

THE QUEENSLAND RASPBERRY (*Rubus probus*)

A SPECIES ADAPTED TO TROPICAL CONDITIONS

J. P. GRIFFITH, Plant Breeder, Insular Experiment Station

ORIGIN

The Queensland raspberry is said to be of stock originating with James Pink of Brisbane, Australia, as a reported cross between a variety received from Japan under the name *Rubus ellipticus*, and *Rubus rosaefolius*, the latter being the pistillate parent.

A letter dated November 26, 1923 was addressed by the writer to Mr. James Pink for further information concerning the origin of the Queensland raspberry, as well as to ascertain something of the conditions under which the berry was produced and the extent of its culture in Australia. It was also our plan to compare the original stock with that introduced to Porto Rico in 1912, which Dr. Bailey believes to be a second-generation cross and which may show points of difference from the original (first generation hybrid).

On January 21, 1924, Miss Jane M. Pink, sister to Mr. James Pink wrote from Brisbane that her brother had passed away on November 2, 1923. He had been so ill during the last few years that he had been unable to get into his experimental garden. As a result the garden became a wilderness and the raspberry in question had evidently died out.

Later a column in one of the Australian papers told of the work of Mr. Pink. An extract from this follows:

"Mr. Pink was a noted student of the Mendelian system of plant breeding and on many occasions showed his proficiency in crossing types in Queensland, some of which were found to be of high merit. One of the most useful examples of cross pollination accomplished by the deceased gentleman and an eminent success was the crossing of the wild native raspberry (evidently *Rubus rosaefolius*) with the Himalayan variety (*Rubus ellipticus*) introduced by Mr. William Soutter many years ago when in charge of the Acclimatisation Society at Bowen Park."

THE PORTO RICAN STOCK

In 1912 the U. S. Department of Agriculture sent to the Porto Rico Experiment Station, Mayagüez, plants of the Queensland berry under the Bureau of Plant Industry Number 23748, with the note that it was a hybrid raspberry, combining *Rubus rosaefolius* (the staminate parents), with *Rubus ellipticus* (the pistillate). An il-

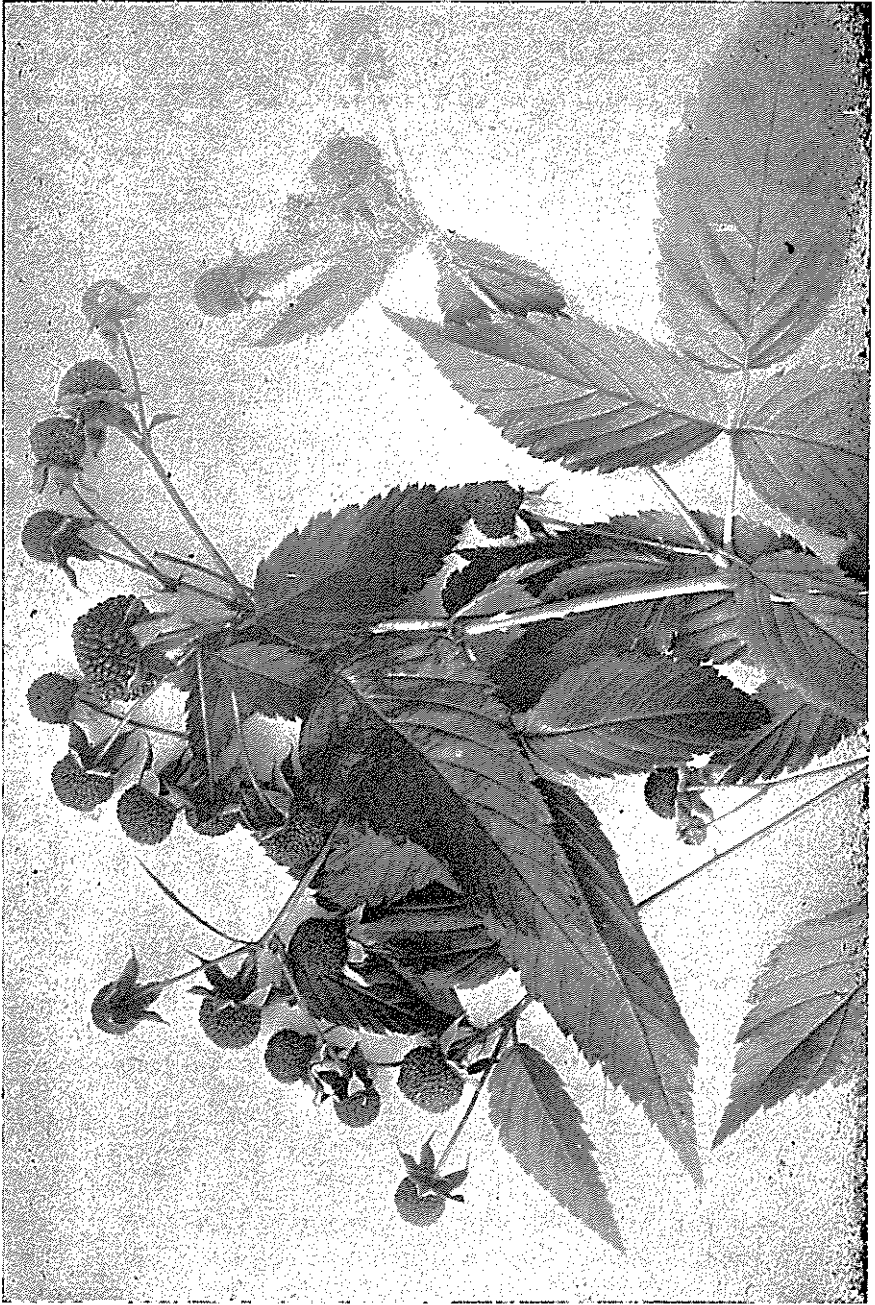


FIG. 1.—Fruiting Cluster of the Queen'sland Raspberry (*Rubus probus*) (Size greatly reduced)

illustration of a fruit cluster appears in the 1912 Annual Report of the P. R. Experiment Station, without notes regarding the berry.

The writer's first experience with the Queensland raspberry was about ten years later when in 1921 he took up the position of horticulturist with the Insular Experiment Station, Río Piedras. At that time there was a planting of about ten plants of the Queensland berry together with two other species, of which our naturalized raspberry, *Rosaefolius*, was one, the other being *Rubus bogotensis*. The exceptional vigor and productiveness of the Queensland berry attracted the writer's attention at the time and roused his curiosity as to the specific name of the plant. Somewhat later specimen plants of the Queensland raspberry and *Rubus rosaefolius* were sent to Dr. L. H. Bailey for his extensive *Rubus* herbarium at Ithaca, N. Y. It was not until 1923 that the Queensland berry was given a specific name and called "*Rubus probus*" by Dr. Bailey. In his "*Gentes Herbarum—Certain Cultivated Rubi*", published in November 1923, pp. 150–151, Dr. Bailey calls attention to the newly named species *Rubus probus*, giving a brief description and using the illustration which appeared in the 1912 Annual Report of the Porto Rico Experiment Station.

Bailey's description is largely technical and includes in addition only some brief notes as to the origin of the berry. Dr. Bailey has not we believe, seen the plant under culture and does not know intimately of its horticultural character. Dr. Bailey also includes *Rubus probus* in his "*Manual of Cultivated Plants*" (MacMillan 1924), see page 355.

It was not until the 1923–25 crop in Río Piedras that the writer realized the possible importance of the Queensland berry to Porto Rican horticulture, though he has written various reports for the Insular Experiment Station and for the local paper, "*Porto Rico Progress*" (See Dec. 22, 1923, Jan. 26, 1924, Oct. 18, 1924), which tell of the merits of this berry. Mr. George Darrow, Pomologist of the U. S. Bureau of Plant Industry, Washington, in his Department circular 320 (Aug. 1924), "*The Van Fleet Raspberry—a New Hybrid Variety*", calls attention to the Queensland raspberry, mentioning its culture in Australia and Porto Rico. The latter part refers to my article, "*Developing a new Raspberry for Porto Rico*" which appears in the *Porto Rico Progress*, Vol. 21, No. 51 p. 8. Plants and seed of the Queensland Raspberry were sent to Mr. Darrow, the former reaching Washington in good condition February 16, 1924.

The best planting so far seen was that made on the grounds of

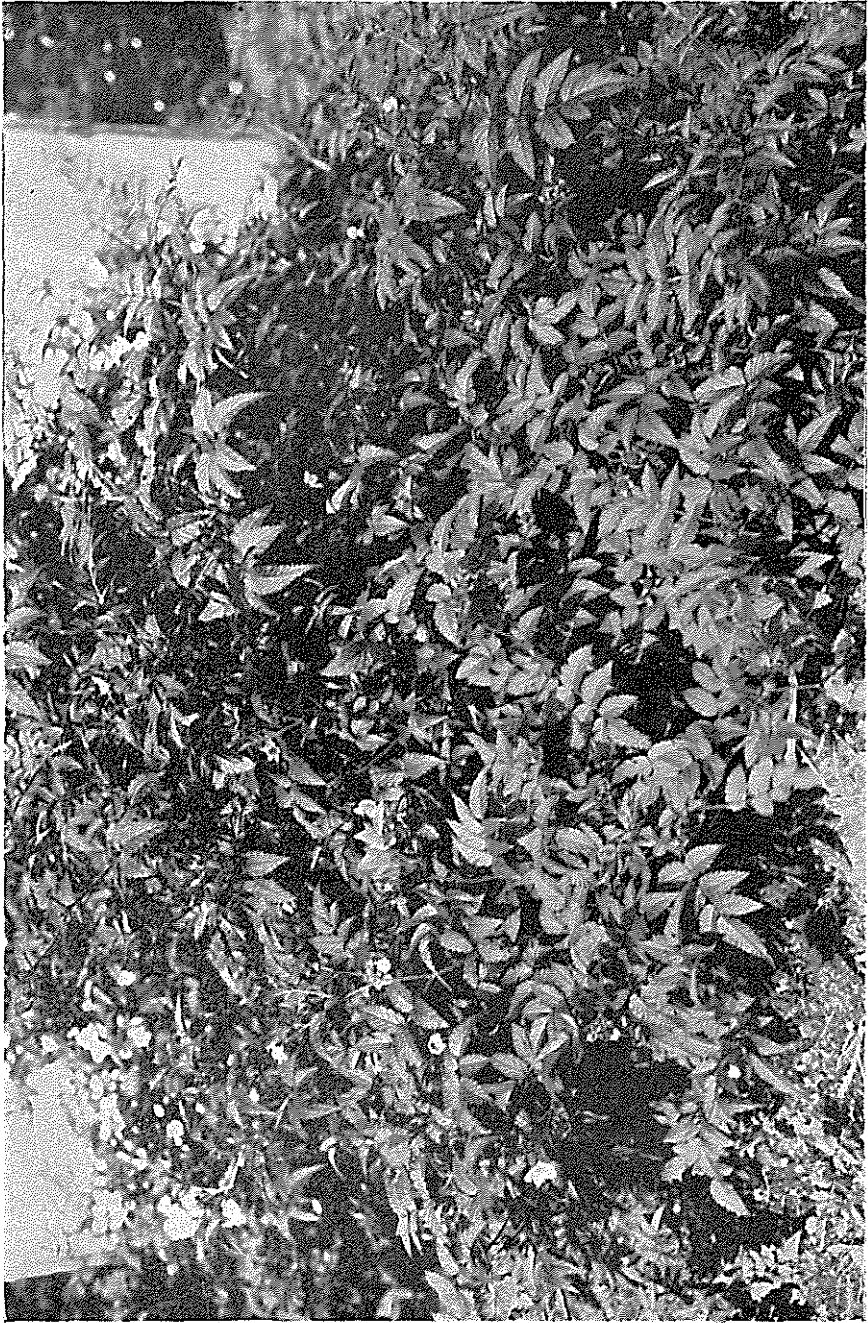


FIG. 2.—The Wild Naturalized Raspberry of Porto Rico (*Rubus rosacefolius*), Female Parent of Queensland Raspberry (Photo original)

the Insular Expt. Station in November, 1923. The 32 plants in this group appeared to reach their maximum development, being loaded with fruit from December 15, 1924, up to about March 1, 1925, when they passed their prime, and from then until March 15 produced only a few fruits. This planting has been used in our hybridization tests.

Other plantings have been made at Mayagüez (also in the lowlands) and at Villalba (elevation about 1,700 feet). At both places the Queensland raspberry has developed and fruited well. Mr. T. B. McClelland, Horticulturist of the P. R. Experiment Station, says that "the Queensland raspberry suffers considerably from the dry season there in Mayagüez. Plantings made during the dry winter period are sometimes killed entirely, but when the water supply is adequate, the plants develop well". Mr. McClelland thinks the berry worthy of wide distribution in Porto Rico. We have had favorable reports of the behavior of mature plantings of Queensland raspberries from the north, west and south sides of Porto Rico, but, to gain fuller information, plantings have been made at the government test farms located in the towns of Trujillo Alto, Vega Baja, Arecibo, San Sebastián, Sabana Grande, Villalba and Cayey. These plantings are still young.

Plants of the Porto Rican stock have been sent to Mr. R. S. Nason of Orlando, Florida, who is interested in the improvement of Rubí and tropical fruits in general. Mr. Nason reports that *Rubus probus* is growing well in Florida, but it is too early to give a final report on it there. It will be interesting to know something of the hardiness of this plant.

CHARACTERIZATION

The Queensland raspberry is a vigorous-growing erect or slightly drooping plant, reaching a height of 7 or 8 feet. The stems are large, coarse and glabrous, with a few short, straight spines. It apparently has none of the characters of its male parent, *Rubus ellipticus*, unless a vigorous vegetative quality has been inherited by *Rubus probus*. On our grounds we have a planting of *Rubus ellipticus* adjoining that of the Queensland berry, with a planting of *R. rosaeifolius* also near, so that the three may be readily compared. *Rubus ellipticus* makes a rank vegetative growth, up to 10 or 12 feet, has coarse stems with heavy red pubescence and long sharp, curved spines. *Rubus rosaeifolius* is a weak decumbent plant, growing up to only about 3 feet in height.

It is a more spiny plant than *R. probus*.



FIG. 3.—The Himalaya Raspberry (*Rubus ellipticus*), Male Parent of the Queensland Raspberry.
Stake held by writer is nine feet high

Technical description:—(after Bailey) “*Rubus probus* is related to *Rubus rosaefolius*, differs in being glabrous on petioles, leaf blades and pedicels, less thorny: leaflets 3 to 9, but usually 7 and relatively much broader, ovate lanceolate to nearly ovate on short fruiting branches, margins more deeply and sharply serrate, veins very prominent; flowers more clustered; calyx lobes acute to short cuspidate little if at all exceeding the petals; fruit red seedy depressed endwise so that it has a flattened appearance, detaching from the receptacle in the form of a ring. Plant upright about 8 feet high; canes not perennial, somewhat bending, but not climbing; leaves 8 to 10 inches long on vigorous growths and leaflets to 4 inches long.” “Certain Cultivated Rubi” page 150).

Rubus probus suckers readily from the root, throwing up strong, vigorous, rapidly growing shoots from the fleshy roots of the plant. In the strong character of its suckers, *Rubus probus* more closely resembles *R. ellipticus* than it does *R. rosaefolius*.

The fruit of *Rubus probus* is produced very abundantly, many clusters setting 8 to 10 berries, as shown by an accompanying illustration. The writer counted 33 berries on a clump of three clusters grouped together. The berries when fully matured are large and flattened and of fairly good flavor though not comparing so favorably with the best northern raspberries, lacking the distinctive character of the latter. The individual berries of *R. probus* are larger than those of either parent fruit of the Queensland berry, is rather perishable and crumbles too easily for a good shipping berry. A large quantity of fruit has been sold from the Station grounds the past season for 15 cents a pint and is evidently appreciated by the native Porto Ricans. Continental Americans who are familiar with northern raspberries do not react so favorably towards the Queensland berry, but some who have tried it in the form of jelly or jam speak well of it. The Station Entomologist, Dr. H. L. Dozier, who was not familiar with either the wild berry (*R. rosaefolius*) or with the Queensland berry before coming to Porto Rico recently, pronounced the latter to be of better flavor. The writer also prefers the fruit of the fully mature Queensland berry. Many of those who have known the northern raspberry may acquire a taste for the Queensland berry by continued use.

Considerable quantities of the wild berry (*Rubus rosaefolius*) are constantly being sold at points in the hills of Porto Rico, near Aibonito, where the berries reach perfection, and on the Cayey-Guayama road. An accompanying photo illustrates this berry. The children

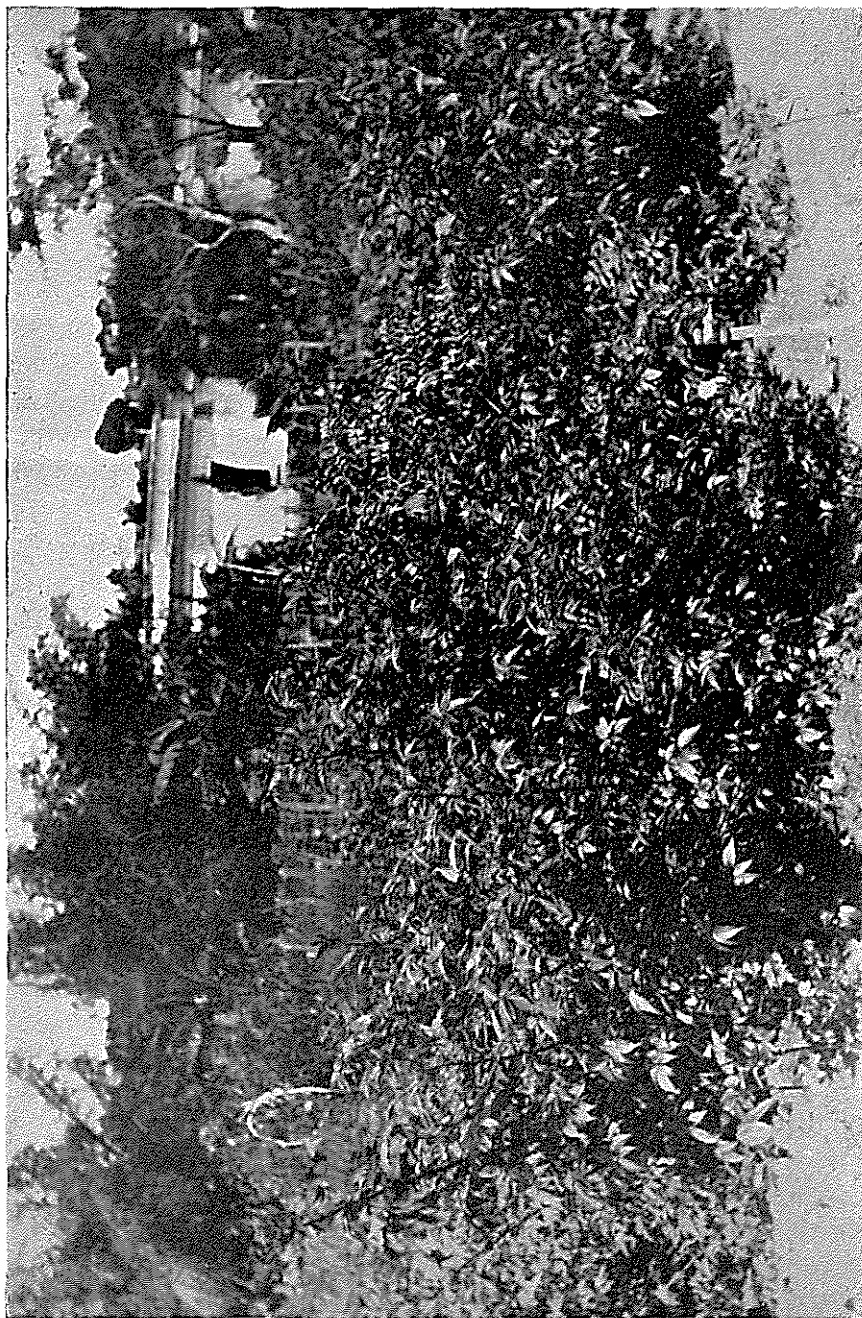


FIG. 4.—The Queensland Raspberry (*Rubus probus*), Showing Vigorous Young Sucker Plants.
Photo, Insular Station, 1925.

gather the fruit under the shade trees in the coffee plantations and sell them for about 10 cents a quart to passing tourists. The fresh fruit is also sometimes carried down from the hills in small straw baskets and sold in San Juan. The wild berry is put up in the form of jelly and jam by an Aibonito hotel and by private individuals living near the town, who prepare the product for sale in San Juan.

Some comparisons between the Queensland raspberry and our naturalized wild berry are interesting. From a fruiting standpoint, *Rubus probus* has several advantages over *R. rosaefolius*. The former produces large clusters of fruit as we have noted above, sometimes running ten to the cluster. *R. rosaefolius* produces only a single fruit on a terminal. The fruits of *Rubus probus* are large and of better flavor than those of *R. rosaefolius*. However, if the fruits of *R. probus* are picked before fully mature they are too acid to be very palatable. Both *R. probus* and *R. rosaefolius* have very perishable fruit, to the thimblelike shape of the latter is more desirable. The fruits of *Rubus probus* reach their full development in both the lowlands and highlands of Porto Rico, while *R. rosaefolius* reaches its maximum only in the higher elevations of the Island.

As regards plant development, the Queensland berry has also certain advantages over the native berry. The Queensland berry will develop normally in bright sunlight under open field conditions, while the *Rubus rosaefolius* requires a part shade for its proper development, and so is not suited for field culture. The Queensland berry makes a vigorous erect plant growth and the suckers "take hold" readily when field planted. The wild berry makes a weak, low, spreading plant growth and is very difficult to establish by suckers. The tall growth of the Queensland berry permits easy picking of the fruit, while the wild berry is so low and produces so sparingly that the harvest is difficult.

PROPAGATION

The Queensland raspberry propagates very readily in three forms. The quickest method of establishing a plantation is by the use of suckers, which are always abundant. Plants may be grown from root cuttings 4 to 6 inches in length by bedding them in sandy soil. Practically all will sprout strong plants. We find that *Rubus probus* comes more readily from seed than most other berries with which we have been working. Our best results have been obtained on a steam-sterilized sandy soil. The seedling method is, of course, a slow way of producing plants. In order to determine whether our stock

of the species, *R. probus*, is a pure one, some 200 seedlings were raised at the Insular Station in 1924. They showed no noticeable variation from the parent type.

In connection with the germination of *Rubus* seed we have received some interesting information from Dr. Chas. A. Shull, plant phys-

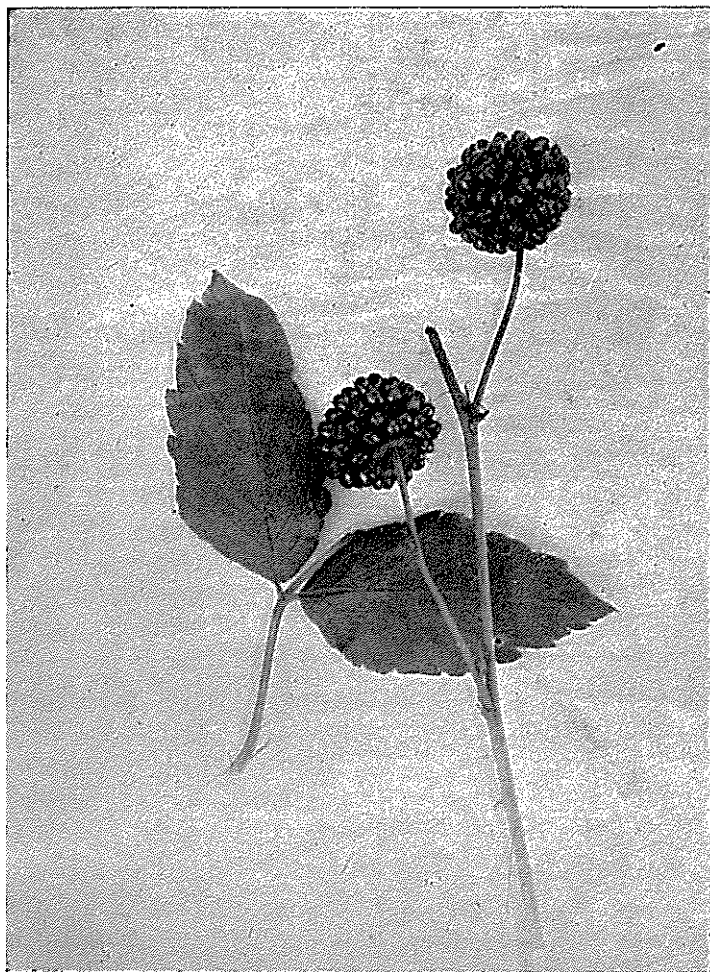


FIG. 5.—A Hybrid Raspberry *Rubus probus* (Female) \times *Rubus strigosus* (Male) Produced in January, 1925 (Cuthbert Raspberry the pollen bearer)

iologist at the University of Chicago, and from Mrs. Opal Davis, formerly in Chicago but now at the Boyce-Thompson Institute for Plant Research, Yonkers N. Y. This relates to the treatment of *Rubus* seed with sulfuric acid to hasten germination and is a con-

tinuation of the study started by R. C. Rose in 1919. In *Rubus* the dormancy is due to the high breaking strength of the pericarp, which is eliminated by treatment with acid under proper conditions. In the case of *Rubus rosaeifolius* a 95-per cent germination was obtained by treating the seed with sulfuric acid sp. gr. 1.84 for 45 mins. and somewhat over 50 per cent germination with the same treatment for *Rubus probus*, tho Dr. Shull believes a one-hour treatment would probably give better results in the case of the latter species. Mrs. Davis is now studying the possible effect of a rest period on the germination of *Rubus probus* seed treated with acid. We have sent her some one-year-old seed for this work.

The best distances for field planting *Rubus probus* are 8 feet between rows and 5 to 6 feet between plants in the row. This allows for maximum development. On Porto Rican soils it will be found advisable to place well-rotted manure under the plants at time of setting. Later a mulch of dried grass around the plants will be found beneficial. In keeping the field of Queensland raspberries free of weeds, it has been noticed that the use of the hoe in severing the roots of the berries causes many suckers to spring up. Unless the young plants are removed they sap the life of the main plant thereby preventing a proper set of fruit.

TRAINING

Very little training is necessary in the case of *Rubus probus* as the plants grow quite erect, drooping only slightly. By placing heavy end posts extending some 6 feet above the ground with 3-foot cross bars of 1" by 4" material at the 2 and 5 foot levels and stretching wires along the sides of the berry rows, the canes will be held from spreading out too much.

GENERAL OBSERVATIONS

While we consider the Queensland raspberry as worthy of more extended planting in Porto Rico, because of its strong plant growth and its great productiveness, the quality and shape of the fruit are defects which we are seeking to remedy by hybridizing *Rubus probus* with northern raspberries of high quality. As a start in this direction, we have crossed the Cuthbert (*Rubus strigosus*), a high quality red raspberry (note photo of Cuthbert plant we have used as a pollinizer) with *R. probus*, which makes an excellent pistillate parent under our conditions. From the resultant fruit of this cross (note illustration) we have obtained several hundred seeds for planting. We have also crossed the Manatee dewberry (*Rubus trivialis*) with



FIG. 6.—The Cuthbert Raspberry (*Rubus stringosus*) in Porto Rico.
Pollen parent used to hybridize the Queensland Raspberry (*Rubus probus*)

Rubus probus and from a few crosses find that the pollen of the dewberry is decidedly congenial to *probus* stock—much more so than Cuthbert, which gave rather poorly formed fruit in some cases, tho plenty of pollen of the Cuthbert has been available over a period of two months or more. Our best results in the *probus-strigosus* cross were obtained where the Queensland berry flowers were not exposed to the hot midday and afternoon sun.

Heretofore the *Rubus* work of the Insular Station has been handicapped by not having the proper conditions in the hills of the Island, as mentioned in the 1923-24 Annual Report of the Insular Experiment Station. We have lately found a desirable spot near Aibonito at the 2,000-foot level, where 18 species and varieties of raspberries, blackberries and dewberries have been planted.

Our experience has so far shown that most of the *Rubi* from the United States, especially those from the northern sections, will not develop well under tropical conditions, the two diseases, Leaf-spot (*Septoria rubi*) and Anthracnose (*Gloesporium venetum*), being too much for them, causing defoliation and in some cases death of the plants. Quite a contrast is offered by *Rubus probus* growing near by which is untouched by these diseases. The plants from northern sections lack vigor in Porto Rico, which increases their susceptibility to diseases here. The blackberries and dewberries from the southern United States make the most vigorous plant growth of the *Rubi* brought from the States and are quite resistant to disease. We are bringing some of the varieties through the flowering stage so that pollen of the high-quality berries may be used in the hybridization of some of the tropical forms which produce fruit more or less lacking in quality. Some of these with which we are working are *R. ellipticus*, *R. moluccanus*, *R. probus*, *R. niveus*, *R. glomeratus*, *R. thunbergii* and *R. macrei* (discussed in my *Florida Grower* magazine article, Dec. 6, 1924). Varieties which have flowered and in some cases set fruit for us are Cuthbert raspberry, Manatee dewberry, Advance blackberry, *Rubus hybridus* and *Rubus ellipticus*, the last named having been brought from Jamaica, where the plant has become naturalized in the hills.

The distribution of promising agricultural crops in Porto Rico will from now on be facilitated by the establishment of the government test farms elsewhere referred to in this article. These farms are located in the various districts and the planters can see for themselves the possibilities with certain crops and obtain stock for starting their own plantings.

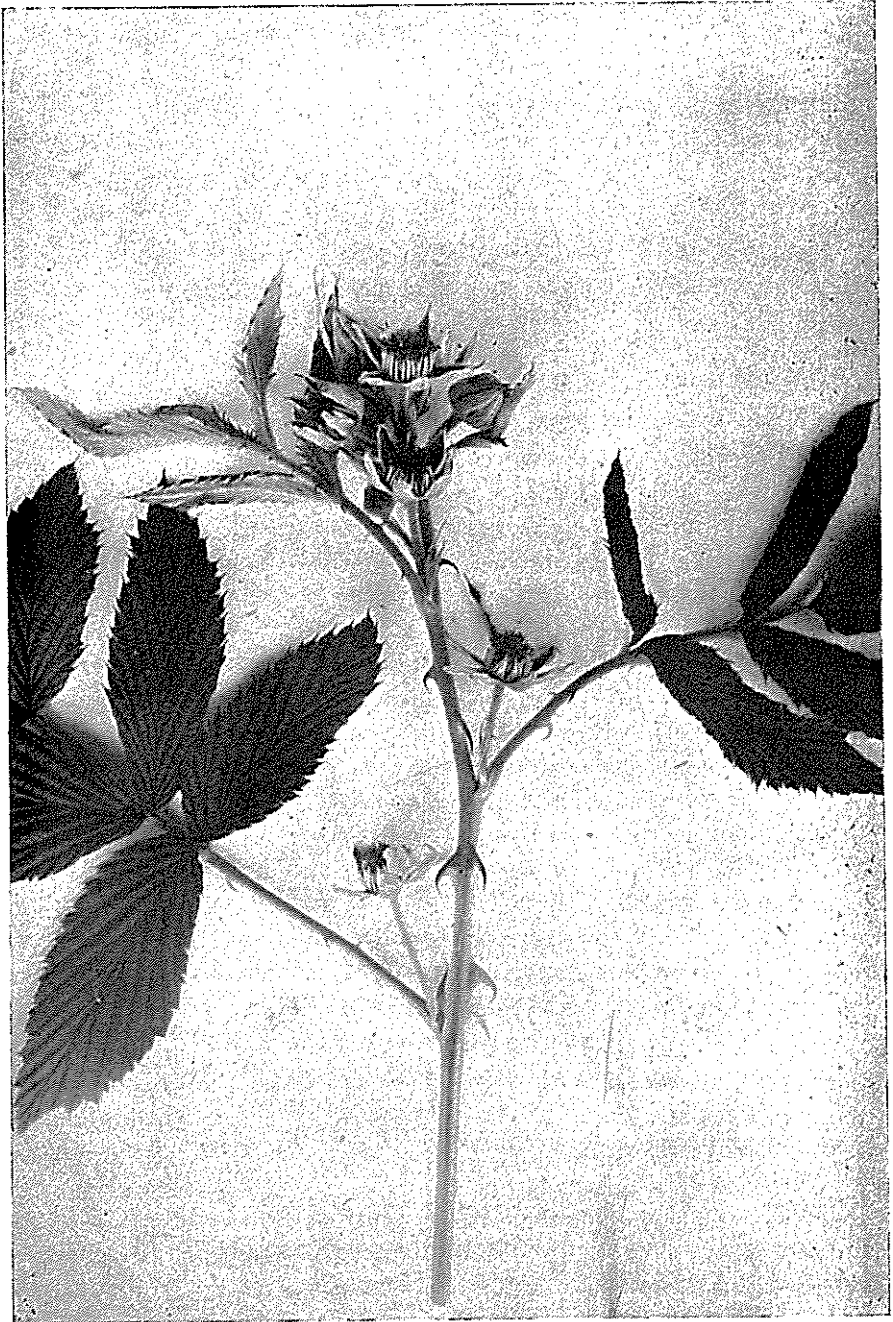


FIG. 7.—Inflorescence of the Ceylon Raspberry (*Rubus* sp. ?)
(Enlarged 1/3) Photo by Dr. H. L. Dozier, April, 1925

A CEYLON RASPBERRY (*Rubus* sp. ??)

ONE OF THE MOST PROMISING OF THE TROPICAL BERRIES UNDER TEST
BY THE INSULAR EXPERIMENT STATION OF PORTO RICO

The Ceylon berry was supplied together with five other species by the Royal Botanic Gardens of Peradeniya, Ceylon, coming originally from the Hakagala hill gardens of Ceylon. The seed was sent from Ceylon on November 27, 1923, and arrived in Porto Rico in March, 1924. The first fruits from the March, 1924, planting began to mature in Río Piedras in April, 1925.

BOTANICAL DESCRIPTION OF THE CEYLON RASPBERRY

Plant: 3-4 m. high, terete, glabrous, heavily glaucous-pruinose, armed with sharp curved spines, about 1 cm. long; *leaves*, pinnate with 5 to 7 leaflets usually 7, petioles 9-15 cm. long with sharp recurved spines, mostly on underside; petiolules and midveins slightly prickly; terminal leaflets, petioluled rhomboid 5-8 cm. long, glabrous and dark green above, white-tomentose beneath (being whiter beneath than leaves of *R. glaucus*) cordate at base, doubly serrate, acuminate, palmately veined, veins prominent; side leaflets nearly sessile, lanceolate-ovate; *inflorescence*, clustered at the terminal, appears also in upper leaf axils, branches tomentose; sepals lanceolate, pubescent, gradually acuminate, 6-8 mm. long, in fruit strongly reflexed; petals broadly ovate, color pink or old rose; 5 mm. long by 5 mm. wide, pistils a dark red color.

Fruit, dark purple covered with fine hairs giving it a pruinose effect 10 to 15 mm. long and 15-20 mm. thick, shape conical. Produce 6 to 8 fruits in terminal clusters and 1-5 (usually 1-2) fruits in each of the axils of leaves. Average 20-25 fruits per fruiting branch.

In planting the Ceylon species of Rubi, the seed of some unfortunately became mixed and the preceding species which we have found necessary to describe is one of these. We are hoping to obtain the true species name either from the Royal Botanic Gardens, Peradeniya, Ceylon, or from the New York Botanical Gardens to which places we have sent herbarium material. The Ceylon raspberry (*Rubus* sp.) makes a strong vigorous plant growth and fruits quite abundantly under Porto Rican conditions. In practically every respect the Ceylon raspberry described on the following sheet resembles the black raspberry, excepting the color of the fruit and the slight difference in the shape of the berry. The Ceylon berry



FIG. 8.—Fructing Cluster of Ceylon Raspberry (*Rubus* sp.) Natural size.
Photo by Dr. H. L. Dozier, Insular Station, April, 1925

roots at the tips of the canes so that large numbers of small plants can be readily secured.

The Ceylon raspberry, aside from its possible merit for cultivation in tropical countries, has a greater possibility, perhaps, as a hybridizer to use in connection with the American black raspberry. In the North the black raspberry is very susceptible to a serious disease, the anthracnose (*Gloesporium venetum*) which shortens the life of commercial plantations and so is more or less a limiting factor in the profitable cultivation of the crop. The United States Department of Agriculture is interested in crossing the black raspberry which Rubi which make a strong plant growth and which are resistant to disease (particularly anthracnose) and it seems that the Ceylon raspberry may be just the pollen parent to use in this hybridization work as so far our tests have shown the Ceylon berry to be resistant to both anthracnose and leaf-spot (*septoria rubi*). Seed and young plants of the Ceylon berry will soon be available for use by the U. S. Department of Agriculture and other experimenters in the United States or elsewhere who may care to work with the species.