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Cranberries in West Virginia

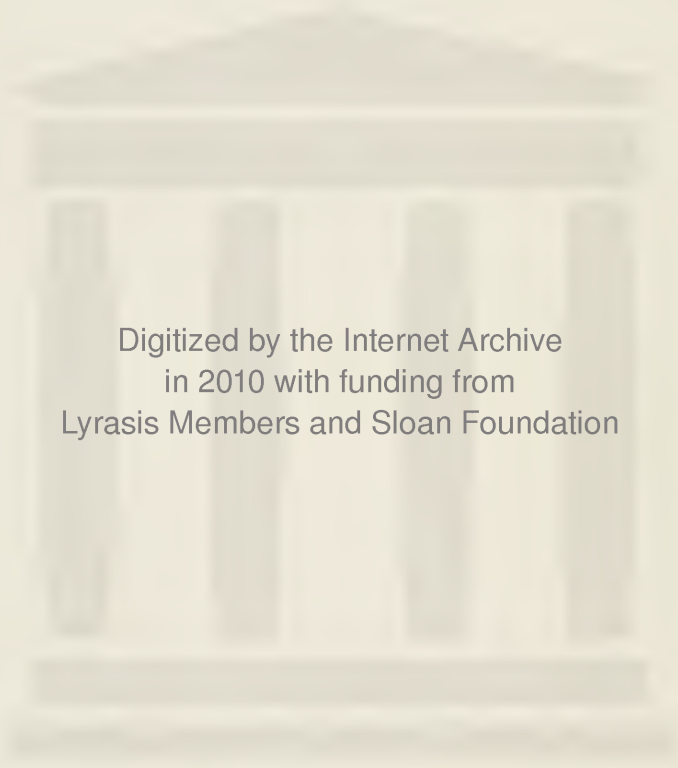
L. C. Corbett

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WEST VIRGINIA UNIVERSITY
AGRICULTURAL EXPERIMENT STATION,
MORGANTOWN, W. VA.

BULLETIN 86.

APRIL, 1903.

Cranberries

in

West Virginia.

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BY L. C. CORBETT.

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[The Bulletins and Reports of this Station will be mailed free to any citizen of West Virginia upon written application. Address, Director of Agricultural Experiment Station, Morgantown, W. Va.]

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This is one of several bulletins reporting work under way, during the incumbancy of Prof L. C. Corbett, as Horticulturist at this station, but prepared for publication by him after his resignation of that position and his acceptance of work as Horticulturist of the Bureau of Plant Industry, in the United States Department of Agriculture, at Washington, D. C.

J. H. STEWART, Director.



FIG. 1. The low lands are suitable for Cranberries.



FIG 2. Experimental plats. Land in the distance also suitable for Cranberries.



FIG 3. Natural Cranberry bogs in Preston county.

CRANBERRIES.

The cranberry industry is more closely restricted by natural conditions than any other fruit industry of equal economic importance in the United States. The peculiar requirements of the plant limit its culture to regions possessing a cool climate, a rich alluvial soil and where an abundance of easily available sand together with an almost unlimited water supply are available. Most other economic plants are less exacting, they thrive and prove profitable in localities where one or more of the factors for the highest success in their culture are wholly or in part lacking. With the cranberry high success can only be gained where every one of the essentials is present in a marked degree.

For these reasons cranberry culture in the United States is at present confined to three or four restricted areas. The chief of these is located in the Cape Cod country of southeastern Massachusetts, where thousands of acres of low, rich alluvial lands have been ditched, dyked, covered with sand and thus converted into ideal cranberry meadows. These lands that refused the early set-

blers the necessities of life have been made one of the most remunerative areas in the State. What is more remarked the industry is purely American and the plant from which it has been built up is found wild in these same lands.

A second locality both in order of development and commercial importance is found in New Jersey, and a third in Wisconsin, while in our mountain glade country we have the possibility of a fourth. As early as 1860 many barrels of cranberries found their way from these glade lands into the markets of Cincinnati. Later, settlement, fire, and grazing animals almost exterminated these wild plants and they were practically forgotten until 1894, when the Horticulturist of the Experiment Station conceived the idea of developing this natural resource. Since that time persistent effort has been made to establish such an industry on the glade lands of Preston county on the farm of J. W. Guseman. At present the plats are thoroughly established and three of them are of bearing age. The product from the named sorts is of large size and of superior color. The vines bear abundantly and regularly and so far have been remarkably free both from insect pests and diseases.

SELECTION OF A SITE.—In determining upon a suitable location for a cranberry plantation in this State one may be guided somewhat by the plants found growing wild in the vicinity. Sphagnum moss, native cranberries, wool grass, and other bog-loving plants are often found in regions best suited to cranberry culture.

The soil should be of a peaty nature or a black alluvial deposit. Within hauling distance should be a supply of clean sand with which to cover the beds. For the Preston county glades a crushing machine, located on the M. & K. R. R., now produces a clean white sand from the native rock, well suited for cranberry beds.

DETAILS OF THE WORK.—The first attempt to establish a bog was a partial failure owing to faulty preparation of the ground. In this particular a prospective planter cannot exercise too much care. Failure at the beginning to thoroughly strip the land of turf and persistent roots of all sorts leads to an endless



FIG. 5. Cranberry plants newly set in sand.

expense in attempting to prevent persistent grasses from running out the cranberries.

After the area to be planted has been stripped it should be brought to grade so that a few inches of water will be sufficient to cover the surface of the whole plat, otherwise extra expense is necessary in the erection and maintenance of dykes as well as an unnecessary head of water. After the surface is prepared by stripping and grading it should be thoroughly loosened by the plow or spade, fined and compacted. After this is accomplished a dressing of river or rock sand, free from clay and seeds of persistent weeds, four to six inches deep should be spread uniformly over the surface of the plat. The area is now ready for the cuttings.

SOIL.—The character of the land on which the Experiment Station bogs are situated is alluvial black loam or muck, which is underlaid at a depth of eighteen inches with a clay subsoil. Plat 1 is a little too high above the general level of the bog to afford the best facilities for irrigation, yet this plat has now the best stand of vines of any plat save No. 4. The first planting on No. 1 was not considered a success. It was reset in the spring of 1896, and is now in first rate shape to take care of itself, save that more or less grass appears annually, as a result of not properly turving the area at the outset. Plats 2 and 3 are only fairly good, some portions of each being first rate, while others are only thinly set with vines. All in all, the experiment may be counted a success, and the stand of plants on Plat No. 4, on the lowest ground, is most encouraging of all. An idea of the general features of the region can be gathered from Figs. 1, 2, and 3.

In early days of cranberry growing little attention was given to the question of varieties. The native bogs were cleared of brush and other incumbrances, and, with arrangements for flooding, the bog was thought sufficiently prepared. The same plan has been followed in Northern Ohio, Wisconsin, and New Jersey, but at the present time special care is exercised in preparing the land. The turf is removed and the surface reduced to a uniform grade, if not to a dead-level. The surface once prepared in this way is ready for sanding. This operation is a simple one in the Cape Cod

region, for the boundaries of nearly every marsh are composed of suitable sand.

The turving in the West Virginia regions is not attended with as much difficulty as in the Cape Cod region, and in many localities can undoubtedly be successfully accomplished by horse power. The Gilmore Sod-Cutter is shown in the accompanying illustration, Fig. 4, which gives an under view of the implement.

In construction this machine is extremely simple. It consists of a strong plank sled with runners about 18 inches apart, and

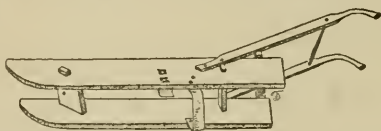


Fig. 4. Under view of the Gilmore sod cutter.

attached to these is a heavy, sharp, steel shearing blade, set to cut about 3 inches deep. In front of this and projecting about 3 inches below the surface of each runner, is a straight, sharp blade, which aids to guide the implement as well as cut the sod. This machine can undoubtedly be profitably employed as a means stripping land sufficiently firm to admit of the use of horse power.

PROPAGATION.—The cranberry is increased from cuttings of the stem or root, usually the stem. These are prepared in various ways, usually the upright stems eight to fifteen inches long are cut off with a mowing blade. If to be shipped they are packed in ventilated barrels. If to be planted immediately they are carried in baskets or other convenient receptacles to the desired location, where the material is separated into small wisps containing from four to eight branches. These are laid at the intersection of marks made at desired distances apart and are pressed into the sand with a broad wedge-shaped dibble, fifteen or eighteen inches long, so that a man can put his weight upon it without effort. After the cuttings are pressed firmly into place a little sand is shoved into the hole left by the dibble with the toe of the boot. The sand and the pressure necessary to force the bunch of cuttings into it insure a stand of vines if the season is at all favorable. In the new plantation shown in the photographs Fig. 4, the plants were set 9 by 18 inches, but 18 by 18 inches is not an unusual distance. Where plants are abundant and labor is not expensive 9 by 18 inches will, I think, insure a quicker cover

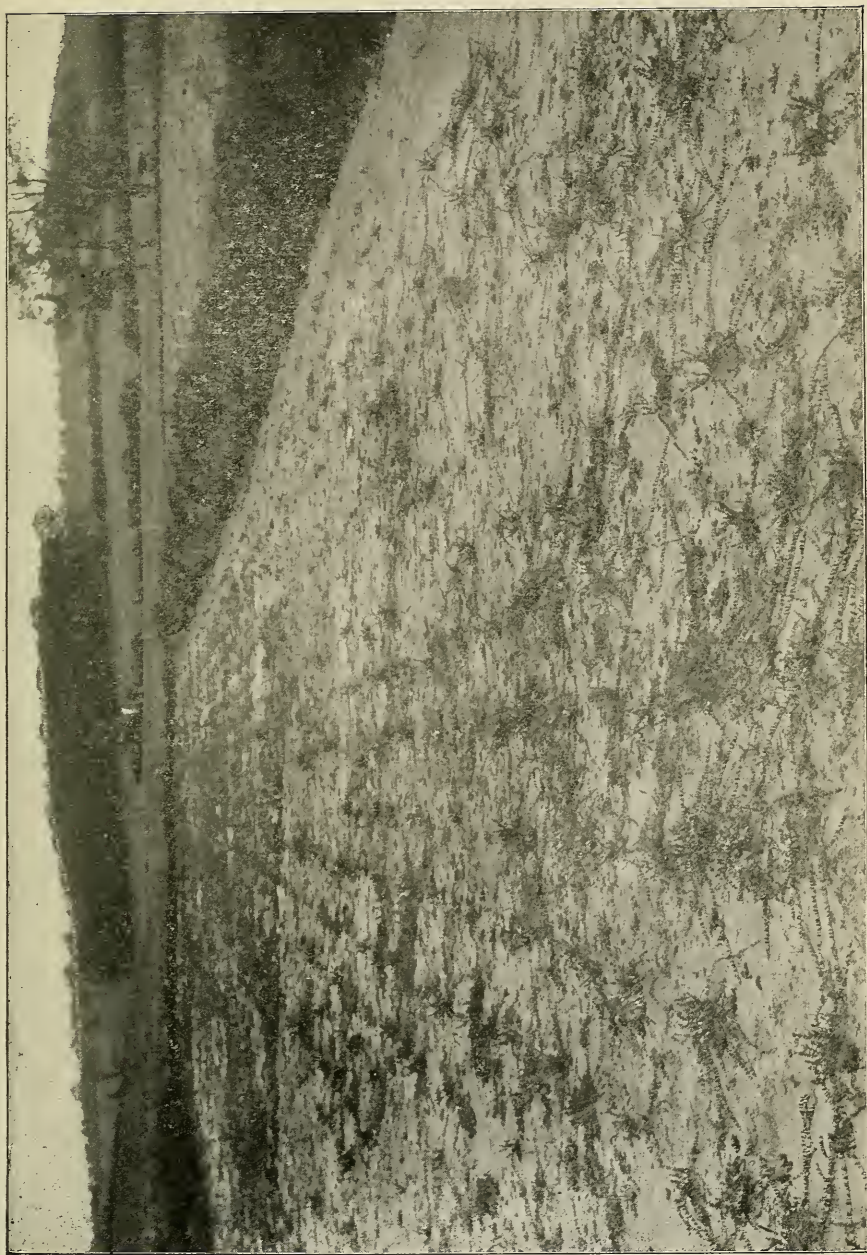


FIG. 6. Cranberry vines showing two seasons growth on sanded bog. (Photo by Corbett.)

which seems to be an important feature in cranberry growing, as the vines fruit better and there is less interference from weeds and grass and consequently less expense in maintaining the bog.

CULTIVATION AFTER PLANTING.—After planting all weeds and grasses should be kept out and the cranberries given undisputed possession of the soil. During the first two years, at least, the area should be kept comparatively dry at the surface, although it is best to keep the water level within four to six inches of the surface even during this period.

Each season it is necessary to go over the bogs and carefully pull out all large weeds and any tall grass which may come in. After the vines have once become thoroughly established little trouble follows from growth of grass, but before the ground is completely covered with vines care is needed to keep down all grass and weeds. Replanted areas, are said to be more difficult to keep clean than newly prepared bogs.

The bogs should be so situated as to be able to flood them when desired. There are several reasons for this. Flooding during winter prevents winter killing and is especially desirable when the plants are not protected by snow. Winter freezes sometimes heave the plants out of the ground. A few inches of water will prevent this. In the winter of 1898-99 many of the plants of Plat No. 3, were thus forced out of the ground and were re-set the following spring. Because of the usual prevalence of snow in Preston county the experimental plats have thus far not been flooded in winter. In regions where late spring or early fall frosts are detrimental water is kept on the plants from November until all danger from spring frost is past. Water on the plats at this time also protects them from the attacks of the vine worm, as the eggs of this insect are deposited on the vines in the fall.

Flooding is also a protection from drought, and from fires. Flooding the bogs while in fruit, which is held to be an advantage by some, since it destroys the fruit worm and some of the root feeding insects, is nevertheless looked upon with no small degree of disfavor by the larger growers on Cape Cođ. While the results claimed are attained the keeping qualities of the fruit is

impaired by making the berries soft and the vigor of the vine is also lessened. The practice is everywhere held in disfavor and few follow it. It is well, however, to construct a dam to get a good head of water which may be used to flood the beds at any time desired. Above the experimental plants in Preston county water is held in readiness by a dam one rod long and three feet high, across a small creek. From this simple reservoir a tile pipe leads to the plants.

Bogs which are naturally very wet are to be drained preferably by open ditches. But it is at all times advisable to have the water level within 8 to 12 inches of the surface of the soil. The roots will then be able to reach an abundance of soil moisture constantly. Experimental Plat 1 is too high above the wet subsoil and the result is not satisfactory. In 1898 the land lying below the experimental bogs was drained by Agricultural tile, for a vegetable garden. This has doubtless had no small influence upon the depth of water lying beneath the cranberry beds. The site selected for a plantation should be as level as possible, providing a slight drainage is afforded.

HARVESTING.—Gathering the fruit, has within recent years, through yankee invention, been greatly simplified. Nearly all extensive growers now-a-days require pickers to use machines or if the people are employed by the day instead of by *the measure* the grower provides the machine. With these devices the work is much abridged, fewer persons are required, less injury from tramping is done to the bog, and this in a great measure offsets any real or supposed injury to the plantation from the use of machines. The quantity that a single individual can pick with an implement of the sort is quite remarkable. Upon one of the bogs of A. D. Makepeace ten persons picked something over 50 barrels of fruit in eight hours. In 1896 the field records, bore testimony of a picker who gathered 528 quarts in a single day and had an average for the season of about 450 quarts daily. At present, gathering of the fruit is paid for by the *measure* which is six quarts. A standard circular tin pail was formerly used, but of late Mr. Makepeace has adopted a wooden box, light in structure, provided with a wire bale and holding 12 quarts, this is more convenient to

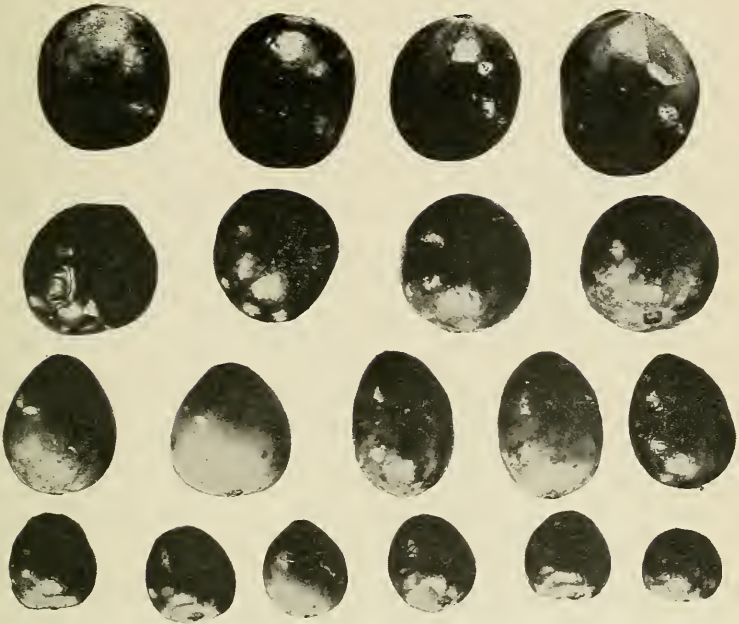


FIG. 7. Two upper lines McFarlin, third Curtinal, lower line "natives"
All natural size.



FIG. 8. Variety Howe. $\frac{3}{4}$ natural size.

empty the fruit into from the picker. After the fruits are picked they are emptied in storage boxes and placed in the store houses. Before being marketed, which is any time up to three months after picking, the fruits are screened; an operation which consists in looking them over after the manner employed in looking over, so called, hand picked beans. A number of fanning mills have been devised for this purpose and all are of more or less value, yet the great bulk of the work of preparing for market is done by hand picking. The screen used is a curved tray-like arrangement with slatted bottom, in length, width, depth and manner of mounting it is almost identical with the sorters used in the apple regions of the Northern Pan handle of our State. The slats in the bottom are arranged at right angles to the length of the box instead of parallel with it as is the case in the apple sorter. The fruit is usually marketed in ventilated barrels. Buyers preferring to crate them at the distributing points, rather than in the field, if crating seems advisable. In storing no artificial cold is needed and the fruits are not held in water as was formerly thought necessary. After being gathered they are placed in ventilated boxes and stored in the same fashion as pears or grapes. The only precaution necessary is to maintain the temperature of the store house above the freezing point which in some cases requires artificial heat.

STATISTICS.—According to the census of 1900 which records the crop of 1899, the total yield of cranberries in the United States was 987,516 bushels valued at \$1,215,059 from a total area of 20,434 acres.

Statistics by states in order of the crop produced is as follows:

State	Acres	Total yield in bushels	Yield per Acre	Per cent. of crop of country
Massachusetts	5,128	598,906	117	60.6
New Jersey	8,356	240,221	29	24.3
Wisconsin	5,821	111,098	19	11.2

As above stated, there were in Massachusetts, 5,128 acres of cranberry bog, and the average yield per acre was 117 bushels; while New Jersey had 8,358 acres of bog, with an average yield per acre of 29 bushels. The area given for Wisconsin was 5,821 acres and the average yield per acre was 19 bushels, this low aver-

age being partly due to including in the total acreage a number of new bogs which were not yet bearing. The low average yield in New Jersey was largely due to a partial failure of the crop, only 61.5 per cent. being gathered. Nearly the entire crop in Massachusetts was grown in Barnstable and Plymouth counties, or what is known as the "Cape Cod district." In New Jersey two of the coast counties, Burlington, and Ocean, produced over half the crop of the State. Jackson, Waushara and Wood counties produced the bulk of the crop in Wisconsin. The largest cranberry bog in the country is located in New Jersey where, from 492 acres of planted vines 20,450 bushels of berries were harvested 1899, and in addition 3,000 bushels were injured by blight, frost, etc.

RESULTS. — Yields of fruit are quite variable. One hundred bushels per acre is considered a good average yield, and in the best seasons 100 barrels per acre have been grown. The general averages calculated from the table of yield for 1899 are, in bushels per acre, as follows:

Massachusetts	117	Rhode Island	22
Suffolk Co. N. Y.	96	Wisconsin	19
New Jersey	29	Maine	17
Connecticut	26	W. Va. (estimated)	84

These all include some very poor bogs owned by careless growers.

The prices prevailing in New York the past few years have allowed the grower \$1.50 to \$2.25 per bushel for the crop right from the pickers' hands.

At the picking time of 1901, three of the experimental plats, just coming into bearing, yielded fourteen bushels of high grade berries. The aggregate area is about one half acre, only one-third of which is well set with plants. Counting the area well set with plants as 1/6th of an acre, the yield was at the rate of eighty-four bushels per acre. The best yield however was on Plat 3 where one square rod produced a bushel equaling 160 bushels per acre. These were large berries of the McFarlin variety, and were marketed at Kingwood, six miles distant, bringing \$3.00 to \$3.20 per bushel. This maximum yield of the first crop and best local price shows an income

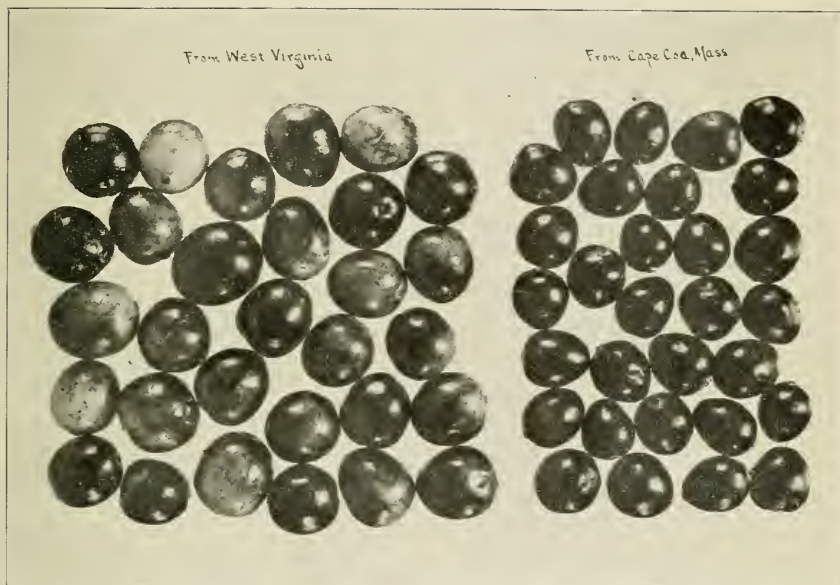


FIG. 9. Comparison of 30 Conquest berries from two sections. $\frac{1}{2}$ natural size.

of \$512 per acre. Taking eighty-four bushels as the average yield and \$3.00 as the minimum price in Kingwood, we have an income of \$258 per acre.

The results are very encouraging. The prospect of establishing the new industry in the bogs of the Allegheny mountains is very good. In the bog regions small sluggish streams can usually be found which will give the needed water supply. Sufficient reservoir capacity is easily obtained by the construction of log dams where timber is cheap. Many of the glade regions of the State are remarkably level and can be put in readiness for the vines at the lowest possible cost. After the plantation is well established, a cost of eight to fifteen dollars per acre will cover all necessary expense over and above picking. No expense should be spared in making the bogs as productive as possible, as the cranberry business is surely a profitable one.

Using the above minimum as a basis we may show the net profit as follows:

Crop from one acre.....		\$252.00
Annual care of bog.....	\$15.00	
Cost of picking.....	60.00	
Screening, packing, and hauling.....	15.00	
Packing material.....	10.00	
Total estimate cost.....		<u>\$100.00</u>
Annual net profit per acre.....		\$152.00

SORTS.—Varieties of cranberries vary as greatly in productiveness and habits of growth as do apples or peaches. As a result of this variation many of the early planted bogs were not profitable and of necessity had to be torn out and re-planted with a variety of greater commercial value. As with apples, those sorts which are largest and command highest prices upon the market are frequently shy bearers and are only grown in limited areas to satisfy the fads of special markets. The question of varieties will, I believe, be a local one. We in West Virginia may find our climate and soil conditions particularly well suited to sorts that are shy bearers in the Cape Cod region, or the opposite may be true. For that reason those contemplating taking up this industry in West Virginia will do well to secure a number of different varieties of good repute from the various cranberry districts, rather than plac-

ing entire dependence either upon native stock or even the best sort from any other region.

Our tests have not progressed far enough to indicate the varieties best suited to our climate. In growth and ability to take possession of the soil the native wild plants have proven superior to all others, they are prolific bearers but the small size of the fruit render them undesirable for general planting. In them, however, we have an assurance that a profitable cranberry industry can be founded in this State, for with care in selecting wild plants of superior size and form a variety thoroughly adapted to the soil and climate and possessing the desired size, form and coloring can soon be built up. In addition to the wild plants taken from an adjacent swamp, cuttings of five of the best varieties grown by Mr. A. D. Makepeace, Wareham, Massachusetts, have been introduced.

Six varieties of cranberries are, therefore, now growing upon the testing grounds of the West Virginia Experiment Station in Preston county, and while it is yet too soon to decide which sorts are best for the conditions existing in West Virginia, a brief description of the behavior of each may not be out of place at this time.

1. NATIVES. At the inauguration of the work in 1895, native plants were transplanted from an adjacent bog to a portion of Plat 3, where they have persisted and made a growth of vine superior to any of the introduced varieties. The vines now form a mat completely covering the surface of the area. While the plants began bearing early the small size of the fruit reduces the yield per acre as well as the market price. The natural size as well as the characteristic form of these fruits is shown in the lower line of Fig. 7. In many bogs of the State fruits of much larger size are to be found, but at the time of establishing the bogs it was not possible to secure these selections. Experience with other native fruits, as well as with the cranberry itself in Massachusetts, renders it certain that by careful selection varieties possessing all the attributes of earliness, productiveness, size, and color which characterize the best Massachusetts sorts, can be secured in this way from the native West Virginia stock if introduced sorts fail

to give the results desired.

2. **HOWE.** This variety occupies all of the upper Plat, No. 1, which was re-set in 1896. Allowance must be made for the high location of this bog. The water is doubtless at too great a depth below the roots of the plants. In spite of this, the vines have covered the plat, or most of it. The variety began bearing the fourth year from setting and produced a light crop. The berries are well colored of the long, or bell-form, type shown in Fig. 7, and possess a flavor superior to any of the others here mentioned. Their keeping quality is good. The rich dark color is assumed by picking time, and they remain in a good attractive condition for the Christmas trade.

3. **CENTENNIAL.** Cuttings of this and the other improved varieties used in the experiment were obtained from A. D. Makepeace, Wareham, Mass. Centennial was given the upper half of Plat 2, in 1895. The vines made a good growth and have yielded fairly well. The berries are of the bugle type or pear form as shown at the left of line three, Fig. 7. The color is light at picking time but intensifies if the fruit is kept in darkness for a few weeks. The fruit keeps better than the average.

4. **EARLY BLACK.** This was planted on the lower half of Plat 2, and at the same time as the above. In comparison the stand is very thin. The variety ripens berries a few weeks ahead of others and produces dark colored fruit for early market. The berries, however, are small and do not keep well. The form is somewhat elongated and may be considered nearest the bell type. See right half of Fig. 8.

5. **McFARLIN.** This variety occupies Plat 3 with the "Natives" and was planted at the same time. The contrast in fruit of the two is clearly shown in the upper and lower lines of Fig. 7. The berries are largest tried here and are shown in contrast with Early Blacks from Cape Cod in Fig. 5. At picking time the color is too light to suit the demands of the trade, but the berries keep well and assume a darker color if stored in shallow trays away from light. Two sample lots of this variety were sealed in glass jars, filled with water. They were placed in a cellar, and were still in perfect condition the middle of the following June, nearly eight months after harvest.

6. MATTHEWS. These plants were set in the spring of 1899, on Plat 4, the lowest and most nearly level of all. The turving and sanding of the plat already described has given these plants a great advantage over the others. The growth of the vines at the second season is shown in Fig. 6. No berries have yet been harvested from the plat.

LESSONS TAUGHT BY THE TEST.

1. The soil must be thoroughly stripped, all sod and vegetation of whatever sort found upon the area to be planted must be removed.

2. A coating of at least four to six inches of sand free from clay or the seeds of persistent weeds is desirable. The sand besides serving as a mulch for conserving the moisture of the muck or peaty soil below also serves an important function in affording a congenial rooting bed for the cuttings when dibbled in.

3. While flooding does not appear to be necessary, an abundant supply of moisture near the surface of the soil is at all times essential to the rapid growth of the young, as well as the established plant.

4. A perfect stand of plants should, if possible, be obtained the first year. Any attempt to economize in the preparation of the land or the setting of the cuttings which would in any way endanger the most perfect stand of plants will prove a false economy.

5. A planted area should at all times be kept free of weeds and grass. This is best done by pulling, as the use of the scuffle-hoe even, loosens and breaks the runners, and to that extent delays the time when the ground shall be fully occupied by the plants and weeds and grass held in check by them.

6. With us flooding for the purpose of protecting the plants from late spring frosts is unnecessary on account of the late blooming habit of the plant.

7. In quality, size and yield the fruit produced on the experimental plats vies well with that produced in the recognized cranberry areas of the country.

8. Thus far the Experimental plantations have been free from the ravages of insect pests and fungus diseases.

