NEW BERRIES from Oregon's Plant Breeding Research

George F. Waldo • Ernest H. Wiegand • Henry Hartman
FOREWORD

Plant breeding has become an important adjunct to modern agriculture. New strains and varieties of economic plants must be introduced from time to time to meet new producer and consumer demands, and to aid in insect pest and disease control.

The development of new, small fruit varieties occupies a prominent place in Oregon. For a number of years a small fruits breeding project has been carried as a cooperative undertaking between the Station and the United States Department of Agriculture. The present publication deals with five new varieties deemed worthy of introduction. These have been selected from among more than 150,000 individual crosses and selections made during the period from 1921 to 1943. Numerous other seedlings and potential new varieties are under test in various parts of the state. Many of these show unusual promise and the Station confidently expects that some of them ultimately will prove to be valuable additions to the small fruits enterprise of the Pacific Northwest.

Wm. A. Schoenfeld

Dean and Director of Agriculture
New Berries from Oregon’s Plant Breeding Research

By George F. Waldo, Ernest H. Wiegand, and Henry Hartman

Since 1927 the United States Department of Agriculture and the Oregon Agricultural Experiment Station have been cooperating in the breeding of small fruits. During this time about 120,000 strawberry seedlings, 11,000 blackberry seedlings, and more than 6,000 red raspberry seedlings of known parentage have been fruited (Figure 1). The best of these seedlings have been selected and widely tested throughout the state.

Since the establishment of the cooperative breeding project at the Oregon Agricultural Experiment Station, five new varieties of small fruits have been originated, named, and introduced. These are as follows: the Corvallis and Brightmore strawberries, the Pacific and Cascade blackberries, and the Willamette red raspberry. There are also several selections of these small fruits that may be introduced in the future.

Figure 1. A, propagation of new varieties of berries in a greenhouse; B, seedlings and selections of strawberries in the field; C, selections remaining after destroying the undesirable strawberry seedlings; D, blackberry selections remaining after destroying the less desirable seedlings.

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STRAWBERRY BREEDING

Extensive strawberry breeding at the Oregon Agricultural Experiment Station was started in 1920 by C. E. Schuster of the Horticulture Department, who carried it on until 1930. George M. Darrow of the United States Department of Agriculture continued the work from 1930 to 1932. Since 1932 it has been carried on by the senior author.

Nearly 50,000 strawberry seedlings were fruited by C. E. Schuster and several hundred promising selections were given further tests. As a result of this earlier breeding work, the Corvallis variety was named and introduced in 1930. Since that time it has become an important variety in sections of the Willamette Valley, being particularly well adapted to the irrigated river-bottom lands. Recent reports from England have indicated that the Corvallis is showing promise in that country.

In 1942 the Brightmore strawberry was introduced as a variety showing resistance to the virus diseases "crinkle" and "yellows," for trial in those areas where Marshall has become so badly diseased as to be unprofitable to grow.

CORVALLIS

Origin

The Corvallis (Oregon 12) strawberry originated from a cross of Ettersburg 121 and Marshall (Oregon) made in 1921 by C. E. Schuster (see Figure 2). After tests conducted between 1925 and 1929, it was considered valuable for canning and freezing as well as for the general market, and was named and introduced in 1930.

Characterization

The Corvallis strawberry has succeeded on various types of soils but has been found best adapted to the river bottom soils of the Chehalis and Newberg series. The plants are more vigorous than those of Marshall and usually are more vigorous than those of Ettersburg 121. When grown in the hill system, the plants of Corvallis often become very large. If grown in the matted row, so many runners are produced that plants become crowded. The foliage of Corvallis is a characteristic yellow-green and is more resistant to leaf-spot dis-
eases than that of either Marshall or Ettersburg 121. Corvallis is also more resistant than Marshall to the virus diseases, crinkle and yellows.

Corvallis has perfect flowers, but the first flowers to open often lack pollen. Because of such pollen deficiency, the early berries are often ill-shaped. The later blossoms, however, set better than those of either Marshall or Ettersburg 121. The flower clusters are large, with stout stems that hold the fruit off the ground.

The fruiting season of Corvallis is late, with ripening beginning in early June and continuing until about July 1. Yields of plants on the river bottom soils consistently exceeded those of Marshall, often amounting to 3 to 5 tons per acre. The first berries to ripen are as large as those of Marshall but the later berries are smaller than those of Marshall.

In shape of berry, Corvallis is intermediate between Marshall and Ettersburg 121 (Figure 2). The first berries of Corvallis are irregular in shape, the later ones blunt conic to globose. The berries ripen evenly, with an attractive deep red exterior and a uniformly red flesh. The seeds are yellow or reddish yellow, and sunken. The skin is tender but the flesh is firm. The berries are rather easy to pick without the cap or hull. The flavor is medium acid to tart, with the dessert quality generally considered excellent.

The tender skin of Corvallis makes this berry unsuited for long-distance shipping, but it has met with considerable favor as a canning variety. It is also excellent in the frozen pack, especially for family use; but for slicing it is not so good as Redheart.

The limitations of the Corvallis are: (1) that it has not yielded well on the hill soils of Oregon, (2) that the later berries to ripen are rather small in comparison with those of Marshall, and (3) that its skin is tender, making it unsuited to long-distance shipping.

**Technical description**

Form blunt conic to oblate with no neck; size medium, small toward end of season; pubescence on pedicels spreading; apex and all sides ripen evenly, color bright deep red; seeds yellow or reddish yellow, sunken; flesh solid red; texture firm, juicy, very smooth; flavor acid, aromatic; dessert quality very high. Season late.

**BRIGHTMORE**

**Origin**

The Brightmore (Oregon 1084) strawberry is a seedling of a cross between the Blakemore and Oregon 154, made by George M. Darrow of the U. S. Department of Agriculture at Corvallis, Oregon, in the spring of 1932, and selected in 1934. Oregon 154 resulted from a cross between Ettersburg 121 and Marshall made by C. E. Schuster, and was selected by him in 1930. Since 1937 extensive tests of Brightmore have been made in various places in Oregon and Washington.

The Brightmore has grown vigorously and has been productive except on the very heaviest soils. It has been outstanding in the trials at the following stations: Western Washington Experiment Station at Puyallup, Washington; Irrigation Branch Experiment Station at Prosser, Washington; and Hood River Branch Experiment Station at Hood River, Oregon. It has grown vigorously on the rich, well-drained river bottom lands of western Oregon and Washington and in the irrigated sections east of the Cascade Mountains. Further trials are necessary to determine its adaptability to the red hill and other upland soils west of the Cascade Mountains.
Reaction to important diseases

No crinkle and yellows, two destructive virus diseases of strawberries prevalent in the Pacific Coast Region, have been observed in Brightmore. This may indicate either that the variety is resistant to these diseases or that plants in test plots have so far escaped infection.

The variety is, however, susceptible to the red-stele root disease.* Care should be taken, therefore, to use only plants free from the disease and plant them in soil where strawberries have not been grown recently.

Characterization

The Brightmore has many of the characteristics of Blakemore, one of its parents. The foliage is medium light green in color. The plant is vigorous, producing many leaves with long petioles. The blossoms open rather early and contain ample pollen. The blossom clusters are medium in height and droop or fall when the fruit ripens.

The berries begin ripening at about the same time as those of Marshall. The first berries are medium in size and this size continues for about 2 weeks, or longer if soil moisture and fertility are adequate to maintain normal plant vigor. The last berries have been too small at Corvallis for sale in the local fresh-fruit markets. The berry separates from the hull or cap very easily, a desirable characteristic of berries for processing.

Yields of Brightmore at Corvallis, Oregon, have been about the average of other varieties. At Puyallup and Prosser, Washington, and at Hood River, Oregon, however, it has outyielded other varieties under most conditions. Brightmore flowers profusely and sets fruit under all conditions.

The Brightmore is notable for its uniformity of shape, which is conic to long conic or necked. The exterior color is slightly darker red than that of Blakemore but a lighter red than that of Marshall. The seeds are yellow, only slightly sunken, and spaced rather far apart. The surface has a remarkable brightness and gloss that suggests that the berries have been waxed or varnished. The flesh is firm and medium red in color.

With a medium-acid flavor, the dessert quality of Brightmore is very good, but not equal to that of well-grown Marshall.

Tests made by the Food Industries Department of Oregon State College and by the Western Washington Experiment Station, Puyallup, Washington, have shown that preserves made of Brightmore were superior to those of Marshall in color, firmness, and other qualities. Since the major portion of the frozen strawberries eventually are used in preserves, Brightmore may replace Marshall in many areas in the Pacific Northwest, especially where virus diseases make Marshall unprofitable.

The principal limitations of the Brightmore are that it is susceptible to the red-stele root disease, a disease sometimes serious on poorly drained and heavy soils, and that it is not so highly flavored as the Marshall.

Technical description

Form conic to long conic or necked; size medium, becoming small toward end of season; color bright, medium light red, very glossy; seeds yellow or reddish-yellow, slightly sunken; flesh light red throughout; texture firm, without cavity; shipping quality good; preserving quality excellent; flavor subacid; dessert quality good; midseason.

* Caused by Phytophthora fragariae Hickman.
NEW BERRIES FROM OREGON'S PLANT BREEDING RESEARCH

BLACKBERRY BREEDING

The new blackberry varieties, Pacific and Cascade, are the results of crossing the native western blackberry with the Loganberry. The native western blackberry (Rubus macropetalus) or, as it is commonly known, "trailing blackberry," is generally considered to have the finest flavor of any blackberry. It is a native in the area west of the Cascade Mountains from northern California to British Columbia. Though selections from the "wild" have occasionally been grown under cultivation, no selection has ever been very productive. One reason for such lack of productiveness is that the staminate (male) and pistillate (female) flowers are borne on separate plants and the selected plants had female flowers only. Plants bearing perfect blossoms are rarely found in the natural state. Other reasons for the low yields from native selections are the small size of the fruit and the susceptibility of this species under cultivation to the Septoria leaf and cane spot.

PACIFIC

Origin

The Pacific (Oregon 163) blackberry originated from a cross in 1932 between the Zielinski, a selection of the trailing blackberry (Rubus macropetalus), found in 1926 by B. C. Zielinski of Salem, Oregon, and the Logan. The Pacific was selected from the resulting seedling progeny in 1935 (see Figure 3).

![Figure 3. Fruit of the Pacific blackberry, a new black variety of the Logan type but with more of the flavor of the native trailing blackberry.](image)

Characterization

The plants are vigorous and similar in appearance to the trailing blackberry. Its cane size is intermediate between that of trailing blackberry and...
that of the Loganberry. Plants are propagated by rooting the tips of canes in the fall, as for the trailing blackberry and Logan.

The blossoms of the Pacific are perfect, like those of the Logan, and are borne on medium to long laterals. The fruit is long, similar to that of the Logan in shape and nearly as large, uniform, attractive in appearance, and glossy. The color is very dark red to almost black. The flavor suggests the trailing blackberry more than it does Logan, although the acidity is much like that of the latter.

The ripening season of Pacific is about the same as that of Logan and Young. During the past 4 years, the first ripe berries have appeared between June 17 and June 29. The length of the ripening season is similar to that of Logan and longer than that of Boysen, usually ending between July 15 and July 30. Its yield has been about the same as that of Boysen when they have been grown under similar conditions. As its season is longer, however, the yield per picking is usually less than that of Boysen.

Canning and freezing tests have been made each season since 1935. During this time, Pacific has been rated as one of the best varieties for the frozen pack; and, in some cases, as superior to either Boysen or Young. In canning, Pacific has also been rated among the best varieties. It has been tested rather widely within the Willamette Valley of Oregon, but only slightly outside this area.

The limitations of the Pacific are that it is more acid than the Young and possibly slightly less productive than the Cascade. Its long ripening season may be an advantage under some conditions and a disadvantage under others.

Technical description

Plants vigorous, trailing, productive; propagated from tips; canes long, cylindrical, slender, grayish-green to red, medium heavy bloom. Prickles short, stout, less numerous than in Logan, green tipped with reddish base. Leaves dark green, remain on canes well

Figure 4. The Cascade blackberry trained to a two-wire trellis in February. Note the many strong canes coming from a single hill.
into the winter or much longer than on Logan. Flowers perfect, borne on medium long laterals. Fruit early to midseason, medium firm, medium size, somewhat smaller than Logan, regular in shape, cylindrical, similar to Logan; reddish black, bright; drupelets medium size; flesh juicy, acid; quality excellent; flavor suggesting that of the native blackberry.

CASCADE

Origin
The Cascade (Oregon 237) blackberry is also from a cross between Zielinski and Logan. It was selected in 1935 from the same group of seedlings as Pacific and in many respects resembles Pacific in appearance.

Characterization
The canes of Cascade, like those of Pacific, are somewhat more slender and are more basal branching than those of Logan.

Cascade exceeds Pacific in plant vigor (Figure 4). It makes an especially vigorous growth the first season after planting, and yields a good crop the following year. The tips of the canes root very readily, much more so than those of either Logan or Pacific. Because of the large number of canes, Cascade can be propagated rapidly. The high yields of Cascade generally exceed those of Pacific and sometimes those of Boysen.

The blossoms are perfect-flowered and are borne on medium-long laterals. The fruit is glossy and dark red to almost black. The berry is long, similar to that of Logan in shape and size but somewhat less uniform than that of Pacific. In general, Cascade fruit is not quite so large as that of well-grown Logan. It is softer than Pacific or Logan and therefore may not be so satisfactory for the fresh-fruit market. The fruiting season of Cascade begins about with that of Pacific or Logan, but Cascade does not produce as many early berries as Pacific or Logan. It is earlier than Boysen, but the end of the Cascade season approximately coincides with that of Boysen.

Cascade has been rather widely tested and has met with favor in both western and eastern Washington and in Oregon. At the Irrigation Branch Experiment Station at Prosser, Washington, it has outyielded all other trailing blackberries.

In canning and frozen-pack tests during the past five seasons, Cascade has not been as outstanding as Pacific. The lack of firmness of Cascade has resulted in a relatively poor appearance after freezing. Its dessert quality, however, is superior to that of Pacific, with less acidity and the flavor more like that of the trailing blackberry. Its superiority over other berries is most evident in preserves and jams where flavor and color are most essential. Should there be an increased demand for preserves, jams, juices, and puree, this variety may be widely grown.

The chief limitation of Cascade is its somewhat softer fruit, which makes it less desirable on the fresh-fruit market.

Technical description
Plants very vigorous, trailing, very productive, propagated from tips; canes numerous, long, many branches, with much more basal branching than in Logan, cylindrical, medium slender, grayish-green to red, light bloom on young canes, becoming heavy on older portions. Prickles numerous, short, as stout as in Logan, green tipped with reddish base. Leaves small to medium, smaller than in Logan, lighter green and deeper veined than Pacific, remaining on canes well into winter. Flowers perfect, borne on medium-long laterals. Fruit early to midseason, medium firm to soft, medium size, smaller than Logan, regular to irregular in shape, cylindrical, reddish black; drupelets medium size; flesh juicy, medium acid; quality excellent; flavor suggesting that of the trailing blackberry.
More than 200 red raspberry selections have been tested in recent years. Many are on trial in various parts of Oregon. Several selections are showing real promise and may be named and introduced. One selection, named the Willamette, has recently been introduced (1943) for trial because it has attracted attention as a market berry in the vicinity of Corvallis.

**WILLAMETTE**

**Origin**

The Willamette (Oregon 334) red raspberry resulted from a cross between Newburgh and Lloyd George, made in 1933 by the senior author. It was selected as a promising seedling in 1936, and propagated the following spring. Since 1939 test plantings have been made in different parts of Oregon and Washington. In addition, a large test planting, set out on the Experiment Station grounds in 1940, was in full production in 1942.

**Characterization**

The berry of Willamette is much larger than that of Cuthbert. The following table, giving records for 4 years, shows that the fruit of the Willamette is the largest of the varieties at Corvallis, Oregon.

**Average Weight per Berry for Four Seasons of Willamette, Cuthbert, Newburgh, and Taylor Raspberries, Corvallis, Oregon.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Willamette</th>
<th>Cuthbert</th>
<th>Newburgh</th>
<th>Taylor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grams</td>
<td>Grams</td>
<td>Grams</td>
<td>Grams</td>
</tr>
<tr>
<td>1939</td>
<td>3.65</td>
<td>2.25</td>
<td>3.50</td>
<td>3.50</td>
</tr>
<tr>
<td>1940</td>
<td>3.65</td>
<td>2.25</td>
<td>3.90</td>
<td>3.10</td>
</tr>
<tr>
<td>1941</td>
<td>4.30</td>
<td>2.45</td>
<td>3.60</td>
<td>3.15</td>
</tr>
<tr>
<td>1942</td>
<td>3.90</td>
<td>2.25</td>
<td>3.00</td>
<td>3.15</td>
</tr>
<tr>
<td>Average</td>
<td>3.88</td>
<td>2.33</td>
<td>3.50</td>
<td>3.23</td>
</tr>
</tbody>
</table>

The berries are also unusually firm and hold up well on standing. The firmness is also maintained after canning or freezing. Because of its large size, firmness, and keeping quality, the fruit of the Willamette has been preferred to that of Cuthbert on the Corvallis markets. Holding tests under refrigeration indicate its adaptation to long-distance shipping. Willamette does not have the characteristic flavor of Cuthbert and is a little more acid. Its acidity, however, is not objectionable and helps to give it a distinctive flavor.

In frozen-pack tests, Willamette has been among the best varieties every year, and in canning tests it has been rated equal to Cuthbert.

The season of Willamette is medium early and long. In the early season of 1941 first ripe berries were picked on June 12 while those of Cuthbert were picked on June 23. In the late season of 1942 the first berries were picked on July 1, about with Cuthbert. The season, however, continues as long as Cuthbert.

The berries are blunt conic and similar in shape to Taylor. The berry is a dark red color, firm, and so far never crumbly.
In 1939, at Corvallis, Willamette outyielded 79 other selections, producing at the rate of nearly 5 tons per acre. At the John Jacob Astor Branch Experiment Station at Astoria, Oregon, it produced at the rate of nearly 4 tons per acre, outyielding Latham, Viking, and Lloyd George, and almost equaling Newburgh. At the Red Soils Experiment Area, Oregon City, it outyielded Cuthbert, but did not equal Taylor or Marcy.

Adaptation and Uses

In plantings at Hood River, Medford, Astoria, and at several places in the Willamette Valley, Willamette has made satisfactory growth and yielded well. The best growth was at Aurora, Oregon. These tests, however, are not enough fully to determine its adaptation. Though Willamette holds its leaves until early winter, there has been little tendency to late fall or winter growth as with Cuthbert. Full knowledge of its disease susceptibility or resistance and winter injury is lacking, but no particular susceptibility to any of the common raspberry diseases has yet been observed.

The Willamette is worthy of a trial for local markets, distant shipping, canning, and the frozen pack. Its particular superiorities over Cuthbert are its large size and firmness of berry.

A limitation of the Willamette is that it has less aroma than the Cuthbert.

Technical description

Bush vigorous; canes medium stout, erect, not so tall as Cuthbert; shoots slightly glaucous, reddish; internodes shorter than those of Cuthbert; prickles dark red, numerous, very short, small, weak, becoming merely raised dots on old canes; suckers as numerous as on Cuthbert. Leaves medium sized, dark green, with characteristically deep midribs and veins; lower surface grayish, with a few fine prickles along the midrib. Flower cluster smaller than on Cuthbert. Fruit midseason, 3 to 6 days before Cuthbert, but ripening for as long a period as Cuthbert; very large, much larger than Cuthbert and larger than Newburgh at Corvallis; blunt conic, similar to the Taylor; cavity large but flesh thick; drupelets medium; color deep red, darker than Cuthbert; very firm, much firmer than Cuthbert; does not crumble; subacid; good raspberry aroma; quality good, better than Newburgh, not equal to Cuthbert.
SUMMARY

Resulting from the cooperative breeding project, five new varieties of small fruits have been named and introduced. These are the Corvallis and Brightmore strawberries, the Pacific and Cascade blackberries, and the Willamette red raspberry. Many other selections of these small fruits are under test and may be introduced in the future. About 120,000 strawberry seedlings, 11,000 blackberry seedlings, and more than 6,000 red raspberry seedlings of known parentage have been fruited in this breeding project.

The Corvallis strawberry was named and introduced in 1930 and has become an important variety in the Willamette River bottom soils. It is excellent in the frozen pack, is good as a canning variety, and has excellent dessert quality as fresh fruit. It has not yielded well on the hill soils of Oregon; its later berries to ripen run down in size as compared to those of the Marshall; and its skin is tender, making it unsuited for long-distance shipping.

The Brightmore strawberry was named and introduced in 1942. In tests, it has outyielded other varieties under most conditions at Puyallup and Prosser, Washington, and at Hood River, Oregon. It has been productive except on the heaviest soils. It is a firm, bright-red variety especially well adapted for freezing and preserving. Preserves made from Brightmore have been superior to those made from Marshall even though the fresh-fruit flavor of Brightmore is not so high as that of the Marshall.

The Pacific blackberry was named and introduced in 1940. It is a black-fruited variety of the Young and Boysen type, but of higher flavor. In shape and size it is similar to the Logan, but it is not so acid as the Logan. It is excellent for the frozen pack and for canning. It is well adapted to the Willamette Valley.

The Cascade blackberry was also named and introduced in 1940 and it is similar in plant and berry to the Pacific. It is softer than Pacific and therefore does not have as good an appearance as that variety either on the fresh-fruit market or in the can. Its dessert quality, however, is generally superior to the Pacific, and for jam and preserves it is unsurpassed. It is generally more productive than the Pacific.

The Willamette red raspberry was named and introduced in 1943. It has been notable as compared with other varieties in several tests in western Oregon. It is more productive, much firmer, and much larger than Cuthbert where it has been tested. It has been among the best varieties in frozen pack tests, and in canning tests has been rated equal to Cuthbert.