FRUITS AND VEGETABLES ON THE GULF COAST.

Report of the Ocean Springs Branch Station.

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AGRICULTURAL COLLEGE, MISS,

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REPORT OF THE OCEAN SPRINGS BRANCH STATION.

INTRODUCTORY.

The Ocean Springs branch of the Mississippi Experiment Station was established in January, 1891, principally for the purpose of ascertaining, as definitely as might be possible, the kinds of fruits which could be grown to the best advantage on the Gulf Coast, what fertilizers are most effective, and what obstacles to his success the horticulturist would probably encounter. While the testing of fruits was made the main feature of the work, considerable attention has also been given to the growing of vegetables and, incidentally, to the cultivation of a few other crops such as are essential parts of an intelligent rotation.

This branch station has now been in operation five years, and while this report is, primarily, of work and observations on the experiment grounds, such facts and experiences as have been gained from the somewhat extensive plantings of fruit trees and market gardens which had been made in the immediate vicinity during the five to ten years immediately preceding the beginning of our work have been drawn upon freely in this endeavor to place the whole truth before the public.

Many of our results have been surprisingly successful, while others have been very disappointing, and the list of total failures is by no means brief. No attempt is made to give a detailed account of all the various tests and experiments which have been made, but rather to give the combined results secured, and so to present in a compact form something of the horticultural possibilities and limitations of the Gulf Coast region. For more readily understanding the behavior of the various plants which have been tested it is necessary to state something of the peculiar soil and climatic conditions of the region in which the work has been done.
The proximity of the Gulf of Mexico has, of course, a marked effect on the climate, giving milder winters and less intensely hot summers than in the interior of the State. The extreme minimum temperature observed for winter being 12 degrees, and the maximum for summer 102 degrees. Killing frosts are liable to occur at any time from the middle of November until the first of April. Cold snaps during the winter, sufficient to kill orange and young fig trees, occasionally occur, though they are usually of short duration, being followed by warm and open weather. The hardier garden vegetables, such as turnips, cabbage, lettuce, radishes, etc., grow well in the open ground all winter without injury from cold in ordinary seasons. It is not necessary to provide glass to cover hotbeds and cold frames for forcing early tomato, cucumber and other plants. There is enough warm and sunny weather to bring such plants forward well by using cloth covers for protection at night, though it is necessary to provide hay or some other extra covering for very cold nights.

The average rainfall is abundant, about 60 inches annually, but in its distribution the year can be divided into four well marked seasons; the fall and spring being dry, while mid-summer and mid-winter are wet. The spring drought is often so pronounced as to be a serious drawback to the gardener, while the over abundant rains in July frequently injure the ripening grapes, figs and peaches.

The coast soils are mostly poor and sandy, and will not produce crops without a liberal application of fertilizers. They usually contain a fair amount of vegetable matter which give them a good color and a mellow, loamy texture, but they are very deficient in potash and phosphoric acid. The application of both these substances, and especially the latter, is absolutely indispensable for the production of paying crops of any kind. Chemical analyses show these soils to be very deficient in both, but practical experience shows that phosphates are a much more necessary ingredient of a fertilizer than is potash. Fairly good crops can often be grown by the use of acid phosphate alone, but when potash has been used without the phosphate the result has never been satisfactory. Florida “soft phosphates” were used quite extensively in 1895, but apparently produced less effect than an equal value of acid phosphate. For most purposes a complete fertilizer should be
used, but it should always be rich in phosphoric acid. A mixture containing one part of kainit, two of cottonseed meal and three of acid phosphate is recommended for fruits and corn, with a somewhat larger proportion of meal or the addition of stable manure for vegetables.

Most of the coast lands are rather low and flat, so that the subject of adequate drainage for carrying off the heavy summer rainfall is a very important one. The land usually lies in a succession of gentle swales and low ridges so that it is nearly always possible to find an outlet for drains and ditches. It is only the ridge land that is regarded as being fit for cultivation. The swales, often called "savannahs," are kept wet by the seepage from the ridges, and so can be cultivated only after thorough ditching. Back from the coast the land rises gradually and the ridges become higher and better drained. The lands ten to fifteen miles from the gulf are usually much better adapted to farming, and especially to fruit growing, than are those within two or three miles of the coast. The ridge lands were all originally covered by a heavy growth of the long leaf pine, _Pinus palustris_. The savannahs are also often covered by a scattered and more or less stunted growth of pine, but in other cases they are simply open meadows with scarcely any tree growth. Both ridges and savannahs are covered with a carpet of grasses and other herbage, but there is almost no underbrush. Where the drainage water from the savannahs accumulates in sufficient quantity to cut a channel it soon becomes bordered by a tangled growth of broad-leaved evergreen and deciduous trees and shrubs. Such thicket are "bay-heads" or, if of considerable size, "swamps." On nearing tidewater these streams often have more fall and cut channels deep enough to thoroughly drain the adjacent bottom lands, and these drained areas are called "hammocks." They occur not only along the smaller streams, but frequently border the larger bayous and sometimes the shore of the gulf itself. The hammocks, like the swamps, are characterized by the tangled growth of evergreen and deciduous trees and shrubs in striking contrast to the adjoining open and grassy pine lands. The hammock soil has rather more natural fertility than that of the pine lands, and when fresh will produce crops with less fertilizer. It is light and warm, and matures crops earlier than the pine lands, and so is better adapted for vegetable growing, but it occurs only in limited areas.
All the common garden vegetables can be grown during some portion of the year with more or less success, and the family table need never be without fresh vegetables at any season. There are, however, numerous climatic difficulties and fungous enemies to be encountered, to which reference will be made in discussing the different crops.

With fruit the range is more limited. It is too far south for assured success with most northern varieties, and still the winters are too cold for safety with the sub-tropical kinds. There are enough, however, which are thoroughly at home here to give a continuous succession for the greater part of the year, and many more with which sufficient partial success can be expected to justify planting them in a small way for home use. It is interesting to note the behavior of many northern varieties when subjected to such unaccustomed climatic conditions. It would naturally be expected that the mild weather of mid-winter would tempt the northern strangers into unseasonably early growth and bloom, and that failure might result from that cause. The fact is quite the reverse of this. In February the LeConte pear, and the Peen To and Honey peaches are in full bloom, and the sub-tropical orange and fig frequently start into dangerously early growth, but the northern Bartlett pear, and the Alexander and Crawford peaches still stand perfectly dormant, apparently waiting for winter, and thinking the season to be an unusually long and mild fall. When they do finally start it is slowly and with a lack of vigor which tells of their uncongenial surroundings, though later in the season they may partially recover and make a fairly good growth. By the promptness with which growth starts in the spring it is possible to make a close guess as to what varities will be permanently successful.

INSECTS AND DISEASES.

Most of the insects and diseases found further north are common and destructive, the most notable exceptions being the Colorado potato beetle, the codlin moth, and the apple and pear scab, neither of which has been observed here. There are, however, several other plant enemies peculiar to this region which will be considered in detail in connection with the various crops. Cut-worms of various kinds are often exceedingly abundant and destructive. The ten-spotted Diabrotica, besides being a corn-root worm as a
larva, passes the winter in the adult form, and feeds voraciously on many kinds of vegetation and is often so abundant as to be a general nuisance. It is particularly fond of rose petals in early spring, and often injures young cucumber and melon plants. *Heterodera radicicola*, the nematode worm, causing root-knot or root-gall on many kinds of vegetables and fruit trees, is often a serious pest. Very few cultivated plants are known to be invariably exempt from its attacks, and no reliable remedy has been found. Grasses and fibrous rooted plants are usually less affected than are those with more fleshy roots. When ground is known to be infested it is probably best to turn it out or pasture it a few years before using it again for cultivated crops.

With soil and climatic conditions so different from those in other parts of the country, it is not surprising that results should vary widely from those secured elsewhere. As will be seen from the following pages the list of plants which have been tested, in both fruits and vegetables, is quite comprehensive.

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**FRUITS AND NUTS.**

**ALMONDS.**—Four varieties were planted, but all were complete failures. The trees were repeatedly defoliated by a leaf-spot disease; probably *Cylindrosporium*, and all the varieties tested, including the best California kinds, were equally worthless.

**APPLES.**—No apple trees were planted on the experiment grounds, but from the growth of those in the surrounding country it is evident that this is too far south for them to be at home. This is indicated by the slow and listless way in which they start in the spring. They grow slowly and without vigor, though they do not seem to be diseased, and some varieties fruit quite freely. A few native seedlings of considerable merit have been observed, and the testing of all varieties of southern origin to determine which are best adapted to the soil and climate is a promising field for further experiment. As stated before, the scab, (*Fusicladium*) so troublesome in the North, has not been observed. The leaf rust (*Raestelia*) is also absent, but the fruit is considerably damaged by the “bitter” or “summer” rot, (*Gloeospспорium*). Our present experience does not warrant the planting of apples for commercial purposes, but for home use they should be more widely planted.
APRICOTS.—Eight varieties have been planted, but with poor results. The ordinary European and Californian varieties have been complete failures. The trees lack vigor, and are short lived. The foliage is diseased, and the flower buds usually blight without opening, or if they do bloom they fail to set fruit. The recently introduced Japanese varieties are much more hardy. The trees seem quite healthy and vigorous, but they bloom so very early that the fruit buds are usually killed by spring frosts; and when they escape that danger the fruit is so much larger and more attractive to the curculio than either peaches or plums at the same season that it is quite uniformly wormy. For these reasons they cannot be recommended for general planting.

BANANAS.—Cultivated for ornament only. Even the most hardy varieties are usually killed to the ground each winter, and so do not fruit, as in this climate the stalks are biennial and do not fruit until the second year.

BLACKBERRIES.—Wild blackberries are abundant and some of them are very good. The Dewberries (Rubus trivialis) are usually considered more desirable than the high bush kinds. They ripen in April and bear much more abundantly than do the northern wild species. It would seem that the selection and cultivation of the better kinds among them offers an attractive field for profitable enterprise. The ordinary cultivated varieties of blackberries grow well when planted on soil which has been suitably enriched. A few wild plants producing fruit of a very superior quality have been removed from the woods to the experiment grounds, where they have borne two heavy crops, and have been entirely free from the rust. The red rust (Cecoma nitens) is seldom seen among the wild plants, though it develops abundantly on plants brought here from the North.

CHERRIES.—Cultivated cherries are almost unknown in this region, though the wild cherry (Prunus serotina) occurs frequently in the dry hammocks. Thirty-four varieties were planted on the experiment grounds in 1893. Some have died, none have borne fruit, and none give much promise of ultimate success. The sweet varieties seem to grow better than the Dukes and Morellos, but none of them can yet be recommended.

CHESTNUTS.—The dwarf chestnut or chinquepin (Castanea pumila) is a common shrub in the hammocks, but
neither the common American nor the Spanish promise to be successful. Trees of both species were planted in 1891, but very few are now living. The foliage is unhealthy, and large branches, or sometimes even the whole top of a tree dies suddenly, from no ascertainable cause. The Japanese varieties have not yet been tested.

CURRANTS.—An entire failure.

DEWBERRY.—See blackberry.

GOOSEBERRIES.—Also a failure.

GRAPES.—Grapes are more uniformly successful here than any other of the northern fruits. They grow freely on all kinds of soil; even, strange to say, where too wet for most other fruits. The crop is a sure one, but the yield averages less than in the northern grape regions. Some form of horizontal trellis similar to the "Munson," where the fruit hangs in the shade of the leaves, is greatly to be preferred, as the fruit is much less liable to injury than when exposed to the sun and dew. They are subject to all the more common diseases excepting the black rot (\textit{Physolospora}) which seldom or never occurs. Powdery mildew (\textit{Uncinula}) is troublesome only on the European varieties. Downy mildew (\textit{Plasmopara}) sometimes defoliates Delaware and Triumph late in the season, but has not been observed on other varieties. Anthracose and root-rot are the two most serious diseases of the vine, while the ripe rot or bitter rot (\textit{Melanconium}) does much the most damage to the fruit. This attacks the berries and the fruit stems just as they are beginning to ripen. The attack on the stems is the more serious as it makes them dry and brittle, causing the berries to drop off, or "shell" badly while on the way to market. It also develops rapidly on the berries during transit, and is doubtless responsible for so many shipments of southern grapes reaching the market in "bad order." Spraying with Bordeaux early in the season does not seem to prevent it. Clusters hanging in the shade are much less likely to be affected than are those exposed to the sun and dew, and it is for this reason that the horizontal trellis is so strongly recommended.

The slug, or saw-fly larva sometimes defoliates the vines early in the season, but it can be controlled readily by the use of Paris green. The leaf folder is a much more serious pest as it comes just when the fruit is ripening, when the use of arsenites is inadvisable. It does little harm to the present crop, but if abundant it greatly weak-
ens the vines for the following year. Hand picking of the infested leaves can be resorted to in the garden, but is hardly practicable for a large vineyard.

A careful selection of varieties is essential, as all are not equally successful. None of the European or vinifera type can be recommended. They may grow fairly well for a time, especially if trained against the side of a building, but they are much troubled with mildew and other diseases, and they start into growth in the spring so much earlier than the American varieties that they are often injured by frosts. Of the standard varieties of the Labrusca type, Champion, Delaware, Concord, Ives and Niagara can be recommended, while Moore's Early and Worden are sad failures. Among the hybrids, Black Eagle, Lindley and Wilder are quite promising. Herbemont is planted more extensively than any of the Aestivalis or of the riparia type, though like most of the late varieties it is often severely damaged by the bitter rot. Of course the Scuppernongs, or rotundifolia type are perfectly at home here. No other fruit, in the North or South, will begin to yield so much fruit with so little labor or expense, and withal such good fruit as do the Scuppernongs. Ripening as they do in August, when other fruits are scarce in the South, they are doubly welcome. The fact that the fruit does not grow in bunches, and that it fails from the stem when ripe, will prevent its being shipped to distant markets, but for nearby markets and for home use it deserves to be even more widely planted than at present. Thomas, a black variety equally hardy and productive, is larger than the ordinary Scuppernong, of different flavor, and is preferred by some. Flowers, another black kind, is poorer than the others in quality, but it is valuable for its lateness, as it will hang on the vines until late in September.

GUAVAS.—Of the different Guavas which have been planted the "Strawberry" or "Cattley" has succeeded fairly well, while all the others have proved too tender. It is killed down by exceptionally cold winters, but as it sprouts readily from the root the loss is only temporary. The fruit is pleasant flavored, and is a desirable addition to the home garden.

FIGS.—Next to the Scuppernong grape, no fruit is more generally cultivated here than the fig. Every old garden has a few fine old trees which never fail to bear heavy annual crops. For several years past the canning factories have bought all the figs they could get, and have
paid good prices for them. This has stimulated considerable planting of fig orchards which has quite uniformly resulted in complete failure. The plantings on the station grounds have been equally unsuccessful. Out of 160 trees representing nearly sixty varieties that have been planted at various times and from different sources, not a single tree is now in a satisfactory condition, and none of them have produced fruit. Many are entirely dead. Those which are still alive throw up feeble shoots each year and are killed to the ground during the following winter. A succession of hard winters and late spring frosts are probably responsible for a considerable part of these failures, as the trunk of a fig tree which is three years old or more becomes more resistant to the cold. Old trees are seldom injured by the hardest freezing of midwinter, and if a frost comes after growth starts in the spring it is the leaves and new shoots only that are injured. Others soon start, and as the fruit forms on the new growth the crop is not much injured, though it may be a little later in ripening. A frost after the leaves start kills a young tree to the ground. It may sprout again from the roots, but its vitality is greatly weakened, and two or three such shocks in successive years usually kills the tree entirely. Most of the older trees stand in dooryards, and dooryard conditions seem particularly favorably for figs. The shelter of buildings and fences gives needed protection from the cold when young, and the roots are not disturbed by the plow. The roots of the fig are very near the surface of the ground, and all cultivators agree that plowing among the trees after the first year is not advisable. Fig roots are often seriously injured by the root-gall nematode, and they are apparently less liable to this attack in the hard dooryard soil than in fields where vegetables have been cultivated. Whatever the cause, the fact remains that the old dooryard trees grow and flourish, while the young orchards, planted within the last six or eight years, have all failed.

The "Celeste" is the only variety in general cultivation. Several other kinds are occasionally seen, but are mostly known under names which are wholly local. It was intended to make the testing of figs a prominent feature of the station work, but the failure to preserve the trees through a succession of hard winters made this impossible.

KAKI.—See Persimmon.

LOQUAT. MEDLAR. JAPAN PLUM.—This interesting evergreen fruit tree is often seen in gardens. The
foliage is attractive, and the flowers which open late in the fall are very fragrant. The fruit ripens in February and March, when its mild subacid flavor is very refreshing and seems appropriate to the season. It is abundant in the New Orleans market, and is occasionally shipped north. The fruit, which is exposed all winter, is sometimes killed, but the tree is sufficiently hardy, and is recommended for all private gardens.

MULBERRIES.—Mulberries grow readily and bear regularly and abundantly, and although the crop is of no commercial value, it is one which is useful at home through a long season. Trees should be planted in the chicken yard and hog pasture, as they will furnish a large amount of food for these animals. In some cases a curious transformation of the fruit into a hard, granular, starchy mass has been observed. Often an entire tree is affected, while in other cases the trouble is confined to single branches. Locally, such trees are said to have "gone to seed," and it is claimed that when a tree is once affected it always continues to bear "seeds." No remedy has been found, and we are entirely unable to account for the trouble, and have never seen it mentioned in print.

NECTARINES.—Seedling nectarines are occasionally seen, but the fruit rots so badly that it is of very little value. Six of the best California varieties were planted on the station grounds, but all were complete failures.

OLIVES.—A few olive trees were planted at Ocean Springs a number of years ago by the late Mr. Maginnis, and they seemed so promising that he afterwards planted an orchard of several acres. This later planting never did well, as the trees grew slowly and unevenly, and finally all were killed by the severe cold of February, 1895.

Mr. Ar. Hopkins, of Biloxi, Miss., who has been engaged in the growing of olives for a number of years, writes us as follows: "The first olives which I planted were fifty trees received from Italy in 1886. These have made a wonderful growth, and have been heavily loaded with fruit, but the fruit has been small. The following year I planted the same number of trees which were received from France, but as they were much older and larger than the Italian, they made a much slower growth, though they have thrived fairly well, but have not fruited abundantly. The next year I planted 100 trees from California, at the same time that Mr. Maginnis planted his. The growth of these trees has been very vigorous and
bushy, and the fruit very large and fine. I planted my trees between orange trees; and the shade from them, together with the extra care which they received, were doubtless a benefit to the olives. From my experience I am confident that, with intelligent cultivation, the growing of olives can be made a profitable industry along the Gulf Coast. Were it not for a borer which attacks the trunks and larger branches the olive would have no serious enemies here. The severe cold of last spring, which completely destroyed my orange grove, did not affect them in the least, nor has the heat or drouth of our sandy coast lands worked any harm to this hardy tree.

ORANGES.—Oranges have been grown along the coast for many years. Occasional cold winters cut the trees to the ground, but they sprout from the roots and soon make bearing trees again. The winter of 1894–95 was much the most severe on record, and very few trees were left alive. This region is clearly not in the true orange belt, and the growing of them on a commercial scale should not be attempted, though for home use a few trees in sheltered locations will be a good investment. Eleven varieties have been planted on the station grounds, and the Satsuma, if budded low on the trifoliata stock, has been sufficiently hardy to escape serious damage. If the earth is mounded about the trunk in the fall, enough bearing wood can always be saved for renewing the top. When a crop is secured the coast orange is of very good quality, sweet seedlings comparing favorably with similar Florida fruit.

PEACHES.—Our experience with peaches on the coast soils has been more uncertain and contradictory than with any other fruit. The trees are usually very short lived, and are subject to many diseases, but occasional trees may be found twenty years old which are still thrifty and able to bear good crops. One large orchard planted near us grew fairly well for four or five years and then suddenly died without having ever produced a crop. In other cases trees have borne abundant crops in two years from planting. Of seventy-eight trees planted on the station grounds in 1891 there are now about a dozen in fairly good condition, another dozen which are quite sickly, and all the others have died.

Success or failure seems to depend largely on the local character of the soil. Only well drained land with a good yellow or red clay subsoil should be selected for planting. On wet land, or on land which has a white sandy subsoil,
failure is certain. The varieties, too, must be selected with great care, and it is only those of the Chinese Cling, of the Honey, and perhaps of the Spanish types that can be recommended. The native seedlings seem to be of the Spanish type, and some of them are of considerable value. The tree of the Peen To type is sufficiently vigorous, but it blooms in midwinter, and only in exceptional seasons does the fruit escape being killed by frost. The ordinary northern varieties, of the Alexander and Crawford types, on the contrary, do not bloom until April, long after danger from frost is past, but the trees lack vitality. This is especially true of the flower buds, many of which die without opening, and those which bloom seldom mature fruit.

The peach borer is very abundant and destructive, and the ordinarily recommended remedies seem to be entirely inadequate for its control. The curculio is also very abundant, but perhaps no more so than in many other peach growing sections. In soils infested with the root-gall nematode peaches suffer severely, seeming to be more seriously injured by this worm than any other fruit, except perhaps the fig. Many trees have been observed affected by what some writers have called "crown gall." This is a wart-like growth, sometimes as large as a goose egg, occurring on the larger roots, on the crown, or on the trunk above the ground. Its cause has not been determined. It interferes with the nutrition of the tree, and in extreme cases kills it outright. Trees are often defoliated after midsummer by the leaf rust (Puccinia pruna-spinosa) and another fungus, Cercosporella Persica, forming a white, mould-like growth on the leaves, often contributes to the same result. Gummosis, an obscure disease in which blisters filled with gum form under the bark on the trunk and large branches, is quite common and very destructive. Its cause is not well understood, but it seems to be connected with a general physiological disturbance of the tree.

Notwithstanding this formidable list of diseases and difficulties some fine peaches have been grown on the coast. When first planted the trees grow very rapidly, and they come into bearing very early. They should certainly be planted for family use, and perhaps in a limited way for market, but always with the full understanding that they will probably be short lived, and that sudden failure is liable at any time.

PEARS.—Pears have been tested somewhat largely, forty-two varieties having been planted, including types of
the American, European and Oriental sorts. The northern and European varieties are not well suited to this climate, as they bloom late, and in various ways show that they are out of their latitude. It is still an open question whether any of them will prove permanently successful, and they should be planted only in an experimental way. The Oriental varieties, on the contrary, are perfectly at home. They grow freely and bear abundantly and regularly. So far there has been no trouble from either scab (Fusicladium), leaf-blight (Entomospori), or the codlin moth. Up to the spring of 1894 the same could have been said of the blight, but in that season the form known as "blossom blight" suddenly appeared in the LeContes in many scattered localities, and badly damaged bearing orchards. It appeared again in 1895, though less virulently, and promises to become a permanent menace to the pear industry. The long blooming period at the South gives this dreaded disease a very serious advantage, as Waite's careful investigations for the U. S. Department of Agriculture have shown us that the germs are carried to the flowers by bees and other insects, where they find in the nectar a culture medium exactly suited to their rapid growth and multiplication. At the North, where all varieties bloom at practically the same time and are out of bloom in a week or ten days, there is not time for such serious damage to be done. On the coast, with a succession of varieties, they will be blooming during nearly or quite two months, and the chances for the spread of the infection are much greater.

Before the advent of the blight the difficulty was not in growing the pears, but in finding a market for them. This difficulty is not likely to increase. The LeConte and Keiffer, while not first-class in quality are, when properly handled, really much better than they have been given credit for, and they are rapidly gaining a recognized place in the markets of the country. The rapid spread of the blight through the whole South has served to discourage planting, and the supply of the fruit is not likely to increase in the near future. Notwithstanding the danger from blight the Oriental pears offer one of the best fields for commercial fruit growing.

PECANS.—There seems to be no drawback to the profitable culture of this fine nut except the rather long time required to bring a grove into bearing. The trees are healthy and long-lived, and produce abundantly when of sufficient age. Some of the finest large "paper-shell" vari-
eties originated in this immediate locality and there is considerable interest in propagating them. Unfortunately these fine varieties do not reproduce themselves from the seed with certainty, and great difficulty has been experienced in getting root grafts to grow. It has recently been found possible to successfully top-work trees, even of considerable size, by summer budding, and we have in this the best and cheapest way for establishing groves of named varieties. The trees can be transplanted when young with no more loss than with other orchard trees. Some growers prefer to plant the nuts where the tree is to grow, claiming that such trees are longer lived and less liable to injury by storms than are transplanted trees. We have no data for determining how much, if any, advantage there may be in that method. Lots of seedlings always vary greatly in size, and by planting in nursery rows and selecting those trees of even grade for the permanent planting, the grove will be more uniform in growth than where nuts are planted. The continued planting of pecans is heartily recommended. The ordinary distance for planting, forty or fifty feet apart each way, is so great that while the trees are young they will interfere but little with the use of the land for other purposes.

PERSIMMONS.—The native persimmon is common, but of no special value except in the hog pasture. The Japanese varieties, of which fourteen have been planted, may become a commercial fruit of considerable importance. The markets have been slow to recognize them, but their fine appearance and their really very good quality is gradually winning for them a place. Many of our trees came into bearing two years after planting, and have been exceedingly productive. An excessive dropping or shedding of the fruit sometimes occurs in midsummer, especially in very wet seasons. As the trees begin to grow early in the spring the crop is sometimes injured by frost. The trees are usually perfectly healthy, but in a few cases an obscure disease somewhat resembling pear blight has been observed. On the question of varieties it is still impossible to speak with much assurance. The varieties which have been planted on the station grounds have acted quite differently in different seasons, but probably Among and Tani-Nashi have given the best general results. On the whole, it is a promising fruit.

PLUMS.—Nearly all of what has been said in regard to peaches will apply equally well to plums. When young
the trees, especially of the Japanese varieties, grow beautifully and seem to promise the most satisfactory results. Occasionally this promise is fulfilled, but in most cases the trees become diseased and die without having borne a profitable crop. Of two trees each of twenty-seven varieties planted on the station grounds in 1891 only seven are now living (February 1896), and not more than six have ever borne a good crop. Marianna trees stand the climate better than any others tested, and a number of fine old specimens have been observed, but for some reason they are not fruitful. They bloom abundantly, the fruit sets and grows to the size of a small cherry, when it almost invariably drops off without any known cause.

POMEGRANATES.—This fruit is common, but is usually grown for ornament rather than for profit. Like the other subtropicals, it is occasionally injured by a severe winter or a late spring frost, but the tree seems entirely healthy, and the fruit may yet win itself a place in the markets.

QUINCES.—The northern varieties are seldom seen here, and give no promise of usefulness. The Chinese quince grows readily. The fruit is large and coarse, but it has merit for jellies and preserves, and should be included in the plantings for home and local use. Like other Pomaceous fruits it is sometimes injured by pear blight.

RASPBERRIES.—These, especially the red varieties, can be grown with moderate success by heavy mulching and manuring, but plantings are short lived and seldom bear enough to make them profitable.

STRAWBERRIES.—Quite successful and easily grown, but from this soil only the firmest varieties will stand shipment. To be most successful, plants should be set in August or September, though they can be planted at any time up to Christmas, and if well manured will make a fair crop in the spring. The fruit often begins to ripen in February, and the plants continue to bear until June. With so long a fruiting season, of course the pick is never so great at any one time as in the North, but the total yield is often quite large. Among the varieties which have given the best results are Alabama, Cloud Seedling and Neuman. Bessie, Big Bob, Michel and Wilson are preferred by some. Crescent and Sharpless grow fairly well, but the fruit is too soft even for home use. Many other popular northern varieties are entire failures.

WALNUTS.—Six varieties of the English walnut were
planted on the station grounds, but they did not thrive and all are now dead. The Japan walnut (*Juglans Sieboldiana*) is more promising, as the trees are still living and have made a fairly good growth, though they do not seem very vigorous, and may fail before reaching maturity.

**VEGETABLES.**

Nearly all of the common garden vegetables have been grown with greater or less success, and there is no reason why an abundant supply for home use should not be had throughout the entire year. The great distance from the principal market centers, with the consequent high freight charges and long time in transit, together with the large amounts of fertilizer required, are points which should be carefully considered in planting commercially. On the other hand, the cheapness of the lands and the mild climate which enables the truck farmer to grow two, or even three crops from the same land during the year, are compensating advantages which should not be lost to sight. On the whole, however, it must be admitted that the prices obtained during the last few years have not been sufficient to encourage increased plantings.

Among those crops to which we have given greatest attention have been the following:

**ASPARAGUS.**—This is very seldom seen, though we have secured good cuttings in two years from the seed. The yields secured have been smaller than at the North, but it should be more generally planted,

**BEANS.**—Nearly all kinds which we have planted have done well. String beans for early shipment are one of the staple market crops, and butter beans are planted largely for the local market, as that is one of the few crops which continues to yield during the late summer. The small or Sewee varieties have been more prolific than the large Limas. We have found the Red Kidney a valuable crop, as it grows easily, requires but little fertilizer, yields well, and the dry beans find a ready local market. Unless planted early the crop will not mature before the summer rains, when it will be hard to cure.

**BEETS.**—We have been successful with beets only when planting very early, and find that they need very heavy manuring.

**CABBAGE.**—We have grown heads in the late fall from seed sowed in shaded beds in August. Seed for the
spring crop is sown in November in sheltered beds or canvas covered cold-frames, and the plants are set in the field in January. Late spring cabbage have rarely been successful on account of the worms. We have done well with cauliflowers occasionally, but here they are much more difficult to grow than cabbage.

CARROTS.—Have been grown readily in early spring, but have had very little shipping value.

CORN.—Sweet corn grows well early in the season, and we have made good crops from successive plantings made from February 1 to May 1. Later in the season it has not succeeded so well, being often greatly injured by the boll worm. Singularly enough it is seldom planted, the ordinary field varieties being grown for table use.

COW PEA.—We have found this the most useful legume which we could grow for use in green manuring, and it is also used largely as a garden vegetable as well as for forage. It is one of the most important of southern agricultural plants, and its increased use cannot be too strongly urged.

CRESS.—Watercress has grown very readily, and when once planted in a spring branch or other moist place it has cared for itself without further attention.

CUCUMBER.—This is a standard crop for northern shipments. We have succeeded best by planting seed in dirt bands under canvas-covered cold frames about the middle of February. They have then been ready to go to the field by March 20, which is as early as is safe in ordinary seasons. For a later crop seed may be planted in the open ground from March 10 to 15. It is well to replant the same hills a week later in case the first plantings should be caught by a frost. We find it best to plant not more than two or three feet apart in the rows, so that the vines will cover the ground quickly, though of course the soil must be made very rich for such close planting. The striped beetle, so well known as an enemy of the cucumber, is often abundant, though it usually does but little harm as it does not appear until about the middle of April when the vines should have covered the ground. If very abundant it injures the foliage sufficiently to shorten the yield.

A small leaf-hopper sometimes causes a similar injury, and the spotted Diabrotica is often a destructive pest in the seed beds and when the plants first come up in the field. One season a large field was badly damaged by doves. Before they were detected the birds went along the rows
and ate off the seed-leaves just as they came through the ground. Cucumbers are a heavy crop to handle, and when prices are low freight charges consume the profits.

EGG PLANT.—This plant is subject to a blight which causes the entire plant to suddenly wither and die. The blight is probably identical with the tomato blight, which will be discussed later. When free from this disease, the plants are thrifty and prolific.

KOHL-RABI.—Like all vegetables belonging to the cabbage and turnip family, this grows readily during the cooler part of the year. Here it grows as easily as do turnips, and is much more delicate in flavor. It is not as widely grown as it deserves.

LETTUCE.—This crop has grown readily during the fall, winter and spring. When thoroughly enriched, this light sandy soil suits it admirably, and fine heads can be grown in the open air.

MELONS—MUSK.—We have found the requirements for muskmelons and cantaloupes much the same as for cucumbers, and they need the same general treatment. If the crop ripens during rainy weather, which is often the case, it is liable to serious damage from cracking and rot. The melons are often bored into and ruined by the boll worm, and the varieties with a smooth skin are badly injured by sunburn, while the heavily netted varieties escape this injury.

MELONS—WATER.—This soil and climate produce a very fine quality of watermelons and they are quite extensively grown. Unfortunately they are subject to a serious disease known as the "wilt" or "blight." It is usually not observed until the vines have run so as to begin to cover the ground, when suddenly the leaves as a whole, or perhaps at first only those on a single branch, will be seen to wilt and become limp. Vines thus attacked soon die, and whole fields of promising vines are sometimes destroyed by this blight in a very few days. When the disease once appears on a field it is useless to plant it in melons for a number of years, as they will surely die. How long the infection remains in the soil has not been determined. No remedy has been found, and in order to avoid the disease it is necessary to plant on fresh land each year. Even this does not always insure success, as the melons occasionally blight on new land which has never before been in cultivation. In his preliminary report on Southern Tomato Blight, Dr. Halsted suggested that this melon blight might
be the same as the blight affecting tomatoes. Later experiments undertaken at this place to test the matter did not support this view, and recent investigations by Dr. E. F. Smith of the U. S. Department of Agriculture, show conclusively that there is no connection between the two diseases.

MUSTARD.—Like the other Cruciferae, it has grown finely during the cooler months.

OKRA.—A standard crop here, and one of the few which continue in season during August and September. It is usually entirely free from disease, but is occasionally defoliated by a leaf-blight (*Cercospora Hibisci*). ONIONS.—We have grown good crops in the spring from seed sowed in the fall, and no special diseases have been observed.

PEANUTS.—All varieties have grown very well, but the larger running kinds often fail to fill well and make too many pops. The small, erect-growing Spanish nut does much better, and is a doubly valuable crop, as the tops make an excellent quality of hay, while hogs can be turned into the field to harvest and fatten on the nuts. Like other leguminous plants, this crop acts as a nitrogen gatherer, and so adds to the fertility of the soil where it is grown.

PEPPERS.—All varieties have grown readily and fruited abundantly. Plants are sometimes killed by tomato blight, but seem more resistant than either egg-plants or tomatoes.

POTATOES.—Irish potatoes have usually done well when planted early for a spring crop, and they are quite largely grown in this section for the northern markets. As previously mentioned, the Colorado potato beetle is unknown here, and the crop is not troubled by other insects. No trouble from scab need be anticipated when clean seed is used. The Macrosporium disease occurs, but is seldom troublesome, while the dreaded northern potato blight, *Phytophthora infestans*, is wholly unknown. We have, however, a southern potato blight which is often very destructive. This is a bacterial disease very similar to, if not identical with the tomato blight. It manifests itself first by the sudden wilting and dying of the tops. This usually occurs after the new potatoes are somewhat forward, and sometimes after they are nearly full grown. If dug at once

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these may be sound and fit for use, but the disease soon extends down the dying stem and causes them to decay. If the potatoes from a diseased hill are cut open a brown line can often be traced under the skin, showing that the disease has reached them, though they may appear perfectly sound externally. Such potatoes, when mixed with others in the barrel, will rot while on the way to market, and so form centers of infection which may destroy the value of the whole shipment, and it is probable that the presence of this disease explains the poor keeping qualities of many shipments. No remedy for the disease is known, and the only preventive is planting on uninfected land. It is another cause which enforces crop rotation. Seed from the spring crop is often saved and planted in August, for a fall crop. For this fall crop it is necessary to sprout the potatoes before planting, and to plant whole potatoes. The potatoes from this second crop have been quite free from disease, and have kept well through the winter.

PUMPKINS.—These have not succeeded as well as in the North.

RADISHES.—These have been grown in the open ground without trouble from September to May.

RAPE.—Our experience with this plant has been disappointing. The related Crucifers all grow so readily that it was planted with great confidence, but has never been successful.

RHUBARB.—A complete failure. Several plantings have been made, but the plants have never survived the first summer.

RUTABAGAS.—These have been very successful. As they can be planted from August to January they are valuable for winter forage.

SPINACH.—Hard to get a stand, and seldom fully successful.

SQUASH.—Summer squashes have been grown quite successfully. When started in dirt bands, under canvas as described for cucumbers, they grow readily, and are one of the valuable crops for northern shipment.

TOMATOES.—Tomatoes have received more attention than has any other vegetable. A very fine early crop can sometimes be grown and when successful is very profitable. There are, however, three quite serious enemies to the crop. The boll-worm is everywhere recognized as a tomato pest, and here it causes very serious losses in some seasons. Black rot, or "blossom-end rot," is a widely known disease
that also gives great trouble. The southern tomato blight is, however, more to be dreaded than either of the others, as it kills the plants very quickly just before the fruit begins to ripen, and when the soil is once infected it becomes impossible to grow tomatoes on it the following season. How long the infection may live in the soil has not yet been determined.

This disease was first observed at Crystal Springs in Copiah county eight or nine years ago. Its ravages there and at other points where it had been observed in the state were so severe that in 1891 the Station commissioned Dr. B. D. Halsted, of the New Jersey Station, to visit the infested localities and make a special study of the disease. His report forms Bulletin No. 19, of this Station. He determined the bacterial nature of the disease, and first suggested its probable identity with the similar disease of egg plants and potatoes. Field experiments suggested by Dr. Halsted for the prevention of the disease were carried on by the writer during four years at this branch station, and the results obtained up to that time were published in the Sixth Annual Report of the Station, in 1893. While the experiments seem to indicate some benefit from the use of lime, kainit, and Bordeaux mixture, they cannot be considered as conclusive, and the only safe preventive lies in a careful crop rotation. The disease had not been reported outside of Mississippi until the summer of 1895, when Dr. Erwin F. Smith of the U. S. Department of Agriculture found it near Charleston, S. C. Failure of the tomato crop in the neighborhood of Mobile, Ala., is undoubtedly due to this disease, and it will probably be found in many other localities. The tomato blight found in Florida by Prof. Rolfs of the Florida Station is an entirely distinct disease, which is not bacterial in its origin.

TURNIPS.—This crop has been planted during each month from August to March, and with good returns. With heavy manuring both turnips and rutabagas give large yields, and they can be grown profitably for stock feed since they occupy the ground only during the winter.

YAMS.—Sweet potatoes or yams are, perhaps, the most important vegetable crop for the Coast country. They are propagated in various ways. Sometimes the potatoes are cut and the pieces planted in hills as are Irish potatoes, and when planted in that manner the pieces are called "mother potatoes." It is more common to bed the potatoes and then draw the sprouts for planting. In either
case only enough to produce a supply of vines are planted in the spring; and these vines are cut and planted for the main crop during the rains of midsummer. Vine cuttings planted as late as August 10 have sometimes made a fair yield, but it is better to plant from the middle of June to the middle of July. A large number of varieties are grown here, but nearly all are known under local names, almost every grower having his special favorite. The varieties most esteemed belong mostly to the cut-leafed or yam type, though recently the "Dooley," a variety resembling the pumpkin yam, but having entire leaves, has become quite popular. Sweet potatoes require but little fertilizer, but they have succeeded best on rather new land. It is the most profitable crop to plant on raw and freshly broken sod.

EXPERIMENTS IN BULB GROWING.

Nurserymen and florists import annually large quantities of Dutch and other foreign flower bulbs. The possibility of supplying this demand with southern grown bulbs has recently attracted some attention, the North Carolina Station in particular having done considerable work in this line which has been quite successful. In order to test the possibilities of the Gulf Coast for this purpose, in 1892 Henry A. Dreer, of Philadelphia, kindly sent us several thousand bulbs, including many varieties of hyacinths, narcissus, tulips, callas, etc. The cultivation of these bulbs has been carried on quite extensively during the last three years, and the results seem to be quite conclusive. All varieties of narcissus amaryllis, crinum and gladiolus can be grown easily and successfully, while tulips, hyacinths and callas will be disappointing.

FORAGE PLANTS.

Numerous tests of forage plants have been made here to determine the values of the different species for the Gulf Coast. Among the true grasses which have been tested here have been Timothy, Kentucky blue grass, orchard grass, Italian ryegrass, tall meadow oat grass, redtop, rescue grass, and Texas blue grass. All except the last three were complete failures. Redtop alone among the common northern grasses stands the long summer well,
and makes a green sod through the winter. It will probably prove a valuable grass for winter pasture, but does not grow tall enough to have much value for hay. Occasional plants of rescue grass make a good winter growth, but we have never been able to secure a full and even stand over large areas. Texas blue grass succeeds fairly well if the soil is rich, but otherwise it is disappointing. It does not come well from the seed, and propagation from the roots is tedious work. It is doubtful if any of these grasses are equal to the native "carpet grass" (Paspalum platycaule) as a winter pasture, and they certainly do not compare with it for summer grazing. It is hard to overestimate the value of the carpet grass for these light sandy lands. It seldom grows tall enough for hay, but no other grass, except Bermuda, makes so dense a sod on these lands, or bears trampling and grazing so well. Unlike Bermuda, it is green all winter. It is very nutritious, all kinds of stock are fond of it, and it is an ideal pasture grass. It "comes in" spontaneously wherever the land is heavily and continuously pastured.

Watergrass (Paspalum dilatatum) is another very valuable native which is also green through the whole year. It grows more in bunches, and does not make as dense a sod as the carpet grass, but on moist, rich land it grows tall enough to make a heavy crop of hay. Unfortunately it does not seed well, and so multiplies slowly. Bermuda of course grows well and makes the best of pasturage through the summer, and on rich land it makes a good yield of very fine hay. Its two objections are, that it dies nearly to the ground in winter, and that it is hard to eradicate when once established. Crabgrass (Panicum sanguinale) and bullgrass (Paspalum purpurascens) are two valuable native grasses which should not be overlooked. They are both annuals which appear spontaneously in the fields after ordinary crops are laid by and, with the Mexican clover (Richardsonia scabra), they furnish the bulk of the hay made on the coast. They all make very good feed, though the crabgrass is most salable on account of its lighter color.

Among the legumes, cow peas, Spanish peanuts, and beggar-weed (Desmodium molle) can be strongly recommended. The latter is seldom seen, but it grows very easily, and yields a much greater weight of forage than either of the others. It should be planted more widely. Lespedeza succeeds fairly well, though seldom large enough to cut for hay. It has made its appearance here within a very few
years, but is spreading rapidly, and has gained a good hold in many places.

Many other common leguminous forage plants have been planted repeatedly, but none of them can be recommended. Those which have been tested include red and white clovers, crimson clover, burr clover, spring vetch \((Vicia sativa)\), hairy vetch \((Vicia villosa)\), alfalfa, soja beans, seradilla, and others.

CONCLUSIONS.

While every one should be encouraged to grow an abundant supply of fruits and vegetables for home use, and as a side crop for the local markets, it seems unwise to advise the general farmer to engage hastily in the trucking business as his sole means of support. The liability to loss from the uncertain climate and from the various plant diseases mentioned on previous pages is so great, the fluctuations of the markets are so wide, and the high freights and heavy fertilizer bills are so certain that the growing of hogs, sheep or cattle offers a more safe and sure return for labor. Some few special crops for northern shipment may well form a part of an intelligent rotation, but in the long run the farmer who makes his fertilizers at home, and improves his lands by keeping any well bred and well cared for line of live stock, will come out ahead of the one who grows only sale crops, the profits of which must go largely to the railroads and fertilizer factories.

We are fully aware that this Report is not such as will stimulate the immediate planting of large orchards or extensive market gardens, but we are sure that the work upon which it is based has been carefully and thoroughly done, and that the facts and conditions mentioned are those which will probably confront every fruit and vegetable grower in that region. The Station was established for the purpose of ascertaining facts, and we have given the facts as we have found them.