

Hoosier Horticulture



Development of the Cultivated
Blueberry

Purdue Horticultural Show

The Successful Woodlot

Program Annual Meeting

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DEVELOPMENT OF THE CULTIVATED BLUEBERRY

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Millions of dollars worth of blueberries are sold every year. Practically all these are gathered from swamps, hillsides and wild pastures, where they grow without human aid. May we not count the commercial importance of this unimproved fruit as an indication of the immense popularity that awaits the better blueberries which are now being developed?

Blueberries have been cultivated in a few places for several years. There are small fields in Indiana, Florida and other states.

REQUIREMENTS OF GROWTH

Attempts to cultivate blueberries have most frequently failed however because the plants were set in soil of neutral or alkaline reaction which is best suited to most garden crops.

Blueberries require an acid soil, preferably one composed of peat and sand. This is the most important discovery made by Mr. Frederick V. Coville of the U. S. Department of Agriculture, who has made a careful study of the laws governing the growth of blueberries.

Of equal importance to their welfare is a well controlled supply of water. The blueberry roots must have a continual supply of both moisture and air. It is easy to understand that blueberries need plenty of water—we see them growing in swamps and very wet places; but under New Jersey conditions at least their need of good drainage is less apparent. Every thriving wild blueberry bush, however, no matter how watery its environment, has access to some tussock of moss or heap of loose partially decayed vegetation through which both air and blueberry rootlets freely penetrate.

A third important law explained by Mr. Coville is the need of cross pollination. Many blueberry plants are entirely sterile to their own pollen; on others, berries may set when self-pollinated but if so they are slow in developing, never reach full size, and the seeds and resulting plants lack vitality.

Another fact not generally realized is that low temperatures are necessary to stimulate various phases of the development of the blueberry. For successful breeding and propagating it is important to know the amount of chilling a plant or cutting must experience before it will start normally. Blueberry seeds will not germinate till the nights attain a certain low temperature or they are given artificial refrigeration and pollination of the flowers cannot be successfully accomplished if the night temperatures are too high. In outdoor culture, of course, normal seasonal temperatures provide these conditions.

WILD STOCKS

In locating good bushes I have depended almost entirely on the people who pick wild berries for market, and large size of the berry was the only point considered in making the first selection. To begin with we accepted plants with berries half an inch in diameter but they were so easily found that we quickly raised our standard to 16 mm. or about $\frac{5}{8}$ of an inch. Over a hundred plants were located within twenty miles of my home in New Jersey. Two of them bore some berries over 19 mm. or $\frac{3}{4}$ of an inch in diameter.

We made an effort last year to locate in other parts of the country plants with berries $\frac{3}{4}$ of an inch in diameter, or just the size of a cent. We offered \$50.00 each for such plants, packed according to direction and delivered to the nearest express office—we to pay the transportation. The offer was advertised widely and I received hundreds of samples, none of which approached the best New Jersey berries in size. Surely little New Jersey has no monopoly of blue berries as large as a cent, and I hope members of this Society will interest themselves in locating such bushes. Our \$50.00 offer still holds good and the plants would be of great value in the breeding work, especially if they came from New England, about the Great Lakes, from North Carolina or from some other blueberry center, the climate of which differs appreciably from that of New Jersey. If you are inclined to help in this search please remember that only plants with berries nearly or quite $\frac{3}{4}$ of an inch in diameter are wanted; and don't, oh! please don't! inspire all your friends with an ambition to send samples of the best berries they ever saw; even when said berries are less than $\frac{1}{4}$ inch across; it takes too much time to carry out the remains.

CHARACTERISTICS OF INDIVIDUAL PLANTS

I visited in their original location most of the hundred odd plants selected between 1912 and 1916, either while in fruit or when dug during the dormant season. Each was divided into many pieces which were used for propagating. From each original plant there were thus obtained from five to five hundred little new plants. The young plants from each original bush have been kept entirely separate and each lot has its own peculiar set of characteristics, entirely distinct from those of any other lot. In very many cases the young plants show characteristics which explain peculiarities attributed to accident when observed in the original plant. Thus: Earlin was the tallest plant I ever dug, over 12 feet high, and the youngsters are a leggy, gawky lot. Haines No. 9 though gnarly and seemingly very old had an appearance of vigor which led me to believe the young plants would be clean cut and aristocratic; but no! every one, as soon as it is past its infancy, looks old and gnarly. The original Adams plant grew on the bank, of a brown stream which at high water had washed bare several large roots which were bent at right angles on themselves; a mere accident of circumstance apparently, and yet every Adams plant of two years old or over that I have dug, unlike other blueberry plants, has had a number of its larger roots bent at right angles. Rubel was a large plant, beautifully symmetrical, with smooth bark and a fine well balanced appearance, and under cultivation Rubel plants have proven uniformly fine, well balanced and vigorous.

The individual characteristics which make every seedling blueberry plant distinct from every other are innumerable. In connection with the fruit of important differences include size, color, flavor, texture and time of ripening. The berries on one plant may be gone before those on another begin to ripen.

Of greatest importance is the varying ability of plants to resist injury by frost. A remarkable example of this was observed early in my blueberry work. It was past the middle of May when a hard freeze came. Such an event spells disaster for cranberry growers, and the following day my father and I were investigating the extent of the damages and we observed two large blueberry bushes growing so close together that their branches intermingled. On one the young leaves, flowers and buds were uninjured; while on the other they were completely blackened as by fire.

Our selected plants varied in their resistance to frost injury, and the most tender have been discarded. None of them however were very susceptible—we unwittingly secured resistant plants because most of them were located in years when wild blueberries were seriously injured by frost.

Of the hundred odd plants originally selected for the size of their berries, only six proved worthy of propagation for commercial fruit production. These are known as the Rubel, Harding, Sam, Dunfee, Adams and Grover; each name perpetuating that of the discoverer of the original plant.

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CULTURAL METHODS

We now have at Whitesbog about twenty-five acres set with blueberries, twenty with seedlings from the Department and five with plants raised from cuttings of the wild bushes.

The land we are using is in the so-called Pine Barren region of New Jersey, and has never been cultivated before. It was considered useless. It is sandy, and the sand is overlaid with a peaty layer from two to six inches thick. Before plowing it is occupied by a variety of bushes, many of them of the heath family including several species of blueberries and huckleberries.

In preparing the land for cultivation we cut and burn the brush and plow under the peaty turf, leaving the white sand on top. It is desirable to plow the land a year or more before planting and work it occasionally with a disk harrow in order to thoroughly kill the original growth. So much of this consists of unselected blueberries that they come up close to the better plants and get overlooked by the men who hoe.

The plants from the Department, when set in the field, have mostly been as large as they could be grown, in a two-inch pot. They are set four feet apart in rows of eight feet apart. There is little doubt that this spacing is too close for some varieties and too wide for others—but all our plants so far are on trial.

We practice clean culture so far as the shortage of labor permits. The new land on which manure has been never used is not very weedy, but the young plants need hoeing two or three times during the summer, and frequent use of the cultivator helps maintain good aeration of the soil, so essential to vigorous growth.

IRRIGATION AND DRAINAGE

One important fact which makes blueberries an especially good auxiliary crop for us is that we have developed an elaborate irrigation and drainage system for our cranberries, much of which can be used for the blueberries with but little additional expense. The cranberry bogs and blueberry fields are underlaid with a hard pan two feet or so below the lower level of the peat. Irrigation is provided by the percolating of water through the soil above this hard pan from reservoirs, which are maintained at a level some feet higher than the bogs and fields. These reservoirs influence the water content of the soil for a mile or more below them. In the cranberry bogs drainage is cared for by open ditches but in the cleanly cultivated blueberry fields open ditches have not proved practical. Every shower washes in sand and stops the flow of water. We have therefore installed tile drains. These are mostly satisfactory but in periods of heavy rain during the growing season there is too much surface water. This checks the growth of the plants and we must find some way of caring for it.

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INSECTS AND DISEASES

The great quantities of wild blueberries which are produced in many parts of the country are proof of the comparative freedom of these plants from the ravages of insects or disease. This does not mean that blueberries have not a multitude of enemies, but that in their natural environment the balance of power favors the blueberries. As we bring them under cultivation we make conditions more or less artificial. It is not natural to have great fields of blueberries only. Then they will undoubtedly be planted on soil and in situations that are not so perfectly suited to their needs as those which the wild plants occupy as the result of their successful struggle with other vegetation. This changing of the balance of nature will in time probably result in giving advantage to some one of the insects or diseases to which blueberries are subject.

In the plantation at Whitesbog, where we are working with native plants under almost natural conditions, we have had very little trouble with either insects or disease.

The only thing against which we are taking specific preventive measure is a borer, the life history of which is much the same as that of the raspberry borer. The adult beetle, during July, girdles a new shoot from one to four inches below the tip. She

scarifies the bark in two irregular bands, approximately one-quarter inch apart, and between them deposits an egg, the shape and color of a miniature banana an eighth of an inch long. This soon hatches a minute larva which proceeds to bore its way down the stem. The first summer it only goes two or three inches, but the following summer it grows and travels much faster, making holes at intervals through which the frass is discarded. The stem dies, frequently with fruit ready to ripen. The borer grows to be an inch or more long and continues down into the base of the plant below the ground level, neatly cutting off the stem which it has killed two or three inches above the surface.

We guard against this damage but breaking off the wilting tips several inches below the girdle. We have been doing this for several years and it is interesting to note that now the larger percentage of wilted tips is found on the margins of the fields. This is probably because the margins are subject to infestation from the uncared for wild plants in the neighborhood, while our work has protected most of the field.

The infant blueberry industry has two great safeguards against the development of any insect or disease to the point of being a pest.

One is the interest with which the potential pests are being studied by the men who have helped solve so many disease and insect problems for cranberry growers. Of these men Dr. C. L. Shear of the U.S. Department of Agriculture is most notable among the pathologists, and chief among the entomologists is Mr. H. B. Scammell, who made a study of cranberry insects for the U. S. Department of Agriculture. While stationed at Whitesbog, Mr. Scammell caught the blueberry fever. He is now in commercial cranberry work and is preparing to become one of the pioneer blueberry growers.

The second safeguard is the fact that individual blueberry plants vary in their power to resist the attacks of some, if not all kinds, of both insects and disease, and this is taken into consideration in the selection of varieties.

Among the insects which attack the blueberry is one which deposits its eggs in the stems. Galls thereupon grow in which the larvae develop. Year after year I have noted individual wild blueberry plants covered with these galls, while the other plants in the same thicket remain clean or with but very few galls.

Among the blueberry diseases which are under observation is one which transforms nearly mature fruit into shriveled mummies instead of the luscious berries they would normally become. Certain plants whose other good points led us to consider them as a start for future varieties were found especially susceptible to this mummy berry disease and were discarded.

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FUTURE PROSPECTS

We believe that commercial blueberry culture has a great future—that in a few years it will be yielding large revenues from thousands of acres that are now waste land.

The most serious check on the rapidity of this development will probably be the difficulty of securing plants of the better varieties. You know ten years ago "they" said blueberries could not be started from cuttings. Mr. Coville's careful work has proven that "they" were wrong. We have proven that blueberry cuttings can be started with less elaborate equipment than that employed by Mr. Coville, but it is not yet plain sailing by any means, and our losses are heavy. Last year they were 75 per cent of all the cuttings put in.

With this handicap it is a slow process to work up a considerable stock of plants from a single fine wild bush or a single selected pedigreed seedling. This is true even though we bud extensively to provide a large amount of cutting material. By the way—these budded plants are not practical for commercial fruit production. Even when set with the union well under the surface of the ground they continually send up sprouts from below it. This necessitates removal of the sprouts two or three times during the season, which, for a considerable area is impractical.

This year we are making nearly our whole stock of better plants into cuttings. There will be approximately 100,000 of them, and we believe we can avoid many of last year's pitfalls. We are confident that there are no insuperable difficulties in the way of producing large quantities of the best plants; but while these difficulties are being overcome there will, for a few years certainly, be a shortage of plants.

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CONCLUSIONS

Blueberries are found from the Gulf Coast to Labrador and Alaska; in swamps and high on mountain sides. The better

varieties we are developing in New Jersey may not be well suited to all localities. The methods employed at Whitesbog, however, I am sure are well suited to developing better blueberries for every locality where they are already found. These methods include selection of the best local bushes, and testing them under cultivation with Mr. Coville's underlying principals well in mind. Then if they prove worthy he will be glad to cross the best of them with the best plants from other localities.

I trust that what I have said may attract some pioneers to this new branch of horticulture and that you will remember we are in the market for wild blueberry plants with berries as large as a cent.

Report Am. Pomological Society.

The great popularity of the blueberry or huckleberry makes the subject of its cultivation of great interest. In the early history of Indiana this berry grew in abundance and they were gathered in great quantities for both home consumption and for market, but with the clearing up of the country and the draining of the marshes they have gradually disappeared until there is no longer an adequate supply in any of our markets. Many of our acid muck soils which formerly produced fine crops of berries have been drained and the soil sweetened by the application of lime at great expense in order to grow thirty cent corn. Is it not time we were giving some attention to the cultivation of this popular fruit in a commercial way? There are large areas in the State that are well suited to its production and with the introduction of varieties of recognized merit and markets eager for the fruit at high prices, there is certainly an opportunity for profitable investment.

A NEW INSECT PEST

A recent insect importation has appeared in New York. It is of European origin and works on the upper surface of the leaves of the apple, similar to the work of the pear and cherry slug, defoliating the tree if left unchecked and as it produces several broods during the season is quite destructive to unsprayed or insufficiently sprayed trees. But to Indiana's commercial growers with their thorough and continuous methods of spraying it need cause no alarm.