

IMPROVEMENT OF CURRANTS AND GOOSEBERRIES

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CURRANTS and gooseberries are closely related bush fruits that are far more extensively raised and prized in Europe than in the United States. They were formerly grouped into a single genus, *Ribes*, but now the gooseberries are generally placed in a separate genus, *Grossularia*. Though hybrids have been made between currants and gooseberries, only sterile seedlings have so far been raised.

MATERIAL FOR CURRANT BREEDING

THE red currant seems to have been cultivated first some time before 1600 in the Netherlands, Denmark, and around the Baltic Sea. According to Hedrick,¹ in 1665 Rea mentioned three red currant varieties, one white, and one small black. Currant bushes were ordered for the Massachusetts colony in 1629; thus they were early brought to North America. By 1826 about 20 cultivated varieties were known in England, a good many of which were brought to the United States soon after their introduction. Most of the currant industry was based on European varieties until about 1890. Fay, a seedling raised by L. Fay, Portland, N. Y., in 1868, was introduced in 1880; Wilder, a seedling of Versailles, was raised by E. Y. Teas, Irvington, Ind., about 1877; Red Cross and Diploma both originated from a cross between Cherry and White Grape made in 1885 by J. Moore, Attica, N. Y.; and Perfection originated in 1887 from a cross of Fay × White Grape made by C. G. Hooker, Rochester, N. Y. These five varieties quickly became important and constitute possibly 85 percent of the total present acreage. London Market and Victoria, the other principal varieties, are old European sorts. Thus the currant industry in the United States is based largely on varieties originated by American breeders.

The European black currant is extensively cultivated in Europe and to a lesser extent in Canada, but it has been found to be by far the most susceptible host for the white-pine blister rust fungus, and the United States Department of Agriculture advises against its cultivation in States where white pines are important forest trees.

The American black currant (fig. 1) is a much less susceptible alternate host for the blister rust fungus than the European black currant. Though cultivated as a garden crop, there is probably very little commercial acreage of this fruit. The best-known variety is the

¹ HEDRICK, U. P., assisted by HOWE, G. H., TAYLOR, O. M., BERGER, A., SLATE, G. L., and FINSET, O. THE SMALL FRUITS OF NEW YORK. 614 pp., illus. Albany. (N. Y. (State) Dept. Farms and Markets Ann. Rept. (1924-25) 33, pt. 2.)

Crandall, which has large berries. It grows well in the prairie regions with hot summers, but its berries ripen so unevenly that they must be picked singly. N. E. Hansen selected and introduced four American black varieties—the Tonah, Atta, Mato, and Wanka—in 1925. These bear fruit of larger size than the ordinary wild black currant.

In 1923 Thayer's work on the red and the white currant was published.² This aided greatly in identifying varieties and classifying

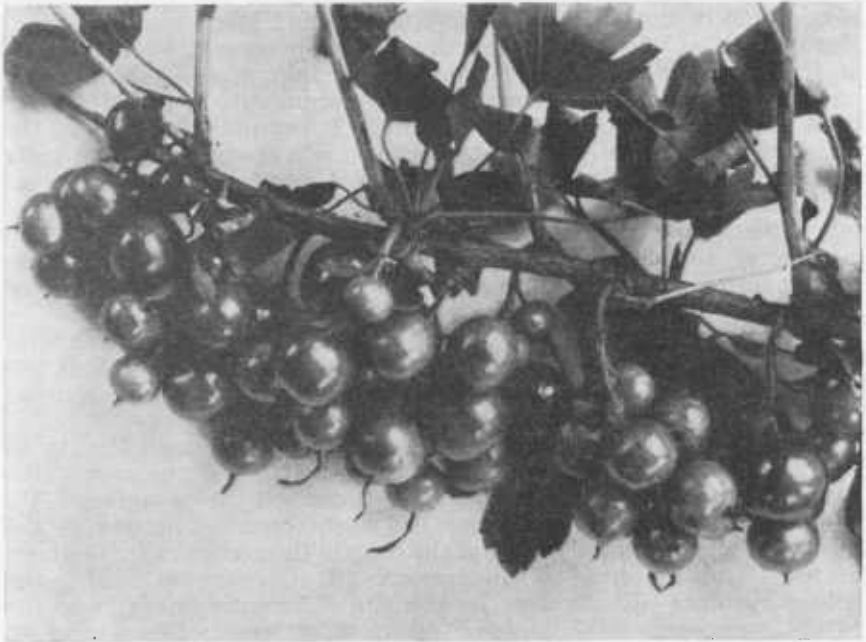


Figure 1.—The American golden or black currant. An extremely hardy and drought-resistant native currant that is a much less receptive host of the white-pine blister rust than the European black currant.

them as to their botanical origin. In 1924 Berger³ covered species and varieties of both currants and gooseberries, and his work is very helpful in studying the group. Hedrick and his associates⁴ also described the species and varieties and gave colored plates of many of the more important types.

RELATION OF CURRANTS AND GOOSEBERRIES TO WHITE-PINE BLISTER RUST

After the white-pine blister rust epidemic had shown this disease to be a serious menace to white pines in the United States, eradication of currants and gooseberries, the alternate hosts of the blister rust

² THAYER, P. THE RED AND WHITE CURRANTS. Ohio Agr. Expt. Sta. Bull. 371, pp. 307-394, illus. 1923.

³ BERGER, A. A TAXONOMIC REVIEW OF CURRANTS AND GOOSEBERRIES. N. Y. Agr. Expt. Sta. Tech. Bull. 109, 118 pp., illus. 1924.

⁴ HEDRICK, C. P., assisted by HOWE, G. H., TAYLOR, O. M., BERGER, A., SLATE, G. L., and EINSET, O. See footnote 1.

fungus, was undertaken in sections where the white pine is important. This has restricted interest in both currants and gooseberries, and in large areas, as in New England, most of the cultivated currants and gooseberries have been eradicated. As a consequence, the acreage of currants in the United States reported for 1929 by the 1930 census, 3,574 acres, was less than half of the 7,379 acres reported in 1919. Only 1,302 acres of gooseberries were reported in 1929.

The white-pine blister rust was brought into the United States between 1898 and 1910 on white-pine planting stock imported from Europe. It is now established throughout most white-pine regions of the United States from Maine to Virginia, west to Minnesota, and in Montana, Idaho, Oregon, and Washington. Recently it has been found in northwestern California. It injures all species of the white-pine group (five-needle pines), which are among the most valuable timber trees of the northern United States, having an estimated stumpage value of about \$400,000,000. The disease cannot spread from pine to pine, but only from pine to currant and gooseberry and then from these back to pine. It causes a rust on the leaves of currant and gooseberry, which may defoliate the most susceptible varieties.

Valuable white-pine forests can be protected by eradicating wild and cultivated gooseberries and currants for a distance of about 900 feet around white pines, except that black currants must be destroyed for greater distances from pines.

Currants and gooseberries differ greatly in their susceptibility to the white pine blister rust. As already noted, the common cultivated black currant—the European black currant (*Ribes nigrum* L.)—because of its high susceptibility has been the chief agency in the rapid and long-distance spread of the disease throughout the Northern States. The American black currant (*R. americanum* Mill.), the golden currants (*R. odoratum* Wendl. and *R. aureum* Pursh), and the native gooseberries (*Grossularia divaricata* (Dougl.) Spach and *G. curvata* (Small) Cov. and Britton) have seemed somewhat more sus-

AMERICAN native species of gooseberries range from Florida far north into Canada, and some of them are resistant to high summer temperatures and to the leaf diseases that have discouraged gooseberry growing in this country. By suitable crossing, these characteristics can be combined with the great size, the fine flavor, and the beauty of varieties developed in Europe through generations of breeding, encouraged by a public that had a great fondness for this fruit. Some of the hybrids already produced in this country show what can be done in the way of improved quality and size of fruit and vigor of plant. There is no doubt that the gooseberry offers opportunities for the development of improved varieties that would be welcome additions to our gardens.

ceptible than most cultivated varieties. Franco-German, Netherlands, and London Market currants are very resistant or nearly immune, while cultivated varieties of gooseberries are very resistant.

To protect white-pine stands, many States have established regulations governing the planting of currants and gooseberries, and some for white pines. In general, currant and gooseberry plantings are prohibited where white pine is important, and white-pine plantings where the currants and gooseberries are important. Before planting these fruits the State laws should be consulted. Summaries of the laws are given in Farmers' Bulletin 1398.⁵

G. G. Hahn, of the Division of Forest Pathology, Bureau of Plant Industry, has recently tested the Viking red currant, a variety introduced from Norway, and found it immune to blister rust. Propagating stock has been imported, and in 1935 and 1936 a large number of plants were distributed to experiment stations for testing as to its horticultural value and for breeding. Plants already fruiting in New England and New York have shown that it is of good dessert quality and desirable for jelly making. A few open-pollinated Viking seedlings, produced where cross-pollination was not eliminated, have been slightly susceptible to blister rust. The culture of the Viking in white-pine areas will depend on the policy within each State after its horticultural value and seedling susceptibility to the fungus have been fully determined.

SPECIES OF CURRANTS

Berger states that there are about 150 species of currants and gooseberries distributed all over the Northern Hemisphere, but mostly in North America, and extending along the mountains of the Americas as far south as Patagonia. At least 100 species are currants and some 50 are gooseberries. The Rocky Mountains in North America are especially rich in species. There are about 15 species of red currants, of which *Ribes sativum* Reichenb., *R. rubrum* L., *R. warscewiczii* Jancz., and *R. petraeum* Wulfen, and hybrids of them are considered important for breeders.

Ribes sativum.—A native of western Europe, frequently escaped from cultivation in North America. Leaves heart-shaped at base, five-lobed and with lobes spreading to the side, clusters 10-20-flowered, flowers flat, greenish yellow. Chautauqua, Diploma, Red Cross, Versailles, and Wilder are typical varieties, while Cherry and Fay belong to a section of the species.

Ribes rubrum.—Northern Europe to northern east Asia. This species is more northern than *R. sativum*, from which it is most easily distinguished by its forward-pointing leaves and cup-shaped flowers. Leaves truncate or subcordate at base and lobes cupped or pointing forward, broader than long, clusters longer, flowers cup-shaped, pale green or brownish. London Market and Victoria are typical varieties. Perfection is derived from *R. rubrum* × *R. sativum*.

Ribes warscewiczii.—A very productive species of eastern Siberia, worthy of use in breeding. Leaves large, heart-shaped; clusters about 15-flowered, flowers coppery red to pale flesh-colored; fruit large, blackish purple, very acid. Near to *R. rubrum*, but flowers larger and fruit more acid.

Ribes petraeum.—Very widely distributed over Europe, northwestern Africa, and northern Asia. Leaves roundish, pubescent when young; flowers bell-shaped, green streaked with red or purple; fruit red or blackish red, more acid than *R. sativum* or *R. rubrum*. Growth starts late in spring. Prince Albert is derived from *R. petraeum* × *R. rubrum*, and Gondouin from *R. petraeum* × *R. sativum*.

⁵DARROW, G. M., and DETWILER, S. B. CURRANTS AND GOOSEBERRIES; THEIR CULTURE AND RELATION TO WHITE-PINE BLISTER RUST. U. S. Dept. Agr. Farmers' Bull. 1398, 38 pp., illus. 1924.

The black currants of Europe are all derived from *Ribes nigrum*. It is more vigorous than the red currant species, and the whole plant has a characteristic aroma. To many the fruit flavor is objectionable; to others highly pleasing. It is a native of Europe as far north as Scandinavia, and of northern and central Asia. An allied species, *R. ussuriense* Janc., is native to eastern Manchuria, but the plant has a camphorous aroma and the fruit has no odor. The American black currant, *R. americanum*, has an aroma in the plant and fruit similar to that of *R. nigrum*. It ranges from New Mexico to Virginia northward into Canada. One variety, Sweet Fruited Missouri, has been in cultivation, though the fruit is sometimes gathered in the wild. It is not especially promising.

The golden currants, native in central and northwestern United States to northern Mexico, are often known as American black currants. Yellow- or golden-fruited forms are common. The most common variety is the Crandall, with rather large fruit. There are several species, but all are close to *Ribes odoratum*, to which the Crandall belongs.

There are many ornamental species of currants in the Rocky Mountain region, but they are mostly of little value for their fruit.

MATERIAL FOR GOOSEBERRY BREEDING

THE gooseberry seems to have come into cultivation at about the same time as the currant. According to Hedrick, it was grown in English gardens before 1600. By 1629 there were 3 red varieties, a blue, and a green variety described; by 1778, 24 varieties were described; by 1825, 185 kinds were listed; and in 1831 a list of 722 varieties was published. The great development in the size of the European gooseberry was in part due to the high esteem in which it is held in England, and to the shows held there. For example, 171 gooseberry shows were held in England in 1845. Prizes were given for the heaviest fruits, and in 1852 a berry of the London variety was shown that weighed 7 grams (about one-fourth ounce), or seven to eight times the weight of the wild fruit.

In North America the European gooseberries were attacked by mildew, and gooseberries were little grown until after the Houghton was originated from seed planted in 1833 by A. Houghton, Lynn, Mass. Houghton was from a cross of the European with an American variety, and from seed of it Charles Downing, Newburgh, N. Y., raised the Downing about 1855 (fig. 2, C). The gooseberry industry of the United States was largely based on these two varieties until about 1900, or until after the use of fungicides became common so that mildew could be controlled on varieties from Europe or of European parentage, such as Chautauqua and Industry. Since 1900 several varieties have become prominent: Oregon (Oregon Champion), a cross between Crown Bob and Houghton, raised about 1860 by P. Prettyman in Oregon; Pearl, a cross of Downing \times Red Warrington, originated by William Saunders, London, Ontario, and introduced in 1888; Red Jacket (Houghton \times Red Warrington), also originated by Saunders and introduced about 1890; Carrie, a seedling of Houghton, raised by W. Elliot, Minneapolis, Minn., and introduced in 1905;

Poorman, a seedling raised by W. H. Craighead, Brigham, Utah, and introduced in 1896; and Como (Pearl \times Columbus), originated at the Minnesota Agricultural Experiment Station and introduced in 1922. Of these varieties, Poorman (fig. 2, *B*) has the best appearance and

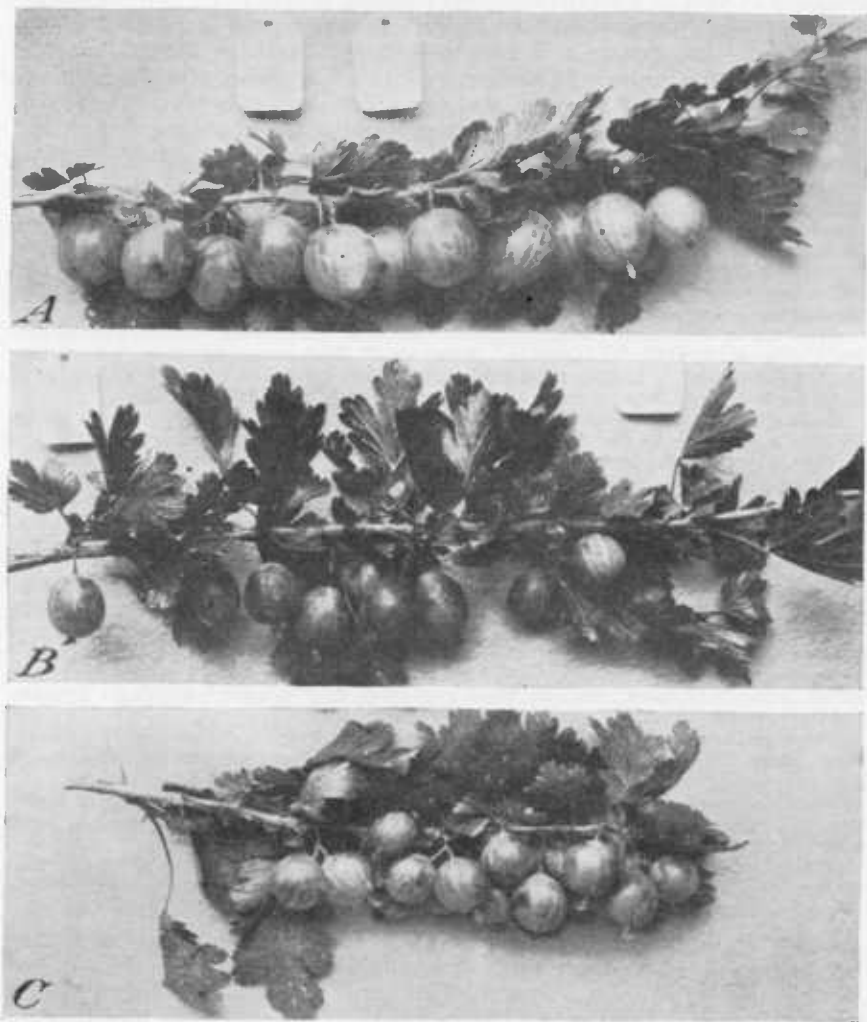


Figure 2.—*A*, Columbus, a large European gooseberry; *B*, Poorman gooseberry, the largest of the hybrids between American and European varieties; *C*, Downing, a hybrid that has long been the most important American gooseberry.

is excellent in quality, comparing favorably with the best European sorts. Though considered a cross between Downing and Houghton, it may possibly have been a cross with one of the Rocky Mountain species.

SPECIES OF GOOSEBERRIES

The gooseberries of Europe are derived from the one species *Grossularia reclinata* (L.) Mill., which ranges from northern Africa through Europe from Spain to the Caucasus, north to Scandinavia. *G. uva-crispa* (L.) Mill., a native of central Europe, is said to be more drought-resistant, with very sweet late fruits. It starts growth about 2 weeks later than the species. Berger considers that the Houghton was derived from a cross of this form of the European gooseberry with *G. hirtella*. Most of the rest of the species of gooseberries are natives of North America, and several are promising for breeders.

Grossularia cynosbati (L.) Mill.—Native from North Carolina to Missouri, north to Manitoba and New Brunswick, Berry prickly, wine red, with a rather thick skin. Bush to 4.5 feet high; common in woods and rocky places.

Grossularia missouriensis (Nutt.) Cov. and Britton.—Native from Tennessee to Kansas, north to Minnesota and South Dakota. Berry not prickly, purplish. Bush to 6 feet high. The Glenndale, derived from this crossed with European varieties, is very vigorous and productive and stands the hot summers better than other gooseberries.

Grossularia divaricata (Dougl.) Spach, the coast gooseberry.—Native from central California to British Columbia. Berry small, dark purple or black, not prickly. Bush 6 to 10 feet. Trebla, a variety propagated by A. F. Etter, is supposed to have been derived from a cross of this species with cultivated varieties.

Grossularia hirtella (Michx.) Spach.—Native from West Virginia to South Dakota and north to Newfoundland and Manitoba. Berry purple or black, not prickly. Bush to 3.5 feet. Houghton, Downing, Pearl, Carrie, Oregon, and other varieties are considered to have been derived from crosses of this species with the European varieties. It has given mildew resistance to American varieties.

Grossularia oxycanthoides (L.) Mill.—Native from Michigan to North Dakota, north to Newfoundland and the Yukon. Berry smooth, purple, sweet, good; bush low, spreading; branches bristly. A hardy, far-northern species.

Grossularia nivea (Lindl.) Spach, the Snake River gooseberry.—Native to northern Nevada, Idaho, eastern Washington, and Oregon. Berries smooth, bluish black, very good; bush 5 to 10 feet high; somewhat similar to *G. missouriensis*.

Grossularia curvata (Small) Cov. and Britton.—Native from Georgia to Texas. Berry green to purplish, smooth; bush low, spreading; branches arching. Promising for breeding, because native to the South.

Grossularia echinella Cov.—Native to northern Florida. Berry very prickly, large, green, bush spreading. Promising for breeding because native to the South and because of its large fruits.

Grossularia rotundifolia (Michx.) Cov. and Britton.—Native from North Carolina to Massachusetts in rocky places in woods. Berries smooth, purplish; bush with slender arching branches.

Grossularia irrigua (Dougl.) Cov. and Britton, the inland black gooseberry.—Native to western Montana and eastern Oregon, north to British Columbia. Berries smooth, purple or black; bush 3 to 10 feet high.

Besides these species there are others in the western United States that may be of value. Thus *Grossularia lobbii* (A. Gray) Cov. and Britton, *G. pinetorum* (Greene) Cov. and Britton, *G. sericea* (Eastwood) Cov. and Britton, and *G. marshallii* (Greene) Cov. and Britton have large fruits but with prickles or glandular bristles. Of the species listed above, *G. nivea* is possibly one of the most promising for breeding.

SYSTEMATIC BREEDING WORK WITH CURRANTS AND GOOSEBERRIES

VERY little systematic breeding work has been done with currants and gooseberries. The fact that nearly all the red currant varieties grown in this country originated here indicates the possibilities for

improvement of this fruit, particularly in breeding for resistance to leaf diseases; and this is borne out by the more recent red currant work at the Minnesota Agricultural Experiment Station. Varieties of red currants resistant to cane blight (*Botryosphaeria ribis* Gross. and Dug.) and with foliage resistant to leaf spot (*Septoria ribis* Desm.) are needed to make the currant a useful garden and commercial fruit in many sections where it is now difficult to grow. The hardness, drought resistance, and great vigor of the American black currants (golden currants) make this group also promising. Selections of these currants are needed that mature many or all berries on a cluster, so as to reduce the cost of harvesting.

Probably the greatest opportunity, however, is in gooseberry breeding. The chief need is for fine-flavored, attractive-fruited varieties that are resistant to leaf spot, to high summer temperatures, and to mildew (*Sphaerotheca mors-uae* (Schw.) Berk. and Curt.). Such southern native species as *Grossularia echinella* and *G. curvata* endure high summer temperatures and are resistant to mildew. Some resistance to leaf spot seems to be shown by *G. missouriensis* and probably certain other native species. European gooseberries cross readily with American species, and the productiveness and vigor of the hybrids have indicated how promising this line of work might be. Poorman, though not so large as many of the European gooseberries, is larger than the other hybrids and has greater beauty and better flavor when ripe than European varieties now grown in this country. The Glendale has greater vigor than most other hybrids and far greater vigor than the European sorts. American native species range from Florida far north into Canada; and varieties with the size of the European, the quality and beauty of Poorman, the vigor of Glendale, and the range of American species would be welcome additions to our garden fruits.

WORK OF EXPERIMENT STATIONS WITH CURRANTS AND GOOSEBERRIES⁶

In South Dakota, crosses were made between the native wild gooseberry of South Dakota (*Grossularia missouriensis* (Nutt.) Cov. and Britton) and the large-fruited European varieties. The first hybrid variety to be introduced was Sunset in 1924, followed in 1925 by Kabu, Kaduza, Kana, Kanga, Kapoza, Kataga, Kawauka, Kazouta, Kaza, and Kopa. In addition, the station has grown many thousands of seedlings of the native gooseberry, selecting the best for a new generation. Seedlings of the native wild gooseberry were first introduced in 1921, and up to 1927 eight generations of seedlings had been raised.

Similar work in growing thousands of seedlings of the wild black currant resulted in the selection in 1923 of large-fruited seedlings. Four were named and introduced in 1925—Tonah, Atta, Mato, and Wanka. In addition the Siberian black currant, collected by Hansen in 1897 in Siberia, was introduced in 1910.

In North Dakota, breeding with the gooseberry was begun in 1920, the native wild gooseberry (*Grossularia missouriensis*) being crossed

⁶ A. S. Colby (Illinois), G. L. Slate (New York), A. N. Wilcox (Minnesota), and A. F. Yeager (South Dakota) kindly furnished details of the breeding work with currants and gooseberries at their experiment stations.

with Oregon Champion, Transparent, Houghton, Downing, Copland, Josselyn, and Carrie. The best combination was with the Oregon Champion. In 1932 three of the seedlings were named and introduced—the Pixwell, Abundance, and Perry. Pixwell is considered especially good for jelly, preserves, and sauce. *G. setosa* Lindl., another wild gooseberry from North Dakota, was also crossed with Oregon Champion, and though the first hybrid generation was not particularly promising, the second showed better seedlings. A. F. Yeager, in charge, noted that red color of fruit was dominant over green, smooth fruit over downy, and long pedicel and peduncle over short. He also found a dwarf plant type in Oregon Champion crosses and observed that a light-green color of unripe fruit was apparently, dominant over dark-green color. He is studying inheritance of thorns, winter hardiness, and drought and heat resistance.

In New York gooseberry breeding was begun at the New York (State) Agricultural Experiment Station at Geneva in 1892 and has been continued at intervals since. The Fredonia, introduced in 1926, is the only variety resulting from the work. It is a seedling of Crown Bob and is large, late, and productive for an English type. Among the varieties crossed are America, Boskoop, Black Champion, Chautauqua, Crandall, Downing, Honing Fruheste, High Sheriff, Houghton, May Duke, Lancashire Lad, Pale Red, Wellington Glory, Whitesmith, and Victoria. This station maintains a very large collection of species and varieties.

A small number of currant crosses have been made, but no varieties have been introduced. A large collection of currant varieties and species is also maintained. George L. Slate reported that crosses have been made as follows:

Fay × Missouri Sweet Fruited.	Boskoop × <i>Ribes sanguineum</i> .
Fay × Crandall.	Chautauqua × <i>Grossularia echinella</i> .
White Transparent × Crandall.	<i>R. nigrum</i> L. × Ozonne.
Cherry × Crandall.	Honing Fruheste × <i>R. pinetorum</i> .
Black Naples × White Transparent.	Honing Fruheste × <i>R. lacustre</i> . (?)
White Transparent × Black Naples.	May Duke × <i>R. pinetorum</i> .
Diploma × Black Naples.	May Duke × <i>R. lacustre</i> .
Lee (black) × Mountain (gooseberry).	<i>R. pinetorum</i> × <i>R. lacustre</i> .
Black Naples × Downing.	<i>R. pinetorum</i> × <i>R. odoratum</i> .
Boskoop (black) × Poorman.	<i>R. pinetorum</i> × <i>R. innominatum</i> .
Lee × Poorman.	<i>R. lacustre</i> (?) × <i>R. pinetorum</i> .

In Minnesota the breeding of gooseberries was begun in 1909 and has been continued since. Carrie, Chautauqua, Columbus (fig. 2, A), Houghton, Josselyn, and Pearl have been intercrossed and crossed with selections of wild species. *Ribes hirtella* Spach has been used to obtain thornlessness. Como, a cross of Pearl × Columbus, was introduced in 1922. It has resistance to sun scald and to disease and is productive. It is especially good in cooking qualities.

The raising of seedling currants was begun in 1912 and has been continued to the present. No crossing has been done. The Red Lake variety was introduced in 1933, being selected for the large size of the berry and of the cluster and for its productiveness. It is succeeding well in New Jersey and in other Eastern States.

In Illinois the work with gooseberries was begun in 1924 with the objective of obtaining greater production, larger size, higher flavor,

fewer thorns, and disease-resistant foliage. Poorman, Spinefree, Chautauqua, Carrie, Glendale, and Transparent have been intercrossed, and over 2,000 seedlings are under test. Papers by Colby,⁷ in charge, indicate the accomplishments.

WORK OF THE UNITED STATES DEPARTMENT OF AGRICULTURE WITH CURRANTS AND GOOSEBERRIES

The work at the United States Northern Great Plains Field Station at Mandan, N. Dak., under W. P. Baird, has consisted largely in raising seedlings and making selections of the native hardy, drought-resistant, productive wild black currant *Ribes odoratum*. In 1924, selections of this currant were crossed, and about 50 selections have been made. Baird has noted that black fruit is dominant over yellow and red and that a round shape is dominant over oblong. Some gooseberry and red currant breeding has been done. The drought of 1936 killed most of the gooseberry and red currant selections, but the black currants withstood it.

At Corvallis, Oreg., a collection of the best-fruited forms of the native species of currants and gooseberries was made by L. N. Gooding, and hybridizing was begun by George F. Waldo.

At Washington, D. C., crosses have been made in recent years by F. V. Coville and O. M. Freeman between *Grossularia echinella*, a gooseberry species native to Florida, and cultivated varieties. Several selections were made, and the second hybrid generation is being raised at Beltsville, Md.

In 1932 the Glendale gooseberry was introduced. This originated as a seedling raised by the late W. Van Fleet probably about 1905, before he joined the Department of Agriculture, from a cross of ((*G. missouriensis* × Red Warrington) × Triumph) × Keepsake. It is a very rank-growing variety, which succeeds from Maryland and Virginia to Kansas, at the southern limit of gooseberry growing.

CURRANT AND GOOSEBERRY BREEDING IN FOREIGN COUNTRIES

The Dominion station at Ottawa, Canada, has introduced at least four varieties of gooseberries—Charles, Silvia, Mabel, and Spinefree, the last-named being a cross of a second-generation thornless wild with Mabel. It is described as of good flavor, thick-skinned, bright red, free of spines, upright, vigorous, free of mildew, and resistant to leaf spot.

This station also introduced the following 12 black currants originated by William Saunders before he became director in 1887: Climax, Clipper, Eclipse, Ethel, Kerry, Magnus, Ogden, Ontario, Saunders, Success, Topsy, and Winona. Of these, Kerry, Clipper, Eclipse, and Climax are recommended varieties in Canada.

At the East Malling Horticultural Research Station in England, the production of improved varieties of red and black currants is a breeding project. The use of X-rays to induce mutations, and a study of inheritance in black currants, are two lines of research now under way.

⁷COLBY, A. S. SIZE INHERITANCE IN GOOSEBERRY FRUITS. Amer. Soc. Hort. Sci. Proc. (1933) 30: 105-107. 1934.

INHERITANCE OF GOOSEBERRY LEAF INFECTION. Amer. Soc. Hort. Sci. Proc. (1934) 32: 397-399. 1935.

At the University of Bristol production of heavy-cropping varieties of black currants is one objective, and two varieties have been named and introduced. At times some gooseberry breeding for mildew resistance has been carried on at this station.

Laxton Bros., of Bedford, England, have done much breeding work with black currants and gooseberries, and some with red currants. They have introduced the following red currants and gooseberries:

TABLE 1.—*Currants and gooseberries introduced by Laxton Bros., of England*

Variety	Year introduced	Parentage	Superior qualities
Red currants:			
Perfection.....	1909	Long clusters, sweet, large.
Laxton's No. 1.....	1925	Vigorous, productive.
Gooseberries:			
Bedford Yellow.....	1915	Gold Drop × Drill.....	Golden yellow, high flavor, large.
Amber.....	1916	Wonderful × Lancaster Lad.....	Amber color, high flavor.
Bedford Red.....	1922	Crown Bob × Langley Green.....	Red, productive.
Green Gem.....	1922	Drill × Whitesmith.....	Yellowish green, high flavor.
Emerald.....	1925	Drill × Crown Bob.....	Early, green, productive.
Golden Ball.....	1928	Drill × Whitesmith.....	Yellow, high flavor.
Rearguard.....	1928	Wonderful × Lancaster Lad.....	Very late, firm.

In Sweden, C. G. Dahl, in charge of the gooseberry breeding at Alnarp, reported that breeding was begun in 1911 to obtain mildew-free varieties. *Grossularia divaricata* (Dougl.) Cov. and Britton and *G. nivea* (Lindl.) Spach were crossed with European varieties. Some 1,000 plants were raised, and one variety, Scania, has been introduced. It is free from mildew and produces a strong plant and large fruit. A second variety, a second-generation hybrid from *S. nivea* × a European variety, is being distributed under the name Centum. It is also free from mildew, with fruit like Downing, of fine flavor.

In the Union of Soviet Socialist Republics, I. V. Michurin originated one gooseberry variety, Shtambooi, which was reported to be resistant to mildew.