because they resembled other native types in every way except flower structure. However, their assumed origin was changed when seedlings grown from crosses between the native blackberries and domestic varieties yielded perfect-flowered seedlings resembling the natural hybrids. Santiam, Johnson, Starr and Lincoln are selections from the wild that presumably arose as natural hybrids between native species and Logan, as indicated by their close similarity with seedlings derived from crosses of Logan and native blackberries. Other perfect-flowered selections used in breeding, such as Black Logan, Kayberry, Kosmos and Ware do not closely resemble Santiam, and other selections from the wild, and, therefore, may have some other domestic parent than Logan, such as Himalaya or Evergreen.

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Table 1. Seedlings grown from native Pacific coast blackberries and selections made, Corvallis, Oregon.

Oregon Origin	Number	Selected	Percent	Calif. Origin	Number	Selected	Percent
Zielinski	3,933	91	2.31	Jenner-1	533	19	3.56
Hunter	469	4	0.85	Branstetter	484	7	1.45
Wild	314	8	2.55	Jenner-2	215	3	1.39
Dyke	224	3	1.34	Arcata	108	1	0.93
Davenport	146	0		Patrick Point	91	0	
Asbahr	135	0		Agate Beach	88	0	
Triangle Lake	60	0		Point Arena	78	1	1.28
Cazadero	47	0		N. Calif.	62	0	
Gate	8	0		Trinidad	49	2	4.08
				Rohnerville	48	0	
				Clam Beach	35	0	
				Abalone Beach	4	0	
TOTAL	5,336	106	1.99	TOTAL	1,795	33	1.84

Table 2. Seedlings grown from possible and known hybrids of Pacific coast blackberries and selections made, Corvallis, Oregon.

Possible Hybrids	Seedling's Number	Selected	Percent	Known Hybrids	Seedling's Number	Selected	Percent
Santiam (Ideal)	994	11	1.10	Cascade	1,583	16	1.01
Kayberry	879	2	0.23	Pacific	1,024	18	1.76
Black Logan	721	35	4.85	U.S.-Oreg. 998	814	23	2.83
Johnson	567	6	1.06	" 1007	794	9	1.13
Kosmos	292	0		" 236	651	4	0.61
Ware	213	1	0.47	" 126	561	0	
Starr	104	3	2.88	" 878	552	14	2.54
Lincoln	96	2	2.08	" 1079	449	18	4.01
				" 217	447	2	0.45
				Other	4,100	46	1.12
TOTAL	3,866	60	1.55	TOTAL	10,975	150	1.37

The selections used in breeding and known to be native blackberries are listed in Table 1 under the heading of "Oregon origin" and "California origin." The Zielinski selection found by B. C. Zielinski near Salem, Oregon, was used most extensively. Seedlings from crosses of Zielinski x Logan have characteristics very similar to the native blackberry. Two selections from the progeny were named (Pacific and Cascade), which are productive and have highly flavored fruit, but are too soft for commercial handling. These varieties and selections of the same origin, such as U.S.-Oreg. 126, 217 and 236, have been used extensively in breeding as given in Table 2.

Other native blackberry selections found in Orgeon have been used sparingly as parents (Table 1). Apparent natural hybrids have been used extensively in breeding (Table 2). The Santian (Ideal), which is grown commercially to some extent in Oregon, when crossed with Himalaya, gave a selection that was named Chehalem which is being grown on a small com-

mercial scale. The Black Logan, whose origin is not clear, was crossed with Young, and the resulting seedlings were outstanding for bright black color, large size, and productiveness. One of these, named Olallie, is of considerable commercial importance in California.

Seedlings of Chehalem x Olallie have been outstanding in productiveness, large size of fruit, and high flavor. One of the most promising selections, Marion, is now extensively grown commercially in Oregon. Other selections of this cross are still under evaluation as potential commercial varieties.

A collection of native blackberries from along the northern California coast was made primarily for a study of their relation to the Logan. Crosses were made between them and La France, the European tetraploid red raspberry. This was done to simulate the supposed origin of the Logan. Although most of the seedlings from the crosses appeared worthless, they did have characteristics closely resembling Logan, which is evidence that the suspected origin of Logan is correct as being derived from a native blackberry and a red raspberry. Further crossing with the best of these hybrids indicates they have value in breeding.

Many selections were made in the cross of Jennifer-1 x Eldorado because the seedlings were very productive, glossy black and firm, a characteristic which are very desirable for commercial blackberry production. Two selections, U.S.-Oreg. 878 and 998, have been particularly valuable parents in further breeding, as shown in Table 2. These selections somewhat resemble Mammoth. Although no varieties have been introduced from crosses of native blackberries by the eastern upright blackberry, such as Eldorado, promising selections are under test.

An analysis is given in Table 3 of the original parents of 21 selections and 6 named varieties which have been outstanding in canning and freezing tests. Special emphasis has been placed on pleasing flavor in the evaluation of blackberries for commercial purposes, since flavor is a very important fruit character governing acceptability.

The parentage of these selections and varieties falls into three classes according to origin. All of them have Pacific Coast native blackberry entering into their origin to some extent. The varieties Logan, Young and Boysen are also in the parentage of all but Chehalem. The third category includes Himalaya, Eldorado, Austin Thornless, Lucretia and the red raspberry, La France. At least one of these appears in 19 of 27 kinds, and in all the selections made in recent years.

It is quite evident that the native blackberry may be involved in the origin of Boysen and unquestionably in the origin of Young and Logan. When Boysen and Young are crossed with native blackberries, the distinctive, desirable flavor quality is retained, and often increased.

Large numbers of seedlings must be grown, since a great many have inferior characters and must be discarded, as noted in a previous report (2). During the period from 1927 to 1966, about 40,000 seedlings have been grown, of which approximately 7,000 were first generation hybrids between native blackberry and cultivated varieties, and about 14,000 apparently equivalent to second generation hybrids. Much of the recent breeding has involved various recombination patterns.

The primary objective in the early breeding was a replacement for Logan. The introduction of the Young, followed closely by Boysen, largely replaced the demand for Logan before any superior Logan-type was originated. The very rapid increase in the acreage of Thornless Evergreen, with

Table 3. Analysis of parentage of 21 selections and 6 varieties of blackberries with outstanding processing quality and most acceptable flavor.

Selection or variety	Parents	Nature of parentage[1]									
		Native Selection								Other	
(1)	(2)	(3)								(5)	
Aurora	U.S.-Oreg 616 x U.S.-Oreg 73	√				√				√	
Cascade	Zielinski x Logan	√									
Chehalem	Santiam x Himalaya	√								√	
Marion	Chehalem x Olallie	√	√			√				√	
Olallie	Black Logan x Young	√				√					
Pacific	Zielinski x Logan	√				√					
U.S.-Oreg 616	" x "	√				√					
" 742	Pacific x Boysen	√				√	√				
" 793	U.S.-Oreg 605 x Boysen	√				√	√				
" 917	Cascade x Olallie	√	√			√	√				
" 922	Chehalem x Olallie	√	√			√				√	
" 965	U.S.-Oreg 616 x U.S.-Oreg 73	√				√				√	
" 968	" 742 x " 743	√				√	√				
" 977	" 466 x " 743	√				√	√			√	
" 978	" 466 x " 743	√				√	√			√	
" 992	Chehalem x Olallie	√	√			√				√	
" 993	" x "	√	√			√				√	
" 1050	U.S.-Oreg 743 x U.S.-Oreg 877	√	√			√	√			√	
" 1063	" 743 x Chehalem	√	√			√	√			√	
" 1105	Olallie x U.S.-Oreg 878	√	√			√				√	
" 1123	Marion x U.S.-Oreg 878	√	√	√		√				√	√
" 1124	" x " 878	√	√	√		√				√	√
" 1125	Olallie x U.S.-Oreg 878	√	√			√				√	
" 1127	" x " 878	√	√			√				√	
" 1191	Chehalem x U.S.-Oreg 977	√	√			√	√	√		√	√
" 1282	U.S.-Oreg 1063 x Austin Thornless	√	√			√	√			√	√
" 1375	" 1067 x Aurora	√	√	√		√	√	√	√	√	√

[1]Each check-mark designates number of times that a parent enters into the parentage.

its heavy production, has eased the urgent need for more blackberry varieties for commercial purposes in the Pacific Northwest. However, the lack of a distinctive, acceptable flavor, and the late season of ripening of Evergreen are unfavorable characters that offset its productivity. The Marion, with its rich flavor, and high production, is now being extensively planted, and apparently will fulfill the need for a high quality processing variety.

Since the thornless form of the Evergreen has proved to be a popular replacement for the thorny form, only thornless varieties may be acceptable in the future. Efforts are now directed toward incorporatoin of high flavor and other desirable characteristics of commercial blackberries into thornless vines. This program involves the use of the native western blackberries, which have high flavor, earlier ripen-

ing, smaller seeds and more pliable canes than Evergreen.

Literature Cited

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Some Interesting Golden Delicious Seedling Selections

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The popularity of the Golden Delicious apple in nearly all apple growing areas of the world has prompted fruit breeders to use it in crosses in order to incorporate the outstanding qualities of Golden Delicious into other varieties.

Several selections of the Golden Delicious type have been developed by fruit breeding institutes or fruit growers; a few have already been named. The Summerland Research Station has a limited program in breeding Golden Delicious types of apple, and a few selections have been found worthy of growers' trial.

9E-13-47 (= Kendall x Golden Delicious) is indistinguishable in appearance from Golden Delicious. However, towards the end of the storage period, when Golden Delicious has lost practically all its acidity and flavor, and tastes quite neutral, the seedling 9E-13-47 is slightly firmer and richer in flavor because of its higher level of acidity and soluble solids. The fruit of the 9E-13-47 could be marketed without difficulty as Golden Delicious, but before the selection can be named and planted commercially, growers' experience is needed to determine its growth and bearing habits. At the Summerland Station, the selection has been as free from russeting as Golden Delicious. The selection has borne almost annually, alternating from moderate to heavy crops. The selection can be planted as a pollinizer for Golden Delicious. This combination gives the grower the unique opportunity of growing what appears to be one variety, but actually are two varieties that will successfully pollinize each other.

10-C-18-33 (= Golden Delicious open pollinated) is like Golden Delicious, but can be distinguished from it by a more roundish-conic fruit. The skin color is a bright yellow, and covered on the sunny side with an intensively red blush. In spite of rather prominent lenticels on the sunny side, the fruit of the selection is fairly attractive. The fruit of 10C-18-33 has a fair amount of acidity – more than both Golden Delicious and the selection 9E-13-47 described above. Be-

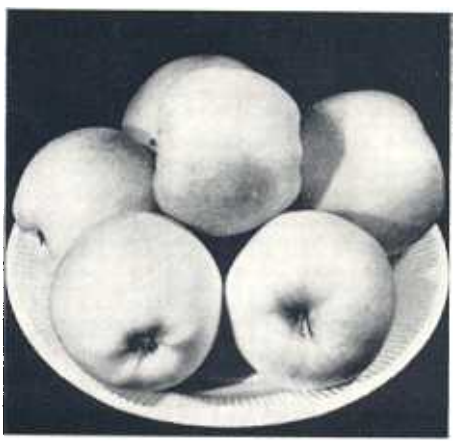

Figure 1. The fruit of the selection 10C-6-25 (Winesap x Golden Delicious) is large, round, smooth, with very slight blush.

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