rate of application depends on the age and growth condition of the trees. The application should be made about two weeks before growth starts in the spring. When a winter cover crop is used it will be best to apply acid phosphate at rate of 400 to 800 pounds, and sulphate of potash at rate of 100 to 200 pounds per acre, just before sowing time in the fall. This will be very beneficial to the winter cover crop, does not leach, and will be there when needed by the trees in the spring. Then you will only have to apply the commercial nitrogen in the spring, instead of the complete formula.

In a good crop year, some successful orchardists apply five to fifteen pounds of Sulphate of Ammonia per tree, after the nuts are set. This is in addition to 1,000 pounds to 1,500 pounds of complete commercial fertilizer per acre. All this is added even though the humus content shows better than one and three-fourths per cent, and leguminous cover crops used each year.

So that it will be seen, to be successful with pecans, plenty of humus, commercial fertilizer, and good cultivation is essential.

Unless the new terminal growth is from four to twelve inches, there is little chance of a real nut crop. So the cultural problem in the end is to produce a satisfactory terminal growth, on which the nuts are formed the following year.

One very successful orchardist makes it a rule to apply to each tree the number of pounds of commercial fertilizer to correspond with the square of its diameter. That is for a tree with a trunk ten inches in diameter, he would apply one hundred pounds of commercial fertilizer.

Here is an illustration of what good care will do with a pecan orchard. A man near the Georgia line conceived the idea that his ten year old one hundred twenty acre pecan orchard did not need the cultivation he had been giving it, so he quit all cultivation. One year after that he did get a fair crop, but that was probably due to the trees making the usual final effort to reproduce themselves before dying. The orchard had no care for five years, and pine saplings grew up in it. After five years a progressive orchardist bought this neglected orchard. The first winter he cut down the pine saplings and plowed it. That spring he fertilized it well and planted a leguminous cover crop, in rows, which he kept cultivated till about June 1st. The cover crop was disced under the last of August. This was repeated each year, and in addition, some use of Austrian winter peas was made, and about 1,000 pounds of commercial fertilizer per acre applied each spring. The results were as follows: The first year the orchard produced 1,200 pounds of pecans; the second year 25,000 pounds; the third year 52,000 pounds, and it has produced as high as 80,000 pounds. This orchard has produced about as consistently as any orchard in the South, since the new owner obtained it.

The trouble with most all of our orchards is the lack of care. You cannot expect to get anything out of the pecan orchard unless you put something in it.

BLUEBERRIES IN NORTHWEST FLORIDA

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We believe that the blueberry in Northwest Florida and other Gulf Coast regions offers possibilities sufficiently attractive to encourage the development of an important industry of this fruit. Notable progress has already been made as discussed before this Society in 1924, by Prof. Carl B. James, then Horticulturist, and now General Development Agent of the Louisville and Nashville Railroad Company. This most interesting article by Prof. James, which is found in the 1924 Proceedings of the Florida Horticultural Society, furnishes us a complete history of the blueberry in Northwest Florida. In my discussions I shall, therefore, frequently refer to the information furnished by Prof. James.

"The term blueberry does not, unfortunately, have as distinct a meaning in our Southland as it should. It, as well as the term huckleberry, is
here more or less indiscriminately applied to various members of at least two, possibly more, distinct botanical genera. The term blueberry might appropriately, as it is in some sections, be applied only to the various species and varieties of the one botanical genus *Vaccinium*, and the term huckleberry applied only to the various members of the genus *Gaylussacia*. For the purpose of distinction, but without giving full technical description, we may say that the fruit or berry in the *Gaylussacias* (huckleberries) has ten hard or bony seed, that are large relative to the amount of flesh or pulp; while in *Vaccinium* (blueberries) the seeds are much more numerous, very small relative to the amount of pulp and almost unnoticeable when eaten.

"In developing the blueberry industry in North Florida from suitable native plants, we are there concerned only with certain *Vacciniums*. We eliminate, because unsuitable, the deerberry or buckberry, the farkleberry or sparkleberry, and the *Gaylussacias* (huckleberries) which include the tangle or dangleberry. Some of the *Vacciniums* (blueberries) must also be disregarded as there are several species and varieties growing wild in that territory and unfortunately even then few from which selection for cultivation should be made as known in the different localities under different common names. Some of the names applied to these suitable varieties are: Huckleberry, high bush blueberry, swamp blueberry, June blueberry, rabbit-eye and Arab. This is further complicated by the fact that the same name may be applied to different forms in different localities, and also some of the collectors who might wish to have it appear that they have a monopoly on something superior have coined brand new names, as cluster-berry blueberry, etc."

It appears that there is sufficient acreage of the poor or unselective types of blueberries to supply, within the next few years, the demand for such quality. But the markets are undersupplied with desirable early types of blueberries properly graded and packed.

For commercial purposes further plantings of blueberries should be made of plants propagated from plants possessing the following desirable qualities:

1. The fruit should be not less than one-half inch in diameter.
2. Spherical form of the berry (the flattened form, however, is not objectionable.)
3. Should have a bluish bloom (not shiny black).
4. Earliness.
5. Should have very small inconspicuous seeds.
6. Distinct blueberry flavor (neither insipid or distinctly acid).
7. Prolific productions.
8. Fruit clusters accessible for quick picking.
9. Good shipper (does not wither or "go down" quickly).

Since it is desired that a blueberry should possess the above listed qualifications, it therefore follows that methods of propagation should be discussed. At the present time the more simple and practicable methods of propagation are of special importance to the average grower because there are insufficient reliable nurserymen offering standardized plants.

*Rooted Suckers*—This is the simplest method of propagation of the blueberry. These blueberries readily reproduce by stooling-out or forming rooted suckers from the underground stem or rhyzome. These new plants can be removed annually and planted out and later these transplanted plants will in turn reproduce more rooted suckers. Any careful grower can practice this method of propagation, and by the use of only a few of the desired plants in the beginning, can within a relatively few years reproduce a large number of the same kind of plants.

*Cuttings*. This berry is readily propagated by cuttings which are taken during the dormant season—from December to February. The cuttings are made from one-year wood cut about six to eight inches long. These cuttings should be planted four to six inches deep in clean sand. A cheap propagating box, in which the cuttings are to be planted, can be constructed of rough or finished boards. This frame or box should be four to six feet wide and of any desired length, and should be from eighteen inches to two feet high. Burlap is used for a cover to produce partial shade. This box, of course, is
for outside purpose. The soil within the frame is removed to a depth of about six inches and is refilled with clean sand. Such a propagation box, used by some of our growers in the coastal territory, has given practically as good results as more expensive frames or boxes covered with glass, cloth, etc., where rather exact control of both humidity and temperature is attempted.

An expert nurseryman or propagator could obtain successful results in using tender green wood cuttings by constructing suitable box to maintain optimum shading, ventilation, humidity and temperature conditions. This method, however, should not be attempted by the amateur, but left to the skillful propagator.

**Tubering.** This method of propagation consists of cutting the stems of the old plants into pieces about four inches long and planting these pieces horizontally in shallow furrows in the beds and covering with about four inches of sand and kept moist and shaded. These stem cuts are made and planted during the dormant period. After new shoots have sprung up, the roots will develop from their base.

**Stumping.** This is a method that is sometimes used. Plants are cut off at about the surface of the ground and earth and sand is mounded over the stump to a depth of about six inches. Shoots developing thereby produce roots, and during the following winter these rooted shoots are separated from the stumps and planted in nursery rows.

In propagating the blueberry it must be remembered that the plant is an acid loving type (seems to thrive best in a soil of p.H reading of five to six) and should be propagated and grown in the ideal acid sand or soil for best results.

Some of us have seen the blueberry industry of New Jersey, and most of us are familiar with the development of wonderful varieties for New Jersey's conditions by selection and hybridization. It was my good fortune this past season to see the Whitesbog blueberries at harvesting, and note the quality of the berries that are produced commercially in that section. It was especially interesting to see how carefully those berries are harvested, graded and packed. Each quart of fruit contains a label denoting the brand and grade and has a covering of transparent cellophane. Of all the different packs of fresh fruits that I have seen, I believe without a doubt this blueberry pack is the most attractive of them all. Further these New Jersey blueberry growers are handsomely compensated for such quality and pack for early in the 1930 season they netted from ninety cents to $1.00 per quart. I was informed that the season's average F. O. B. price per quart would be from fifty to sixty cents.

The above remarks relative to the blueberries of New Jersey, should convince one of the wisdom of making selections and propagating from those best individual blueberry plants of Northwest Florida. Along that line lies great possibilities for progressive growers and skilled plant propagators.

From now on, under a statute recently passed by Congress, a new variety of plant life may bring to its creator the same monetary rewards under similar process of law as have been reaped by the inventors of something new in the way of mechanical appliances. In other words, plants are patentable.

However, the discovery in order to merit a patent must be reproduced by means of cuttings, buds or methods other than seeds or tubers. Such fruits as strawberries, raspberries and blueberries etc., are patentable if new varieties are produced.

There are some people in Northwest Florida who think that the establishment of canneries for the canning of blueberries is now desirable. There are several important reasons why we believe this should not be done. Of course, some individuals by the use of small home outfits no doubt might have some degree of success in packing in glass fancy packs of jams and jellies for special trade direct to consumers and possibly a few hotels.

The State of Maine has an important blueberry canning industry which is located principally in the county of Washington. In this (one) county the blueberry industry amounts to about one million dollars annually. It was my privilege during the past August to make a trip to the blueberry section of Maine to get first hand information not only of the canning feature but also of cul-
tural methods, etc. I wish to state here that the blueberry of Maine is the low-bush type; in height ranging from six to eight or ten inches. Of the 1928 crop, 91.25 per cent were canned; 8.85 per cent frozen; and .90 per cent shipped fresh.

The prices that the Maine growers received for their berries delivered to the canneries were thirteen cents for 1929 high price crop and eight cents for 1930 low price crop. Therefore, it is seen that growers receive at the canneries prices ranging from $2.50 to $4.16 per bushel.

During recent years the blueberry packers of Maine received their highest prices for their 1929 pack, and their lowest prices for their 1930 pack. The majority of the fruit is packed in No. 10 cans, and the 1929 price for this pack was $12.00 per dozen while the 1930 price was around $8.00 per dozen. With these prices prevailing it is readily seen that the canning of blueberries in Northwest Florida is not attractive. Furthermore, we are informed that our present blueberries of the South cannot be packed in tin on account of comparatively high acid content.

As a matter of information a few additional remarks pertaining to the blueberry industry of Maine might be interesting. The topography of the area varies from moderately rolling to hilly. The soils on the higher elevations are generally a gravelly loam, and in the valleys and near the seacoast a sandy loam or clay. Blueberries are found principally on gravelly or sandy soils that are acid.

The average length of the growing season is from 125 to 155 days. The average date of last killing frost in the spring is from May 11 to May 18 and the first killing frost in the fall is from September 26 to October 11. The average annual precipitation is from thirty-eight to forty-five inches, with eighteen to twenty inches of rainfall during the growing season.

Blueberries are grown on four different classes of land: “Barrens,” “Field,” “Pasture,” and “Woodlands.” The blueberry lands are burned over once in each three years. This burning serves the purpose of pruning, and to some extent cultivation. This is very unique and it is thought by some people to be detrimental in the long run in that by continual burning, land that is now ideal blueberry soil might some day become unsuitable for profitable production.

The type or class of soil designated as “Field” gives the highest production, and the first crop after burning is the largest, the third the smallest. The yields, depending on conditions, run from a few bushels to one hundred bushels per acre. The average net cost of producing blueberries in Maine on all classes of land is approximately $2.50 per bushel.

The berries are not picked by hand but are raked or stripped as are cranberries. One man can strip from eight to ten bushels per day on good fields, and the pay for such work runs from seventy-five cents to one dollar per bushel.

A very serious blueberry pest in Maine is the blueberry maggot. Formerly these infested berries were separated in the canneries by use of mechanical equipment. A few years ago the United States Department of Agriculture established the Blueberry Insect Investigations Laboratory at Cherryfield, Maine. At this laboratory life history studies were made and control methods developed. I know of no economic pest more economically and satisfactorily controlled than is this pest by the use of the government's recommendations.

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FLORIDA STATE HORTICULTURAL SOCIETY

GROVE HEATING

Dr. A. F. Camp, Florida Agricultural Experiment Station, Gainesville

With winter coming on many grove owners are turning their thoughts again to the subject of grove heating either to save their crop of fruit or to protect their trees from actual damage. Unfortunately grove heating in Florida has made for itself rather a bad name but from observations covering many attempts at this practice I am forced to conclude that the most of the difficulty has been with the operator rather than with the practice. Too much work has been carelessly