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COUNTY MAP OF STATE OF FLORIDA.

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THE CITRUS GROVE, ITS LOCATION AND CULTIVATION.

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CITRUS CULTURE.

Choosing a Location.

The character of Florida soils is variable to a considerable extent. Even in the same vicinity various kinds of soils may occur. These vary from a clay to loamy, sandy, and marly soils. Some of them, also, are muck soils.

Clay Soil is one of the best for citrus-growing when it is found in a warm region. Less fertilizer is required and the trees are productive, bearing an unusually fine quality of fruit if the soil is properly handled.

Loaming Soil.—This is the character of the soil that is most largely employed for citrus-growing and with best results. Elsewhere this soil might be referred to as sandy loam. It contains a considerable admixture of clay and organic matter, with a large body of sand.

Sandy Soil, or sandy land as it is often called, is usually free from a perceptible admixture of either vegetable matter or clay. For the most part it tends to be lacking in water and fertilizer-holding power. When it is almost pure sand it appears white, and is usually considered an unfavorable soil.

Marly Soils occur in some sections. After a considerable amount of humus has been worked into the stiff

marl, they make good soils for citrus trees. In their original state, the marly soils are apt to produce an indifferent growth in the young trees, usually causing them to suffer more or less from dieback, scale insects, and other such disorders. This condition, however. passes off as the soil becomes more thoroughly tilled and has more vegetable matter incorporated in it.

Muck Soils are not the ideal soils upon which to plant citrus trees, since they are inclined to be sour, to produce an exuberant growth, and for a number of years to give rough and imperfect fruit. After muck lands have been cultivated for a number of years and brought into a thorough state of tilth, they produce excellent crops of citrus fruits, unless the mucks remain raw in form and contain a considerable amount of humic acid.

The Natural Growth As An Index.

Hammock.—It is in our native hammocks that the wild citrus groves occur. In some regions thousands of trees have been transplanted from these old native groves to higher lands. In other places the hammocks were cleaned up, leaving the orange seedlings standing, to be budded over to the better varieties. These wild trees were always found to be the sour orange. At the present time the hammock lands are regarded as the ideal ones for citrus culture. The great cost necessary to clear these up thoroughly has in many cases deterred people from making use of them.

Rolling Pine.—The higher pine lands, more or less rolling, upon which long leaf pine trees are growing, give us some of the best citrus lands we have in the State. These lands are easily cleared, and quickly brought into service for setting out to citrus trees. They are usually sufficiently drained naturally to permit the citrus groves to grow off promptly and produce a lot of fruit. They are less desirable than the hammocks, on account of re-

quiring a larger amount of fertilizer to bring the trees into bearing. After years of cropping, however, they will require little or no more fertilizer than the adjacent hammocks.

Cabbage Palmetto Hammock.—These hammocks differ from the hammocks proper in that they are usually more or less covered with water for a part of the year. The cabbage palmetto is the predominating tree. Wherever the land is high enough above the adjacent water, these lands may be drained and brought into service for citrus culture. When properly handled, they make among our best citrus groves.

Shell Hammock.—These differ from the other forms of hammock in that the soil is composed, to a greater or less degree, of shell. The trees usually grow off promptly and make a good showing, but sooner or later are apt to be affected severely with dieback; and while in many cases most excellent fruit is raised on shell hammocks they require a special and careful treatment. This character of land may safely be used by those who are expert in handling citrus trees.

Drained Lands.—Lake beds and other lands, sometimes called *prairie,* that are high enough to permit of thorough drainage, have been used to a considerable extent for planting to citrus. In these lands it is purely a question as to whether they are sufficiently high to permit of thorough drainage during the rainy portion of the year.

Pine Land, With Oak Undergrowth.—Some of the pine land, frequently called second-grade pine land, especially that which has a considerable undergrowth of scrub oaks, must be looked upon with some suspicion. Where clay is found within two or three feet from the surface, this character of soil can be easily employed for locating a citrus grove, but where the sand is very deep it will be preferable to choose a location elsewhere.

Flatwoods.—This character of land is usually level and more or less covered with water during the rainy season.

As a rule, a hardpan occurs from a few inches to a few feet below the surface. This prevents rapid and thorough drainage. Saw palmettoes are usually absent or scattered on this character of land. The predominating undergrowth is gallberry. By hardpan, we should understand a more or less impervious stratum occuring in the soil at a depth of a few inches or a few feet. It obstructs the passage of water downward, and also obstructs the downward progress of the roots, causing the soil to become water-logged during the rainy period, and probably very dry during a period of drought. This hardpan may be made up of various matters, either calcareous, siliceous or ferruginous. The cementing material usually breaks up and lets the sand fall apart when exposed to the air. If the hardpan is of a ferruginous nature, it is more or less poisonous to citrus trees. Various methods have been adopted for bringing into cultivation land that has a hardpan under it. Sometimes this hardpan has been broken through by means of plowing. In such cases the hardpan was near the surface and in a thin layer. In other cases, the surface soil has been mounded up so as to put the trees on ridges. In a few cases the hardpan has been broken by discharging dynamite under the trees. Iron salts as they normally occur in the soil have a yellowship or reddish color. Where these colors occur, the darker colored iron hardpans are not likely to be present, consequently it is sometimes concluded that a reddish or yellow soil indicates one especially favorable for agricultural purposes. These flatwoods lands, when thoroughly and deeply drained and the hardpans broken, make a fair place for producing citrus fruit.

Spruce-Pine Land.—The spruce-pine land, as well as the scrub-oak land, should not be employed for citrus-growing at the present time. Splendid citrus orchards occur on lands of this kind, but they have been brought out by experts and at the cost of much more than would have been necessary on lands better adapted for citrus-

growing. In addition to this, these lands produce trees that are subject to many disorders.

Site of the Grove.

Immediately upon deciding that one wishes to plant a grove, he should select the best site that can be produced. A great many questions arise in determining where a grove shall be located. A few of these are discussed below.

Distance From Transportation Line.—The ultimate object being the selling of fruit at a remunerative figure, it becomes necessary to locate a grove within a reasonable distance of some line of railroad or water transportation. The distance which it will be profitable to transport fruit by wagon will depend largely upon the condition of the roads.

Another determining factor in the matter is the cost of the land. A grove of moderate-sized trees, heavily loaded, should produce a thousand boxes of oranges to the acre. Allowing fifty boxes to a load, this would require twenty trips to the transportation station. If a grove were located three miles away from the station, it would probably take one man with a two-horse team six days to haul this fruit. If located one-half that distance, it would require only three or four days. Allowing about $4 a day for this work, the hauling of the fruit from the more distant grove would increase the cost about $8 per acre, which amount must be charged as an annual tax. from this the intending purchaser can readily calculate how much more be can afford to pay proportionately for land in close proximity to the railroad station.

Frost Protection.—There are no parts of Florida that are entirely free from occasional frosts, and in some parts of the State freezing weather may be expected to occur during every winter. There are a few isolated places,

however, that are so favorably located that freezing weather is of rare occurrence.

Under ordinary circumstances, a drop in temperature to 28 degrees and a continuation of this for several hours will not freeze citrus fruit. If, however, the drop goes lower, say to about 26 or 25 degrees, serious damage is apt to result, especially if it is long continued. A drop in temperature to 24 degrees is not likely to prove seriously damaging to trees unless it is of continued duration. Trees in a thoroughly dormant condition will pass through a temperature of 18 degrees without the loss of much wood, but, as a rule, a considerable amount of foliage is lost at that temperature. This, however, varies with different varieties and with the conditions of the tree and the duration of the cold. Even if it does go to freezing, a sudden drop in the temperature and a continuation of it for a number of days proves rather disadvantageous to the health of the citrus grove. It is, therefore, very desirable to have some form of protection against cold.

Water Protection.—Water protection proves to be one of the best shelters against occasional cold days in winter. It has been found that regions located in large bodies of water, or with a northern, eastern and western protection of water, are much less subject to drops in temperature than those that are exposed. Quite a number of such places may be found as far north as 29 degrees 45 minutes of latitude. Even north of this region some fine groves occur that have been protected by artificial means. Farther south, at about the 28th parallel of latitude, a number of locations have been found where water has protected the trees, and in some cases even the fruit, against the most severe cold that we have had.

Hammock Protection.—Quite a number of citrus growers in the State have found that hammock protection is quite as feasible as water protection. By locating in a large hammock and securing the surrounding lands, citrus growers have cut small tracts in the hammock varying

from five to ten acres in extent and planted these in citrus trees, leaving these small groves entirely surrounded by hammock trees. To make such a plan practicable, it is necessary to own the surrounding hammock; otherwise, one would have no control over the hammock trees which he wishes to use as protection against cold.

Shelter From Sea Winds.

Around the coast of Florida the bleak sea winds are damaging to citrus trees and citrus fruits. The direct influence of the sea breezes is to cause the atmosphere and soil to become dry. This stunts the grove and in some cases makes it absolutely impossible for the trees to attain a size that will enable them to bear a profitable crop. In some cases, where groves have been planted in such exposed places, it has become necessary to erect an artificial windbreak. This being built ten or twelve feet high, affords the first row protection against the sea-breezes. Each row then successively forms a protection for the succeeding row.

In addition to the direct influence of the sea winds, we also have the indirect effect in causing the fruit to become torn, scratched, bruised, or otherwise mutilated, and unfit for market purposes. The foliage, and especially the rapidly growing young shoots, are likely to be seriously damaged by mechanical injury from the sea winds. Where it becomes desirable to plant a grove within the influence of the sea winds, it is very important that a strip of hammock should be left as a wind protection. If this is not available, a protecting row of trees should be planted. The native hay tree resists the influence of the sea winds well, but probably a much better tree for the purpose is the camphor.

Preparing the Land.

Clearing the Field.—In preparing for a citrus orchard,

it is important that all native trees, stumps, and other material should be removed from the soil. A few cabbage palmettoes may be left for nurse trees for some time, but there should not be a large number, certainly not more than one hundred to one hundred and fifty to the acre, and, of course, all of those occuring in the rows where trees should stand ought to be removed. Liveoaks and especially pines are found to be very injurious to the growth of citrus trees.

It is not impossible for a person to make a good grove in a field that is full of stumps and debris. The chances, however, are much against his making a success. He would be the exception to the rule if he did so.

Breaking and Plowing.—After the field has been thoroughly grubbed and freed from all obstructions in sight, the next important step is to plow the land thoroughly. During this operation a large amount of roots and underground trash will be turned up. This should be removed and burned. Weeds, grass and stuff that will decay rapidly can be left on the ground and be plowed under to good advantage. It is important to have a large plow and sufficient horse power to do the work thoroughly. A fourteen or sixteen-inch plow, or, better still, a thirty-inch disc plow, will be found useful.

Previous Cropping.—Most people who are intending to put out a citrus grove become impatient for a crop, and, consequently, are too much in a hurry to plant trees. The severe change that has taken place on the land by the removal of the forest and the burning of the stumps has set up a disturbance in the soil. The land, therefore, is in most cases unfit to receive anything but the most vigorous plants. If the field is prepared in time to be planted to a crop of vegetables, this is highly advisable. These vegetables will be less affected by the adverse conditions than are the citrus trees, and even if they should be adversely affected it would mean only the loss of one crop and would not be communicated to the succeeding

years. If the season is not a proper one for planting out vegetables, the field may be planted in some farm crop, especially a cover crop, such as velvet beans, cowpeas or beggarweed. If a good crop of velvet beans has been grown upon the soil, we are pretty certain to have it in first-class condition for setting out to citrus trees. In addition to putting the soil in good condition, the velvet beans will add a large amount of ammonia to the soil, requiring less of this element in the fertilizer to be applied to the trees when set out.

Catch Crops.—During the succeeding year vegetables and farm crops may be profitably planted between the rows of citrus trees. One should, however, not lose sight of the fact that the citrus orchard is the main project under consideration, and that these catch crops must be removed or entirely destroyed if they in any way interfere with the health and growth of the citrus trees. After the vegetable crop has been removed from the citrus grove the middles may be planted to velvet beans, cowpeas or beggarweed. These plants will continue to add ammonia to the soil, prevent leaching by heavy rains and finally return to the soil a large amount of humus, which is very much needed to produce growth and health in citrus trees. It is, however, entirely possible to get so much organic ammonia in the soil as to cause dieback in the small trees. When this occurs, the planter loses from one to two years' time in the growth of his trees.

Perfect Drainage Necessary.—One of our foremost agriculturalists in the State has said that there is not an acre of land in the State of Florida that does not need draining; that even the steep clay hillsides would be improved by being underlaid with tile drains. Our general experience has been that when people speak of land as being perfectly drained they mean that it is perfectly drained during the dry part of the year, and forget altogether about the rainy part of the year, which is the critical season. A grove site should be so perfectly

drained, naturally and artificially, as to never allow the soil water to stand above two feet from the surface at any time. Several instances are known where groves located on the top of a hill, seventy-five feet above a lake, had standing water in the soil during the rainy season. Such trees as are within the influence of this water necessarily become weakened by the exclusion of oxygen and interferes with the bacterial life in the soil. For the orange grove as a whole, surface drainage appears to be the cheapest and most profitable. Tile drains are likely to become clogged by citrus roots, and much damage may result before the grower recognizes the defect.

Irrigation.—While much good can be done by conserving the moisture in the soil, occasional years occur, however, when the drought becomes so severe that if one had an irrigating plant the advantages derived from it would be sufficient to pay for the whole outfit; and during about three years out of five a sufficient number of droughts occur to make a good irrigating plant very desirable. The type of plant to use depends very much upon one's own inclinations and the amount of money he has to spend. Furrow irrigation, as practiced in California, is entirely practicable and has been used to some extent in Florida. This is the cheapest method, and the one which will doubtless be generally adopted.

Culture Proper.

Object.—Too many grove owners look upon cultivation in the light taken by a certain colored boy, who, when asked what he was cultivating for, replied: "Seventy-five cents a day." During a money stringency the first thing the grove owner does in many cases is to cut down the amount of cultivation. We cultivate an orange grove to admit air into the soil, as a first requisite, to keep up the bacterial life; and, secondly, to conserve the moisture present.

Germ Action.—Plants in general take up the ammonia in the soil in the form of nitrates. These nitrates, to a large extent, are formed from broken-down vegetable matter. They are prepared by the organisms constantly present in the soil. Nearly all of our fertilizers applied to the trees must go through this breaking down process. Possibly the only exception to this is when we use nitrate of soda and nitrate of potash. To secure the best results the nitrifying bacterial must be present in the soil in sufficient quantity. The temperature of the soil must range somewhere between 40 and 130 degrees F., the most favorable soil temperature being about 98 to 99 degrees. A reasonable amount of moisture is necessary, and there must be a free circulation of air. The nitrates are most rapidly formed in the soil near the surface, especially in the first six inches. The depth at which the largest amount of nitrates are formed varies with the condition of the soil. From this it will be seen that nitrates are forming rather rapidly in our soils during almost the entire year.

Conserving Moisture.—Another important reason for cultivating is to conserve the moisture of the soil. To make the fertilizer applied available to the plant, it becomes necessary for these substances to be placed in solution. In the absence of moisture in the soil the fertilizer applied to the grove will be as useless as if left in the bag. On the other hand, if too large an amount of moisture be present, the plants are unable to get a sufficient amount of the chemical elements in the water that is being absorbed. Conservation of moisture by cultivation is best accomplished by using some light implement that will work rapidly over the soil, breaking the crust or stirring the already loose surface soil, forming what is usually spoken of as the soil mulch. The appended table shows the effect of cultivation and non-cultivation on lands that would be considered fairly good citrus lands. During the year when these tests were being made there

was a very great deficiency in the rainfall; in fact during the four months following the first of January; there was only one rainfall that amounted to enough to wet the soil:

MOISTURE IN CULTIVATED AND UNCULTIVATED LAND.

	April 18, 1908.		April 24, 1908.	
Cultivated—	Percentage.	Tons per acre.	Percentage.	Tons per acre.
First foot	5.35	107.0	4.71	94.2
Second foot	5.73	114.6	5.67	113.4
Third foot	5.17	103.4	5.28	105.6
Fourth foot	4.94	98.8	4.95	99.0
Totals	....	423.8	....	412.2
Uncultivated—				
First foot	2.81	56.2	2.91	58.4
Second foot	3.17	63.4	3.20	64.0
Third foot	2.92	58.4	2.99	59.8
Fourth foot	2.83	61.6	3.19	63.8
Totals	....	239.6	....	246.0

Cultivated land, average..... 418.0 tons
Uncultivated land, average..... 242.8 tons

Diff. in favor of cultivated land... 175.2 tons of water, or 1½ in. of rain.

The above table shows that an amount of moisture equal to one and one-half inches of rainfall may be conserved by plowing and cultivating.

Increasing Humus Content.—The humus is the dark-colored material which occurs in practically all soils to a greater or less extent. Sandy soils almost devoid of humus are very white. When a large amount of humus

is added to such a soil, it takes on a dark color. Our pure muck or peat beds may be said to be pure beds of humus, though the decaying vegetable matter in this period of its transition is not usually spoken of as humus, but rather as peat. In the next stage of its decay it takes on more of an earthly character, and is then spoken of as humus. All forms of animal and vegetable matter take this form before changing into distinctly inorganic substance. Large roots, roots of crops, stalks of crops, and similar growth, are useful in increasing the humus of the soil. The most useful of our humus-supplying plants are the legumes. Foremost among these is the velvet bean. Cowpeas and beggarweed are also excellent for citrus groves.

Humus in the soil improves its mechanical condition by making a compact soil looser and more permeable to the roots of the plants. It gives the leachy soil a water-holding capacity, and, therefore, a capacity for holding plant-food, especially such as has been supplied in the form of fertilizers. It furnishes a convenient location and food for the useful micro-organism which prepare the fertilizers for the citrus trees. In addition to the above advantages an increase in the humus content of the soil increases the soil warmth.

From what has been said in the foregoing paragraph, it should not be considered that humus is an unmixed blessing. Too large a supply of humus in a grove will cause dieback, and in a fruiting grove it is likely to produce what the orange growers properly know as *ammoniated* fruits, as well as dieback. Consequently, the citrus fruit grower must not attempt to push his trees too rapidly, and must also be careful to have his soil thoroughly drained (drainage for the rainy season), in order that the life processes in the soil may go on in a normal way.

Kind of Culture.

There is probably no other subject in citrus-growing

that formerly elicited so much heated discussion as did the question of the time and kind of cultivation. Usually the debaters ignored entirely the kind of soil, the character of their land, and the length of time during which they had practiced their particular hobbies. We, therefore, find that the sects were divided into practically three schools: The perfectly clean culture men, who considered it a disgrace to have a sprig of grass visible in their groves; the school who argued that since our wild trees never were cultivated in the native state, therefore, the grove trees should not be cultivated; later, a third school sprang up that considered it entirely proper to cultivate during the drier part of the year, but ceased cultivation altogether during the rainy part of the year. It speaks well for the hardihood of the orange tree to be able to endure and produce a paying crop under all of these conditions of cultivation. Some of the school of clean culturists conserved the moisture of the soil by using a liberal organic mulch. Some, in fact, went so far as to spend much time and money in cutting shrubbery from the hammock or piney woods and applying this under the trees as a mulching, to add humus to the soil and to conserve the moisture.

Later, and from necessity, a number of orange growers have had to take care of orange groves that became completely sodded with Bermuda grass. We might call these the Bermuda sod groves.

Spring Cultivation.—In sections of Florida, where it becomes necessary to bank trees to protect them against the danger of winter freezing, cultivation should not be begun until all danger of frost or freezing is past. Remove the heating apparatus or piles of wood that may have been placed in the grove to protect it against freezing, then pull down the banks and begin to cultivate.

Groves that have been well tilled the year before will be found in excellent shape for using small tools, such as the Acme harrow, Planet, Jr., etc. In groves where con-

siderable vegetable matter is left over from the previous year, it may be necessary to use a cutaway harrow to break this up. The first cultivation in the spring may be somewhat deep, since it is not likely that new feeding roots have been formed near the surface. If, however, the cultivation is not started until feeding roots have formed, it is best to avoid deep cultivation. Deep cultivation at this time of the year, as at any other time, is a relative rather than an absolute term.

After the first cultivation, nothing more than a mere stirring of the first inch or two of soil should be given. This conserves the moisture so much needed at this time of the year. Our driest portion of the year is likely to occur during March, April and May. The more frequently we cultivate, the more of the soil moisture is conserved. Ordinarily, it is not profitable to cultivate more frequently than once a week. If our soil is in the best possible condition, a weeder may be used. It may be necessary to load the weeder with a small piece of cordwood. With such an implement, a man and a horse can cultivate a ten-acre grove in a day.

Catch Crops.—Where some form of crop is being grown between the rows of trees, it is necessary to give this crop the best of attention and an abundance of fertilizer to keep it from drawing heavily on the young grove. It is a good practice to keep at least six feet away from the reach of the branches. Trees that are over five years old are likely to have roots extending as far as midway between the rows; consequently, cultivation of the catch crop should be gauged according to the needs of the citrus grove.

Summer Cultivation.—Some fine groves and much excellent fruit have been produced by a continuous summer cultivation; other groves have been seriously injured and the crops of fruit have been ruined by such work. The question depends more upon what the character of the land is than upon any dogmatic method of procedure.

Ordinarily, it is safe to discontinue cultivation as soon as abundant rains occur, and to allow grass and weeds to grow at their will. If the grass and weeds become too tall and appear to be a detriment to the grove, a mower may be used to cut them down. During the summer season these will rot and return to the soil as humus. If the grove does not need mowing, the grass and weeds may be allowed to grow, and at the close of the rainy season the grass may be made into hay and removed from the field. Where the soil is deficient in humus, it will probably pay better to mow the grass and weeds and allow them to rot to humus in the grove.

Velvet beans, cowpeas and beggarweed may also be planted in groves if the soil is not too rich in organic ammonia. These legumes abstract nitrogen from the atmosphere and return it to the soil in the organic form. There are instances where this has been carried on to the extent of producing dieback in the grove. Where there is the probability of getting too much organic nitrogen in the soil, the legume may be made into hay. If these legumes are used in the grove, they should be mown in the beginning of the dry season so as to reduce the number of plant bugs to a minimum, since frequently these sucking insects cause a loss of fruit when the legumes are permitted to remain late in the fall.

Fall Cultivation.—Whether we should cultivate in the fall or not will depend largely on local conditions. If we are having a severe drought it may be advisable to use a cutaway harrow, or an impelment of this kind, to break up the surface soil so as to conserve the moisture. If the moisture is not needed, it is usually preferable to allow the soil to remain undisturbed.

Winter Cultivation.—In the early winter, before there is any danger from frost, it is frequently necessary for us to cultivate to prevent rapid evaporation of the moisture. We can also at that time incorporate more or less of the cover crop that grew during the summer season. Care

must, however, be taken not to carry this cultivation to the extent of stimulating the trees into late growth; otherwise, we are apt to get our trees severely injured by an early freeze. If, however, the work is carried on in such a way as to conserve the moisture and yet not stimulate the grove into growth, much good can be done by early winter cultivation.

Cultivation and Dieback.—Dieback is a disease to which practically all of our citrus trees are subject, and one that causes much annoyance and frequently considerable loss. The observant grove owner, however, will recognize the preliminary symptoms of the disease and guard against it. The disease seems to be due to unfavorable soil conditions, brought on by too rapid a development of ammonia in the soil. It may also occur as a result of a number of other conditions.

Depth to Cultivate.—The depth to which a grove may be cultivated safely depends more on the character of the soil than on any other condition. In sections where there is a deep clay soil, the roots of the trees penetrate well into the ground. In thin, sandy soil, the roots are apt to keep close to the surface. This is also the case in our low palmetto hammocks.

The depth to which we should cultivate, then, will depend largely on the character of the soil on which the grove has been planted. In general, we should never plow or cultivate so deeply as to disturb any considerable number of the fibrous roots, and certainly not to the extent of breaking large roots.

By observing the depth of the roots in the soil, we will be able to gauge, in a measure, the depth to which we can cultivate. This, we will find, varies, however, in the same grove in different years. Consequently, very much depends on the judgment of the man who is doing the cultivation or having it done.

Implements.—Under ordinary circumstances, the heavy two-horse plow has no place in a grove in good health. A

light one-horse plow may be used to some extent. This tool, however, is a poor implement, since it wastes so much time for the grove owner. One of the best implements for deep cultivating is the cutaway harrow or disc harrow. For a small grove, the one-horse harrow will be found preferable. For an extensive grove this is too slow, and we need a two or three-horse cutaway or disc harrow. The spading harrow will also be found useful under certain circumstances. The Acme harrow is also an excellent implement to use when the vegetable matter has been worked into the soil. It does poor work, however, when a considerable amount of vegetable matter is present on the surface. The Planet, Jr., cultivator or Sweep cultivator is also excellent for shallow cultivation. When the orchard has been put into a good state of tilth, and our only object is to conserve the moisture, the weeder is one of the best and most serviceable implements. The ordinary spring-toothed cultivators are not good implements, since they pull up too many of the roots they happen to come in contact with.

Building Up a Neglected Grove.

The best way to build up a neglected grove is to let the other fellow do it. Buying a neglected grove is like buying an old, neglected horse. Under certain circumstances it may be done with profit, but under ordinary circumstances it is cheaper and much more satisfactory to start a new grove.

It happens frequently, however, that one has an old grove, or that part of his property happens to be an old, neglected grove. In such cases, we wish to know what is best to do.

Pruning.—The first step in such condition is to go into the grove with a good sharp saw, pruning shears and other implements for butchering trees. The pruning should be done thoroughly and severely. Take out first

all dead wood; then take out all of the weakened wood; finally, shape the tree up so as to make it more or less symmetrical. Do not leave any long, spreading branches, even if they appear to be perfectly healthy. Head them back, so as to make a good, compact tree. When an old, neglected orchard has been properly treated, it is usually a sad-looking sight.

Fertilizers.—Give the entire grove a liberal allowance of a fertilizer such as is used ordinarily for producing growth. A good formula for this purpose will contain about 4 per cent. ammonia, 6 per cent. phosphoric acid, and 8 per cent. potash. As a source of ammonia, nitrate of soda may be employed; as a source of potash, use a high grade sulphate of potash, or low-grade sulphate of potash; and as a source of phosphoric acid, the acid phosphate. The amount to be applied per tree should be very liberal. More people err in applying too little than in applying too much. Spread the fertilizer evenly broadcast over the entire grove, at least over the portion of the grove where trees occur.

Plowing.—Ordinarily, such a grove should be plowed very deep, even to the point of breaking and cutting large roots. Care must, of course, be taken not to plow so deeply as to destroy a large percentage of the roots of the trees. This will vary according to the character of the soil on which the grove happens to be located. Ordinarily, the plow may be made to go five or six inches deep, plowing much deeper in the middles and shallows near the trunks of the trees. After the grove has been plowed in one direction, then cross plow it. In this way the fertilizer is pretty thoroughly incorporated with the soil and brought where the roots can get it almost immediately. After this thorough and deep plowing has been completed, cultivation with an ordinary implement should be continued.

By such drastic treatment, the weaker trees are likely to be killed out entirely. The sooner these are killed out

the more profitable it will be for the owner. He can then replace them with vigorous young trees. The old trees that have vitality enough to stand such vigorous treatment are pretty sure to respond promptly.

WHITEFLY CONTROL.

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It is important that the citrus grower whose trees are infested or threatened with infestation by whitefly, should have at hand the necessary information which will enable him to initiate and conduct repressive measures to the best advantage. This bulletin is an endeavor to bring together the essential facts of whitefly control in a brief form. The whitefly may be controlled, though it is almost impossible to eradicate it. To control this pest is to keep it in check sufficiently for the trees to continue to bear clean fruit.

How the Whitefly Injures Trees.

Badly infested citrus trees usually bear but a small amount of fruit, and what is borne is insipid and covered with sooty mold. The direct injury done to the trees consists in the loss of the sap which the insects suck at the rate of more than 15 pounds per month for each million of whitefly larvae. Indirectly the trees are injured by the sooty mold which covers the leaves and fruit. This sooty mold is a black fungus which develops in the honeydew, a sugary excretion ejected by all stages of the whitefly. This mold is itself injurious to the trees, because by shutting off some of the sunlight it interferes with the elaboration of food materials in the leaves and also retards the ripening of the fruit. Tests with iodine solution show that the parts of leaves covered with sooty mold produce less starch than the parts not covered.

Summary of Life History.

The young of the citrus whitefly (sometimes incorrectly

called eggs) are scale-like, and live on the under surfaces of the leaves. They pass through five stages of develop ment, increasing from about one-eightieth of an inch to about one-eighteenth of an inch in length. The sixth stage, or final one, is the adult winged whitefly. The first four stages are spoken of as the first, second, third and fourth larval stages; and the fifth stage, the transformation stage from which the winged whitefly emerges, is called the pupa.

The best time to spread the whitefly destroying fungi or to spray with contact insecticides is when these insects are mostly in the first three larval stages, or while they are still in the thin, flat condition of the fourth stage. (For a detailed discussion, read what is said under the heading of "Experiments in Spraying" on a later page.) Those in the thickened condition of the fourth or in the pupal stage, are less easily killed, requiring a stronger insecticide. The eggs of the whitefly cannot be destroyed by ordinary insecticides, and it is useless to spray the winged adults. The whitefly begins its larval development about 10 days or two weeks after the swarming periods in spring, summer, and fall. In other words, the eggs hatch in 10 to 44 days, and there are three broods of larvae. The spring brood of adults is definitely separated in time from the summer brood, the intervening period being occupied by the spring brood of larvae, which may be expected in March, April or May, according to season and locality. The summer brood and the late to early fall brood are not so definitely separated as the spring and summer broods of adults, because during the warm weather the adults are emerging nearly all the time; but large numbers of larvae are present during parts of July and August. The late summer to early fall brood is again separated from the next spring brood by nearly the whole of the fall, the whole of the winter, and sometimes a part of the spring.

Methods of Control.

There are three methods of control—the fungus diseases, spraying with insecticides, and fumigation.

The Fungus Diseases.

It is a well-established fact, but not a widely known one, that insects are subject to diseases as well as other animals and man. Among the principal agents responsible for the diseases of insects are certain parasitic fungi, and the whitefly, fortunately for us, is subject to attack by at least six of them. These are the red fungus (*Aschersonia aleyrodis*) yellow fungus (*Aschersonia flavocitrina*), brown fungus (*Aegerita webbri* Fawcett), cinnamon fungus (*Verticillium heterocladum*), white-fringe fungus (*Microcera* sp.), and occasionally a species of Sporotrichum related to the chinchbug fungus. These are all parasites of the larvae of whitefly, except the last one, which has occasionally been found infesting dead adult whiteflies, and presumably had caused their death.

As it is not within the scope of this paper to fully discuss each of these fungi, the red Aschersonia will alone be treated in some detail as a typical fungus, while brief statements with regard to the others will follow.

The Red Fungus.

This important fungus, the red Aschersonia, has given satisfactory results in localities where the summer rains were normal, or where the trees were in good condition generally, the fungus could always be depended upon to check the whitefly or to bring the trees back into good condition.

Helping the Fungus.—By diligent effort at spreading the fungus, especially during periods of rain, some relief can be obtained even under otherwise adverse conditions, if these be not extreme. In the grove of Mr. W. E. Heath-

cote, of St. Petersburg, Florida, into which this fungus had been introduced the previous year, and in which it was not thriving especially well and was giving only inadequate relief, a single spraying of the fungus spores was made in August, 1908, into 6 trees, and the entomologist counted, as a result, something like 10 times the amount of fungus in these trees that was found in those on each side. Ten times as much fungus, of course, implies ten times as many whitefly larvae killed, and indicates that, in many instances, diligent application of the fungus spores would give results more than repaying the time and money spent. Introductions of fungus should be thoroughly made, and if necessary repeated several times during the period of summer rains. We must not expect the fungus to do all the work unaided, but must help it destroy the whitefly by spreading it at the best time.

EXPERIMENTS IN SPREADING FUNGUS.

In this connection the writer desires to refer to the results produced by fungus in several groves into which it was introduced artificially. The first of these is the R. S. Sheldon grove at New Smyrna. The first introduction of the red fungus (red Aschersonia) in this grove was made by spraying spores under the writer's directions in October, 1906. A very small amount of fungus developed that fall, but it spread well during the next summer and no more was introduced before 1908. During the spring of the latter year some fungus was distributed by pinning leaves. On August 22, 1908, the writer sprayed spores of the red fungus into a few isolated trees near the Sheldon house. But little, if any, fungus had developed in these trees previously and none had been introduced. By September 13, 66 per cent. of the larvae counted upon seven leaves, selected from some collected by Mr. Sheldon from the trees sprayed August 22, were infected by the fungus and dead. This happened in less than one month. The

empty pupa cases were counted as live larvae in making the calculations. Following these excellent results, Mr. Sheldon continued to spread fungus by spraying the spores during the rest of September. Notes upon the grove were again taken on April 21, 1909, as follows:

> Grove has been practically cleaned of whitefly. There has been fungus by the bushel, and other people have been collecting it for their use. Fungus is now becoming much weathered and is peeling off, but there is still plenty. Grove has a fine new growth and many trees have set a good crop. Perhaps one-tenth as many adults on new growth as in other groves in town where no fungus was applied. North third of grove has more adult whiteflies because it is opposite a badly infested grove that was not treated.

Considering the fact that this grove was not isolated but was exposed to reinfestation, the results must be considered very satisfactory. The whitefly was brought under control in just about two years. On the other hand, the writer now believes that the same results might have been attained in less than one year if the first spreading of fungus had been made during the period of summer rains. In fact, it appears that the work might have been accomplished in something like a month if we had spread fungus through the whole grove in August, 1908, as was done on the few trees referred to above.

The first part of the work was an experiment designed to give us accurate data as to the rapidity with which the fungus spreads under those circumstances, and the control of the whitefly in the grove as a whole was a secondary matter.

On July 9, 1910, Mr. Sheldon kindly furnished the following data. The crop of fruit for 1909 was abundant, of good quality, and clean. There were but few whiteflies in 1909 and very little sooty mold. Whitefly considerable in 1910 but so far very little sooty mold. Red fungus was spread in 1909, but so far none in 1910, because fungus is scarce. No other repressive measures have been taken.

On December 22, 1909, the writer visited the 6-acre orange and pomelo grove of Mrs. A. P. Gunther, at Pierson, and made the following notes:

The larvae were in the flat condition of fourth stage and older. Perhaps average of one alive per leaf. The first trees to become covered with sooty mold were observed in summer of 1907. Considerable numbers of larvae dead from unknown cause. Examination lasted one hour. Mr. E. Gunther says fall brood of adults not nearly so large as spring brood. Very good spread of red fungus (Aschersonia). Dozens to hundreds of pustules per leaf. The fungus was first introduced by Mr. Frank Stirling, of DeLand, early in the season; several introductions were made later. Trees look very healthy, thrifty and good color. Good crop last year. Tangerines and pomelos bearing small crop this year. Oranges about one-half crop; some fruit covered with sooty mold and required washing.

The results in this grove appeared to be satisfactory in so far as the whitefly was concerned, and but little, if any, better results could have been obtained by any other method under the same conditions of exposure to reinfestation. This grove appears to be an instance in which diligent spreading of the fungus, aided by the "unknown cause" referred to in the notes, reduced the whitefly to a condition of comparatively little importance in one season.

Other illustrations of the effectiveness of introducing and spreading the fungi artificially under favorable conditions could be given. It is not the writer's wish, however, to make the fungi appear as a panacea for the whitefly, since their usefulness may be greatly limited in dry localities and during periods of drought. It appears desirable, however, to briefly report upon the fungus work of Mr. Frank Stirling, of DeLand.

During 1908 Mr. Frank Stirling, of DeLand, began to spray fungus spores on an extensive scale. That year he treated between eight and nine thousand trees, in and near DeLand. During the spring and summer of 1909,

with one or two helpers, he sprayed fungus spores into 127,500 trees. That is, he made 127,500 sprayings, many trees being sprayed many times. This spraying was mainly of the red fungus, but some yellow and some brown fungi were also used. The best results were had with the red fungus, but the brown did well later in the season. The yellow fungus (Aschersonia), Mr. Stirling says, is a "hustler" for the cloudy-winged species of whitefly. Groves belonging to 58 owners were sprayed at a contract price of 2 cents per tree. This spring and summer (1910) Mr. Stirling is continuing to spray fungus spores. It will thus be seen that the method of spreading fungus as directed by the Experiment Station is receiving a most thorough test.

The entomologist has had occasion to examine personally only two of the groves treated by Mr. Stirling during 1909. These are the Gunther grove at Pierson, referred to on a former page, and the Temple groves at Winter Park. The results in Mr. Temple's groves appear to be about equal in two good sprayings with insecticides, but at less cost. Two sprayings in 1909, with fungus, one in May and one in July, cost 4 cents per tree; to have sprayed with insecticides would have cost 25 to 30 cents per tree. Mr. Stirling is again treating Mr. Temple's trees this season. On April 21, 1910, Mr. Stirling said that in the Stetson groves at DeLand, some of which were sprayed five times with fungus during the season of 1909, the whitefly was held in check and kept from spreading; and had not fungus been spread, one-third of the fruit would have been covered with sooty mold.

Keeping Trees Thrifty.—It should be added here that proper fertilizing and cultivation of the trees is important, since a thrifty tree full of healthy foliage presents conditions favorable for the growth of the parasitic fungi of the whitefly, and, of course, can better withstand the attacks of insects. Irrigation would also frequently benefit the trees and favor the fungus parasites of whitefly and of scales.

INTRODUCING THE RED FUNGUS.

In order to start a growth of the red Aschersonia, it is only necessary to spray a mixture of the fungus spores in water on to the whitefly larvae in the infested trees. The spores of the fungus are produced in enormous numbers in the red elevations or pustules covering the dead larvae. They vary considerably in size, and 13,600,000 to as many as 52,000,000 could be arranged, one layer thick, upon the surface of a square inch. About 40 pustules to a pint of water have given good results. More can be used, or less, if fungus is scarce. It is not necessary to allow the leaves with fungus to soak longer than 5 to 10 minutes, but a longer time does no harm, and the mixture of spores and water may even be allowed to stand for 12 to 14 hours without injury. The mixture of spores and water should be strained through coarse cheesecloth or a fine wire sieve in order to remove all particles liable to clog the pump. Mixtures of fungus spores and water should not be allowed to stand in copper or brass pumps or vessels. It is best to avoid copper and brass vessels altogether, since the copper may injure the spores. Growths of fungus can generally be observed with the unaided eye in about three weeks after spraying the spores. The most successful introductions of the red Aschersonia have been made during periods of rain at a time when the whitefly larvae were young. Thus one of the most luxuriant growths of the Red Aschersonia that the writer succeeded in getting was at DeLand during a period of rain in April, 1908, at which time also the larvae of the spring brood were in the early stage of development and very susceptible to infection by fungus. Generally speaking, the period of summer rains is the most certain time to spread fungus and to introduce it into new places. Seed fungus can generally be obtained from whitefly-infested groves into which the fungi have been previously introduced or in which they occur naturally. Since the fungi do not spread during the winter, but are

nearly dormant, and fungus is sometimes scarce during the spring months, but some can generally be obtained. By midsummer a crop of fungus will have matured upon the spring brood of whitefly larvae so that fungus is then abundant. One should not attempt to introduce fungus after the period of summer rains is over, unless it is desired to spray the spores when seed fungus is most plentiful, preparatory to having an early start when spring opens, as late as October, November and December, and while but a meager infection resulted, this spread rapidly during the following spring and summer, as soon as sufficient moisture and warmth were present. The data and complete details of experiments will not be needed here since they were published in Bulletin 97, page 48; in the Annual Report for 1907, page xxxii; in the Annual Report for 1908, page liv; and in the Annual Report for 1909, page xi. On a small place the mixture of spores and water may be applied by a whisk broom when no pump is available.

OTHER FUNGI.

The methods for introducing any of the other fungus parasites previously mentioned are in general the same as the method just described for the red Aschersonia. Of these fungi the red and the yellow Aschersonia can be introduced with the greatest certainty, and on the whole are generally the most efficient, excepting the brown fungus when conditions for it are right.

One important point in regard to the yellow Aschersonia must not be omitted. This fungus will thrive only upon the cloudy-winged whitefly. This fact, which is fully discussed in Bulletin 97, page 52, and in the Annual Report for 1909, page xxxvi, is important, since it would be useless to introduce the yellow fungus on the white-winged species.

PINNING LEAVES.

Pinning leaves having whitefly larvae infected with a fungus upon them has been extensively practiced in the past, but spore-spraying has now almost entirely displaced this method. If leaves are used, each leaf should be pinned with its fungus side down to the lower surface of a leaf of the whitefly-infested tree, since the fungus will be more readily distributed by natural agencies when in its natural position.

ARTIFICIAL CULTURE OF FUNGUS.

All the fungus parasites of the whitefly can be readily grown artificially upon sterilized sweet potato and other media employed for such purposes. This was proven over two years ago by the Plant Pathologist, Prof. H. S. Fawcett, and the methods were described in his paper on "Fungi Parasites Upon Aleyrodes Citri," Special Studies No. 1, University of the State of Florida, June, 1908. The brown fungus (*Aegerita webbri*, Fawcett) is the only one which has so far failed to produce spores in artificial cultures. Artificial cultures of this fungus can not at present be used for spraying, as can those of the other fungi

The red fungus has been grown extensively in the writer's laboratory on sterilized sweet potato, either in the form of plugs or finely ground. The best results were obtained when the plugs or ground sweet potatoes were placed in one-fourth pint and one-half pint wide-mouthed bottles, which were carefully stoppered with plugs of cotton batten. The potato was placed in the bottles which were then stoppered with the cotton batten, and sterilized by steam. Sterilizing destroys all the germ life in the bottle and on the potato. This is necessary, for otherwise the development of bacteria and other fungi would choke out the slow-growing red fungus. The plug of cotton batten keeps out all undesirable germs, but allows air to

pass. The spores of the fungus are introduced into the bottles either by spraying them in sterilized water with a small atomizer, or by streaking them on with a sterilized platinum needle. The work must be done in a properly prepared dust-proof room.

The last culture of red fungus consisted of about 50 bottles. Fungus grown as just described can be employed for introducing into whitefly-infested groves as successfully as that occuring naturally. This has been repeatedly proven in infested trees near Gainesville and at other places. Since the natural supply of red fungus has been generally sufficient, it is not probable that it will become necessary to grow it artificially; but should it become necessary to supply the artificially-grown fungus, this can be done in ton lots or larger with proper equipment.

While the spores of this fungus germinates in 24 to 48 hours, fungus growth does not become visible on sweet potatoes for about 7 days. This time is about the same as upon whitefly larvae. Some spores are formed in 20 to 30 days; and this again corresponds with the development upon whitefly larvae. Spore formation appears to be completed in about 30 to 60 days. The fungus mass will then be of a light brick-red; in fact, the appearance of this color may be taken as evidence that spores are forming. The fungus should be used at that time, but it will keep for a month, and longer during the winter and early spring. This fungus does not readily become weakened, or lose its virulence, by successive growths upon sweet potato as a culture medium, since successful growths of fungus have been started upon whitefly larvae from each of the first five generations.

What has just been stated in regard to the red fungus holds generally true for the yellow fungus, except that no extensive cultures of this fungus upon sweet potato have been made.

Treatment With Insecticides.

In dry times, and in groves out of condition, the fungi may not thrive sufficiently, and it may become necessary to spray with insecticides, or to fumigate.

Spraying with insecticides has fallen more or less into disfavor. Operations and experiments of the Florida Experiment Station during the past year indicate clearly that effective spraying can be done. The difficulties in the past have risen from spraying being done at the wrong time, or were due to a lack of thoroughness, or to reinfestation from surrounding groves. The difficulty of doing the work so thoroughly that the under surfaces of all the leaves become wet with the spraying solution can be overcome in part by taking special care, and by spraying at a pressure of 100 pounds or over.

Spraying for whitefly can be carried on successfully during that portion of any season when most of the insects are in the larval or pupal stages. During the fall (beginning with October and the greater part of the winter we find the whitefly in the larval stages, and later in winter in the pupal stages. During a part of April or May, soon after the disappearance of the spring brood of adults, there is another period of about a month when but few adult whiteflies are present and the eggs have hatched. After May until the end of September all stages of the whitefly, including the adults, are generally present. During this period rains occur frequently, while the adults fly away from the spray, and the eggs are not generally destroyed by it. Spraying should then be done only when necessary to save the trees.

Experiments in Spraying.

In some orange trees (Mr. B. F. Hampton's grove near Gainesville) which were sprayed on May 7, 1909, with "Golddust" at a strength of 1 pound to 4 gallons of water, 91 per cent. of all larvae of the first to the third stages

were dead after 10 days. The percentages of fourth-stage larvae killed was only 30.

These are the results of counting the dead and live larvae on 10 leaves, selected as representatives of good spraying. On 36 leaves an average of 92 per cent. of all stages were killed. (An. Rept. 1909, p. xiiii). Allowance was made for natural mortality, the percentage of which was computed upon leaves from unsprayed trees. The following temperature conditions existed on the day the spraying was made and during 6 days thereafter:

TABLE I.

MAXIMUM AND MINIMUM TEMPERATURES FOR 7 DAYS.

MAY, 1909.	7th	8th	9th	10th	11th	12th	13th
Maximum	88	82	86	88	87	82	83
Minimum	62	63	66	66	61	61	61

Mean of maxima ..... 85° F.
Mean of minima ..... 63° F.
General mean .....74.5° F.

The results obtained on some 25 Satsuma trees (also in Mr. Hampton's grove), sprayed on June 2, 1909, with "Golddust" as before, are as follows: 99.5 per cent. of the second and third stages were killed, and 89 per cent. of the fourth stage and pupae. The average of all stages killed was 91 per cent. Ten leaves representing good spraying were selected nine days after spraying. Natural mortality was allowed for and computed from unsprayed trees. The following temperature conditions existed on the date of spraying and during 6 days thereafter:

TABLE II.

MAXIMUM AND MINIMUM TEMPERATURES FOR 7 DAYS.

JUNE, 1909.	2nd	3rd	4th	5th	6th	7th	8th
Maximum	99	88	82	90	90	90	88
Minimum	73	75	75	73	70	70	68

Mean of maxima .....89.6° F.
Mean of minima .....72 ° F.
General mean .....80.8° F.

The following table, published in the Annual Report for 1909, was primarily arranged to show the effectiveness of the two soaps indicated, but when compared with the two previous series of sprayings, this table becomes of greater interest, as is brought out in the discussion following. The larvae were mainly in the flat fourth stage of development, but no distinction of stages was made in counting them. The table gives the results on ten leaves of spraying two or three trees with each strength of soap. The leaves were selected to represent good spraying. The sprayings were made near Gainesville in Mr. James Cellon's trees, June 15 to 17, 1909, and the leaves were collected 4 to 15 days later.

TABLE III.

RESULTS OF SPRAYING WITH SOAPS.

Strength of Solution.	Killed by Whale-Oil Soap.	Killed by Octagon Soap.
1 lb. to 6 gals. water.....	...91 per cent....	....96 per cent.
1 lb. to 9 gals. water.....	...88 per cent...	....95 per cent.
1 lb. to 12 gals. water.....	...77 per cent...	....89 per cent.
1 lb. to 16 gals. water and 3 lbs. washing soda.....	...93 per cent...	....94 per cent.

The following temperature conditions existed on the day of spraying and during 6 days after:

TABLE IV.

MAXIMUM AND MINIMUM TEMPERATURES FOR 7 DAYS.

JUNE, 1909.	15th	16th	17th	18th	19th	20th	21st
Maximum	98	93	93	89	92	88	92
Minimum	70	74	75	72	71	69	72

Mean of maxima .....94.3° F.
Mean of minima .....72 ° F.
General mean .....83.1° F.

In the above three series of spraying operations the figures indicate that the June spraying was more effective than the May spraying. Temperature, as well as stage of development, is apparently a factor in successful spraying, since we would expect the solutions to be more pene-

trating when several degrees warmer. Thus only 91.3 per cent. of the stages 1 to 3, and 30 per cent. of the fourth stage were killed with "Golddust" with an initial temperature of 88 degrees and a mean for 7 days of 74.5 degrees; while 99.5 per cent. of the stages 2 and 3, and 89 per cent. of the fourth and fifth stages were killed when the initial temperature was 99 degrees and the mean for 7 days, 80.8 degrees. The results of June 15 to 17 in Mr. Cellon's trees on fourth stage larvae with the soap solutions were excellent, with an initial temperature of 98 degrees and a mean of 83.1 degrees. These figures, in conjunction with many general observations, indicate that we should spray the young larvae in the first to the third stages, and the thin flat condition of the fourth stage, rather than the older fourth stage larvae and the pupae. They also indicate that spraying during the hottest summer weather with the thermometer at about 99 degrees is more effective against all stages and especially against the fourth stage and the pupae, than spraying in cooler weather.

FUMIGATION.

Fumigation with hydrocyanic acid gas is recommended for winter treatment, no eggs or adults being present. A bulletin on the subject has been issued by the U. S. Department of Agriculture, describing the work carried on by Dr. A. W. Morrill and his assistants at Orlando. Those wishing to consult this publication should address the Superintendent of Public Documents, Washington, D. C., inclosing 15 cents, and asking for Bulletin 76 of the Bureau of Entomology.

Winter Treatment.

Winter is a favorable time to treat the whitefly, because this insect is then in its larval stages, and there are no adults to fly away, nor eggs that are difficult to kill.

There are two methods of winter treatment—fumiga-

tion, and spraying. Where fumigation can be employed, it is to be preferred. Those who have carried on extensive fumigation experiments claim that it is less injurious to the trees than spraying with insecticides. Quicker and better results can undoubtedly be obtained with it, especially on the larger trees, where it is difficult to wet all the leaves by spraying. For small and medium-sized trees spraying can, however, be made nearly as effective.

The growers at Winter Haven have organized a protective league, and assessed each grower one cent per year for each tree he owned. In this locality the whitefly had just started in two or three groves, and the results of spraying in winter have been so successful that but few, if any, more whitefly larvae could be found last fall than three years ago. These spraying operations appear to be the most successful on record. The insecticide was a proprietary miscible oil. Another grower states that he has succeeded in keeping the whitefly confined to a few trees in one corner of his grove for four or five years by thorough spraying with another miscible oil.

For winter spraying the solutions must be used much stronger than at other times, and whale-oil soap solution should not be used weaker than 1 pound to 4 gallons of water.

LOCALITIES JUST BECOMING INFESTED.

Winter treatment should not be omitted in any locality in which the whitefly is just coming in and is confined to a limited area. Under such circumstances there is too much at stake in the form of a protective league as just illustrated. All the groves in such a locality are threatened, and no grower can afford to omit paying his share towards keeping the pest confined within its present limits as long as possible. It pays better to help fight the pest in another man's grove than to have it in one's own. Work should not be postponed with the thought that something can still be done in the summer, since by so

doing the whitefly is given another chance to spread during its swarming period in April or May. Fumigate, if possible; if not, then spray thoroughly.

BADLY INFESTED LOCALITIES.

Where a locality is completely and heavily infested, the trees should be treated in winter in order to give them a better chance to set fruit in spring. If co-operation can be effected, it is possible to do the work so thoroughly that no further treatment will be necessary until the next fall or winter. If co-operation for an entire locality is impracticable, it may be feasible to effect co-operation on the part of the owners of localized groups of groves. Where no co-operation whatever is possible, each grower should nevertheless treat his own trees. In this instance spraying should be the method of winter treatment. It would be inadvisable to go to the expense of fumigation where the grove is not isolated and reinfestation is certain, but spraying should be done. Later in April or May, when the grove has become reinfested from the groves of indifferent neighbors, it should be sprayed again. There is a time in April or May when the whitefly larvae are young and easily destroyed by whale-oil soap (1 pound with 6 to 9 gallons of water, or by any other good insecticide diluted sufficiently to be harmless to the leaves or young fruit. This period comes about two weeks after the spring brood of adults has disappeared from the wing. After that, during the period of summer rains, if conditions are at all favorable for fungus growth (plenty of moisture, and good condition of trees) the fungus diseases of the whitefly should be introduced. Finally, if necessary, the trees should be sprayed again in October or November; in which case treatment during the following winter will not be necessary. (See also under the following heading.)

SPRING, SUMMER AND FALL SPRAYING.

SPRING TREATMENT.

Spring treatment should begin about two weeks after the winged whiteflies have disappeared. There are then only young larvae present. This period may occur during April or May, or sometimes earlier, depending upon the season and the locality. In localities where the spring rains are abundant and the general moisture conditions throughout the season generally suitable, the fungi, preferably the red Aschersonia, may be introduced as previously directed. Where the conditions for the fungi are not suitable, or where it is desired to depend altogether upon spraying, the spring period indicated is a most suitable one during which to spray. The advantages of spraying at this time may be summed up as follows: (1) The whiteflies are in the young larval stages and are easily killed; (2) they are mainly on the new growth and more easily sprayed; (3) the larvae are destroyed before sapping the strength of the new growth, and before much sooty mold has developed; (4) rain is not likely to interfere with the spraying.

SUMMER TREATMENT.

Spraying may also be carried on during the summer after the second brood of adult whiteflies has passed its period of greatest numbers, some time in July. During this time the whitefly develops more or less irregularly, there being all stages present in considerable numbers at nearly all times, and rain is generally abundant. For these reasons spraying at this time of the year is not generally advised, excepting when the trees are suffering greatly. The fungi can generally be introduced to good advantage at this time, and they should be applied freely whenever the whitefly is present in sufficient numbers, and conditions are favorable for fungus growth.

FALL TREATMENT.

Fall is an important time to spray for the whitefly, and treatment may begin in October or November, or soon after the adult whiteflies of the late summer brood have disappeared,and after the late laying of eggs have hatched. The Knight grove at Bay View, and F. M. Campbell's grove at Anona were sprayed in the early part of November, 1908, with a spraying mixture whose principal ingredient was whale-oil soap (about 1 pound to 10 gallons of water) and about 90 per cent. of the larvae were killed. For the late fall spraying, whale-oil soap should not be used weaker than 1 pound to 4 or 6 gallons of water, but 1 pound to 6 or 9 gallons may be used earlier.

It is not necessary to spray two or three times during fall or winter, as some think. By doing thorough work 95 per cent. of the larvae are destroyed, and the remaining 5 per cent. will not increase until spring. In other words, spraying should be done so thoroughly that it will be unnecessary to repeat it for that brood.

The advantages of fall spraying may be summed up as follows: (1) The young larvae are abundant and easily killed; (2) they are killed before they wax fat at the expense of the trees; (3) *the trees remain clean for nearly five months;* (4) there are few rains to interfere with spraying.

SPRAYING SOLUTIONS.

Since spraying to kill the young whitefly larvae must be done in spring, summer, or fall, when either tender leaves or fruit are on the trees, it is evident that a spraying solu tion must be used that will not injure the foliage or the fruit. Almost any good contact insecticide can be employed, provided it is sufficiently diluted.

The experiments reported on a previous page show that soap solutions of 1 pound of soap to 6 gallons of water, destroyed all larvae in the first three stages, and

most of those in the fourth and pupal stages. Thorough work resulted in destroying between 90 and 96 per cent. of all the larvae. Soap solutions of 1 pound of soap to 9 gallons of water destroyed about 90 per cent. Good's potash whale-oil soap No. 3 was used, and also Octagon soap. It is probable that any kind of soap will be effective against these young larvae. In winter and late fall the soap solutions should be used stronger, about 1 pound to 4 gallons of water, but a weaker solution used in the spring, summer, or early fall, will generally kill as many of the insects as the stronger solution in winter.

Experiments reported on a previous page show that "Golddust" used on young larvae at the rate of 1 pound to 4 gallons of water killed 90 to 95 per cent. Preliminary chemical examination showed that it consisted of about 25 per cent. of soap, 62 per cent. of washing soda, and about 13 per cent. of water. When we mixed one pound of whale-oil soap with three pounds of washing soda and used one pound of this mixture to 4 gallons of water we got about the same results as we did by using one pound of "Golddust" to 4 gallons of water. One pound of whale-oil soap alone to 9 gallons of water gave about the same result as the whale-oil soap and soda mixture. The cost in each case was a little less than half a cent per gallon. Whale-oil soap is therefore decidedly a cheaper material to use for spraying than "Golddust." A mixture as good as "Golddust" can be made at about one-half the cost by using 1 pound of whale-oil soap and 3 pounds of washing soda to 16 gallons of water.

Three Species of Whitefly.

About two years ago is was discovered that there are two distinct species of whitefly that seriously infest citrus trees in Florida. The second species, *Aleurodes nubifera*, is spoken of as the cloudy-winged species, and the other, *Aleurodes citri*, as the white-winged species. Previous to 1908 is was supposed that only one species infested the

trees, namely, the white-winged species. The cloudy-winged species is so called because there is a delicate cloud-like or smoky area toward the ends of the wings. It should not be understood, however, that this cloudy-winged species is a recent comer. On the contrary, examination by A. L. Quaintance of whitefly material preserved in the Bureau of Entomology, Washington, D. C., has shown that this species existed in Florida prior to 1895. According to some drawings made in Louisiana in 1893 by Prof. Morgan, the cloudy-winged species existed there at that time. The white-winged species began to be studied back in the 70's, and was first described in 1893. So far as records show it appears that both species were probably introduced about the same time. The present distribution of the cloudy-winged is quite as extensive as that of the white-winged one. Sometimes both species can be found in the same locality and on the same tree. The white-winged one is the more destructive, and where both occur together the cloudy-winged species is relatively insignificant; although when alone this latter species frequently causes severe infestation.

A third species has recently gained entrance to the State, the so-called woolly whitefly, *Aleurodes howardii*. This species has been known to infest citrus trees in Cuba and other West Indian islands for some time, but has only recently become established in Florida about Tampa and Ybor City. Dr. E. A. Back of the Bureau of Entomology, Washington, D. C., stationed at Orlando, has written a brief account of the occurence of this species in Florida, in the Florida Fruit and Produce News for November 26, 1909, p. 5; and in Bulletin 64, part viii, Bureau of Entomology, Washington, D. C.

Whitefly and Freezing.

The benefit to the grower of any freezing sufficient to defoliate citrus trees may be considered about the equiva-

lent of a fumigation or extra good spraying so far as the effects upon the whitefly are concerned. The great majority of the whitefly larvae die on leaves killed by cold; but a few may survive, especially on any leaves that are drifted into some moist place where they do not dry out completely. In November and January, 1907-8, the writer collected fallen leaves at DeLand with live fourth-stage larvae and pupae upon them, some of which matured after being taken to the Experiment Station at Gainesville (see Bulletin 97, p. 62). The degrees of cold that have hitherto occured in Florida have not exterminated the whitefly except in one or possibly in two places. At Crescent City the freeze of 1894-5 did exterminate the cloudy-winged species, probably the only one present there at that time. But as all citrus trees were frozen to the ground, and as this species appears to live on citrus only, it is easy to understand how the extermination took place. Freezing destroys directly but few, if any, of the larvae on leaves that remain uninjured.

Quarantine.

The whitefly can be kept out of non-infested groves for a considerable length of time. With but a little attention, growers can save for themselves thousands of dollars. This should be an incentive to every resident of Florida, whether a grove-owner or not, to help in checking the whitefly and keeping it from spreading. Something can be accomplished by closing private gates against vehicles coming from infested districts, since the winged whiteflies are frequently carried on persons and vehicles for long distances. Nursery stock and ornamentals when brought to one's premises should be defoliated if there is the least possibility of any whitefly being present. The whitefly is undoubtedly more frequently carried long distances on nursery stock than by any other means. As a special precaution, nursery stock may be fumigated after defoliating. To what extent whitefly may be carried on pickers'

implements is an open question, but it is easy to conceive of adults or young larvae being carried in that way. Certain growers in non-infested localities have very wisely excluded the implements which have been used in infested localities. Such implements can be made safe, however, by a thorough spraying with soap solutions or other contact insecticides, care being taken to saturate all crevices with the solution. Picking bags and outer garments of pickers may be fumigated in aight-tight containers with carbon bisulphide, at the rate of 1 to 3 ounces for a space the size of a barrel, leaving them in fumigation over night. Hydrocyanic acid gas may also be used. Gasoline used in an air-tight container will also do the work.

Food Plants.

The cloudy-winged species (*Aleurodes nubifera*) has not yet been found alive on any plants except species of citrus. Mr. A. L. Quaintance, however, reports *A. nubifera* on some gardenia leaves collected at Crescent City, Florida, in 1895, by H. G. Hubbard, and preserved in the Bureau of Entomology, Washington, D. C. (See Bulletin No. 12, part IX., Technical Series, Bureau of Entomology, U. S. D. A.). The following is a revised list of food plants of the white-winged species (*Aleurodes citri*). With regard to those marked by an asterisk, it has not yet been determined whether *A. nubifera* or *A. citri*, or both, infest them. The writer is of the opinion that all were probably infested with *A. citri*.

Class I.—Food Plants Preferred by A. Citri.

Native Species:

Prickly Ash (*Fagara Clava-Herculis* (L.) Small).
Wild Persimmon (*Diospyros Virginiana*) (L.)
Wild Olive (*Osmanthus Americana* (L.) B. & H.).
Green Ash (*Fraxinus lanceolata*, Borck).

Introduced Species:

Citrus (all varieties).
Chinaberry (*Melia Azedarach* L.).
Umbrella (*Melia Azedarach umbraculifera* Sarg.).
Cape Jasmine (*Gardenia jasminoides* Ellis).
Privets (*Ligustrum spp.*).
Japan Persimmon (*Diospyros Kaki* L. f.).

Class II.—Food Plants Sometimes Infested But Not Preferred by A. Citri.

Native Species:

Cherry Laurel or Mock orange (*Laurocerasus Caroliniana* (Mill.) Roem.)
Viburnum nudum L.
Buttonbush (*Cephalanthus occidentalis* L.)
Smilax (*Smilax* sp.).
*Blackberry (*Rubus* sp.).
*Water Oak (*Quercus nigra* L.).
*Scrub Palmetto (*Sabal megacarpa* (Champ.) Small).

Introduced Species:

Coffee (*Coffea Arbica* L.).
Pomegranate (*Punica Granatum* L.).
Allamanda (*Allamanda neriifolia* Hook.).
*Honeysuckle (*Lonicera Japonica Halliana*).
**Ficus altissima.*
**Ficus* sp. (from Costa Rica).
Oleander (*Nerium Oleander* L.).
Cultivated pear (*Pyrus* sp.).
Lilac (*Syringe* sp.).
Banana Shrub (*Michelia fuscata* Blume).
Camellia, or Japonica (*Mamellia Japonica* L.).

PLANTS TO BE CONDEMNED.

The cape jasmine, chinaberry, umbrella trees, prickly

ash, privets, wild olive, trifoliate orange (*Citrus trifoliata*), and all useless and abandoned citrus should be condemned and destroyed in all citrus-growing communities. Destruction of these plants will retard the restocking of citrus groves with whitefly after repressive measures have been carried out, and greatly check the spread of the whitefly in localities only partly infested or just becoming infested. While it is safest to destroy all these plants, it is the chinaberry and umbrella trees that are the most dangerous. It has been found by counts and calculations that a large infested umbrella tree may set free tens of millions of adult whiteflies during late summer and early fall, so that a dozen umbrella trees may be counted upon to liberate hundreds of millions of these insects each year to re-stock a treated grove.

These hundreds of millions swarm about apparently in an aimless manner, but have been observed to migrate a mile beyond their place of origin, indicating clearly how these trees are instrumental in spreading the whitefly to the outlying citrus groves. The other deciduous trees of the condemned list stand in the same relation to the whitefly as the chinaberry and umbrella trees, but being smaller they harbor fewer whiteflies. The late summer and fall migration of the whitefly from the umbrella and other deciduous trees is due to the fact that no new foliage is produced at that time. The whitefly prefers to deposit its eggs upon new and tender foliage, and when this is absent, it instinctively leaves the trees, apparently in search of evergreen trees such as citrus, cape jasmine, and others, on which to deposit its eggs.

Whitefly and Increase of Scales.

Scale insects have in some instances increased abnormally in citrus trees that were infested with whitefly. It has been thought that this increase of scales had been somehow brought about by the latter insect. That the whitefly cannot be the principal cause is indicated by the

fact that increase of scales has not always been preceded by whitefly, and that whitefly infestation is not always accompanied by increased numbers of scales. The worst cases of infestation by scales, causing partial or complete defoliation and much loss of small twigs, were in localities suffering from lack of rain. It appears that this lack of moisture is the primary factor, and that the whitefly made a bad condition worse by further exhausting the sap of the trees. The lack of sufficient moisture weakened the trees. It also checked the development of the fungus diseases which normally keep the scales under control. Had the trees been supplied with sufficient moisture they would have been able to put on a fairly good growth. The new leaves would have supplied more food to the trees: (Leaves are not only the lungs of the tree, but also the organs in which food is elaborated.) This food would have been used in part to feed the scales and whitefly, and in part to maintain the vigor of the trees. These leaves would also have supplied more moisture to the air, and their shade would have kept the interior of the trees moister. This would have resulted in a thrifty growth of the almost universally present fungus diseases of scales. It has been noticed that scale fungi and whitefly fungi often thrive remarkably well even in dry localities in vigorously growing trees. It therefore follows that the better the condition in which the grove is kept, the less likely is it to suffer from the depredations of insects.

When there is a great increase of scales, whether or not whitefly is present, it is evident that the fungus diseases of these insects are absent or are not thriving. In this case spraying with some contact insecticides, or fumigation, should be employed to give immediate relief.

WHEN TO SPRAY FOR SCALES.

In the spring, summer, and fall, it is not possible to use strong spraying mixtures, so that it may be necessary to spray the infested trees several times at intervals of some

weeks. It will not always be necessary to spray the whole grove, but only the most severely infested trees. When whitefly is present the spray should, of course, be applied to these as well as to the scales.

The following precautions should be kept in mind when spraying for scales in spring, summer, or fall:

1. Spray when many young scales can be seen with a lens to be crawling about, or to have just attached themselves. These young scales appear either as oval moving specks or as round whitish dots. They are easily destroyed by a weak spraying solution which will not injure the fruit or foliage in any stage of growth.

2. Any contact insecticide may be employed, such as soap solutions, emulsions of oils, or good proprietary insecticides. Soap solutions of 1 pound of soap and 6 to 9 gallons of water will destroy the crawling scales and those just set, together with the young whitefly, larvae, without injuring the trees.

3. Avoid insecticides that are recommended as useful for fungus diseases, because they also destroy the fungus diseases of the scales and whitefly. Whale-oil soap causes little or no injury to these fungi, and the same is true of some of the best proprietary insecticides.

4. During the period of summer rains the fungus diseases of the scales and whitefly should be distributed to those trees in which they do not occur in sufficient quantity.

5. The eggs of the scale insects, being sheltered beneath the old scales, are not easily destroyed by sprays. The old scales are protected by their waxy covering, and are not destroyed in great numbers by spraying solutions, unless of extra strength. Hence, repeated spraying in warm weather when the young are hatching, may be made more effective than winter spraying.

Resume of Scientific Results.

1. Less starch produced by trees affected with sooty mold.
2. Definite advantages gained by spraying fungus over natural spread.
3. The vitality of spores is probably injured by a brass vessel when the mixtures is allowed to stand in it.
4. Proof that the fungi grow best in hot wet weather.
5. Yellow fungus thrives only on A. nubifera.
6. Cultures of fungi used for spraying with success.
7. Cultures of fifth generation retain their virulence.
8. Pupae apparently more or less immune to fungus attack.
9. Use soap solutions for spraying whitefly.
10. Proof that spraying with insecticides is most effective in hottest weather, against younger larvae.
11. A second species of whitefly.
12. Some new food plants of whitefly.

SUMMARY.

1. It is easy in Florida to start growths of the fungus parasites in whitefly-infested trees at the proper time.

2. The proper time to spray fungus spores is when there are many young larvae on the leaves and the weather is both moist and warm.

3. The fungi should be put on the trees as soon as favorable conditions arise, in order that their growth may be helped by the summer rains.

4. If the fungi are applied late in the season, they will not increase sufficiently to be of material advantage until the next year.

5. During a wet spring, favorable conditions for starting growths of fungus may arise as early as April. Generally speaking, the periods of summer rains is the most certain time to start fungus.

6. In localities where there is not sufficient moisture, or when

the trees are out of condition, the fungi grow sparingly, and spraying with insecticides or fumigation should be carried on to check the whitefly.

7. Spraying with insecticides should be done when there are few or no adult whiteflies swarming about, and when all or most of the eggs have hatched, which is about 10 to 14 days after the last of a brood of adults has disappeared.

8. In April or May, in October or November, and during winter, are the times when the most effective spraying with insecticides may be done.

9. In summer the fungi should be applied, because during the period of rains spraying with insecticides is difficult, but the fungi can then be spread to the best advantage.

REMEDY FOR MANGO BLIGHT.

By U. S. Department of Agriculture.

The mango, most delicious of tropical fruits, is now being grown on a commercial scale in Florida, but the production has been seriously interfered with by a fungus growth. The Department of Agriculture is endeavoring to determine on a remedy for this blight, and has just issued a bulletin giving the details of certain experiments in spraying the fruit. Spraying with Bordeaux mixture served to keep the fruit free from infection although when applied to the blossoms during the rainy season it was of little or no value.

Beneath mango trees the disease can always be found on the fallen leaves. Here these leaves merely await a favorable moist season to spread the disease widely. Growers of this newly introduced fruit, which undoubtedly would be very popular in American markets if it were more abundant, realize the seriousness of the disease and it was to aid them that the writer of the Department's new bulletin was sent to Florida to study the trouble.

Mangos come into bloom very irregularly. They are very dependent upon weather conditions. If the weather happens to be dry at blooming time and until the fruit is set, the fruit can be brought through to ripening free from infection, by spraying at certain intervals. However, if the weather is not dry the blossom-blight flourishes when the tree blooms. In the Department's experiments, spraying the blossoms every day prevented a set of fruit and spraying the blossoms every other day did not save sufficient fruit to justify the expense in spraying.

Spraying was, however, effective in keeping the buds of the flowers free from diseases even after the flowers began to open. Experiments seem to show that the buds should be sprayed at least every 4th day until blossoming time. From then until the fruit is set, spraying seems to

be of no value. However, after the fruit is set it can be kept covered with Bordeaux mixture during the first 8 or 10 weeks of its development to great advantage.

The fruits are most susceptible to infection just as they are setting. Consequently, it appears that it would be best to make three applications of Bordeaux mixture at weekly intervals, applying the first one when about one-half to two-thirds of the blossoms have opened, and following these by a fourth application after a lapse of two weeks and a fifth one three weeks later. Altogether this would make five sprayings for the fruit in addition to the two (or in some cases three) for the buds.

The only solution at present for freeing the mango during blossoming time from this dreaded disease is to develop some variety which will be immune. The Mulgoba mango seems to posses a resistant quality in some degree. It has been known to set a good crop of fruit when other mango trees failed to do so. The rapidity with which the blight works on trees that possess no resistant quality may be illustrated by a concrete instance. A tree had been sprayed three times with Bordeaux mixture, and the flowers upon it opened in full bloom on March 26 with every indication that a good crop of fruit would be set. On March 28 all of the flowers were dead and dry.

Weather conditions at present make it almost impossible for the mangos that bloom in winter to set any fruit. Conditions during December and January are ideal for the infection. However, at the time of the mango's spring bloom the weather conditions for good settings of fruit seem more often favorable than not. This fruit may be brought through to maturity in a disease-free and clean condition by a moderate number of sprayings with Bordeaux mixture.

It is never so dry, however, but that spraying will have to be resorted to in order to keep the fruits free from diseases after they have set. No amount of fertilization of the soil will take its place.

THE SWEET POTATO CROP.

By C. K. M'Quarrie.

Assistant Superintendent, Farmers' Institute, University of Florida.

The sweet potato crop holds an important place among the general farm crops of this State, being third in point of value (running a close race with cotton, which is second in the list). Its position is more important than cotton, as it is a maintenance crop and for the most part consumed at home and not subject to market fluctuations.

Because of its adaptibility to all sections of the State, the possibilities of this crop, from a money-making standpoint, are great. The present yield could be largely increased by adopting improved methods of production. And if there is one crop more than any other that can be depended upon year in and year out with a large degree of certainty it is the sweet potato crop.

But to get maximum results and put this crop where it belongs as one of the best farm crops of the State, certain factors in crop production must be studied and acted upon. These are: Its place in crop rotation, soil preparation, the kind of fertilizer to be used, the quality of same, methods of application, planting, care of the crop when growing, the varieties best suited to the soil and to climatic and local conditions and methods of harvesting and care of the crop afterwards.

PLACE IN CROP ROTATION.

The sweet potato crop in the general rotation should follow a crop that puts humus and fertility in the soil. Humus enables the soil to store moisture, increases its temperature, furnishes a certain amount of plant food, retards the loss of fertility by leaching, stimulates chemi-

cal action, and fosters the bacterial life so essential to a large crop yield. Crops such as velvet beans, cowpeas, soy beans and beggarweed are ideal for this purpose, for they not only increase the fertility of the soil by their ability to collect the free nitrogen of the air and store it on their roots in the form of nodules, but the plowing under of the aftermath of these crops puts humus in the soil to keep the crop supplied with the needed moisture while it is growing.

Where any of these crops have been plowed under in the fall and a winter cover crop, such as rye or oats, grown on the land (which is an excellent plant for conservation of moisture and fertility during the winter months), and these crops again plowed under in the green state early in spring, there will be ideal soil conditions for a large crop of sweet potatoes. Some prefer to let the oat crop get to the dough stage and cut and cure it for hay and plow under the stubble. This is also an excellent method, unless in localities where it will be too late in the season before the oats are ready for cutting to be in time to plant the sweet potato crop.

PREPARATION OF THE SOIL.

Plowing or breaking the land in the late fall for all spring-planted crops is the best method to pursue, for if we wait till spring the soil is apt to be too wet after the winter rains to do good work, and the vegetation and materials plowed under in the spring will not have time to rot and assimilate with the soil to form humus, and the soil will not have time to pack back and get into the mechanical condition necessary for success in crop production. Therefore we want to do this breaking in the fall. For this purpose a tool should be used capable of doing good work and plowing completely under all the vegetable material on the top of the land. A disk or heavy turning plow should be used for this purpose, aiming each time

to go a couple of inches or so deeper than the last breaking was done. An old land that has been some years in cultivation subsoiling can be profitably adopted. This subsoiling can be done with an ordinary scooter stock with a six-inch shovel for a plow, running right behind the breaking plow and going as deep as it is possible to go. This subsoiling opens and acrates the lower soil that is not advisable to turn on top or mix with the already made soil. It also helps to retain the moisture received from the rainfall, prevents, to a certain degree, surface washing during heavy rains, and enables the crop to draw on the lower moisture strain in the growing period when moisture is the main factor to a large yield. It also serves the purpose of soil aeration to a lower depth than the breaking plow can do, thus tending to promote the bacterial life of the soil on which crop production so much depends.

In cases where no winter cover crop is grown on fall-broken land, after every heavy rain a tool such as a weeder or harrow should be used, running lightly over the land and forming a dust mulch to prevent the rapid evaporation of moisture that occurs if a crust is allowed to remain long on the land. No deep running tool is wanted for this work.

FERTILIZER FOR THE CROP.

An important point connected with this crop is the kind of fertilizer used, and it is advisable to consider this from the plant-food standpoint and know the formula that is likely to give us best results. Some of the Experiment Stations of the South have given us definite information along this line, which, coupled with results obtained by a number of farmers in growing the crop, enables us to suggest a formula that this crop will generally do well with. A favorite formula contains 3 per cent of ammonia, 7 per cent phosphoric acid and about 8 per cent potash. And in this connection we want to know

the raw materials that enter into the make-up of this formula. For instance, we know that cottonseed meal or caster pomace is not the best for the source of ammonia, because the use of these tends to give the crop soft rot and a poor keeping quality, and we also know that for the potash source we should not use any raw material with chlorine in it, such as muriate of potash or kainit, as the chlorine in them tends to give an inferior quality to the crop.

The raw material recommended for an ammoniate source are either tankage, sulphate of ammonia, or blood and bone; and for potash, sulphate or potash, or double sulphate of potash and magnesia.

The farmer who plants a large acreage of the crop can get the fertilizer manufacturers to compound for him any formula he wants and of any preferred materials, but the small grower has either to take what he can get on the local market or do his own mixing, which is quite easily done. To mix a ton of the formula given above and of the materials recommended, he would have to use about 900 pounds of blood and bone, or bone tankage, 800 pounds of phosphoric acid and 300 pounds of sulphate of potash.

HOW MUCH FERTILIZER PER ACRE.

Land that is in good mechanical condition with considerable humus in the soil will take care of more fertilizer to advantage than poor thin soil devoid of humus. The depth of plowing cuts quite a figure also along this line. A good rule to adopt and one that has been found satisfactory in practice is to use one hundred pounds per acre for the right kind of plant food or the formula already mentioned, for every inch of depth that the land has been plowed. It is true economy to use enough fertilizer of the right kind to get the maximum yield with the least cost of production per bushel.

METHODS OF APPLICATION.

It is a well-known fact that the root system is the foundation on which a crop is made, and the methods of application of the fertilizer determine to a great extent the vigor and number of the feeding rootlets of a crop. Fertilizer applied in furrows, drills or hills tends to make the soil streaked or spotted in its fertility, consequently curtailing the root system because the roots of the crop are not apt to spread through all the soil as they would do if the fertility was uniformly distributed. Therefore it is recommended that, on all well-prepared soils plowed to a depth of six inches or more, the fertilizer be broadcasted on freshly prepared land and worked into the soil by means of harrow, weeder or cultivator, a few days previous to planting the crop. On soils deficient in humus, and plowed a few inches in depth, the application of the fertilizer had best be in furrows; but in such a case the quantity used must be small and the crop will be of a corresponding degree, thus making the cost more per bushel, for the labor required is the same in both cases.

PLANTING THE CROP.

Whenever the "draws" in the seed-bed are ready for setting out in the field, enough land should be prepared for the purpose by making it into beds about four feet from center to center. The height of these beds should be determined by the nature of the land. On rolling land, where there is ample drainage, these beds should not be more than twelve to fifteen inches above the level of the ground and made with a well-rounded top, *not sharp*. On flat woods where drainage is deficient the beds should be made very high, say two to three feet, so as to take care of excessive rainfall in rainy weather, because the roots of the crop should not be in stagnant water at any time. The best tool for making the beds is a disk cultivator.

The disks can be arranged at different angles and depths to make a far better bed and at considerably less cost than those made by a turning plow and afterwards smoothed off with a hoe, as is the general practice. It is not advisable to make more beds than are required at any one time, because a better stand is secured when draws or vines are planted on fresh-made beds, on account of the settling of the soil about them, than when plants are put on beds a few days or a week after they were made.

If draws are set out in April, the vines that we want for the main planting will be ready to be cut for this purpose in May. For it has been found that the cuttings of the vines make a larger yield for table and market than where draws are used, and it is the usual practice just to plant sufficient draws to give plenty of vines for the main planting.

In the planting operation the vines should be cut to lengths of twelve or fifteen inches (we don't want them too long), and laid on top of the bed about fifteen inches apart with butts all one way . By using a forked stick for the purpose, we can insert them into the soil to a depth of four to six inches, always taking care to have the butt ends down. The practice of some growers of pushing the vines in the soil at the middle and leaving both ends sticking out cannot be generally recommended, as in that case the vine is ruptured and more than one joint will root, which tends to a lower yield than where only one joint roots, which is the case when the butt end is inserted.

If dry weather prevails at planting time and the soil is deficient in moisture, watering the plants immediately after setting them out is recommended. For this purpose some vessel with a spout on it (such as an old copper kettle) is best, pouring about half a pint of water in the hole where the plant is set out, taking care to run the wetted soil to the root of the plant. This should be

done in the evening, and next morning a little dry soil should be thrown over these wet places to prevent the evaporation of that watering.

VARIETIES.

More than one hundred so-called varieties of sweet potatoes make up the list of what we have in the State. Many of these are really the same, but under different names in different localities.

In selecting a suitable variety two things should be kept in mind, and the most important in this respect is the market one is catering to, and another is the lateness or earliness of the variety. As a general proposition, an early variety does not give us the largest yield, and is not such a good keeper when stored as a later variety which matures thoroughly before harvesting. A variety in great demand for early summer shipping to Northern markets is the "Big Stem Jersey," but this variety is mostly confined to the central and south-central part of the State, where it is grown largely as a catch crop succeeding a winter truck crop. It is not in much demand in the Southern market because of its dry, mealy nature, the Southern markets calling for a soft sweet potato of the yam type. Among the favorites for domestic use and of medium earliness are the "Dooly Yam," the "Nancy Hall," and "Triumph." The "White Spanish" sometimes called the "Tar Heel" is the earliest we have, but the quality is inferior and is not in much demand after other varieties come on the market. "Southern Queen" and early "Pumpkin Yam" are medium early varieties and are of excellent quality. "Dewey," "Yellow Bunch Yam," "Vineland" and "Hall's Golden" are also desirable types and are the latest ripening varieties for domestic use. These are good keepers when allowed to ripen and stored properly.

Sweet potatoes are also much used for stock feed and

can be profitably grown for that purpose especially for hogs and dairy stock. They can also be used to advantage for horse and mule feed along with grain feeds. The stock-feeding varieties grow to a larger size and are much inferior in quality to those used for domestic purposes. Among the best known in this class are the "white" and the "purple" West Indian Yam, "Brazilian Yam," "Nigger Killer," "Hayti," "Spanish," "San Domingo," "Davis Enormous" and a number of others. Some of these do better in some sections than others, so that one has to consider and find out, if possible, the variety best suited to his soil, location and climatic conditions. This applies both to the domestic and to the stock-feed types.

CARE OF THE GROWING CROP.

Many of our native farmers think that the sweet potato crop does not require any cultivation. If it is planted on new land, little cultivation will be required, as grass and weeds are not apt to be much in evidence. Nevertheless, an occasional stirring of the soil, particularly in dry weather, is useful for the conservation of moisture and the areation needed to produce a good crop.

On old land that has been several years in cultivation, grass and weeds will get quite rampant shortly after planting, particularly if a heavy application of fertilizer has been put on the crop. To keep such in check, the cultivator must be used quite frequently until the vines completely cover the ground, when cultivation may cease, as by that time the young potatoes will be forming in the soil, and their growth would be interfered with if cultivation was continued any longer.

TOOLS TO USE.

The best tool for cultivating this crop that we know of

is a two-horse disk cultivator with the disks set at a suitable angle at different depths, so as to run along the sides of the bed, scraping weeds and some soil into the water furrow in the operation. After the ground has been gone over in this way, the angles of the disks are reversed and rebedding is done, leaving the beds in their previous form. This work not only cleans up the weeds and grass, but aerates the soil and tends to a larger yield.

To protect the young plants from being either torn or covered in the operation, the fenders, with which all such tools are provided, have to be attached to the frame of the cultivator. These fenders have to be properly adjusted as to width and depth to give the best results. Later on when the vines begin running and interfere with the disks in their work, a home-made attachment with fingers on it to lift vines out of the way can be fastened to the cultivator and used to good advantage; for cultivation can be carried on much later than if this was not used.

DISK CULTIVATOR BETTER THAN PLOW.

On these farms where cultivators are not used, the general method practiced for keeping the weeds under control is to use a turning plow for barring off the beds, clearing the top by hoeing, and then bedding back again. This takes more time, and is more expensive, because the plow will not cover more than a couple of acres in a day, whereas the disk cultivator will clear at least 8 to 10 acres a day. Fenders to protect the young plants cannot be used on a plow, and in the rebedding operation a number of plants will be covered by soil, requiring an extra hand to uncover them. When the vines begin running, an extra hand is also required to rake the vines out of the way of the plow, thus adding fifteen to twenty per cent to the cost of producing the crop. The work will not be as well done as by the cultivator, for the raking of the vines out of the way of the plow and back again damages them and curtails the crop.

Care should always be exercised not to work the soil when it is too wet, or when the vines are wet with either dew or rain, for that tends to "scald" the leaves, and is detriment to a good crop yield.

HARVESTING THE CROP.

The bulk of this crop is not generally harvested until the frost occurs. The field should then be gone over, and the vines cut from the crown of the hills by means of a sharp hoe or sickle. This operation prevents the decay in the frosted vines from being communicated to the potatoes, and so causing the soft rot which shows itself soon after the potatoes are dug. If we follow this method the potatoes can ripen in the ground before we dig them, and their keeping qualities will be improved.

In the digging operation, care should be exercised to prevent injury to the tubers by cuts, scratches, or bruises, which are another source of soft rot. Where a considerable acreage is to be harvested, it will be a point of economy to use a regular potato-digger. This works better and quicker, avoids injury, and ensures the getting of all the crop from the ground.

After the digging, the crop should be allowed to lie on the ground in rows for three or four days, so as to get thoroughly dried and cured by the sun. It is as necessary to cure potatoes, both Irish and sweet, as it is to cure hay or forage.

STORING THE CROP.

How to store the sweet potato crop in such a manner as to ensure against loss by decay, is a matter that seriously concerns the farmers of the State. A considerable loss occurs in this crop every winter from preventable causes. The method of harvesting the crop are responsible for a large amount of this loss, and the methods of storing for most of the balance.

We have seldom, if ever, seen a successful sweet-potato house made by digging a hole in the ground and roofing in, or by imitating a smoke house; because both of these lack ventilition. A common practice is to make small conical piles about ten bushels each, and to cover them with soil and bark. As far as my observations goes, this method is frequently a failure, because the contents of these piles are not properly secured against rain, and are not properly ventilated. In my own practice I have found it best to store sweet potatoes in banks on the top of ground conveniently near to the barn or dwelling-house. A piece of ground running north and south, of the desired length, and about four feet wide, is levelled by means of a hoe or rake, and the potatoes are piled on this, about five feet deep, tapering to a sharp ridge. This makes a long V-shaped bank, and care is taken to have the sides with a smooth and uniform slope. After all the potatoes are piled in the bank, a good plan is to allow them to have a few days' exposure to the sum so as to become thoroughly dry, covering at night with sacks or hay to keep off the dew. Then the whole bank is covered two or three inches deep with some kind of hay, and over the hay a couple of inches of soil are thrown. The hay absorbs the moisture that is given off by the potatoes during the sweating that occurs soon after the bank is entirely covered. The soil keeps the hay in place and protects against cold. The bank should be made water-tight by means of boards laid lengthwise, with lepped edges to shed rain; or a temporary frame of scantlings can be made over the bank, and shingles or tar-paper used to keep the potatoes dry.

If the crop is stored in this way, it is less likely to rot than with ordinary methods, and it can be held uutil late in spring, when prices run high.

POULTRY RAISING.

By A. P. Spencer.

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There are about 6,000,000 farms producing poultry in the United States, but comparatively few of these raise poultry otherwise than as a side issue. Several large poultry plants are operated, but their output is but a drop in the bucket in comparison with the whole amount of poultry products produced and consumed.

The average housekeeper on the farm looks to supply her table with eggs from her own poultry yard. At times she has abundance to spare; at other times her supply of fresh eggs is limited or cut off, and she depends on stored eggs or must purchase from a neighbor or grocer, the shortage usually occuring when prices are above the average.

This shortage may be overcome if there is a better understanding of the details of poultry raising and sufficient time given to carrying them out. Successful poultry raising requires some skill and experience backed up by economical management, constant attention and constant foresight.

The average hen lays about sixty eggs in a year. Only about half the eggs placed under hens or in incubators hatch, and many chicks that hatch do not live to a marketable age. These figures are only approximate, but those who have given attention to such matters will not doubt their approximate correctness.

This is not the best that can be done after allowing for natural environments, and considering what has been learned from experimental work and using the artificial methods devised expressly for making poultry raising more profitable and less subject to failure.

Poultry production for profit up to recently was

viewed from three principal standpoints. First, production of eggs; second, production of meat; third, production of breeding stock. A new phase of the business has recently come to our attention in the production of day-old chicks for a special trade.

It matters little which phase of the business is undertaken, some vital principles must be adhered to more or less constantly or there will be little satisfaction and less profit.

In all cases it is well to start on a moderate scale. The inexperienced poultryman must get practical experience, some of which may be more or less costly. If the start is made on a small scale and well within the capacity and finances, if the methods are economical and business principles are applied, it is reasonable to expect a fair profit in return.

On the average Florida farm, poultry can be made profitable, and to do this it is important:

(1) To secure good specimens of well-bred fowls from productive stock.
(2) To feed regularly with a variety of feeds.
(3) To house comfortably and keep free from lice and mites.
(4) To furnish a constant supply of green feeds and fresh water.
(5) To see that they get exercise daily.
(6) To keep a careful supervision over them.

THE BREED TO SELECT.

Three types of poultry breeds lend themselves to the various methods of marketing.

EGG OR MEDITERRANEAN BREEDS.

Of these the White Leghorn undoubtedly have the preference in Florida. The Brown Leghorn, Black Spanish

and White Minorca have many admirers, and from the standpoint of eggs these breeds are unexcelled. They are pooor sitters and nervous and require high fences to confine them.

MEAT OR ASIATIC BREEDS.

Cochins, Langhams and Brahmas are distinctly meat breeds. They grow rapidly and make a satisfactory table fowl, and are usually inferior layers but good brooders.

GENERAL PURPOSE BREEDS.

The American or intermediate types, such as Rhode Island Reds, Barred, White and Buff Rocks, Orpington and Wyandottes are best suited to the average farmer or market poultryman. They are quite generally used and are well suited to Florida conditions. These breeds are well established and breed true to color, with the exception of the Rhode Island Reds, which have a more recent origin, and it is often difficult to secure uniformity of color with them, but as a general utility fowl the Rhode Island Red is considered one of the best. Color markings are usually of secondary importance, although there is a preference for white or yellow-skinned fowls in the best markets.

It cannot be truthfully stated that any one or two breeds are better than all others under all conditions, but in selecting the general utility it is usually good policy to adopt one that is known to be productive under fair management.

FEEDING.

Perhaps more attention has been given this phase of poultry raising than any other. Laying hens should be fed for two purposes only. First, to sustain the body,

and, second, to produce eggs. When the body has been thoroughly nourished and additional food eaten there is a daily waste from some one or more causes if they fail to lay. If they are taking on an excessive amount of fat, some of the food is being assimilated for this purpose. If there is no increase in body weight, the food may be deficient in the necessary elements for egg production, or the fowl may not lay because of indigestion or old age. For these reasons it is almost impossible to prescribe for a non-laying flock unless all the particulars about that flock are known.

The daily ration should be fairly well balanced. If the flock is not yarded and their feed is obtained from the refuse of the stable lots, insects and worms, besides some table scraps, the ration will be fairly well balanced. Poultry confined will not get this variety of feed unless it is supplied from some other source.

A mixture of equal parts of corn, wheat, and oats is a good mixture, as a morning feed; four parts is about sufficient for fifty hens. It is best to scatter the grain among litter to induce exercise. In the afternoon a mash feed (either dry or moist) is given. A good mash feed would be, equal parts of ground corn, oats, and bran, and some animal food (fed from an open hopper). Meat, meat-meal, and ground bone are good animal foods to use. For fowls not accustomed to meat meal; one-half pound per day is sufficient for twelve hens, since it has a laxative effect on the bowels and must be fed sparingly at first. Later when the fowls become accustomed to it, the amount may be increased to one pound per day. Linseed meal may be substituted in part, and is to be recommended because of its lower cost and adding variety to the ration.

Hens should have a supply of protein (muscle and bone producing) as part of their daily ration with animal food forming a part of it. Fresh meat is best, the hens relish it better when cooked, and of course it can be kept sweet

longer. Green cut bone is good although some claim it unsafe on account of the possibility of introducing tuberculosis to which poultry are subject. For summer use, meat meal and meat scraps are suitable and readily accessible. In making up the mixture, let the animal food constitute from eight to ten per cent of the ration, the actual amount depending on the particular material used, Skimmed milk is a good source and it may be both added to the mash and placed where the fowls can drink it.

Vegetable or green foods. The value of green feed for poultry lies in its ability to aid the digestive system, while it also provides with some nourishment. It promotes good health and naturally more eggs. Green feeds should be supplied liberally, even poultry having the picking of the grass and weeds that grow during the winter in Florida are benefited by an additional supply of such vegetables as cabbage, kale, and dwarf essex rape.

Sprouted grains are generally used by northern poultry men with young chicks. They are also valuable because of a ferment called "diastase" they contain that aids digestion of starch. This substance is in sprouting oats, rye, barley, and potatoes.

Fouls must have a constant supply of grit. Grit is used by hens for masticating their food. The supply must be constant and frequently renewed and unless it is sharp digestion will be imperfect. Very often it is advisable to supply some grit even when the fowls have access to a sandy yard, for if the sand is very fine, it is useless. Ground oyster shells or coarse sand are among the best forms.

Fowls must have a dust bath. A dust bath is more essential than is often considered. Hens must dust themselves to rid the body of vermin and to cleanse it and remove the scurf that is constantly exuding from the skin. The dust bath should be frequently renewed and might contain a small quantity of lime, or preferably wood ashes.

WATER A CONSTANT NECESSITY.

Water constitutes 65 per cent of the egg and about 55 per cent of the hen's body, and unless the supply is sufficient the hens will suffer for want of it. The water supplied in green feed is not nearly sufficient. Fifty laying hens will drink 6 to 10 quarts daily, and even more in hot weather if they are producing a good number of eggs each day.

Some simple automatic drinking fountains sold by dealers of poultry supplies are convenient for supplying clean water, as there is a probability of the water becoming polluted if it is supplied to a large flock from open vessels.

Materials for feeding must be fresh and free from mold; musty corn, buckwheat, and bran are inducive of digestive disorders. Kaffir corn is an exceptionally good poultry feed when clean, but unless special care is taken, it is subject to mould during the summer rains in Florida and should be examined before fed.

It is important to keep the appetite good. A light grain feed or "scratch" in the morning, a mash feed at noon (either dry or wet) and a liberal grain feed at night is recommended by good poultrymen. The crops should be full when the hens go to roost. This is especially emphasized in northern States to induce warmth during the night and is less true perhaps in Florida.

BROODY HENS.

Some breeds have a greater tendency to broodiness than others. The lighter egg breeds are less broody than the heavier meat breeds. Broodiness is a natural condition coming at the end of a continuous laying period. All hens have periods for laying and periods for resting. Whatever may be the cause, broodiness can be most effectively overcome by good care and regular feeding, to

build up bodily tissue and to get the hen in a good condition for laying again. To starve broody hens is to increase this tendency. Ducking in cold water or other abuses most commonly practiced do well to break up the broodiness.

POULTRY HOUSES.

A high dry location for the buildings is always preferable to a poorly drained one and as yards running out from the poultry houses that can be cultivated and sown to green crops are convenient, this consideration should not be overlooked. Excessive moisture brings trouble every time. Good drainage and good sanitary conditions mean much to a flock of poultry, yet there is hardly a location however flat, but what local conditions can be greatly improved by raising the level of the ground on which the house is to be constructed, twelve to fifteen inches with a few loads of light soil, thereby making it on a good location.

The open house is always to be recommended in Florida. There is no necessity for expensive structures, but only for comfort, sanitation and convenience. Small flocks usually lay best; 60 to 70 birds in a flock will give a higher average than when greater numbers are kept together, although under certain conditions several hundred may be kept together profitably. In the first case a greater number of eggs per hen are produced, while the larger flocks can be handled with less labor per hen.

Four to six square feet of floor space is sufficient for each bird. Overcrowding is injurious. With one or two sides open, or in our coldest weather covered with canvas, a free circulation of air surrounds the hens and prevents an excessive accumulation of moisture or foul air. Any structure so built as to permit drafts on the birds is faulty. The air should be cool and fresh, but drafts are responsible for much trouble. Poultry often prefer

a tree for roosting, as they object to being housed in drafty quarters. A tree gives better protection than a drafty house, but not nearly as good protection as a properly ventilated house. A concrete floor in Florida is to be recommended though not absolutely necessary. The house can be more thoroughly cleaned and the birds better protected from weasels, skunks and rats, when there is a solid floor and wire netting to cover the open slides, with doors made to fit.

The roosts should be so arranged that they can be quickly moved, and all on the same level. About thirteen inches below the roosts should be boards to collect the droppings. These boards should be tongued and grooved, and closely fitted leaving no cracks or holes to collect dirt. Clean the dropping board every day and pour a little kerosene oil over the roosts once a week. Sprinkle lime around the roosts each day and there will be little trouble with bad odors and vermin.

Darken the laying boxes, as a hen prefers a concealed corner for the nest. Clean the nest boxes frequently, dirty nests are breeding places for fleas, mites, and lice. Eggs absorb disagreeable odors, rapidly, and the quality of the egg will be injured by lying from twelve to thirty-six hours in a dirty nest. Remember always that sanitation and a free circulation of fresh air are indispensable to successful poultry raising.

Never permit sickly or weak birds to remain in the flock. If unthrifty ones are found, remove them at once, and if the sickness seems to linger, it is usually best to destroy them and burn the carcasses. Select the breeding stock from the thriftiest and most active birds of the yards. Without constitutional vigor and good health we cannot expect good returns.

Pullets are usually the best layers, but their eggs should not be used for hatching. One and two-year old hens are best to select when eggs for incubation are wanted. Keep the entire flock under three years old and

weed out the non-producers immediately they are found in the flock.

RAISING CHICKS.

Under average farm conditions most of the chicks will be hatched and mothered by hens, although incubators are rapidly coming into general use.

Hens that steal away to nest usually, but not always, succeed in raising a good brood, although often too late in the season, so we cannot count on that method for raising our best chicks. The hens that lay early are the ones that hatch the early chicks. Furthermore, the early hatched pullets do the laying during November, December and January, so that in order to have early layers one must prepare at least twelve months in advance. Early broilers bring the fancy prices, so that the success in both production and getting the best market is to be two months in advance of those who furnish the bulk and general supply of eggs and meat.

The egg supply is irregular and is always greatest during March, April, May and June, so that the price per dozen naturally declines during these months. During the remaining eight months the retail market depends more or less on the eggs stored during the laying season and cannot always supply strictly fresh eggs.

The poultry man who by proper methods has been able to get his greatest supply of eggs during the months of shortage or October, November, December, and January, gets the cream of the prices and when the market is declining these hens are raising chicks for the early market or for his laying stock the coming year. There is a special trade to be developed in every city in the South for strictly fresh eggs and well fattened nicely marketed, dressed poultry. The product must be uniform and strictly fresh and placed on the market in attractive packages. There is only a small profit in poultry raising if

the product is to go into the ordinary channel of trade, the grocery and country store, when the market is fairly well supplied. But there is a liberal profit if the special trade is catered to.

The Doan Carton Company of St. Louis, Missouri, manufactures egg cartons that will meet the demand of such a trade. Each carton will hold one dozen eggs, and the cartons are so shaped that thirty of these will exactly fill an ordinary 30-dozen egg crate. Immediately the eggs are gathered, sorted and wiped, they are placed in the carton, the lid is sealed and the date stamped on the package. The carton is made of a good quality cardboard, each egg separated from the other, so that there is little danger of breakage. The eggs are not handled again until they are finally taken out by the consumer. Such a package, convenient in size, sealed and guaranteed finds a ready sale at a higher price than the regular market offers. The carton bears the name of the producer with signature over guarantee, and the consumer finding the eggs according to guarantee wants the particular product again. The price of the cartons is $6.50 per thousand if ordered in 1000 lots or less than three-quarters of a cent each.

DAY-OLD CHICKS.

Another phase of the poultry business that has only recently attracted attention is the selling of day-old chicks. In some instances the business has grown to large proportions. One firm offers day-old chicks at 10 cents each, also offers a paper brooder that is packed and sent in the same shipment at $2.00. Hence with an expenditure of $12 the purchaser may start in the poultry business and under favorable conditions this would be a fairly satisfactory way to begin. The development of such chicks will of course depend largely on how they are cared for and the vigor of the stock. A public

hatchery in connection with an established poultry plant would undoubtedly find some business. In these hatcheries the eggs are incubated at a stated price per hundred, or eggs may be exchanged for chicks.

INDIAN RUNNER DUCKS.

By A. P. Spencer.

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Indian Runner Ducks have received attention from many people during the past five years. Their hardiness and their egglaying capability recommend them. From 200 to 250 eggs a bird is not an uncommon yearly average, when the flock is properly handled. The eggs are readily accepted in our markets in place of hen eggs. Bakeries find a ready use for the eggs, and the claim is made that two of these duck eggs are equal in food value and for cooking purposes to three hen eggs.

Unlike hens, the egg production of the Indian Runners does not diminish immediately after the second year. Even up to seven or eight years they retain their normal egg-laying powers. They are only slightly subject to diseases, and parasites are seldom, if ever, found to trouble them. These ducks are wild-natured, and have little regard for a nest, dropping their eggs in any convenient place, frequently in the water or mud. It is best to keep them in yards. Then the eggs can all be gathered, and with the better attention they receive, they lay better, the ducklings grow faster, and being less frequently disturbed by strangers they are tamer. A pond is much enjoyed by them, but is not a necessity. In fact, some people claim that the egg-production is greater without any water for swimming. Nevertheless, the ducks must have an abundance of fresh water for drinking purposes, and this especially must never be neglected.

Indian Runners, like all other live stock, require regular feeding. A meal three times a day is advocated during the laying season, and twice a day when moulting. The feed may not materially differ from a suitable ration for

hens, but as the duck utilizes less grit, it is better when moistened or made into a mash.

Indian Runner ducks are very poor sitters, so that the hatching must be done by hens or in incubators. One of the greatest hindrances to good hatches in incubators is the want of moisture during incubation, as these machines are built for hatching hens eggs and duck eggs require more moisture. Additional moisture must be supplied for a successful hatch. Even when hatched by hens, it is advisable to moisten the eggs once a week, and twice during the last week of hatching.

The eggs are usually fertile if the flocks are properly managed. Thirty or forty in a flock is large enough, with one drake to every six ducks. An 80 to 85 per cent. hatch may be expected under good conditions. If the eggs are to be bought better hatches are usually secured from flocks of sufficient size to give quantities of fresh eggs for shipment each day. While they ship fairly well, their hatching qualities (as in the case with hen eggs) are likely to be injured by long shipment or too much jolting around. So it is preferable to secure the eggs from near home when possible.

At present, we have two varieties of Indian Runners although not particularly distinct—the dark fawn and the light fawn. The American standard describes the perfect female specimen as light fawn.

There seems no claim to any superior egg production in the light fawn variety. On the other hand, the dark fawn is said to produce a whiter egg without the greenish tinge that more closely resembles a hen egg, and is more acceptable for table use.

Ducklings up to three weeks old are sensitive to cold and wet. Getting their feet into very cold water or exposure to a cold rain is almost sure to kill many. Up to five or six weeks of age, they need a good shelter with a dry floor. After that they will require little or no shelter

in Florida, and if well fed will begin laying when four and a half to six months of age.

Indian Runner ducks have many things to recommend them. They are not bothered with lice or vermin, no roup, no scaly legs, very little housing, and hawks do not molest them; but if they have access to a Florida pond, there is a danger from loss by the large turtles that are quite numerous in most sink holes, streams and ponds.

In addition to the demand for eggs, there is a growing demand for the meat, and while these ducks are not as heavy and plump as some other breeds, if they have been well cared for and kept growing, they make nice roasters, fryers and broilers at an early age.

DUCKS AND CHICKS MUST BE KEPT SEPARATE.

It is not a good plan to yard ducks and chickens together. Ducks are naturally good feeders and greedy and will get the most of the feed, and as they enjoy getting into the drinking water, will keep the drinking vessels in a dirty condition. Separate yards are best.

Indian Runner Ducks, like chickens, can be made profitable if they are properly managed. There is sufficient waste on the average farm to supply a good portion of the necessary feed, and while the ducks can be handled as a side issue on the farm, they will not give profitable returns if neglected.

IMPROVING ACID SOILS.

By A. W. Blair.

Chemist Agricultural Experiment Station.

The soil in many sections of Florida are acid (sour), which is unfavorable for the best development of many crops. Soils that are low and wet, especially muck soils, are likely to be acid. It is generally safe to assume that our pine-land soils are more or less acid if there is no indication of phosphate rock, limestone, or marl, at or near the surface. Hammock soils may also be acid, though in some cases the hammocks have a layer of marl a little below the surface.

CAUSES OF ACIDITY.

1. Alkaline materials, such as potash, soda, lime, and magnesia, which can neutralize or counteract acids, have to a large extent, been washed out of our soils by the action of drainage waters. (The State Geologist, in Bulletin No. 1, of the Geological Survey, stated that dissolved material is being carried into the sea through the Silver Springs at the rate of about 600 tons per day.) In this dissolved matter, carbonate of lime greatly predominates.

2. Organic matter, such as grass, weeds, or stalks, decays in the soil with the formation of organic acids, which on account of their slow solubility tend to accumulate in soils not well supplied with alkaline materials like lime.

3. Certain fertilizing materials, sulphate of ammonia in particular, tend to increase the acidity of soils that are naturally deficient in alkaline materials, owing to the plants using the ammonia to a greater extent than they do the sulphuric acid.

CORRECTIVES.

Alkaline materials generally, will counteract or neutralize any acid. In improving an acid soil, the aim should be to get an alkaline material that is cheap and that can be easily handled. To a large extent, lime in its different forms fulfills these requirements.

Carbonate of lime is the form that occurs naturally. It is found as crystallized limestone or marble, as massive limestone rock, as marl, and as shells. It also occurs in certain soils in a newly divided state as the result of the decomposition of some of the above named materials. Examples of such soils are found in the Bluegrass regions of Kentucky, and Southwest Virginia. Carbonate of lime, in any form, if ground fine and worked into an acid soil in sufficient quantities, will correct the sourness. It will not take effect as rapidly as quick-lime, nor is it as concentrated. It should, however, be much cheaper. One hundred pounds of pure quick-lime are equivalent to 170 pounds of pure limestone; but, because of impurities, it would perhaps be best to take 200 pounds of carbonate of lime, in the form of ground limestone or ground shells, as the equivalent of 100 pounds of pure quick-lime.

Slaked Lime (hydrated lime) is made by slaking quick-lime with just enough water to convert it into a fine powder. One hundred and thirty-two pounds of slaked lime prepared in this way are equivalent to 100 pounds of pure quick lime.

Unbleached hardwood ashes contain about 25 to 30 per cent. of lime in addition to 4 to 6 per cent. of potash, and when they can be had at a reasonable price they may be used with profit on acid soils.

Basic, or Thomas, Slag contains about 40 per cent. of lime in addition to 17 or 18 per cent. of phosphoric acid, and if a moderate application of lime is needed along with a heavy application of phosphoric acid, this may be used. In our experiments with pineapples, basic slag has given good results.

APPLICATION.

If ground limestone or shells are used, and the soil is found to be highly acid (by testing with litmus paper), two tons per acre in two or three years will not be excessive. If the soil is only slightly acid, one ton per acre may suffice. Only half the amount need be applied if quick-lime is used. Old, thoroughly air-slaked, lime may be used in about the same amount as ground limestone.

Lime may be applied at almost any time, though it would perhaps be better to apply it during the late winter or early spring, so that it may be thoroughly worked into the soil before the rainy season sets in. If fertilizers containing sulphate of ammonia are used, it would be better to apply the lime one month before or one month after the fertilizer application.

CROPS BENEFITED BY LIME.

Most vegetable and fruit crops are benefitted by the use of the lime where there is a tendency to acidity of the soil. It has, however, been shown that watermelons do best on an acid soil. It has also been shown that lime makes the conditions more favorable for the development of scab on the Irish potato.

With celery, lettuce, cabbage, citrus fruits, hay, and forage crops, it may be used liberally.

COWPEAS FOR HAY AND FOR SOIL BUILDING.

By C. K. McQuarrie.

Assistant Superintendent Farmers' Institutes, Gainesville, Fla., March 27, 1912.

Our system of agriculture in this State (and in the South generally) has paid too little attention to growing legume crops as soil improvers. The farmer has thus been compelled to make large outlays for commercial fertilizers, which really never build the soil to the point of increased crop yields annually. We have been neglecting one of the most important methods of soil building known to agriculture. One of the best of the legume family for this purpose is the cowpea, and it is safe to say that no one crop known can add more to our agricultural wealth. Hay of the best quality can be made from it, and nearly four times as high in digestible protein as timothy hay. Its power to collect the free nitrogen of the air and store it in the form of nodules on the roots, thus increasing soil fertility, enables the farmer to grow succeeding crops without expensive nitrogenous fertilizers.

PLANTING COWPEAS.

To make the best of the cowpea crop there are two distinct periods in which it should be planted to enable the farmer to get hay of good quality. The first planting should be done as early in spring as possible so as to have the crop cut and cured for hay before the rainy season occurs. The other planting should be done in July, (or early in August) so as to have the crop come off in the fall when dry weather prevails.

VARIETIES TO PLANT.

On land where a winter crop that depletes the soil has been grown, such as cabbage, rape, or any of the small grains, a good plan for soil recuperation is to grow a legume crop immediately thereafter. The cowpea fits in there just right, and by making the crop into hay, the land will be in good condition to bear a profitable fall crop of some kind suitable to the soil and system of farm management. The variety of seed to be used should be carefully considered, for while there are upwards of fifty distinct types of the cowpea, there are very few that are suitable for early planting. Another point for consideration is the immunity of the variety we use to root-knot and wilt. On land where the root-knot is known to prevail, cowpeas of any variety are subject to it, and in that case we had better use the velvet or Lyon beans for a legume crop. There are two varieties of cowpeas that are known to be more resistant to root-knot than others, the Iron and Brabham, and they are desirable types for hay-making purposes.

PREPARING FOR COWPEAS.

The land for cowpeas should be well prepared by thorough plowing and pulverization of the soil. The success of any crop depends a good deal on the seed-bed prepared for it. An application of about 400 pounds per acre of acid phosphate should be broadcasted and harrowed in before planting the seed. On soil that is in a good mechanical condition it will be advisable to sow the seed "broadcast," using about seven pecks to the acre and using a drill for the purpose. If no drill is available, the seed can be sown by hand and worked into the soil with a cultivator, smoothing the surface with a harrow or weeder. On thin soil it is advisable to sow in drills about thirty inches apart and cultivate the growing crops several

times. In that case about five pecks of seed per acre will be sufficient.

COWPEA MIXTURES.

Some of our farmers get excellent results from cowpea mixtures; that is, sowing other seeds with the cowpeas. This practice is generally recommended for the purpose of easier curing of the hay, as the mixture being of different texture cures more readily than if of one kind. A mixture that is very popular is sorghum and cowpeas. The Early Amber sorghum is the best, as its growing period comes near that of the cowpeas. If both are sown at the same time, five pecks of cowpeas and two pecks of sorghum broadcasted or drilled in is sufficient for an acre.

Cowpeas and German millet are another good combination, for the period of growth of the millet and the earlier varieties of cowpeas correspond sufficiently to make the product desirable, and the millet aids considerably in curing the hay. Cowpeas and soy beans are also a good combination, using the larger varieties of the soy bean, such as the Mammoth Yellow, and the slower growing varieties of cowpeas, such as the Clay and the Whippoorwill.

On some of the older fields of the State in the northern and western portion, Johnson grass has become more or less a pest. In fields where it abounds, cowpeas can be disked on the land at the rate of six to seven pecks per acre. The disking of the Johnson grass roots tends to a better stand of grass, and the peas mixed with it makes excellent hay. If the seed is planted in early April, the hay can be cut in about sixty to seventy days, and will be one of the best hays it is possible to get. This method of treating Johnson grass lands solves a difficult problem, as you cannot grow a cultivated crop successfully where it abounds.

CURING THE CROP.

To get the best quality of hay the cowpea crop must not be allowed to get too ripe. At the blooming stage all the nutriment is in the plant, when it starts to make the seed to perpetuate its kind. The best time to cut cowpeas for hay is when the first pods are in the snap stage. As this hay requires careful handling it should not be cut when wet with either rain or dew. Cut in the forenoon, and as soon as wilted rake it into windrows and put it in small cocks the same afternoon. Hay-cock covers are useful if unfavorable weather prevails, and they will then repay their cost several times over. They can be made from seventy-two-inch muslin, cut into squares, soaked in raw linseed oil, and wrung dry. They should have string loops on the corners, so as to fasten them to the cocks by wooden pins. Very thin muslin is best, for if thick muslin is used it causes the hay to sweat, and is no more effective in shedding rain.

Next day open up these cocks in a loose manner, exposing the hay to the sun as little as possible, or the shedding of the leaves is apt to occur. Test the hay by twisting a bunch in the hand. If no moisture shows haul it to the barn. It will undergo a sweating process there, but that will only make it the more palatable, and better cured. It will overcome the sweat all right, if left alone, and when it cools off will make a superior grade of hay.

The feeding value of cowpea hay and of its mixtures has long been recognized as of a high order, the hay being equal in protein content to the best bran, and high in carbohydrates. In dairy feeding, well-cured cowpea hay, cut at the right stage, is equal pound for pound to the ordinary bran used for feeding.

TO ENCOURAGE SHEEP RAISING ON SOUTHERN FARMS.

By U. S. Dept. of Agriculture.

As Ranges Are Reaching Their Limit of Production Farms Should Profit by Increased Demand for Sheep Products.

The consumption of mutton per capita in the United States is increasing every year, though the amount used is much less in proportion to other meat than in Europe. There are good reasons for expecting a continuation of good prices for mutton and lamb, and the demand for wool also may be expected to increase more rapidly than the production. These facts are brought out in a recent letter from a scientist of the Department of Agriculture to a Southern farmer who inquired regarding the possibilities of the sheep business.

The Department's specialist called attention to the fact that while farm-raised sheep have often not been profitable, this has usually been because of lack of proper attention and management. Variations in price of wool and mutton have stood in the way of such general interest in sheep as would cause them to be regarded as highly as they should be in the future. Ranges all over the world are now carrying about as many sheep as they can support under a strict range system, and an increase in the production of sheep products must come mainly from farms. Here, then, is the farmer's opportunity to take advantage of the increased consumption of these products.

While mutton can be produced at low cost and there is a growing demand for it, difficulty in selling may be experienced in sections where the amount of live stock produced has not been sufficient to make it worth while for regular buyers to operate. Slaughtering plants that

can handle carloads are within reach of all sections and if a sufficient number of neighbors combine to have one hundred lambs of similar breeding, size and condition to ship jointly the returns are assured. It will also be possible to secure visits and bids from buyers when such a number is promised. The lamb clubs of Tennessee, notably the one at Goodlettsville, have proven very successful in this work.

The same organization can also be used in disposing of the wool.

In countries where economy in farm management has been studied a long time, the sheep is considered to be necessary in utilizing vegetation on such waste lands as are not wet or marshy. But the sheep can hold its place on high-priced land as a meat producer alone. Compared with large animals it has some important advantages. First, the lambs mature very rapidly, being marketable at four months of age or later, according to breeding and feeding. This is an economy because a larger proportion of the total feed goes into increase of weight than in slower growing animals. Second, the sheep consumes a greater variety of plants than do other animals. Many of such plants are detrimental to pastures and would otherwise require hand labor to hold them in check. Third, grain waste in harvesting can be entirely recovered by sheep. These facts prompt some farmers to claim that the summer food of sheep costs nothing, because what they consume would otherwise bring no returns.

Compared with hogs the sheep has an advantage in the wider variety of materials it consumes. Being a reminant it makes its gain with a minimum of grain and expensive concentrates. This is especially important on some southern lands that are better adapted to the production of forage crops than to grain growing.

Like the hog, the sheep has its peculiar ailments which sometimes result in loss as well as discouragement. Unlike the ailments of the hog, however, those of the sheep

are ordinarily not contagious, and the means necessary to prevention are the same as should be adopted for the most economical production, even in health.

The most serious menace to continuous thrift in the flock is the presence of internal parasites, chiefly stomach worms. The eggs of the stomach worm are dropped upon the ground with the feces from infected sheep. The small worms are swallowed with the grass three or four days after hatching from the eggs, and reach the stomach. Stomach worms are frequently present in such large numbers as to draw so heavily from the circulation as to cause emaciation and finally death of the lamb. Mature sheep are much less affected by these worms, though they usually scatter the eggs.

Keeping the flock upon crops sown upon plowed land prevents infection. Such practice also furnishes the greatest amount of feed from each acre and the kind and variety of food upon which sheep thrive best. Plowing the land prevents danger from stomach worm eggs dropped upon it. In warm weather the flock should be moved to fresh ground every ten days or two weeks to prevent infection of lambs by larvae from eggs dropped from the ewes. If lambs are by themselves the time between changes might be longer, but in most forage crop rotations changes will need to be made every two or three weeks. Fall-sown rye, spring oats and vetches or peas, rape, cowpeas, soy beans, crimson or Japan clover, planted at proper intervals, will furnish fresh pasturage at times desired. Some of the land can be used twice in a year, as by having one planting of rape upon the rye ground. The cultivation of the land destroys all infection from previous pasturing. Under such a system of cropping and grazing the land will improve, as the manurial value of the crops is practically all left upon the land and is very evenly distributed. Like the boll weevil, the stomach worm was considered to be wholly an evil thing until it was found that the methods of prevention and circum-

vention were also the best methods for economical production.

In most parts of the South ewes drop their lambs in November or December. Stomach worms are much less troublesome in the cooler months. Also rape and some other forages will furnish good winter feed if planted early enough to make a fair growth before the coldest weather. Lambs marketed in March or April sell at a premium because of the market scarcity of genuine spring lambs at that time of the year.

TO PROTECT SHEEP FROM DOGS.

The dog question is a serious one in many sections, and better State legislation is needed to protect flocks from the ravages of worthless curs. Woven wire fences will turn dogs. While it is expensive to fence large pastures in this way, smaller fields devoted to forage crops will carry the flock in a more healthy condition and require much less outlay for fencing. The whole forage crop area can be fenced and lower portable fences used for confining the sheep to the particular crop ready for grazing.

It is seldom that the highly bred and well-kept dogs attack sheep. The roving nondescripts do most of the damage. Communities in which the majority of people consider sheep to be of more importance than dogs will have a sentiment that is not heathful for dogs that travel independently.

SEASONS AND DATES FOR PLANTING VEGETABLES AND OTHER CROPS IN FLORIDA.

The following lists include what experience demonstrates can be successfully grown each month as the season most suitable for each variety comes around in the several sections of the State.

NORTH AND WEST FLORIDA.

January—Asparagus seed, Brussels Sprouts, Cabbage Seed and Plants, Cauliflower seed, Collards, Leeks, Lettuce, Mustard, Onion sets, Radishes, Rape, Spanish Onion seed, Tomato seed, Turnips, Oats, Strawberry Plants.

February—Asparagus seed, Early corn, Brussels Sprouts, Cabbage, Carrots, Collards, Eggplant seed, English Peas, Irish Potatoes, Kale, Leeks, Lettuce, Onions, Parsley, Parsnip, Pepper seed, Rutabagas, Salsify, Spinach, Beets, Turnips.

March—Beans, Beets, Brussels Sprouts, Cantaloupes, Carrots, Collards, Cowpeas, Cucumbers, Early Field Corn, Cotton, Eggplant, English Peas, Irish Potatoes, Kale, Kohlrabi, Leek, Okra, Parsley, Parsnip, Pepper, Pumpkin, Radish, Rape, Rutabagas, Salsify, Squash, Sugar Corn, Watermelons, Tomato, Turnip, Sugar Cane, Japanese Cane.

April—Beans, Cantaloupes, Cowpeas, Cucumber, Eggplant, English Peas, Irish Potatoes, Kohlrabi, Lettuce, Okra, Parsley, Parsnip, Peppers, Pumpkins, Radishes, Rutabagas, Squash, Sugar Corn, Field Corn, Sweet Potatoes, Cotton, Tomatoes, Turnips, Watermelons, Sorghum.

May—Beans, Butter Beans, Cantaloupes, Cowpeas, Cucumbers, Eggplant, Okra, Peppers, Pumpkins, Squash,

Sugar Corn, Sweet Potatoes, Tomato Plants and seed, Watermelons, Sorghum, Velvet Beans.

June—Butter Beans, Cowpeas, Eggplant, Peppers, Squash, Sweet Potatoes, Tomatoes, Watermelons.

July—Cowpeas, Eggplant, Parsley, Peppers, Pumpkin, Rutabagas, Squash, Sweet Potatoes, Tomato Plants and seed, Watermelons, Sorghum.

August—Beans, Beets, Cabbage, Cauliflower seed, Carrots, Cowpeas, Cucumbers, Collards, Eggplants, Irish Potatoes, Kale, Kohlrabi, Okra, Onions, Rape, Rutabagas, Salsify, Spinach, Squash, Tomatoes, Turnips, Celery seed.

September—Beets, Brussels Sprouts, Cabbage, Carrots, Cauliflower plants, Celery plants, Collards, Cowpeas, English Peas, Irish Potatoes, Kale, Leeks, Lettuce, Mustard, Onion sets, Parsnip, Radishes, Rape, Rutabagas, Salsify, Spinach, Turnips.

October—Beets, Bermuda Onion seed, Brussels Sprouts, Cabbage, Carrots, Cauliflower plants, Celery plants, Collards, Kale, Leeks, Lettuce seeds and plants, Mustard, Onion sets, Parsnips, Radishes, Rape, Spinach, Turnips.

November—Beets, Brussels Sprouts, Cabbage seeds and plants, Carrots, Collards, Kale, Lettuce, Mustard, Onion sets, Parsnip, Radishes, Rape, Spinach, Turnips, Oats, Rye, Strawberry Plants, Vetch and Crimson Clover.

December—Cabbage plants and seed, Collards, Leeks, Lettuce plants and seed, Mustard, Onions, Radishes, Rape, Oats, Rye, Strawberry Plants, Vetch and Crimson Clover.

The following list includes what experience demonstrates can be successfully grown each month as the season most suitable for each variety comes around in the section of the State mentioned below.

CENTRAL FLORIDA.

January—Asparagus seed, Brussels Sprouts, Cabbage

seed and plants, Cauliflower seed, Collards, Leeks, Lettuce, Mustard, Onion sets, Radishes, Rape, Spanish Onion seed, Tomato seed, Turnips, Eggplant seed, Oats.

February—Asparagus seed, Early corn, Sea Island Cotton, Beans, Brussels Sprouts, Cabbage, Cantaloupes, Carrots, Collards, Cucumbers, Eggplant seed, English Peas, Irish Potatoes, Kale, Leeks, Lettuce, Onions, Parsley, Parsnip, Pepper seed, Rutabagas, Salsify, Spinach, Windsor Beans, Beets.

March—Beans, Beets, Brussels Sprouts, Cantaloupes, Carrots, Cauliflower, Collards, Cowpeas, Cucumbers, Early Corn, Eggplant, English Peas, Irish Potatoes, Kale, Kohlrabi, Leek, Okra, Onion, Parsley, Parsnip, Pepper, Pumpkin, Radish, Rape, Rutabagas, Salsify, Squash, Sugar Corn, Watermelons, Tomatoes, Turnips, Sea Island Cotton.

April—Beans, Cantaloupes, Collards, Cowpeas, Cucumbers, Eggplant, English Peas, Irish Potatoes, Kohlrabi, Lettuce, Okra, Onion Plants, Parsley, Parsnip, Peppers, Pumpkin, Radishes, Rutabagas, Squash, Sugar Corn, Dasheens, Sweet Potatoes, Tomatoes, Turnips, Watermelons, Velvet Beans.

May—Beans, Butter Beans, Cantaloupes, Collards, Cowpeas, Cucumbers, Eggplant, Okra, Peppers, Pumpkins, Squash, Sugar Corn, Sweet Potatoes, Tomato plants and seed, Watermelons, Velvet Beans, Dasheens.

June—Butter Beans, Cabbage seed, Cauliflower seed, Celery seed, Cowpeas, Eggplant, Peppers, Squash, Sweet Potatoes, Tomatoes, Watermelons.

July—Cabbage seed, Cantaloupes, Cauliflower seed, Celery seed, Cowpeas, Eggplant, Parsley, Peppers, Pumpkin, Rutabagas, Squash, Sweet Potatoes, Tomato plants and seed, Watermelons.

August—Beans, Beets, Cabbage, Cauliflower seed, Carrots, Cowpeas, Cress, Cucumbers, Collards, Eggplant, Irish Potatoes, Kale, Kohlrabi, Okra, Onions, Rape, Ruta-

bagas, Salsify, Spinach, Squash, Tomatoes, Turnips, Windsor Beans, Celery seed.

September—Beets, Brussels Sprouts, Cabbage, Carrots, Cauliflower plants, Celery plants, Collards, Cowpeas, Cucumbers, English Peas, Irish Potatoes, Kale, Leeks, Lettuce, Mustard, Onion sets, Parsnip, Radishes, Rape, Rutabagas, Salsify, Spinach, Squash, Turnips.

October—Beets, Bermuda Onion seed, Brussels Sprouts, Cabbage, Carrots, Cauliflower plants, Celery plants, Collards, Kale, Leeks, Lettuce seed and plants, Mustard, Onion sets, Parsnip, Radishes, Rape, Spinach, Turnips, Strawberry Plants.

November—Beets, Brussels Sprouts, Cabbage seed and plants, Carrots, Collards, Kale, Lettuce, Mustard, Onion sets, Parsnip, Radishes, Rape, Spinach, Turnips, Oats, Rye, Strawberry Plants.

December—Cabbage plants and seed, Collards, Leeks, Lettuce plants and seed, Mustard, Onions, Radishes, Rape, Strawberry Plants, Oats.

The following list includes what experience demonstrates can be successfully grown each month as the season most suitable for each variety comes around in the section of the State mentioned below.

TAMPA, ORLANDO, TITUSVILLE AND SOUTHWARD.

January—Beans, Beets, Brussels Sprouts, Cabbage plants and seed, Carrots, Cauliflower seed, Collards, Eggplant seed, Irish Potatoes, Kale, Kohlrabi, Lettuce, Mustard, Radishes, Rape, Spanish Onion seed, Spinach, Tomato seed, Turnips, Corn, Oats.

February—Adams Early Corn, Beans, Beets, Brussels Sprouts, Cabbage, Cantaloupes, Carrots, Cucumbers, Eggplant seed, Irish Potatoes, Kale, Lettuce, Okra, Onions,

Pepper seed, Spinach, Squash, Windsor Beans, Field Corn.

March—Beans, Beets, Brussels Sprouts, Cantaloupes, Cauliflower, Cowpeas, Cucumbers, Early Corn, Eggplant, Irish Potatoes, Lettuce, Mustard, Okra, Onions, Pepper, Pumpkin, Radish, Squash, Sugar Corn, Tomatoes, Watermelons, Velvet Beans.

April—Beans, Collards, Cowpeas, Cucumbers, Eggplant, Kohlrabi, Okra, Radishes, Squash, Sugar Corn, Sweet Potatoes, Tomatoes, Onion plants, Pepper, Pumpkins, Velvet Beans.

May—Beans, Butter Beans, Cowpeas, Eggplant, Okra, Peppers, Pumpkins, Squash, Sugar Corn, Sweet Potatoes, Tomatoes.

June—Butter Beans, Cabbage seed, Celery seed, Cowpeas, Eggplant seed, Peppers, Squash, Sweet Potatoes, Tomato plants and seed, Watermelons.

July—Cabbage seed, Cantaloupes, Celery seed, Cowpeas, Eggplants and seed, Peppers, Pumpkins, Squash, Sweet Potatoes, Tomato plants and seed, Watermelons.

August—Beans (snap), Cabbage seed, Cantaloupes, Carrots, Cauliflower seed, Collards, Cowpeas, Cucumbers, Eggplant, English peas, Irish Potatoes, Kale, Kohlrabi, Lettuce, Mustard, Onions, Peppers, Pumpkins, Radishes, Rape, Rutabagas, Spinach, Squash, Swiss Chard, Tomatoes, Turnips, Windsor Beans.

September—Beets, Brussels Sprouts, Cabbage plants and seed, Carrots, Celery seed and plants, Collards, Cowpeas, Cucumbers, English Peas, Irish Potatoes, Kale, Lettuce, Mustard, Onion sets, Radishes, Rape, Rutabagas, Spinach, Squash, Swiss Chard, Turnips.

October—Beets, Bermuda Onion seed, Brussels Sprouts, Cabbage plants and seed, Carrots, Celery seed, Collards, Kale, Lettuce plants and seed, Mustard, Onion sets, Radishes, Rape, Rutabagas, Spinach, Swiss Chard, Turnips, Strawberry Plants, Oats.

November—Beets, Brussels Sprouts, Cabbage plants

and seed, Carrots, Celery seed and plants, Collards, Kale, Lettuce, Mustard, Onion sets, Radishes, Rape, Rutabagas, Spinach, Swiss Chard, Turnips, Oats, Strawberry Plants.

December—Cabbage plants and seed, Celery plants, Collards, Lettuce plants and seed, Mustard, Onion sets and plants, Radishes, Rape, Spanish Onion seed, Swiss Chard, Oats, Strawberry Plants.

SOME OTHER USEFUL INFORMATION.

LENGTH OF TIME REQUIRED FOR VEGETABLE SEED TO GERMINATE.

The following periods are about the time it takes to sprout after being sown; of course, these periods vary somewhat according to the age of the seed, but more so upon the conditions of the weather and the soil.

Beans	from	4	to	8 days.
Cabbage and cauliflower	from	4	to	8 days.
Beets	from	8	to	15 days.
Collards	from	4	to	8 days.
Carrots	from	14	to	20 days.
Celery	from	12	to	20 days.
Corn	from	5	to	9 days.
Cukes	from	4	to	10 days.
Egg Plants	from	7	to	20 days.
Lettuce	from	3	to	5 days.
Muskmelon and cantaloupe	from	5	to	10 days.
Watermelons	from	6	to	12 days.
Mustard	from	3	to	5 days.
Onions	from	6	to	12 days.
Parsley	from	20	to	30 days.
Peas	from	5	to	10 days.
Pepper	from	8	to	15 days.
Radishes	from	3	to	5 days.
Spinach	from	8	to	15 days.
Squash	from	6	to	9 days.
Tomatoes	from	6	to	12 days.
Turnips	from	3	to	5 days.

THE AVERAGE TIME IN FAVORABLE SEASONS FOR PLANTS TO MATURE, FROM THE SOWING OF THE SEED.

Bush beans, from 40 to 50 days, according to variety.
Pole beans, from 60 to 90 days, according to variety.

Beets, from 60 to 75 days, according to variety.
Cabbage, from 60 to 100 days, early varieties.
Cabbage, from 100 to 120 days, medium early varieties.
Cabbage, from 150 to 190 days, late varieties.
Carrots, from 60 to 75 days, according to varieties.
Cauliflower, from 100 to 150 days, according to varieties.
Celery, about 150 days, Golden Self Blanching variety.
Corn, from 70 to 90 days, according to variety.
Cucumbers, from 60 to 80 days, according to variety.
Eggplants, about 120 days.
Lettuce, from 60 to 90 days, according to variety.
Melons, from 80 to 90 days, according to variety.
Mustard, about 35 days.
Okra, about 70 days.
Onions, from 120 to 130 days, according to variety.
Peas, from 60 to 70 days, according to variety.
Pepper, from 100 to 120 days, according to variety.
Potatoes, from 85 to 100 days, according to variety.
Radishes, from 25 to 35 days, according to variety.
Squash, about 60 days, for early varieties.
Squash, about 120 to 150 days, for late varieties.
Spinach, from 50 to 60 days.
Tomatoes, from 110 to 130 days, according to variety.
Turnips, from 60 to 90 days, according to variety.

QUANTITY OF SEED REQUIRED FOR A GIVEN NUMBER OF HILLS.

Pole beans	1 pint	to	100 hills.
Corn, sweet	½ pint	to	100 hills.
Cucumbers	1 ounce	to	50 hills.
Watermelons	1 ounce	to	30 hills.
Okra	1 ounce	to	100 hills.
Pumpkins	1 ounce	to	30 hills.
Squash	1 ounce	to	30 hills.
Muskmelons	1 ounce	to	50 hills.

QUANTITY OF SEED FOR A GIVEN LENGTH OF DRILLS.

Beets	1 ounce	to	60 feet of drills.

Beans, bush	½ pint	to 50	feet of drills.
Carrots	1 ounce	to 150	feet of drills.
Okra	1 ounce	to 75	feet of drills.
Onions, seed	½ ounce	to 100	feet of drills.
Onions, sets	1 quart	to 40	feet of drills.
Parsley	1 ounce	to 150	feet of drills.
Peas	1 quart	to 100	feet of drills.
Radishes	1 ounce	to 100	feet of drills.
Spinach	1 ounce	to 100	feet of drills.
Turnips	1 ounce	to 175	feet of drills.

QUANTITY OF SEED REQUIRED FOR GIVEN NUMBER OF PLANTS.

Cabbage	1 ounce for	2,000 plants.
Cauliflower	1 ounce for	2,000 plants.
Collards	1 ounce for	2,000 plants.
Celery	1 ounce for	7,500 plants.
Eggplant	1 ounce for	1,500 plants.
Lettuce	1 ounce for	3,000 plants.
Pepper	1 ounce for	1,500 plants.
Tomatoes	1 ounce for	3,000 plants.

NUMBER OF PLANTS TO THE ACRE AT GIVEN DISTANCES.

12 inches by 3 inches	174,240 plants.
12 inches by 12 inches	43,560 plants.
18 inches by 3 inches	116,160 plants.
18 inches by 12 inches	29,040 plants.
18 inches by 18 inches	19,360 plants.
24 inches by 18 inches	14,520 plants.
24 inches by 24 inches	10,890 plants.
30 inches by 12 inches	17,424 plants.
30 inches by 20 inches	10,454 plants.
30 inches by 24 inches	8,712 plants.
30 inches by 30 inches	6,970 plants.
36 inches by 3 inches	58,080 plants.
36 inches by 12 inches	14,520 plants.
36 inches by 18 inches	9,680 plants.

36 inches by 24 inches.....	7,260 plants.
36 inches by 36 inches.....	4,840 plants.
48 inches by 24 inches.....	5,445 plants.
48 inches by 30 inches.....	4,356 plants.
48 inches by 36 inches.....	3,630 plants.
48 inches by 48 inches.....	2,723 plants.
60 inches by 36 inches.....	2,901 plants.
60 inches by 48 inches.....	2,178 plants.

PART II.

CROP ACREAGES AND CONDITIONS.

DIVISION OF THE STATE BY COUNTIES.

Following are the divisions of the State, and the counties contained in each:

Northern Division.

Franklin,
Gadsden,
Hamilton,
Jefferson,
Lafayette,
Leon,
Liberty,
Madison,
Suwannee,
Taylor,
Wakulla—11.

Western Division.

Bay,
Calhoun,
Escambia,
Holmes,
Jackson,
Santa Rosa,
Walton,
Washington—8.

Northeastern Division.

Alachua,
Baker,
Bradford,
Clay,
Columbia,
Duval,
Nassau,
Putnam,
St. Johns—9.

Central Division.

Citrus,
Hernando,
Lake,
Levy,
Marion,
Orange,
Pasco,
Seminole,
Sumter,
Volusia—10.

Southern Division.

Brevard,
Dade,
DeSoto,
Hillsborough,
Lee,
Manatee,
Monroe,
Osceola,
Palm Beach,
Pinellas,
Polk,
St. Lucie—12.

DEPARTMENT OF AGRICULTURE

W. A. McRAE, Commissioner. H. S. ELLIOT, Chief Clerk

CONDENSED NOTES OF CORRESPONDENTS

By Divisions.

Northern Division.—The climatic conditions existing in this district are considerable different from last year at this time. Then the whole country, practically, was deluged with excessive rains. This season the excessive rains are absent but the spring has been unusually cold. The rains that we have had have fallen pretty generally and have been of benefit more than otherwise. On account of the cool weather existing planting has been late again this year and many farmers throughout the country have not yet completed the breaking of land for corn or cotton. The crop planted and being planted this year is about the same as last year. The low price of cotton more than anything else is responsible for the shortness of the acreage. There has been a considerable increase in the acreage planted to grain crops, corn, oats, sugar cane and, in fact, all of the field or standard crops have been increased in acreage this year, something that we think a great deal better than planting so much cotton at prices that do not return a profit sufficient to make it a desirable crop in this country.

Western Division.—The same conditions, practically, exist throughout this section as in the one previously mentioned. Breaking of land and planting of crops is also behind and is in really about the same condition as last year. In many instances, perhaps about one half, the planting will not be completed until May, especially

if climatic conditions continue as at present dry. In this district the planting of the standard field crops has if climatic conditions continue as at present, dry. In fact, there is more attention paid to the growing of standard field crops than formerly, exclusive of cotton. One reason for this is that more attention is being given to the growing of live stock, and to make live stock growing worth while it is necessary to plant a large acreage of standard and forage crops.

NORTHEASTERN DIVISION.—About the same conditions exist in this district as in the previous ones. There is really little difference in conditions in the whole northern and western sections of the State, the climatic conditions being practically the same and the character of crop growing being about the same. Of course the nearer the eastern section of the State a little more diversion in crops is obtained through the growing of vegetables for market as well as fruits that are better adapted to that section than the northern and western. In this section crops are planted earlier than in the others and the character of the soil being different in the eastern section it is in a cultivable condition earlier than in the northern and western. As far as precipitation is concerned in all of these sections it has been just about right for the breaking of land and the planting of the crops. The difficulty has been that it has been unseasonably cool and late cold snaps in various localities have to some extent injured a few of the tender and foremost of the vegetable crops. At this time, however, all of these crops are in good condition and it is expected that good results will be attained. In some sections of this district sea island cotton is grown to a considerable extent, but the acreage planted and being planted to sea island cotton is barely holding its own with years past. It is early enough, however, in the season to plant additional crops and increase the acreage should it be desired or appear profitable to do so.

CENTRAL DIVISION.—There is practically no difference in climatic conditions in this district from those above referred to. The same conditions, practically, obtain throughout the State as a matter of fact. The vegetable crops are not doing so well in this district as last year in some localities, but in other localities they are improved over last year. There has been no excessive rain fall of consequence to damage crops in this section. Only in one or two localities has any damage been inflicted by the elements, but as a whole this district is in good condition. The fruit trees in the southern portion of the district especially, are putting on an unusually heavy bloom and the indications are that the fruit crop this year will be larger than ever before.

SOUTHERN DIVISION.—As far as climatic conditions are concerned, the southern division is practically in the same condition and has been subject to about the same influences that the rest of the State has had to contend with. In nearly all sections of this division crops have been good, only in a few localities have they been affected by unseasonable temperature or other climatic conditions. The fruit trees are in excellent condition and our reports show that in all sections the bloom on both the orange and grape fruit trees is greater than has been for many years, thus indicating an unusually heavy crop of fruit. There is in this district a notable increase in a number of what has heretofore been scarce crops, as avocado pears, mangoes and others. This year these crops bid fair to exceed any former crops by a large percentage. It does not matter, however, how large the out put of these crops will be it will be many years before they can hope to supply the demand, consequently, we look upon these fruits as among those most profitable to grow and that will be for many years to come. The indications are generally throughout this season for fine crops. Acreages have in the majority of cases been increased and climatic conditions have been in general

quite favorable. Under these circumstances with the usual care and direction there should be abundant crops to harvest next fall.

REPORT OF ACREAGE AND CONDITION PER CENT OF CROPS PLANTED AND BEING PLANTED FOR THE QUARTER ENDING MARCH 31, 1914.

COUNTIES.	*Upland Cotton.*	*Sea Island Cotton.*	*Corn.*
Northern Division.	Acreage.	Acreage.	Acreage.
Franklin	...	...	90
Gadsden	75	...	100
Hamilton	...	100	100
Jefferson	85	90	100
Lafayette	...	90	100
Leon	100	...	110
Liberty	...	85	100
Madison	100	70	100
Suwannee	...	100	110
Taylor	...	100	100
Wakulla	95	...	100
Div. Average per cent.	91	91	101
Western Division.			
Calhoun	...	...	100
Escambia	75	...	125
Holmes	105	...	120
Jackson	100	...	110
Santa Rosa	100	...	105
Walton	90	...	100
Washington	100	...	100
Div. average per cent.	97	...	109
Northeastern Division.			
Alachua	...	90	100
Baker	100	100	110
Bradford	...	100	100
Clay	...	100	100
Duval	...	...	100
Nassau	100	100	125
Putnam	...	...	115
St. Johns	...	...	100
Div. Average per cent.	100	98	106
Central Division.			
Hernando	...	...	100
Lake	...	...	105
Levy	...	...	60
Marion	100	98	105
Orange	...	...	110
Pasco	...	...	100
Seminole	...	...	100
Volusia	...	...	100
Div. Average per cent.	100	98	96
Southern Division.			
Brevard	...	...	...
Dade	...	...	...
DeSoto	...	...	100
Hillsboro	...	...	100
Lee	...	...	110
Manatee	...	...	...
Osceola	...	...	120
Palm Beach	...	...	...
Pinellas	...	...	...
Polk	...	...	110
St. Lucie	...	...	...
Div. Average per cent.	...	...	110
State Average per cent.	97	96	104

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Oats.*	*Sugar Cane.*	*Broom Corn.*
Northern Division.	Acreage.	Acreage.	Acreage.
Franklin	...	100	...
Gadsden	100	65	...
Hamilton	65	100	...
Jefferson	75	95	...
Lafayette	70	90	...
Leon	100	100	...
Liberty	100	100	...
Madison	100	100	...
Suwannee	100	100	...
Taylor	90	95	...
Wakulla	100	100	...
Div. Average per cent.	90	95	...
Western Division.			
Calhoun	85	100	...
Escambia	100	125	100
Holmes	105	110	...
Jackson	105	105	...
Santa Rosa	100	100	...
Walton	80	95	...
Washington	120	75	...
Div. Average per cent.	99	101	100
Northeastern Division.			
Alachua	50	60	...
Baker	70	125	...
Bradford	50	50	...
Clay	105	100	...
Duval	100	100	...
Nassau	110	150	100
Putnam	100	100	...
St. Johns	...	110	...
Div. Average per cent.	84	99	100
Central Division.			
Hernando	100	150	...
Lake	100	135	...
Levy	25	40	...
Marion	98	100	...
Orange	...	...	...
Pasco	90	95	...
Seminole	...	...	...
Volusia	100	100	...
Div. Average per cent.	85	103	...
Southern Division.			
Brevard	...	...	...
Dade	...	...	...
DeSoto	...	125	...
Hillsboro	...	...	...
Lee	...	150	...
Manatee	...	100	...
Osceola	100	150	...
Palm Beach	...	500	...
Pinellas	...	125	...
Polk	...	110	...
St. Lucie	...	100	...
Div. Average per cent.	100	170	...
State Average per cent.	92	113	100

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Tobacco* Open Field	*Tobacco* (Un. Shade)	*Rye.*
Northern Division.	Acreage.	Acreage.	Acreage.
Franklin	...	...	...
Gadsden	100	100	50
Hamilton	...	...	80
Jefferson	100	100	75
Lafayette	...	...	...
Leon	75	105	...
Liberty	...	...	...
Madison	...	100	100
Suwannee	...	...	100
Taylor	...	...	...
Wakulla	...	...	...
Div. Average per cent.	92	101	81
Western Division.			
Calhoun	...	...	...
Escambia	100	110	100
Holmes	...	...	110
Jackson	...	...	100
Santa Rosa	...	...	...
Walton	...	...	...
Washington	...	...	100
Div. Average per cent.	100	110	102
Northeastern Division.			
Alachua	...	...	100
Baker	...	...	100
Bradford	...	...	...
Clay	...	...	...
Duval	...	...	...
Nassau	...	...	110
Putnam	...	...	...
St. Johns	...	...	...
Div. Average per cent.	...	...	103
Central Division.			
Hernando	...	...	...
Lake	...	...	100
Levy	...	...	...
Marion	...	...	105
Orange	...	...	...
Pasco	...	95	...
Seminole	...	...	...
Volusia	...	...	...
Div. Average per cent.	...	95	102
Southern Division.			
Brevard	...	...	...
Dade	...	...	...
DeSoto	...	...	...
Hillsboro	...	...	...
Lee	...	...	110
Manatee	...	...	...
Osceola	...	...	...
Palm Beach	...	...	...
Pinellas	...	...	...
Polk	...	...	...
St. Lucie	...	...	...
Div. Average per cent.	...	...	110
State Average per cent.	96	102	97

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Rice*	*Sweet Potatoes.*	*Field Peas.*
Northern Division.	Acreage.	Acreage.	Acreage.
Franklin	...	100	100
Gadsden	...	100	100
Hamilton	...	100	90
Jefferson	...	100	100
Lafayette	...	100	100
Leon	...	110	110
Liberty	100	100	100
Madison	...	100	...
Suwannee	...	110	100
Taylor	90	100	100
Wakulla	...	100	100
Div. Average per cent.	95	102	100
Western Division.			
Calhoun	90	100	100
Escambia	80	125	100
Holmes	...	105	103
Jackson	...	125	103
Santa Rosa	100	105	100
Walton	...	100	100
Washington	80	100	100
Div. Average per cent.	87	109	101
Northeastern Division.			
Alachua	...	100	100
Baker	100	100	100
Bradford	...	100	100
Clay	...	100	100
Duval	...	150	100
Nassau	125	125	125
Putnam	...	120	110
St. Johns	100	100	100
Div. Average per cent.	108	112	104
Central Division.			
Hernando	100	100	100
Lake	...	90	100
Levy	...	80	35
Marion	94	100	105
Orange	...	100	100
Pasco	100	110	100
Seminole	...	100	100
Volusia	...	100	100
Div. Average per cent.	98	97	93
Southern Division.			
Brevard	...	200	...
Dade	...	100	100
DeSoto	...	100	100
Hillsboro	...	100	...
Lee	100	200	150
Manatee	...	100	100
Osceola	100	...	...
Palm Beach	...	150	...
Pinellas	...	100	100
Polk	100	110	100
St. Lucie	...	100	...
Div. Average per cent.	100	125	108
State Average per cent.	97	109	101

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Peanuts.*	*Cassava.*	*Velvet Beans.*
Northern Division.	Acreage.	Acreage.	Acreage.
Franklin	50	...	90
Gadsden	100	...	75
Hamilton	110	...	100
Jefferson	110	...	100
Lafayette	100	...	...
Leon	110	...	100
Liberty	100	...	...
Madison	100	...	50
Suwannee	115	...	100
Taylor	110	...	...
Wakulla	100	...	...
Div. Average per cent.	100	...	88
Western Division.			
Calhoun	100	...	100
Escambia	150	100	150
Holmes	112	...	115
Jackson	125	...	105
Santa Rosa	100	...	100
Walton	100	...	75
Washington	100	100	110
Div. Average per cent.	112	100	108
Western Division.			
Alachua	100	...	100
Baker	100	...	100
Bradford	100	...	100
Clay	110	...	100
Duval	125	...	100
Nassau	110	100	110
Putnam	100	...	110
St. Johns	...	100	100
Div. Average per cent.	108	100	102
Central Division.			
Hernando	100	...	...
Lake	75	95	112
Levy	95	...	50
Marion	110	100	110
Orange	...	...	150
Pasco	100	...	100
Seminole	...	...	125
Volusia	100	100	100
Div. Average per cent.	97	98	107
Southern Division.			
Brevard	...	...	...
Dade	...	100	100
DeSoto	...	...	100
Hillsboro	...	...	100
Lee	100	100	175
Manatee	...	...	100
Osceola	100	100	150
Palm Beach	...	...	...
Pinellas	...	100	100
Polk	...	...	100
St Lucie	...	...	100
Div. Average per cent.	100	100	114
State Average per cent.	103	133	104

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Irish Potatoes.*		*Cabbage.*	
Northern Division.	Acreage.	Condition.	Acreage.	Condition.
Franklin	100	100	100	100
Gadsden	75	80	75	75
Hamilton	60	80	75	85
Jefferson	60	80	80	80
Lafayette	...	...	...	...
Leon	100	95	100	90
Liberty	...	...	...	...
Madison	90	90	75	80
Suwannee	100	90	100	90
Taylor	90	75	...	...
Wakulla	...	...	...	...
Div. Average per cent...	86	86	86	88
Western Division.				
Calhoun	100	100	100	100
Escambia	100	120	125	80
Holmes	...	...	103	95
Jackson	100	80	100	85
Santa Rosa	100	100	100	80
Walton	115	85	100	90
Washington	...	...	...	...
Div. Average per cent..	103	97	105	88
Northeastern Division.				
Alachua	150	60	100	100
Baker	...	...	200	100
Bradford	...	...	100	90
Clay	100	100	125	95
Duval	125	100	100	100
Nassau	125	100	150	90
Putnam	100	100	100	90
St. Johns	150	100	100	90
Div. Average per cent..	125	93	122	94
Central Division.				
Hernando	100	100	100	100
Lake	125	100	100	85
Levy	50	75	50	50
Marion	105	100	100	95
Orange	100	100	90	100
Pasco	95	90	100	95
Seminole	100	100	90	100
Volusia	40	20	120	80
Div. Average per cent...	89	86	94	88
Southern Division.				
Brevard	...	...	200	100
Dade	100	100	100	100
DeSoto	100	100	100	100
Hillsboro	125	100	80	100
Lee	100	100	110	100
Manatee	100	80	100	90
Osceola	200	100	200	75
Palm Beach	125	100	200	100
Pinellas	100	90	100	90
Polk	100	100	100	90
St. Lucie	100	100	125	80
Div. Average per cent...	115	97	129	93
State Average per cent..	104	92	107	90

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Cucumbers.*		*Tomatoes.*	
Northern Division.	Acreage.	Condition.	Acreage.	Condition.
Franklin	100	100	100	75
Gadsden	80	85	...	...
Hamilton	75	80	...	...
Jefferson	80	80	75	75
Lafayette	...	...	...	...
Leon	95	90	75	80
Liberty	...	...	...	...
Madison	100	90	100	80
Suwannee	100	90	80	90
Taylor	...	...	...	...
Wakulla	...	...	...	...
Div. Average per cent...	90	88	86	80
Western Division.				
Calhoun	90	80	...	...
Escambia	150	100	112	80
Holmes	...	...	...	...
Jackson	100	85	...	...
Santa Rosa	100	80	100	75
Walton	100	100	...	...
Washington	...	...	...	...
Div. Average per cent...	108	89	106	77
Northeastern Division.				
Alachua	100	100	200	50
Baker	100	100	125	90
Bradford	...	...	100	90
Clay	100	90	100	90
Duval	100	100	100	100
Nassau	100	100	100	100
Putnam	100	100	100	90
St. Johns	...	...	110	100
Div. Average per cent...	100	98	112	89
Central Division.				
Hernando	100	100	...	...
Lake	120	90	95	75
Levy	60	60	125	80
Marion	105	90	100	100
Orange	100	90	...	...
Pasco	95	95	90	90
Seminole	100	90	...	...
Volusia	100	90	100	80
Div. Average per cent...	98	88	102	85
Southern Division.				
Brevard	300	100	...	...
Dade	100	70	100	80
DeSoto	100	90	100	90
Hillsboro	110	100	125	90
Lee	140	100	100	100
Manatee	115	100	100	90
Osceola	150	90	100	90
Palm Beach	120	50	90	90
Pinellas	100	90	100	90
Polk	100	90	100	90
St. Lucie	140	75	90	60
Div. Average per cent...	134	87	100	87
State Average per cent..	106	90	101	84

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*English Peas.*		*Beans.*	
Northern Division.	Acreage.	Condition.	Acreage.	Condition.
Franklin	75	75	75	75
Gadsden	...	...	75	75
Hamilton	...	...	75	80
Jefferson	90	90	85	90
Lafayette	...	...	...	...
Leon	100	100	100	100
Liberty	...	...	100	90
Madison	50	70	...	...
Suwannee	...	...	110	90
Taylor	...	...	...	...
Wakulla	...	...	...	...
Div. Average per cent...	79	84	89	84
Western Division.				
Calhoun	...	...	100	100
Escambia	100	100	100	80
Holmes	...	...	...	...
Jackson	...	...	...	...
Santa Rosa	100	100	100	90
Walton	...	...	...	...
Washington	...	...	...	...
Div. Average per cent...	100	100	100	90
Northeastern Division.				
Alachua	100	100	100	75
Baker	125	100	...	...
Bradford	...	...	...	...
Clay	100	100	110	95
Duval	90	100	125	100
Nassau	150	90	100	100
Putnam	100	100	110	90
St. Johns	...	...	...	...
Div. Average per cent...	111	98	109	92
Central Division.				
Hernando	...	...	...	...
Lake	105	100	90	70
Levy	...	...	30	80
Marion	100	100	110	90
Orange	...	...	...	...
Pasco	95	95	90	80
Seminole	...	...	...	...
Volusia	100	90	100	40
Div. Average per cent...	100	96	84	72
Southern Division.				
Brevard	...	...	500	100
Dade	...	...	100	75
DeSoto	100	100	100	90
Hillsboro	...	...	90	90
Lee	100	100	80	100
Manatee	...	...	110	90
Osceola	125	100	125	90
Palm Beach	150	90	150	60
Pinellas	...	...	100	100
Polk	...	...	100	90
St. Lucie	...	...	75	60
Div. Average per cent...	119	97	130	86
State Average per cent..	102	95	104	85

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Lettuce.*		*Egg Plants.*	
Northern Division.	Acreage.	Condition.	Acreage.	Condition.
Franklin	75	75	75	50
Gadsden	100	100	...	...
Hamilton	...	...	...	...
Jefferson	100	100	...	...
Lafayette	...	...	...	...
Leon	100	100	...	...
Liberty	...	...	...	...
Madison	...	...	...	...
Suwannee	100	100	...	...
Taylor	...	...	...	...
Wakulla	...	...	...	...
Div. Average per cent...	95	95	75	50
Western Division.				
Calhoun	...	...	...	...
Escambia	100	100	100	...
Holmes	...	...	...	...
Jackson	...	...	...	...
Santa Rosa	...	...	100	...
Walton	...	...	...	...
Washington	...	...	...	...
Div. Average per cent...	100	100	100	...
Northeastern Division.				
Alachua	100	80	100	100
Baker	...	...	...	...
Bradford	...	...	...	...
Clay	...	...	...	...
Duval	100	100	100	100
Nassau	110	90	100	100
Putnam	100	100	100	90
St. Johns	...	...	...	...
Div. Average per cent...	100	92	100	97
Central Division.				
Hernando	...	...	...	...
Lake	65	100	...	...
Levy	...	...	...	...
Marion	110	100	100	100
Orange	110	100	100	80
Pasco	90	90	...	...
Seminole	110	100	100	100
Volusia	100	100	100	50
Div. Average per cent...	98	98	100	82
Southern Division.				
Brevard	...	...	...	...
Dade	...	...	100	80
DeSoto	100	100	50	80
Hillsboro	...	...	...	...
Lee	...	...	80	100
Manatee	100	100	...	...
Osceola	100	100	120	80
Palm Beach	100	100	90	70
Pinellas	100	85	100	80
Polk	100	100	100	85
St. Lucie	...	...	150	50
Div. Average per cent..	100	98	99	78
State Average per cent..	99	96	95	77

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	Celery.		Beets.	
Northern Division.	Acreage.	Condition.	Acreage.	Condition.
Franklin	50	100	100	100
Gadsden	...	...	...	...
Hamilton	...	...	...	...
Jefferson	...	...	100	100
Lafayette	...	...	...	...
Leon	...	...	100	100
Liberty	...	...	...	...
Madison	...	...	...	...
Suwannee	...	...	...	...
Taylor	...	...	...	...
Wakulla	...	...	...	...
Div. Average per cent...	50	100	100	100
Western Division.				
Calhoun	...	...	...	...
Escambia	...	...	100	100
Holmes	...	...	...	...
Jackson	...	...	...	...
Santa Rosa	...	...	100	100
Walton	...	...	...	...
Washington	...	...	...	...
Div. Average per cent...	...	...	100	100
Northeastern Division.				
Alachua	...	...	...	...
Baker	...	...	...	...
Bradford	...	...	...	...
Clay	...	...	...	...
Duval	100	100	100	100
Nassau	100	100	100	100
Putnam	...	...	...	...
St. Johns	...	...	...	...
Div. Average per cent...	100	100	100	100
Central Division.				
Hernando	...	...	...	...
Lake	...	...	110	100
Levy	...	...	25	75
Marion	100	100	100	100
Orange	115	100	...	...
Pasco	...	...	...	...
Seminole	120	100	...	...
Volusia	100	100	100	80
Div. Average per cent...	109	100	84	89
Southern Division.				
Brevard	...	...	10	100
Dade	...	...	...	...
DeSoto	...	...	...	...
Hillsboro	100	100	110	80
Lee	...	...	...	...
Manatee	125	100	...	...
Osceola	200	100	100	100
Palm Beach	...	...	200	100
Pinellas	100	80	...	...
Polk	100	90	...	...
St. Lucie	100	100	100	100
Div. Average per cent...	121	95	104	96
State Average per cent..	95	99	98	97

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Watermelons.*		*Cantaloupes.*	
Northern Division.	Acreage.	Condition.	Acreage.	Condition.
Franklin	100	100	100	100
Gadsden	75	75	...	...
Hamilton	115	85	100	80
Jefferson	115	90	100	90
Lafayette	110	90	...	...
Leon	105	90	100	90
Liberty	100	90	...	...
Madison	110	95	100	90
Suwannee	115	95	100	90
Taylor	100	95	...	...
Wakulla	100	90	...	...
Div. Average per cent...	104	99	100	90
Western Division.				
Calhoun	100	90	80	80
Escambia	150	95	100	80
Holmes	110	95	...	...
Jackson	110	95	100	80
Santa Rosa	...	...	...	...
Walton	75	60	...	...
Washington	200	100	80	100
Div. Average per cent...	124	89	90	85
Northeastern Division.				
Alachua	100	75	100	75
Baker	100	80	100	80
Bradford	100	90	...	...
Clay	100	95	...	...
Duval	125	100	100	100
Nassau	125	90	100	90
Putnam	120	90	100	90
St. Johns	110	100	...	...
Div. Average per cent...	110	90	100	87
Central Division.				
Hernando	...	...	...	...
Lake	90	65	90	65
Levy	40	75	...	...
Marion	105	90	105	90
Orange	60	80	...	...
Pasco	85	90	100	100
Seminole	65	80	...	...
Volusia	100	70	140	160
Div. Average per cent...	78	79	109	89
Southern Division.				
Brevard	50	95	...	...
Dade	...	...	...	...
DeSoto	100	90	50	90
Hillsboro	...	...	100	100
Lee	150	100	...	...
Manatee	...	...	...	...
Osceola	150	100	100	100
Palm Beach	120	80	...	...
Pinellas	100	80	100	80
Polk	100	90	100	90
St. Lucie	112	90	...	...
Div. Average per cent...	110	91	90	92
State Average per cent..	105	90	98	89

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Strawberries.*		*Orange Trees.*	*Lemon Trees.*
Northern Division.	Acreage.	Condition.	Condition.	Condition.
Franklin	100	100	90	90
Gadsden	...	...	...	...
Hamilton	...	...	50	40
Jefferson	...	...	80	...
Lafayette	...	...	80	...
Leon	...	...	95	...
Liberty	...	...	...	...
Madison	...	...	50	...
Suwannee	...	...	90	...
Taylor	...	...	90	...
Wakulla	...	...	85	...
Div. Average per cent...	100	100	76	65
Western Division.				
Calhoun	...	...	100	...
Escambia	100	100	...	...
Holmes	...	...	...	...
Jackson	...	...	...	...
Santa Rosa	...	...	...	...
Walton	...	...	...	...
Washington	100	100	...	...
Div. Average per cent...	100	100	100	...
Northeastern Division.				
Alachua	100	100	100	100
Baker	125	100	100	...
Bradford	110	100	100	...
Clay	100	100	100	100
Duval	150	100	100	90
Nassau	125	90	100	100
Putnam	100	100	100	...
St. Johns	110	100	100	...
Div. Average per cent...	103	97	100	97
Central Division.				
Hernando	100	100	100	...
Lake	100	90	150	100
Levy	...	...	100	...
Marion	100	97	105	100
Orange	...	...	120	...
Pasco	85	90	95	80
Seminole	...	...	115	...
Volusia	120	100	90	...
Div. Average per cent...	100	95	109	93
Southern Division.				
Brevard	...	...	150	...
Dade	...	...	100	80
DeSoto	100	95	110	100
Hillsboro	100	100	90	100
Lee	...	...	100	100
Manatee	...	...	125	100
Osceola	300	100	140	140
Palm Beach	100	90	105	...
Pinellas	110	100	110	100
Polk	100	100	110	100
St. Lucie	100	100	100	100
Div. Average per cent...	130	98	113	115
State Average per cent..	106	98	99	92

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Lime Trees.*	*Grapefruit Trees.*	*Bananas.*	*Pineapples*
Northern Division.	Condition.	Condition.	Condition.	Condition.
Franklin	...	90	50	...
Gadsden	...	...	...	...
Hamilton	...	...	...	...
Jefferson	...	80	...	...
Lafayette	...	80	...	...
Leon	95	...	...	...
Liberty	...	...	...	...
Madison	...	75	...	...
Suwannee	...	90	...	...
Taylor	...	90	...	...
Wakulla	...	80	...	...
Div. Average per cent...	...	85	50	...
Western Division.				
Calhoun	...	100	...	...
Escambia	...	...	...	...
Holmes	...	...	...	...
Jackson	...	...	...	...
Santa Rosa	...	...	...	...
Walton	...	...	...	...
Washington	...	...	...	...
Div. Average per cent...	...	100	...	...
Northeastern Division.				
Alachua	...	100	100	...
Baker	...	100	...	...
Bradford	...	...	...	...
Clay	...	100	...	...
Duval	...	100	...	...
Nassau	...	100	90	...
Putnam	...	100	...	...
St. Johns	...	100	...	...
Div. Average per cent...	...	100	95	...
Central Division.				
Hernando	...	100	...	...
Lake	100	100	...	...
Levy	...	100	...	...
Marion	100	105	100	...
Orange	...	110	100	...
Pasco	90	95	...	...
Seminole	...	100	100	...
Volusia	...	90	...	...
Div. Average per cent...	97	100	100	...
Southern Division.				
Brevard	...	150	...	...
Dade	95	100	80	80
DeSoto	100	110	...	...
Hillsboro	100	80	100	...
Lee	100	100	100	...
Manatee	100	120	...	...
Osceola	140	140	200	150
Palm Beach	100	110	90	80
Pinellas	...	110	...	...
Polk	...	115	...	...
St. Lucie	100	125	75	70
Div. Average per cent...	104	115	107	95
State Average per cent..	100	100	88	95

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Mangoes*	*Guavas.*	*Avocado Pears.*
Northern Division.	Condition.	Condition.	Condition.
Franklin	...	...	...
Gadsden	...	...	...
Hamilton	...	...	...
Jefferson	...	...	...
Lafayette	...	...	...
Leon	...	...	...
Liberty	...	...	...
Madison	...	...	...
Suwannee	...	...	...
Taylor	...	...	...
Wakulla	...	...	...
Div. Average per cent.	...	...	...
Western Division.			
Calhoun	...	...	...
Escambia	...	...	...
Holmes	...	...	...
Jackson	...	...	...
Santa Rosa	...	...	...
Walton	...	...	...
Washington	...	...	...
Div. Average per cent.	...	...	...
Northeastern Division.			
Alachua	...	...	...
Baker	...	...	...
Bradford	...	...	...
Clay	...	...	...
Duval	...	...	...
Nassau	...	...	...
Putnam	...	...	...
St. Johns	...	...	...
Div. Average per cent.	...	...	...
Central Division.			
Hernando	...	...	...
Lake	...	100	...
Levy	...	...	...
Marion	...	100	...
Orange	...	...	...
Pasco	...	...	...
Seminole	...	100	...
Volusia	...	80	...
Div. Average per cent.	...	95	...
Southern Division.			
Brevard	...	...	...
Dade	90	100	100
DeSoto	...	125	...
Hillsboro	...	100	...
Lee	100	100	100
Manatee	...	115	...
Osceola	200	200	100
Palm Beach	110	100	100
Pinellas	110	105	110
Polk	...	100	100
St. Lucie	100	100	80
Div. Average per cent.	118	114	99
State Average per cent.	118	104	99

REPORT OF ACREAGE AND CONDITION—Continued.

COUNTIES.	*Peaches.*	*Pears.*
Northern Division.	Condition.	Condition.
Franklin	100	100
Gadsden	85	75
Hamilton	75	50
Jefferson	80	60
Lafayette	80	50
Leon	80	40
Liberty	75	...
Madison	50	25
Suwannee	80	40
Taylor	75	35
Wakulla	80	...
Div. Average per cent.	79	53
Western Division.		
Calhoun	...	...
Escambia	150	150
Holmes	...	...
Jackson	...	...
Santa Rosa	50	50
Walton	...	...
Washington	...	...
Div. Average per cent.	100	100
Northeastern Division.		
Alachua	100	100
Baker	100	100
Bradford	...	...
Clay	...	...
Duval	80	70
Nassau	125	100
Putnam	...	...
St. Johns	100	100
Div. Average per cent.	101	94
Central Division.		
Hernando	100	40
Lake	100	100
Levy	50	50
Marion	110	100
Orange	...	...
Pasco	75	65
Seminole	...	...
Volusia	100	100
Div. Average per cent.	89	76
Southern Division.		
Brevard	...	...
Dade	...	...
DeSoto	...	...
Hillsboro	...	...
Lee	...	...
Manatee	...	...
Palm Beach	100	...
Palm Beach	...	...
Pinellas	...	...
Polk	...	...
St. Lucie	...	...
Div. Average per cent.	100	...
State Average per cent.	94	81

PART III.

Fertilizers,
Feed Stuffs, and
Foods and Drugs.

SPECIAL SAMPLES.

Florida is the only State in the Union that provides for the "special sample," drawn by the consumer or purchaser, under proper rules and regulations fixed by law—to be sent to the State Laboratory for analysis free of cost. Any citizen in the State who has purchased fertilizers or feeds for his own use may draw a sample of the same, according to law, and have the same analysed by the State Chemist free of cost. And in case of adulteration or deficiency he can, on establishing the fact, receive double the cost of price demanded for the goods.

The law requires the "special samples" to be drawn in a manner to prevent the submission of spurious samples; rules and regulations are published in every Bulletin for drawing and transmitting "special samples."

This special sample has been a most potent factor in enforcing the law and discouraging the sale of adulterated or misbranded goods.

Special samples of foods and drugs may also be sent to the State Laboratory for analysis free of cost, when the sample is properly drawn according to law. The necessary instructions and blanks required to properly draw and transmit samples of "food and drugs" will be sent to any citizen requesting the same.

"THE SPECIAL SAMPLE FURNISHES THE CONSUMER WITH THE SAME PROTECTION DEMANDED BY THE MANUFACTURER, WHO BUYS HIS MATERIALS ONLY UPON GUARANTEE AND PAYS FOR THEM ACCORDING TO ANALYSIS, AND IS PAID FOR BY THE CONSUMER OUT OF THE FUNDS DERIVED FROM THE INSPECTION FEE OF TWENTY-FIVE CENTS PER TON PAID ON FERTILIZERS AND FEEDS SOLD IN THE STATE.

REGULATIONS GOVERNING THE TAKING AND FORWARDING OF FERTILIZER OR COMMERCIAL FEEDING STUFF SAMPLES TO THE COMMISSIONER OF AGRICULTURE.

SECTION 15 OF THE LAWS.

Special samples of Fertilizers or Commercial Feeding Stuffs sent in by purchasers, under Section 9 of the laws, shall be drawn in the presence of two disinterested witnesses, from one or more packages, thoroughly mixed, and a FAIR SAMPLE OF THE SAME OF NOT LESS THAN EIGHT OUNCES (ONE-HALF POUND) SHALL BE PLACED IN A TIN CAN OR BOTTLE, SEALED AND SENT BY A DISINTERESTED PARTY TO THE COMMISSIONER OF AGRICULTURE AT TALLAHASSEE. NOT LESS THAN EIGHT OUNCES, IN A TIN CAN OR BOTTLE, WILL BE ACCEPTED FOR ANALYSIS. This rule is adopted to secure fair samples of sufficient size to make the necessary determinations, and to allow the preservation of a duplicate sample in case of protest or appeal. These duplicate samples will be preserved for two months from date of certificate of analysis.

The State Chemist is not the proper officer to receive special samples from the purchaser. The propriety of the method of drawing and sending the samples as fixed by the law is obvious.

The drawing and sending of special samples in rare cases is in compliance with law. Samples are frequently sent in paper packages or paper boxes, badly packed, and frequently in very small quantity (less than ounce); frequently there are no marks, numbers or other means of identification; the postmark in some instances being absent.

I would call the attention of those who desire to avail themselves of this privilege to Sections 9 and 10 of the law, which are clear and explicit.

Hereafter strict compliance with above regulations will

be required. *The sample must not be less than one half pound, in a tin can or bottle, sealed and addressed to the Commissioner of Agriculture. The sender, name and address must also be on the package, this rule applying to special samples of fertilizers or commercial feeding stuff.*

A onepound baking powder tin can, properly cleaned, filled with a fairly drawn, well mixed sample taken from several sacks, is a proper sample. *It should be sealed and addressed to the Commissioner of Agriculture at Tallahassee. The sender's name and address should also be placed on the package. If more than one sample is sent, the samples should be numbered so as to identify them. All this should be done in the presence of the witnesses and the package mailed or expressed by one of the witnesses.*

The tags off the sacks should be retained by the sender to compare with the certificate of analysis when received, and not sent to this office. *The date of the drawing and sending the sample, and names of the witnesses, should also be retained by the sender; not sent to this owce*

SOIL ANALYSIS.

We frequently have samples of soil sent in for analysis and a request to advise as to the best methods of fertilizing.

Excepting in extreme cases, such as Heavy Clays, Pure Sand and Muck Lands, there is but little information to be derived from a soil analysis that would be of benefit to farmers. So much depends on tilth, drainage, culture and other physical conditions that an analysis made under laboratory conditions is of little value.

A chemical analysis of a soil may indicate a very fertile soil, rich in plant food, while the facts are the soils are not productive.

This is instanced by the rich Sawgrass muck lands and river bottoms of the State that are fertile chemically, but not productive until properly drained; also, by the arid lands of the west, rich in the elements of plant food, but not productive until irrigated.

Other soils, with less plant food, but on account of proper physical conditions, culture and tilth, are exceedingly productive.

The average of thousands of analysis of Florida soils made by the Agricultural Experiment Station and the State Laboratory is as follows:

Nitrogen (per cent.) 0.0413
Potash (per cent.) 0.0091
Phosphoric Acid (per cent.) 0.1635

This is a fair average of all the Norfolk and Portsmouth soil series of the State, which comprise by far the greater portion of the State.

In this connection we quote from the report of the Indiana Agricultural Experiment Station, Purdue University, Lafayette, Ind., 1908, as follows:

"Soil Analysis of Little Value in Showing Fertilizer Requirements.—The Chemical Department is called upon to answer hundreds of letters of inquiry in relation to agricultural chemical problems from people all over the State. In this connection it might be well to say that there is a widespread idea that the chemist can analyze a sample of soil and, without further knowledge of the conditions, write out a prescription of a fertilizer which will fill the needs of that particular soil.

"The Experiment Station does not analyze samples of soil to determine the fertilizer requirements. There is no chemical method known that will show reliably the availability of the plant food elements present in the soil, as this is a variable factor, influenced by the kind of crop, the type of soil, the climate and biological conditions; hence, we do not recommend this method of testing soil."

The method recommended by the Indiana Station is

the field fertilizer test or plot system, in which long, narrow strips of the field to be tested are measured off side by side. The crop is planted uniformly over each. Different fertilizers are applied to the different plots, every third or fourth one being left unfertilized. The produce from these plots is harvested separately and weighed. In this manner the farmer can tell what fertilizer is best suited for his needs. As climatic conditions may influence the yield with different fertilizers, it is best to carry on such tests for more than one year before drawing definite conclusions. There is positively no easier or shorter method of testing the soil that we feel safe in recommending.

Soil can be greatly improved by an intelligent rotation of crops, the conservation of stable manure, and the use of some kind of commercial fertilizer. Farmers need have no fear that the proper application of commercial fertilizer will injure the land.

WATER ANALYSIS.

We frequently analyze water for public use—city, town and neighborhood supplies; springs and artesian wells in which the public is interested; when some economic question, boiler, laundry or other industrial use is to be decided.

WE DO NOT ANALYZE WATER FOR INDIVIDUAL ACCOUNT WHEREIN THE PUBLIC IS NOT INTERESTED. SUCH SAMPLES SHOULD BE SENT TO A COMMERCIAL LABORATORY. THE STATE LABORATORY DOES NOT COMPETE WITH COMMERCIAL LABORATORIES.

Also we do not make bacteriological examinations nor examinations for disease germs. Such examinations and analyses are made by the State Board of Health at Jacksonville.

We do not make a sanitary analysis, nor a complete quantitative determination (separating each mineral and stating the quantity thereof).

Such an analysis would be costly in time and labor, and of no real value to the inquirer. We determine the total dissolved solids in the sample, and report them as parts per 1,000,000, naming the principal ingredients in the order of their predominance.

We find Calcium Carbonate (lime), Sodium Chloride (salt), Magnesium Sulphate (epsom salts), Silica (sand), and Iron, is the general order of their predominance, though on the coast, where the total disollved solids amounts to 5,000 or more parts per 1,000,000, Sodium Chloride (salt) is the predominant substance.

From a knowledge of the chemical analysis of a water, unaccompanied by any further information, no conclusion as to the potability and healthfulness of the water can be deduced.

Therefore, we require the following information to be given in regard to the source of the water.

(1). The source of the water; spring, lake, river, driven well, dug well, bored well, artesian well, or flowing well; and also the depth of the water surface below the top of the soil, and in cased wells the depth of the casing.

(2). The locality of the source of the water: town, city or village; or the section, township and range.

(3). The proposed use of the water; city supply, domestic use, laundry, boiler, irrigation or other industrial use.

(4). No sample of water will be analyzed unless the name and address of the sender is on the package for identification.

We require two gallons of each sample of water in a new jug, stopped with a new cork, and sent by prepaid express. We will not accept any sample of water for analysis not in a new jug. Vessels previously used for

other purposes are never properly cleaned for sending samples of water for analysis. Corks, once used for other substances (molasses, vinegar, whiskey, kerosene, etc.), are never properly cleaned. In sampling a well water the stagnant water in the pump must first be pumped off. The jug must first be rinsed with the water to be sampled, emptied, and then filled. A sample of spring, river or lake water is best taken (after rinsing the jug), by allowing the jug to fill after immersion some distance under the surface near the center of the body of water.

NOTE.—We find the waters of the State—springs, wells, driven wells and artesian wells—generally very pure and wholesome, with but little mineral impurity and that such as is not harmful. Except in cases of gross carelessness, in allowing surface water to contaminate the well or spring, the waters of the State are pure and wholesome. The deep wells of the State are noted for their purity and healthfulness.

ANALYSIS OF FOODS AND DRUGS.

Samples of Foods and Drugs are drawn under special regulations. Application should be made to the Commissioner of Agriculture or State Chemist for the necessary blanks, instructions, etc., for drawing and transmitting samples of foods and drugs, including drinks of all kinds.

COPIES OF LAWS, RULES AND REGULATIONS, AND STANDARDS.

Citizens of the State interested in fertilizers, foods and drugs, and stock feed, can obtain, free of charge, the respective Laws, including Rules and Regulations and Standards, by applying to the Commissioner of Agriculture or State Chemist. Application for the Quarterly Bulletin of the State Department of Agriculture should

also be made to the Commissioner of Agriculture or State Chemist. The Bulletins of the Florida Agricultural Experiment Station can be had by application to the Director at Gainesville.

INSTRUCTIONS TO MANFACTURERS AND DEALERS.

Each package of Commercial Fertilizer, and each package of Commercial Feeding Stuff, must have, securely attached thereto, a tag with the guaranteed analysis required by law and the stamp showing the payment of the inspector's fee. This provision of the law, Section 3 of both laws—will be rightly enforced.

Manufacturers and dealers will be required to properly tag and stamp each package of Commercial Fertilizer or Commercial Feeding Stuff under penalty as fixed in Section 6 of both laws. Tags shall be attached to the top end of each bag, or head of each barrel.

INSTRUCTION TO PURCHASERS.

Purchasers are cautioned to purchase no Commercial Fertilizers or Commercial Feeding Stuff that does not bear on *each package* an analysis tag with the guarantee required by law, and the stamp showing the payment of the inspector's fee. Goods not having the guarantee tag and stamp are irregular and fraudulent; the absence of the guarantee and stamp being evidence that the manufacturer or dealer has not complied with the law. Without the guarantee tag and stamp showing what the goods are guaranteed to contain, the purchaser has no recourse against the manufacturer or dealer. Such goods are sold illegally and fraudulently, and are generally of little value. All reputable manufacturers and dealers now comply strictly with the law and regulations by placing the guarantee tag and stamp on each package.

INSTRUCTIONS TO SHERIFFS.

The attention of Sheriffs of the various counties is called to Section 3 of both laws, defining their duties. This Department expects each Sheriff to assist in maintaining the law and protecting the citizens of the State from the imposition of fraudulent, inferior or deficient Commercial Fertilizers or Commercial Feeding Stuffs.

REGULATION 42—ANALYSES MADE BY STATE LABORATORY.

Only such materials as are of public interest are analyzed by the State Laboratory, such as are directed by the Pure Food, the Fertilizer and Stock Feed Law.

There are no fees or charges of any kind made by the State Laboratory.

The State Laboratory is not permitted to compete with commercial laboratories.

No commercial work of any kind is accepted.

The State Laboratory does not analyze samples for individual account wherein the public is not interested. Such samples should be sent to a commercial laboratory.

REGULATION 43—ANALYSES IN CRIMINAL CASES.

The State Laboratory does not make post mortem examinations, nor furnish evidence in criminal cases, (except as provided by the Pure Food, Fertilizer, and Stock Feed Laws). Such analyses and examinations are made by specialists employed by the grand jury and pro-

secuting attorney, the cost being taxed as other criminal costs, by the court.

MARKET PRICES OF CHEMICALS AND FERTILIZING MATERIALS AT FLORIDA SEA PORTS, APRIL 1, 1914.

Ammoniates.

Nitrate of Soda, 17% Ammonia	$ 56.00
Sulphate of Ammonia, 25% Ammonia	76.00
Dried Blood, 16% Ammonia	65.00
Cynanamid, 18% Ammonia	60.00
Dry Fish Scrap, 10% Ammonia	45.00

Potash.

High Grade Sulphate of Potash, 90% Sulphate, 48% K_2O	$ 50.00
Low Grade Sulphate of Potash, 48% Sulphate, 26% K_2O	30.00
Muriate of Potash, 80%; 48% K_2O	46.00
Nitrate of Potash, imported, 15% Ammonia, 44% Potash K_2O	107.00
Nitrate of Potash, American, 13% Ammonia, 42% Potash K_2O	100.00
Kainit, Potash, 12% K_2O	13.00
Canada Hardwood Ashes, in bags, 4% K_2O Potash	19.00

Ammonia and Phosphoric Acid.

Water Soluable Tankage, 14% Ammonia	$ 47.00
High Grade Tankage, 10% Ammonia, 10% Phosphoric Acid	46.00

Tankage, 8% Ammonia, 18% Phosphoric Acid..	40.00
Low Grade Tankage, 6½% Ammonia, 12% Phosphoric Acid	35.00
Hotel Tankage, 6% Ammonia, 7% Phosphoric Acid	28.00
Sheep Manure, ground, 5% Ammonia.....	24.00
Imported Fish Guano, 11% Ammonia, 5½% Phosphoric Acid	52.00
Pure Fine Steamed Ground Bone, 3% Ammonia, 22% Phosphoric Acid	31.00
Raw Bone, 4% Ammonia, 22% Phosphoric Acid.	37.00
Ground Castor Pomace, 5½% Ammonia, 2% Phosphoric Acid	26.00
Bright Cotton Seed Meal, 7½% Ammonia.....	30.00
Dark Cotton Seed Meal, 4½% Ammonia.....	26.00

PHOSPHORIC ACID.

High Grade Acid Phosphate, 16% Available Phosphoric Acid .....$	15.00
Acid Phosphate, 14% Available Phosphoric Acid	14.00
Bone Black, 17% Available Phosphoric Acid...	25.00

MISCELLANEOUS.

High Grade Ground Tobacco Stems, 2% Ammonia, 7% Potash .....$	24.00
High Grade Ground Kentucky Tobacco Stems, 2½% Ammonia, 10% Potash.....	28.00
Tobacco Dust No. 1, 2% Ammonia, 2% Potash..	25.00
Cut Tobacco Stems, in sacks, 2% Ammonia, 4% Potash	20.00
Dark Tobacco Stems, baled, 2% Ammonia, 4% Potash	19.00
Land Plaster, in sacks	12.00

The charges by reputable manufacturers for mixing and

bagging any special or regular formula are $1.50 per ton in excess of above prices.

NEW YORK WHOLESALE PRICES, CURRENT APRIL 1, 1914—FERTILIZER MATERIALS.

AMMONIATES.

Ammonia, sulphate, foreign, prompt.....	2.85	@	—
futures	2.90	@	—
Ammonia, sulph., domestic, spot.....	2.85	@	—
futures	2.90	@	—
Fish scrap, dried, 11 p. c. ammonia and 14 p. c. bone phosphate, f. o. b. fish works per unit	3.60	&	10
wet, acidulated, 6 p. c. ammonia, 8 p. c. phosphoric acid, delivered....	—	@	—
Ground fish guano, imported, 10 and 11 p. c. ammonia and 15-17 p. c. bone phosphate, c. i. f. N. Y., Balto. or Phila.....	3.60	&	10
Tankage, 11 p. c. and 15 p. c. f. o. b. Chicago	3.17½	&	10
Tankage, 10 and 20 p. c., f. o. b. Chicago ground	3.00	&	10
Tankage, 9 and 10 p. c., f. o. b. Chicago ground	3.00	&	10
Tankage, concentrated, f. o. b. Chicago, 14 to 15 per cent., f. o. b. Chicago.....	3.10	&	10
Garbage, tankage, f. o. b. Chicago.....	9.00	½	—
Sheep manure, concentrated, f. o. b. Chicago, per ton 13.00		@	—
Hoofmeal, f. o. b. Chicago, per unit.....	2.60	@	2.70
Dried blood, 12-13 p. c. ammonia, f. o. b. New York	3.35	@	—
Chicago	3.20	@	—
Nitrate of soda, 95 p. c. spot, per 100 lbs...	2.22½	@	—
futures, 95 p. c.	2.22½	@	—

Phosphates.

Acid phosphate, per unit		45	@ 50
Bones, rough, hard, per ton		22.50	@24.00
soft steamed unground		21.50	@22.00
ground, steamed, 1¼ p. c. ammonia and 60 p. c. bone phosphate		20.00	@21.00
ditto, 3 and 50 p. c.		23.50	@24.00
raw ground, 4 p. c. ammonia and 50 p. c. bone phosphate		28.50	@30.00
South Carolina phosphate rock kiln dried, f. o. b. Ashley River		3.50	@ 3.75
Florida land pebble phosphate rock 68 per cent., f. o. b. Port Tampa, Fla.		3.00	@ 3.25
Florida high grade phosphate hard rock 77 per cent., f. o. b. Florida ports		5.75	@ 6.25
Tennessee phosphate rock, f. o. b. Mt. Pleasant, domestic, 78@80 p. c., per ton		5.00	@ 5.50
75 p. c. guaranteed		4.75	@ 5.00
68@72 p. c.		4.25	@ 4.50

Potashes.

Muriate of potash, 80-85 per cent., basis 80 per cent., in bags		39.07	@ —
Muriate of potash, min. 95 per cent., basis 80 per cent., in bags		40.75	@ —
Muriate of potash, min. 98 per cent., basis 80 per cent., in bags		41.65	@ —
Sulphate of potash, 90-95 per cent., basis 80 per cent., in bags		47.57	@ —
Double manure salt, 48-53 per cent., basis 48 per cent., in bags		25.04	@ —
Manure salts, min. 20 per cent., K_2O, in bulk		13.58	@ —
Hardsalt, min. 16 per cent., K_2O, in bulk		10.87	@ —
Kainit, min. 12.4 per cent., K_2O, in bulk		8.36	@ —

STATE VALUATIONS.

For Available and Insoluble Phosphoric Acid, Ammonia and Potash, for the Season of 1914.

Available phosphoric Acid..... 5c a pound
Insoluble Phosphoric Acid..... 1c a pound
Ammonia (or its equivalent in nitrogen-..17½c a pound
Potash (as actual potash, K_2O)..... 5½c a pound

If calculated by units—

Available Phosphoric Acid.....$1.00 per unit
Insoluble Phosphoric Acid..... 20c per unit
Ammonia (or its equivalent in nitrogen). 3.50 per unit
Potash ..... 1.10 per unit

With a uniform allowance of $1.50 per ton for mixing and bagging.

A unit is twenty pounds, or 1 per cent., in a ton. We find this to be the easiest and quickest method for calculating the value of fertilizer. To illustrate this, take for example a fertilizer which analyzes as follows:

Available Phosphoric Acid...6.22 per cent.x$1.00—$ 6.22
Insoluble Phosphoric Acid...1.50 per cent.x .20— .30
Ammonia .....3.42 per cent.x 3.50— 11.97
Potash .....7.23 per cent.x 1.10— 7.95
Mixing and Bagging .....— 1.50

Commercial value at sea ports.....$27.94

Or a fertilizer analyzing as follows:

Available Phosphoric Acid.....8 per cent.x$1.00—$ 8.00
Ammonia .....2 per cent.x 3.50— 7.00
Potash .....2 per cent.x 1.10— 2.20
Mixing and Bagging .....— 1.50

Commercial value at sea ports.....$18.70

The State valuations are for cash for materials delivered at Florida seaports, and they can be brought in one-ton lots at these prices at the date of issuing this Bulle-

tin. Where fertilizers are bought at interior points, the additional freight to that point must be added.

The valuations and market prices in preceding issultrations are based on market prices for one-ton lots.

STATE VALUES.

It is not intended by the "State valuations" to fix the price or commercial value of a given brand. The "State values" are the market prices for the various approved chemicals and materials used in mixing or manufacturing commercial fertilizers or commercial stock feed at the date of issuing a Bulletin, or the opening of the "*season.*" They may, but seldom do, vary from the market prices, and are made liberal to meet any slight advance or decline.

They are compiled from price lists and commercial reports by reputable dealers and journals.

The question is frequently asked: "What is 'Smith's Fruit and Vine' worth per ton?" Such a question cannot be answered categorically. By analysis, the ammonia, available phosphoric acid and potash may be determined and the inquirer informed what the cost of the necessary material to compound to a ton of goods similar to "Smith's Fruit and Vine" would be, using none but accepted and well known materials of the best quality.

State values do not consider "trade secrets," loss on bad bills, cost of advertisements and expenses of collections. The "State value" is simply that price at which the various ingredients necessary to use in compounding a fertilizer, or feed, can be *purchased for cash in ton lots at Florida seaports.*

These price lists are published in this report, with the "State values" for 1914 deducted therefrom.

COMPOSITION OF FERTILIZER MATERIALS.

NITROGENOUS MATERIALS.

	POUNDS PER HUNDRED		
	Ammonia	Phosphoric Acid	Potash
Nitrate of Soda	17 to 19	.....	.....
Sulphate of Ammonia	21 to 24	.....	.....
Dried Blood	12 to 17	.....	.....
Concentrated Tankage	12 to 15	1 to 2	.....
Bone Tankage	6 to 9	10 to 15	.....
Dried Fish Scrap	8 to 11	6 to 8	.....
Cotton Seed Meal	7 to 10	2 to 3	1½ to 2
Hoof Meal	13 to 17	1½ to 2	.....

PHOSPHATE MATERIALS.

	POUNDS PER HUNDRED		
	Ammonia	Available Phos. Acid	Insoluble Phos. Acid
Florida Pebble Phosphate	.....	.....	26 to 32
Florida Rock Phosphate	.....	.....	33 to 35
Florida Super Phosphate	.....	14 to 45	1 to 35
Ground Bone	3 to 6	5 to 8	15 to 17
Steamed Bone	3 to 4	6 to 9	10 to 20
Dissolved Bone	2 to 4	13 to 15	2 to 3

POTASH MATERIALS AND FARM MANURES.

	POUNDS PER HUNDRED			
	Actual Potash	Ammonia	Phos. Acid	Lime
Muriate of Potash	50	.....	.....	.....
Sulphate of Potash	48 to 52	.....	.....	.....
Carbonate of Potash	55 to 60	.....	.....	.....
Nitrate of Potash	40 to 44	12 to 16	.....	.....
Double Sul. of Pot.& Mag.	26 to 30	.....	.....	.....
Kainit	12 to 12½	.....	.....	.....
Sylvinit	16 to 20	.....	.....	.....
Cotton Seed Hull Ashes	15 to 30	.....	7 to 9	10
Wood Ashes, unleached	2 to 8	.....	1 to 2	.....
Wood Ashes, leached	1 to 2	.....	1 to 1½	35 to 40
Tobacco Stems	5 to 8	2 to 4	.....	3½
Cow Manure (fresh)	0.40	0 to 0.41	0.16	0.31
Horse Manure (fresh)	0.53	0 to 0.60	0.28	0.31
Sheep Manure (fresh)	0.67	1.00	0.19	0.33
Hog Manure (fresh)	0.60	0.55	0.19	0.08
Hen Dung (fresh)	0.85	2.07	1.54	0.24
Mixed Stable Manure	0.63	0.76	0.26	0.70

FACTORS FOR CONVERSION.

To convert—

Ammonia into nitrogen, multiply by	0.824
Ammonia into protein, multiply by	5.15
Nitrogen into ammonia, multiply by	1.214
Nitrate of soda into nitrogen, multiply by	0.1647
Nitrogen into protein, multiply by	6.25
Bone phosphate into phosphoric acid, multiply by	0.458
Phosphoric acid into bone phosphate, multiply by	2.184
Muriate of potash into actual potash, multiply by	0.632
Actual potash into muriate of potash, multiply by	1.583
Sulphate of potash into actual potash, multiply by	0.41
Actual potash into sulphate of potash, multiply by	1.85
Nitrate of potash into nitrogen, multiply by	0.139
Carbonate of potash into actual potash, multiply by	0.681
Actual potash into carbonate of potash, multiply by	1.466
Chlorine, in "kainit," multiply potash (K_2O) by	2.33

For instance, you buy 95 per cent. of nitrate of soda and want to know how much nitrogen is in it, multiply 95 per cent. by 0.1647, you will get 15.65 per cent. nitrogen; you want to know how much ammonia this nitrogen is equivalent to, then multiply 15.65 per cent. by 1.214 and you get 18.99 per cent., the equivalent in ammonia.

Or, to convert 90 per cent. carbonate of potash into actual potash (K_2O), multiply 90 by 0.681, equals 61.29 per cent. actual potash (K_2O).

COPIES OF THE FERTILIZER, STOCK FEED AND PURE FOOD AND DRUG LAWS.

Copies of the Laws, Regulations and Standards will be furnished by the Commissioner of Agriculture on application.

AVERAGE COMPOSITION OF COMMERCIAL FEED STUFFS.

NAME OF FEED.	Crude Fiber.	Protein.	Starch and Sugar.	Fat.	Ash.
Bright Cot'n Seed Meal	9.35	39.70	28.60	7.80	5.80
Dark Cotton Seed Meal	20.00	22.90	37.10	5.50	5.00
Linseed Meal, old process	7.50	35.70	36.00	7.20	5.30
Linseed Meal, new process	8.40	36.10	36.70	3.60	5.20
Wheat Bran	9.00	15.40	53.90	4.00	5.80
Wheat Middlings	5.40	15.40	59.40	4.10	3.20
Mixed Feed (Wheat)	7.80	16.90	54.40	4.80	5.30
Ship Stuff (Wheat)	5.60	14.60	59.80	5.00	3.70
Corn (grain)	2.10	10.50	69.60	5.40	1.50
Corn Meal	1.90	9.70	68.70	3.80	1.40
Corn Cobs	30.10	2.40	54.90	0.50	1.40
Corn and Cob Meal	6.60	8.50	64.80	3.50	1.50
Hominy Feed	4.05	10.50	65.30	7.85	2.55
Corn and Oats, equal parts	5.80	11.15	64.65	5.20	2.25
Barley (grain)	2.70	12.40	69.80	1.80	2.40
Barley and Oats, equal parts	6.10	12.10	64.75	3.40	2.70

AVERAGE COMPOSITION OF COMMERCIAL FEED STUFFS—(*Continued.*)

NAME OF FEED.	Crude Fiber.	Protein.	Starch and Sugar.	Fat.	Ash.
Oats (grain)	9.50	11.80	59.70	5.00	3.00
Rice (grain)	0.20	7.40	79.20	0.40	0.40
Rice Bran	9.50	12.10	49.90	8.80	10.00
Rice Hulls	35.70	3.60	38.60	0.70	13.20
Wheat (grain)	1.80	11.90	71.90	2.10	1.80
Dry Jap Sugar Cane...	26.22	2.28	62.55	1.55	2.77
Cow Pea	4.10	20.80	55.70	1.40	3.20
Cow Pea Hay	20.10	16.60	42.20	2.20	7.50
Velvet Bean Hulls	27.02	7.46	44.56	1.57	4.32
Velvet Beans and Hulls	9.20	19.70	51.30	4.50	3.30
Velvet Bean Hay.....	29.70	14.70	41.00	1.70	5.70
Beggarweed Hay	24.70	21.70	30.20	2.30	10.90
Japanese Kudzu Hay..	32.14	17.43	30.20	1.67	6.87
Cotton Seed (whole)...	23.20	18.40	24.70	19.90	3.50
Cotton Seed Hulls.....	44.40	4.00	36.60	2.00	2.60
Gluten Feed	5.30	24.00	51.20	10.60	1.10
Beef Scrap	.....	44.70	3.28	14.75	29.20

FORMULAS.

There are frequent inquiries for formulas for various crops, and there are hundreds of such formulas published; and, while there are hundreds of "brands," the variations in these grades are surprisingly little. Dozens of "brands" put up by the same manufacturer are identical goods, the only difference being in the name printed on the tag or sack. A good general formula for field or garden might be called a "vegetable formula," and would have the following: Ammonia, 3½%; available phosphoric acid, 6½%; and potash, 7½%. The following formulas will furnish the necessary plant food in about the above proportion. I have purposely avoided the use of any fraction of 100 pounds in these formulas to simplify them. Values are taken from price lists furnished by the trade, January 1, 1912.

For cotton, corn, sweet potatoes and vegetables: Ammonia, 3½%; available phosphoric acid, 6½%; potash, 7½%.

(A) "VEGETABLE."

No. 1.

		Per Cent.	
900	pounds of Cotton Seed Meal (7½-2½-1½)	3.25	Ammonia
800	pounds of Acid Phosphate (16 per cent)	6.46	Available
300	pounds of Muriate or (Sulphate) (50 per cent)	7.50	Potash
2,000	State value mixed and bagged	$27.52	
	Plant Food per ton	343	pounds

No. 2.

		Per Cent.	
1,000	lbs. of Blood and Bone (6½-8)	3.25	Ammonia
400	lbs. of Acid Phosphate (16 per cent)	7.00	Available
600	lbs. Low Grade Sulp. Pot. (26 per cent)	7.80	Potash
2,000			
	State value mixed and bagged	$28.45	
	Plant Food per ton	360	pounds

No. 3.

		Per Cent.
300 lbs. of Dried Blood (16 per cent).....		3.25 Ammonia
100 lbs of Nitrate of Soda (17 per cent).....		8.00 Available
1,000 lbs of Acid Phosphate (16 per cent).....		7.80 Potash
600 lbs of Low Grade Sulp. Pot. (26 per cent)		
2,000		

State value mixed and bagged.....$29.45
Plant Food per ton..... 381 pounds

(B) "FRUIT AND VINE."

No. 1.

Fruits, Melons, Strawberries, Irish Potatoes: Ammonia, 4 per cent., Available Phoshporic Acid 7 per cent., Potash 10 per cent.

		Per Cent.
1,000 lbs. of Blood and Bone (6½-8).....		
400 lbs. of Muriate of Potash (50 per cent)...		4 Ammonia
500 lbs. of Acid Phosphate (16 per cent).....		8 Available
100 lbs. of Nitrate of Soda (17 per cent).....		10 Potash
2,000		

State value mixed and bagged.....$34.50
Plant Food per ton..... 440 pounds

No. 2.

		Per Cent.
500 lbs. of Castor Pomace (6-2 per cent).....		4.00 Ammonia
200 lbs. of Sulp. of Am. (25 per cent).....		7.70 Available
900 lbs. of Acid Phosphate (16 per cent).....		9.60 Potash
400 lbs. of Sulp. of Pot. (48 per cent).....		
2,000		

State value mixed and bagged.....$33.76
Plant Food per ton..... 426 pounds

No. 3.

		Per Cent.
500 lbs. of Cotton Seed Meal (7½-2½-1½).....		
100 lbs. of Nitrate of Soda (17 per cent).....		3.97 Ammonia
100 lbs. of Sulp. of Am. (25 per cent).....		8.30 Available
900 lbs. of Acid Phosphate (16 per cent).....		8.97 Potash
400 lbs. of Sulp. of Potash (48 per cent).....		
2,000		

State value mixed and bagged.....$33.56
Plant Food per ton ..... 425 pounds

COMMERCIAL STATE VALUES OF FEED STUFF FOR 1914.

For the season of 1914 the following "State values" are fixed as a guide to purchasers, quotation January 1.

These values are based on the current prices of corn, which has been chosen as a standard in fixing the commercial values; the price of corn, to a large extent, governing the price of other feeds, pork, beef, etc.:

Commercial Values of Feed Stuffs for 1914.

Indian corn being the standard @$35.00 per ton.
($1.75 per sack of 100 lbs., 98c per bu. 56 lbs.)

To find the commercial State value, multiply the percentages by the price per unit.

A unit being 20 pounds (1%) of a ton.

Protein, 4.8c, per pound .....96c. per unit
Starch and Sugar, 1.55c. per pound .....31c. per unit
Fats, 3.5c. per pound .....70c. per unit

Example No. 1.

CORN AND OATS, EQUAL PARTS—

Protein	11.15 x 96c,	$10.71
Starch and Sugar	64.65 x 31c,	20.04
Fat	5.20 x 70c,	3.64
State value per ton		$34.49

Example No. 2.

Protein	10.50 x 96c,	$10.08
Starch and Sugar	69.60 x 31c,	21.57
Fat	5.40 x 70c,	3.78
State value per ton		$35.43

DEPARTMENT OF AGRICULTURE—DIVISION OF CHEMISTRY.

SPECIAL FERTILIZER ANALYSES, 1914.

R. E. ROSE, State Chemist. FERTILIZER SECTION. FRANK T. WILSON, Asst. Chemist.

Samples Taken by State Chemist and State Inspector Under Sections 1, 2, and 13, Act Approved May 24, 1905.

NAME, OR BRAND.	Laboratory Number.	Moisture.	Phosphoric Acid.			Ammonia.	Potash (K_2O.)	BY WHOM SENT.
			Available.	Insoluble.	Total.			
Fertilizer No. 2	3162	7.62	6.20	6.10	12.30	4.38	5.90	M. C. Britt Winter Garden.
Fertilizer	3163	4.51	5.92	1.23	7.15	4.70	6.72	T. B. Glass, Hastings.
Fertilizer	3164	4.07	9.08	0.77	9.85	4.62	7.02	R. T. Hewitt, Hastings.
Fertilizer	3165	4.41	8.00	0.80	8.80	4.69	6.86	Miss Estelle Hewitt, Hastings.
Fertilizer No. 2	3166	3.84	8.78	0.82	9.60	5.03	7.94	E. D. Davis, Hastings.
Fertilizer No. 1 (Acid Phosphate)	3167	.....	17.70	0.20	17.90	.....	.....	E. B. Shelfer Co., Quincy.
Fertilizer No. 2	3168	9.73	11.50	0.60	12.10	.....	4.08	E. B. Shelfer Co., Quincy.
Fertilizer No. 3 (C. S. Meal)	3169	.....	.....	.....	.....	7.63	.....	E. B. Shelfer Co., Quincy.

Fertilizer	3170	5.66	8.27	0.38	8.65	2.80	10.28	H. A. Perry, Pomona.
Fertilizer No. 1	3171	.....	6.90	0.70	7.60	3.05	10.34	Henry W. Smith, Wauchula.
Fertilizer No. 2	3172	.....	9.10	0.10	9.20	4.50	11.76	Henry W. Smith, Wauchula.
Fertilizer No. 1	3173	6.41	6.88	1.37	8.25	4.00	8.80	J. W. Case, Hastings.
Fertilizer No. 2	3174	6.55	7.24	1.34	8.58	4.80	7.88	J. W. Case, Hastings.
Fertilizer	3175	5.16	7.05	5.15	12.20	6.61	16.49	J. E. Griffin, Lakeland.
Fertilizer	3176	6.33	9.40	0.30	9.70	4.45	11.80	D. M. Bryan, Wauchula.
Fertilizer	3177	.....	3.10	1.60	4.70	2.15	8.60	W. R. Denham, Jacksonville.
Cotton Seed Oil Cake Sweepings	3178	.....	.....	.....	.....	6.42	.....	J. E. Dubuisson & Co., Pensacola.
Fertilizer	3179	.....	1.05	0.45	1.50	7.40	14.82	K. R. Breuizer, Hastings.
Fertilizer No. 1	3180	7.45	8.30	1.15	9.45	4.55	7.09	J. W. Case, Hastings.
Fertilizer No. 2	3181	6.98	7.08	1.37	8.45	4.52	9.32	J. W. Case, Hastings. (For Mrs. S. I. Killingsworth.
Fertilizer	3182	9.38	6.90	1.00	7.90	4.18	7.84	J. A. Cody, Hastings. (For A. M. Stevens).
Fertilizer	3183	7.29	7.00	1.00	8.00	4.82	8.04	J. A. Cody, Hastings. (For W. A. Stevens.)
Fertilizer	3184	.....	7.83	0.27	8.10	4.13	8.00	J. A. Cody, Hastings.
Fertilizer	3185	6.33	7.33	1.77	9.10	5.03	8.18	M. V. Wilder, Limestone.

NAME, OR BRAND.	Laboratory Number.	Moisture.	Phosphoric Acid.			Ammonia.	Potash (K_2O.)	BY WHOM SENT.
			Available.	Insoluble.	Total.			
Fertilizer	3186	5.11	8.35	0.45	8.80	4.90	12.25	W. G. Norsworthy, McIntosh.
Fertilizer	3187	.....	5.68	4.12	9.80	5.58	5.22	J. R. Pounds, Ocoee.
Cotton Seed Meal	3188	.....	.....	.....	.....	7.10	.....	Capital City Grocery, Tallahassee.
Fertilizer	3189	6.32	7.42	2.25	9.68	4.15	7.77	J. J. Brown, Hastings.
Fertilizer	3190	6.52	7.05	1.15	8.20	5.00	5.86	F. H. Smith, Hastings.
Fertilizer	3191	6.37	6.53	1.47	8.00	4.70	9.04	W. R. Underhill, Barberville.
Fertilizer	3192	8.53	7.48	1.27	8.75	4.55	6.56	S. H. Lane, Barberville.
Fertilizer	3193	5.76	7.40	0.80	8.20	4.30	5.33	A. M. Anderson, Bowling Green.
Fertilizer No. 1	3194	7.74	5.78	0.92	6.70	5.70	4.30	Albert McClain, Candler.
Fertilizer	3195	10.59	7.73	1.77	9.50	4.85	7.61	C. J. Masters, Armstrong.

Fertilizer	3196	7.18	7.65	1.35	9.00	5.15	8.00	J. L. Burton, Crescent City.
Fertilizer No. 1	3197	9.46	6.40	3.60	9.00	4.18	9.04	E. R. Watson, Arcadia.
Fertilizer No. 2	3198	9.63	7.20	3.30	10.50	5.23	5.50	E. R. Watson, Arcadia.
Fertilizer	3199	1.12	4.75	2.10	7.85	6.20	9.14	Tonner & Borland, Citra.
Guano No. 1	3200	4.68	6.15	0.25	6.40	3.35	8.40	C. W. Edwards, Day.
Guano No. 2	3201	7.10	5.73	0.77	6.50	5.15	8.11	C. W. Edwards, Day.
Cotton Seed Meal	3202	.....	.....	.....	.....	7.58	.....	Independent Fertz. Co., Jacksonville.
Fertilizer (Floats)	3203	.....	1.90	25.45	27.35	.....	.....	W. S. Reeve, Pensacola.
Fertilizer No. 1	3204	7.47	8.50	1.10	0.60	4.88	7.71	Gus A. Morton, Williston.
Fertilizer No. 2 (Dried Blood)	3205	.....	.....	.....	.....	13.42	.....	Gus A. Morton, Williston.
Fertilizer No. 3 (Nitrate of Soda)	3206	.....	.....	.....	.....	18.50	.....	Gus A. Morton, Williston.
Cotton Seed Meal	3207	.....	.....	.....	.....	7.75	.....	C. E. Van Landingham, Juniper.
Fertilizer No. 1	3208	7.25	9.43	0.87	10.30	4.15	11.43	T. J. Peters, Perrine.
Fertilizer No. 2	3209	8.52	9.30	1.50	10.80	4.55	10.87	T. J. Peters, Perrine.
Fertilizer No. 3	3210	8.83	9.65	1.45	11.10	4.50	10.93	T. J. Peters, Perrine.
Fish Scrap	3211	8.14	4.85	4.65	9.50	11.00	0.62	Florida Freezer & Fertz. Co., Jensen.
Fertilizer	3212	3.96	4.20	4.90	9.10	4.39	5.01	J. P. Cowburn, Crescent City.

SPECIAL FERTILIZER ANALYSES, 1914—Continued.

NAME, OR BRAND.	Laboratory Number.	Moisture.	Phosphoric Acid.			Ammonia.	Potash (K_2O.)	BY WHOM SENT.
			Available.	Insoluble.	Total.			
Ashes	3213	.....	.....	.....	.....	.....	0.23	J. L. Overstreet, Kissimmee.
Fertilizer	3214	8.02	7.10	0.70	7.80	4.75	10.10	H. A. Perry, Pomona.
Fertilizer	3215	10.13	10.25	0.35	10.60	1.30	15.00	J. M. Brownlee, Starke.
Ashes	3216	.....	.....	.....	.....	.....	0.78	A. A. Calhoun, Marianna.
Fertilizer No. 1 (Muriate of Potash).	3217	.....	.....	.....	.....	.....	52.96	L. B. Thompson, Pensacola.
Fertilizer No. 2 (Muriate of Potash).	3218	.....	.....	.....	.....	.....	53.20	L. B. Thompson, Pensacola.
Fertilizer No. 3 (C. S. M. Sweepings).	3219	.....	.....	.....	.....	7.60	.....	L. B. Thompson, Pensacola.
Cotton Seed Meal No. 1	3220	.....	.....	.....	.....	7.65	.....	Shelfer & Ellinor Co., Havana.
Kainit	3221	.....	.....	.....	.....	.....	13.12	W. E. Privette, Jasper.
Soft Phosphate No. 1	3222	.....	2.82	26.68	29.50	.....	.....	W. C. Rerdell, Tampa.

Soft Phosphate No. 2	3223	.....	3.35	5.00	8.35	.....	.....	W. C. Rerdell, Tampa.
Fertilizer	3224	6.87	8.00	2.30	10.30	5.30	8.76	J. V. Cyreen, Hallandale.
Fertilizer No. 1	3225	.....	11.90	0.65	12.50	3.20	11.88	W. E. Quarterman, Live Oak.
Fertilizer No. 2	3226	.....	10.25	1.45	11.70	5.52	7.47	W. E. Quarterman, Live Oak.
Fertilizer	3227	8.14	7.22	1.03	8.25	4.33	5.01	Geo. W. Futch, Bowling Green.
Fertilizer	3228	5.31	8.83	1.67	10.50	5.18	6.62	E. K. Head, Coquina.
Fertilizer	3229	5.90	5.35	3.85	9.20	4.73	5.35	E. Dickerman, Mt. Dora.
Manure Salt	3230	.....	.....	.....	.....	.....	19.25	J. D. Trammell, Muscogee.
Fertilizer No. 1 (White)	3231	.....	20.35	4.45	24.80	0.80	18.92	J. E. Ward, Lake Jackson.
Fertilizer No. 2 (Gray)	3232	.....	6.50	1.40	7.90	2.37	4.62	J. E. Ward, Lake Jackson.
Fertilizer No. 1	3233	11.55	9.45	2.25	11.80	2.55	3.15	W. W. Hurston, Laurel Hill.
Fertilizer No. 2	3234	9.20	8.40	0.60	9.00	2.50	3.96	W. W. Hurston, Laurel Hill.
Fertilizer No. 3	3235	6.00	6.00	1.50	7.50	9.35	4.01	W. W. Hurston, Laurel Hill.
Cotton Seed Meal	3236	.....	.....	.....	.....	7.30	.....	N. H. Shaw, Quincy.
Kainit	3237	.....	.....	.....	.....	.....	14.49	Putnam & Wilcox, Perry.
Cotton Seed Meal	3238	.....	.....	.....	.....	7.55	.....	Julian Howard, Quincy.

DEPARTMENT OF AGRICULTURE—DIVISION OF CHEMISTRY.

FERTILIZER SECTION.

R. E. ROSE, State Chemist. OFFICIAL FERTILIZER ANALYSES, 1914. FRANK T. WILSON, Asst. Chemist.

Samples Taken by State Chemist Under Sections 1 and 2, Act Approved May 22, 1905.

Deficiencies Greater than 0.20% are Distinguished by Black Face Type.

NAME, OR BRAND.	Laboratory Number.	Analyses, Guaranteed and Found.	Moisture.	Phosphoric Acid.			Ammonia.	Potash (K_2O.)	BY WHOM and WHERE MANUFACTURED.
				Available.	Insoluble.	Total.			
Standard Bean & Pea Special...	1949	Guaranteed	8.00	6.00	1.00	7.00	5.00	4.00	Standard Fertz Co., Gainesville, Fla.
		Found	7.31	7.23	1.77	9.00	2.93	5.44	
Special Mixture	1950	Guaranteed	10.00	7.00	1.50	.....	4.00	7.50	Armour Fertz. Works, Jacksville, Fla.
		Found	4.98	7.55	1.75	9.40	4.75	7.80	
Sun Hastings Potato Fertilizer..	1951	Guaranteed	10.00	7.00	1.00	.....	4.00	7.00	Peninsula Fertz Co., Palatka, Fla.
		Found	6.68	7.45	0.25	7.70	4.08	7.34	
Special Fertilizer	1952	Guaranteed	10.00	11.00	1.00	.....	2.00	.....	Peninsula Fertz. Co., Palatka, Fla.
		Found	7.69	12.10	0.25	12.35	2.50	.....	
Hastings Meal Mixture.....	1953	Guaranteed	10.00	7.00	.....	.....	4.00	7.50	Independent Fertz. Co., Jacksonville, Fla.
		Found	5.19	7.10	1.15	8.25	4.70	7.76	
Mapes Orange Tree Manure....	1954	Guaranteed	12.00	6.00	2.00	.....	4.00	3.00	Mapes Formula & Peruvian Co., New York, N. Y.
		Found	8.77	6.10	2.85	8.95	4.43	5.77	

Cotton Seed Meal	1955	Guaranteed	.....	.....	.....	2.50	7.50	1.50	Camilla Cotton Oil & Fertz. Co., Camilla, Ga.
		Found	.....	.....	.....	.....	8.15	.....	
Standard Grade C. S. Meal	1956	Guaranteed	.....	.....	.....	2.50	7.50	1.50	Donalsonville Oil Mill, Donalsonville, Ga.
		Found	.....	.....	.....	.....	8.20	.....	
Cotton Seed Meal	1957	Guaranteed	.....	.....	.....	2.50	7.50	1.50	Camilla Cotton Oil & Fertz. Co., Camilla, Ga.
		Found	.....	.....	.....	.....	7.88	.....	
Cotton Seed Meal	1958	Guaranteed	.....	.....	.....	2.50	7.50	1.50	Empire Cotton Oil Co., Quitman, Ga.
		Found	.....	.....	.....	.....	7.00	.....	
Cotton Seed Meal	1959	Guaranteed	.....	.....	.....	2.50	7.50	1.50	Thomasville Mill & Forage Co., Thomasville, Ala.
		Found	.....	.....	.....	.....	8.30	.....	
No. 1 Peruvian & Fish Guano Mixture	1960	Guaranteed	12.00	5.00	1.00	.....	4.00	5.00	Florida Fertz. Co., Gainesville, Fla.
		Found	7.07	4.90	0.90	5.80	3.90	6.57	
Tomato Special	1961	Guaranteed	10.00	6.00	1.00	.....	4.00	8.00	Florida Fertz. Co., Gainesville, Fla.
		Found	6.48	6.58	0.57	7.15	4.30	8.31	
Georgia State Standard Ammoniated Superphosphate	1962	Guaranteed	10.00	8.00	1.00	.....	2.00	2.00	Va-Carolina Chemical Co., Gainesville, Fla.
		Found	10.35	7.93	1.42	9.35	3.33	3.16	
Lettuce and Cuke Special	1963	Guaranteed	12.00	5.00	1.00	.....	6.50	4.00	Florida Fertz. Co., Gainesville, Fla.
		Found	6.22	6.03	0.92	6.95	6.50	3.93	
So. States Special Vegetable Grower	1964	Guaranteed	8.00	6.00	1.00	.....	4.00	5.00	Va-Carolina Chemical Co., Gainesville, Fla.
		Found	6.26	6.93	0.75	7.68	4.80	7.08	
No. 1. Peruvian & Fish Guano Mixture, Double Strength Pot.	1965	Guaranteed	12.00	5.00	1.00	.....	4.00	10.00	Florida Fertz. Co., Gainesville, Fla.
		Found	4.62	5.90	1.00	6.90	4.65	10.97	

NAME, OR BRAND	Laboratory Number.	Analyses, Guaranteed and Found.	Moisture.	Phosphoric Acid.			Ammonia.	Potash (K_2O.)	BY WHOM and WHERE MANUFACTURED.
				Available.	Insoluble.	Total.			
Standard Melon Special	1966	Guaranteed	8.00	6.00	1.00	7.00	4.00	6.00	Standard Fertz. Co., Gainesville, Fla.
		Found	12.41	8.25	0.75	9.00	3.60	6.85	
Standard Potato Special	1967	Guaranteed	10.00	7.00	1.00	8.00	3.50	8.00	Standard Fertz. Co., Gainesville, Fla.
		Found	9.31	8.05	0.65	8.70	3.38	8.86	
H. G. Sulphate of Potash	1968	Guaranteed	5.00					50.00	Armour Fertz. Works, Jacksville, Fla.
		Found						49.45	
Cotton Seed Meal	1969	Guaranteed				2.50	7.50	1.50	Montezuma Mfg. Co., Montezuma, Ga.
		Found					7.90		
Standard Grade C. S. Meal	1970	Guaranteed				2.50	7.50	1.50	Donaldsonville Oil Mill, Donaldsonville, Ga.
		Found					8.00		
Cotton Seed Meal	1971	Guaranteed				2.50	7.50	1.50	Florida Cotton Oil Co., Jacksonville, Fla.
		Found					7.70		
Cotton Seed Meal	1972	Guaranteed				2.50	7.50	1.50	McCaw Mfg. Co., Macon, Ga.
		Found					7.45		
Standard C. S. Meal	1973	Guaranteed				2.50	7.50	1.50	Grovania Cotton Oil Co., Grovania, Ga.
		Found					7.75		
Cotton Seed Meal	1974	Guaranteed				2.50	7.50	1.50	Ashburn Oil Mill, Ashburn Ga.
		Found					8.40		
Bright C. S. Meal	1975	Guaranteed				2.50	7.50	1.50	Armour Fertz. Works, Jacksville, Fla.
		Found					7.55		
Cotton Seed Meal	1976	Guaranteed				2.50	7.50	1.50	Florida Cotton Oil Co., Jacksonville, Fla.
		Found					7.95		

DEPARTMENT OF AGRICULTURE—DIVISION OF CHEMISTRY.

FEEDING STUFF SECTION.

R. E. ROSE, State Chemist. SPECIAL FEEDING STUFF ANALYSES, 1914. E. PECK GREENE, Asst. Chemist.

Samles Taken by Purchaser Under Section 9, Act Approved May 24, 1905.

NAME, OR BRAND.	Laboratory Number.	Fibre.	Protein.	Starch and Sugar. (Nitrogen Free Ext'r't.)	Fat.	Ash.	BY WHOM SENT.
Cotton Seed Meal	270	.....	26.94	.....	.....	.....	Carroll Dunscombe, Stuart.
Bran	271	9.75	15.36	56.41	3.74	6.67	E. H. Sellards, Tallahassee.
Standard Middlings	272	4.65	15.62	58.00	2.66	5.07	J. E. Bubulsson & Bros., Pensacola.
Ground Feed	273	8.79	9.92	68.00	2.10	2.59	A. W. Corbett, St. Augustine.
Scratch Feed	274	2.32	11.93	71.75	2.95	1.35	D. S. Earhart, Wauchula.
Sugar Cane Bagasse No. 1	275	32.58	5.27	57.04	1.00	1.13	V. W. Helm, Miami.
Sugar Cane Bagasse No. 2	276	34.45	4.91	55.57	1.20	1.07	V. W. Helm, Miami.
Sugar Cane Bagasse No. 3	277	34.02	5.22	56.74	0.85	1.02	V. W. Helm, Miami.
Feed	278	11.35	9.30	66.92	1.37	8.94	Stringfellow & Doty Co., Jacksonville.
Cotton Seed Meal	279	.....	38.61	.....	.....	.....	Sheifer & Ellinor Co., Havana.
Feed	280	8.43	14.04	61.34	3.75	2.15	Chipley Gin Co., Chipley, Fla.
Beet Pulp	281	13.82	8.34	67.99	0.45	2.20	Wilson & Parker Co., Jacksonville.
Chicken Feed	282	3.86	11.50	62.49	2.31	9.01	W. G. Dodd, Tallahassee.

DEPARTMENT OF AGRICULTURE—DIVISION OF CHEMISTRY.

FEEDING STUFF SECTION.

R. E. ROSE, State Chemist. OFFICIAL FEEDING STUFF ANALYSES, 1914. E. PECK GREENE, Asst. Chemist.
Samples Taken by State Chemist and State Inspector Under Sections 1, 2, and 13, Act Approved May 24, 1905.
Deficiencies Greater than 0.20% are Distinguished by Black Face Type.

NAME, OR BRAND.	Laboratory Number.	Analyses, Guaranteed and Found.	Fibre.	Protein.	Starch and sugar (Nitrogen free extr'v.)	Fat.	Ash.	NAME AND ADDRESS OF MANUFACTURER.
Kornfalfa Kandy Feed.....	1651	Guaranteed	12.00	9.00	55.00	3.50	.....	Kornfalfa Feed Milling Co., Kansas City, Mo.
		Found	11.95	10.46	57.32	2.04	7.75	
Krak-a-Jack Horse Feed.....	1652	Guaranteed	15.00	10.00	55.00	2.50	.....	The Superior Feed Co., Memphis, Tenn.
		Found	7.17	12.21	57.93	2.85	8.45	
Crescent Molasses Feed.....	1653	Guaranteed	12.00	11.00	55.00	3.50	.....	Geo. B. Matthews & Sons, New Orleans, La.
		Found	8.31	10.78	56.47	6.60	6.19	
"Rex" Dry Stock Feed.....	1654	Guaranteed	10.00	11.00	55.00	4.00	.....	Milam-Morgan Co., New Orleans, La.
		Found	13.80	14.64	59.21	4.55	8.50	
Victor Feed	1655	Guaranteed	12.00	8.00	62.00	3.00	.....	The Quaker Oats Co., Chicago, Ill.
		Found	8.77	8.60	59.74	2.27	4.56	
Cracker Mule Feed.....	1656	Guaranteed	12.00	10.00	58.00	3.50	.....	The Quaker Oats Co., Chicago, Ill.
		Found	8.22	10.79	66.32	2.15	4.32	

Choice Bran	1657	Guaranteed	9.10	16.04	53.50	4.26	.....	Hecker - Jones - Jewell Co.,
		Found	10.02	15.97	51.78	5.50	7.07	New York, N. Y.
Wheel Horse Feed	1658	Guaranteed	17.50	11.00	50.00	3.00	.....	Commonwealth Feed Mills
		Found	12.77	12.11	57.51	4.00	4.47	Co., St. Louis, Mo.
Big Egg Scratching Grain	1659	Guaranteed	5.00	10.00	60.00	2.50	.....	The Quaker Oats Co., Chi-
		Found	3.27	10.09	72.24	2.75	2.50	cago, Ill.
Ship Stuff	1660	Guaranteed	7.00	14.50	54.00	4.00	.....	The Dunlop Mills, Richmond,
		Found	6.50	14.48	60.48	4.50	4.87	Va.
Pure Wheat Bran & Screenings	1661	Guaranteed	9.50	14.50	50.00	4.00	.....	Liberty Mills, Nashville,
		Found	8.50	13.09	55.68	4.02	6.54	Tenn.
Sterling Horse Feed	1662	Guaranteed	8.00	9.25	64.50	3.25	.....	The Quaker Oats Co., Chi-
		Found	6.27	10.53	66.44	3.67	4.07	cago, Ill.
Maizefalfa Feed	1663	Guaranteed	12.00	10.00	58.00	3.50	.....	The Quaker Oats Co., Chi-
		Found	10.55	11.41	60.90	3.07	5.15	cago, Ill.
Ceralfa Stock Feed	1664	Guaranteed	11.50	13.00	55.00	3.50	.....	Edgar-Morgan Co., Memphis,
		Found	9.73	14.04	57.01	3.50	5.58	Tenn.
Winter Wheat Middlings	1665	Guaranteed	5.50	14.00	59.00	4.00	.....	Quaker City Flour Mills Co.,
		Found	4.02	16.06	61.42	3.70	5.65	Philadelphia, Pa.
Boss Feed	1666	Guaranteed	12.00	8.00	62.00	3.00	.....	The Quaker Oats Co., Chi-
		Found	8.95	9.48	65.28	2.35	4.77	cago, Ill.
Atlas Feed	1667	Guaranteed	.....	11.85	57.18	3.25	.....	Barnard & Hester, Tampa,
		Found	9.85	11.23	60.02	3.45	5.90	Fla.

OFFICIAL FEEDING STUFF ANALYSES, 1914.—Continued.

NAME, OR BRAND.	Laboratory Number.	Analysis, Guaranteed and Found.	Fibre.	Protein.	Starch and Sugar, (Nitrogen Free Extr't.)	Fat.	Ash.	NAME AND ADDRESS OF MANUFACTURER.
Peters's "Arab" Horse Feed....	1668	Guaranteed	15.00	9.00	59.00	2.00	.....	M. C. Peters Mill Co., Omaha, Neb.
		Found	8.06	10.35	62.03	2.01	5.00	
Tampo Stock Feed.....	1669	Guaranteed	9.15	10.20	49.00	5.40	.....	Milam-Morgan Co., New Orleans, La.
		Found	10.47	10.46	58.01	3.57	6.10	
Besto Molasses Feed.....	1670	Guaranteed	12.00	10.00	57.00	3.50	.....	J. T. Gibbons, New Orleans, La.
		Found	9.09	13.90	57.25	1.94	5.79	
Molasco	1671	Guaranteed	12.00	10.00	55.00	3.25	.....	National Oats Co., St. Louis, Mo.
		Found	14.34	9.49	59.77	3.79	5.18	
Winner Molasses Feed.....	1672	Guaranteed	12.50	9.00	57.00	1.50	.....	Robinson-Danforth Co., St. Louis, Mo.
		Found	11.97	10.03	61.02	1.61	4.43	
Sucrene Dairy Feed.....	1673	Guaranteed	12.00	16.50	46.00	3.50	.....	American Milling Co., Chicago, Ill.
		Found	12.46	15.02	51.08	3.16	6.42	
Tampa Dairy Feed.....	1674	Guaranteed	13.15	17.12	49.00	4.10	.....	Barnard & Hester, Tampa, Fla.
		Found	13.09	18.34	51.80	4.30	5.15	
Royal Horse and Mule Feed....	1675	Guaranteed	12.00	10.00	55.00	2.50	.....	Standard Feed Co., Memphis, Tenn.
		Found	11.86	10.79	59.97	4.25	6.60	

Superior Stock Feed	1676	Guaranteed	12.00	11.00	50.00	2.50	.....	The Superior Feed Co., Memphis, Tenn.
		Found	10.52	10.43	58.45	2.49	5.36	
Tampa Infirmary Feed	1677	Guaranteed	7.50	9.78	62.95	6.05	.....	Barnard & Hester, Tampa, Fla.
		Found	2.56	11.41	67.49	4.57	4.75	
Grainfalfa Feed	1678	Guaranteed	12.00	10.00	58.00	3.50	.....	The Quaker Oats Co., Chicago, Ill.
		Found	14.07	11.23	57.11	3.12	4.55	
Camp's Flaked Corn and Oats	1679	Guaranteed	8.00	10.00	65.00	4.00	.....	The Toledo Grain & Milling Co., Toledo, Ohio.
		Found	4.32	10.09	69.06	3.60	2.33	
Egg and Developing Mash	1680	Guaranteed	7.22	16.60	52.07	4.51	.....	J. H. Wilkes & Co., Nashville, Tenn.
		Found	7.62	20.81	50.45	4.42	6.95	
Grainfalfa Feed	1681	Guaranteed	12.00	10.00	58.00	3.50	.....	The Quaker Oats Co., Chicago, Ill.
		Found	10.52	10.88	63.10	2.23	3.95	
Pure Dustless Alfalfa Meal	1682	Guaranteed	30.00	14.00	25.00	1.50	.....	Otto Weiss Alfalfa Stock Co., Wichita, Kan.
		Found	29.50	14.04	38.11	2.90	7.75	
Kyomo Feed	1683	Guaranteed	7.09	15.75	63.62	3.82	.....	The J. E. M. Milling Co., Frankfort, Ky.
		Found	6.90	15.18	61.08	3.01	4.87	
"Rex" Dry Stock Feed	1684	Guaranteed	10.00	11.00	55.00	4.60	.....	Milam-Morgan Co., New Orleans, La.
		Found	13.14	14.48	51.72	3.37	6.47	
Pine Leaf Middlings	1685	Guaranteed	6.10	15.75	57.95	4.20	4.10	Cairo Milling Co., Cairo, Ill.
		Found	6.94	15.62	58.42	4.45	5.97	
Larro Feed	1686	Guaranteed	14.00	19.00	50.00	3.00	3.50	The Larrowe Milling Co., Detroit, Mich.
		Found	11.30	20.62	50.46	3.20	5.49	

NAME, OR BRAND.	Laboratory Number.	Analyses, Guaranteed and Found.	Fibre.	Protein.	Starch and Sugar. (Nitrogen Free Extrt.)	Fat.	Ash.	NAME AND ADDRESS OF MANUFACTURER.
Ballard's Bran	1687	Guaranteed	8.04	15.78	53.00	4.42	.....	Ballard & Ballard Co., Louisville, Ky.
		Found	8.60	15.80	55.10	3.30	7.45	
Pure Shorts	1688	Guaranteed	7.00	15.00	55.00	4.00	.....	Washburn - Crosby Milling Co., Louisville, Ky.
		Found	10.79	16.76	54.30	3.15	6.30	
Ship Stuff	1689	Guaranteed	8.00	14.50	57.00	3.50	.....	Atlanta Milling Co., Atlanta, Ga.
		Found	6.60	14.92	58.64	3.03	7.02	
Work-More Feed	1690	Guaranteed	12.00	10.00	58.00	3.50	.....	The Quaker Oats Co., Chicago, Ill.
		Found	12.06	11.41	59.32	2.46	5.25	
Choice Bran	1691	Guaranteed	9.10	16.04	63.50	4.26	.....	Hecker-Jones-Jewell Milling Co., New York, N. Y.
		Found	8.62	15.62	55.48	4.23	5.73	
Boss Feed	1692	Guaranteed	12.00	8.00	62.00	3.00	.....	The Quaker Oats Co., Chicago, Ill.
		Found	8.60	8.86	66.72	2.90	3.68	
M. Middlings	1693	Guaranteed	6.2.	17.59	53.65	5.78	.....	Hecker-Jones-Jewell Milling Co., New York, N. Y.
		Found	7.35	16.94	56.39	4.30	6.27	
Victor Feed	1694	Guaranteed	12.0v	8.00	62.00	3.00	.....	The Quaker Oats Co., Chicago, Ill.
		Found	10.12	9.48	64.92	3.11	2.77	

Pure Wheat Middlings.....	1695	Guaranteed	6.00	16.25	62.50	4.60	.....	The Dunlop Milling Co., Clarksville, Tenn.
		Found	6.34	15.71	59.41	3.83	4.65	
Vim Horse Feed.....	1696	Guaranteed	12.00	10.00	58.00	3.50	.....	The Quaker Oats Co., Chicago, Ill.
		Found	11.07	10.71	58.60	2.90	6.15	
Schumacher Special Horse Feed	1697	Guaranteed	8.00	9.25	64.50	3.25	.....	The Quaker Oats Co., Chicago, Ill.
		Found	7.57	9.92	68.02	3.03	2.74	
Schumacher Stock Feed.....	1698	Guaranteed	10.00	10.00	60.00	3.25	.....	The Quaker Oats Co., Chicago, Ill.
		Found	17.57	12.55	49.76	4.17	6.57	
Wheat Bran and Screenings...	1699	Guaranteed	9.50	14.75	57.50	4.00	.....	The Dunlop Milling Co., Clarksville, Tenn.
		Found	9.04	15.71	54.28	4.03	7.07	
Corno Horse and Mule Feed....	1700	Guaranteed	12.00	10.00	58.50	3.50	.....	The Corno Mills Co., St. Louis, Mo.
		Found	13.10	11.23	58.29	3.40	4.63	
Falco Horse Feed.....	1701	Guaranteed	12.00	9.00	59.00	2.00	.....	Baker & Holmes Co., Jacksonville, Fla.
		Found	9.94	10.02	57.89	3.64	6.48	
Chieftain Horse Feed.....	1702	Guaranteed	12.00	9.00	59.00	2.00	.....	G. E. Patteson & Co., Memphis, Tenn.
		Found	8.30	9.52	61.58	2.52	5.07	
Special Feed	1702	Guaranteed	12.00	10.50	58.00	2.50	.....	J. D. Frazier Co., Atlanta, Ga.
		Found	10.42	9.49	53.65	3.09	8.45	
O. B. C. Special Horse & Mule Feed	1704	Guaranteed	12.00	10.50	55.00	2.75	.....	G. E. Patteson & Co., Memphis, Tenn.
		Found	10.95	12.02	54.77	2.55	7.19	
Mak-Fat Molasses Feed.....	1705	Guaranteed	12.00	10.00	55.00	3.00	.....	National Milling Co., Macon, Ga.
		Found	12.55	9.30	54.97	3.43	6.02	

NA..E, OR BRAND.	Laboratory Number.	Analyses: Guaranteed and Found.	Fibre.	Protein.	Starch and Sugar. (Nitrogen Free Extr't.)	Fat.	Ash.	NAME AND ADDRESS OF MANUFACTURER.
Creamo Dairy Feed.....	1706	Guaranteed	18.00	16.50	45.00	4.50	.....	The Corno Mills Co., St. Louis, Mo.
		Found	18.02	17.02	43.69	6.27	6.87	
Ideal Horse and Mule Feed...	1707	Guaranteed	12.00	10.50	56.00	3.50	.....	Just Milling Feed Co., Nashville, Tenn.
		Found	12.25	11.93	54.35	2.15	9.95	
Pawnee Feed	1708	Guaranteed	12.00	8.25	65.00	3.50	.....	National Oats Co., St. Louis, Mo.
		Found	12.25	8.42	63.16	2.46	4.37	
Manna Rice Special Chick Feed	1709	Guaranteed	4.00	11.00	65.00	2.50	.....	Edgar-Morgan Co., Memphis, Tenn.
		Found	4.00	12.37	65.33	3.67	5.45	
Spring Wheat Middlings.....	1710	Guaranteed	8.00	15.00	52.00	4.00	.....	M. G. Rankin & Co., Milwaukee, Wis.
		Found	7.00	21.32	49.49	6.02	6.00	
Choice Wheat Middlings.....	1711	Guaranteed	8.00	15.00	50.00	5.00	.....	Kensch & Schwartz Co., New York, N. Y.
		Found	5.45	21.32	51.51	4.70	6.42	
Linseed Meal	1712	Guaranteed	8.00	32.00	.....	7.00	.....	Robert B. Brown Oil Co., St. Louis, Mo.
		Found	7.65	37.28	35.51	6.71	4.25	
Steinmesch Mixed Feed.....	1713	Guaranteed	6.00	10.00	65.00	3.50	.....	Steinmesch Feed Co., St. Louis, Mo.
		Found	8.77	11.76	60.62	5.71	3.70	

Ship Stuff	1714	Guaranteed	8.00	14.50	57.00	3.50	.....	Atlanta Milling Co., Atlanta, Ga.
		Found	6.05	14.92	60.12	4.37	4.47	
Pure Wheat Middlings	1715	Guaranteed	3.90	16.00	60.00	4.50	.....	Igleheart Bros., Evansville, Ind.
		Found	5.25	17.38	59.40	4.76	4.25	
Homco Feed	1716	Guaranteed	7.00	9.50	67.89	7.00	.....	American Hominy Co., Indianapolis, Ind.
		Found	5.17	12.11	61.28	9.02	3.60	
M. Middlings	1717	Guaranteed	6.50	16.80	55.11	5.60	.....	Hecker-Jones-Jewell Milling New York, N. Y.
		Found	6.72	17.99	56.30	4.73	3.84	
Dried Beet Pulp	1718	Guaranteed	20.00	8.00	58.00	0.50	2.50	The Larrowe Milling Co., Detroit, Mich.
		Found	16.72	9.45	60.90	0.78	3.65	

DEPARTMENT OF AGRICULTURE—DIVISION OF CHEMISTRY.

FOOD AND DRUG SECTION.

R. E. ROSE, State Chemist. SPECIAL FOOD AND DRUG ANALYSES, 1914. L. HEIMBURGER, Asst. Chemist.

Samples Taken by Purchaser Under Section 12, Act Approved June 5, 1911.

ALCOHOLIC DRINKS.

Number.	LABEL.	MANUFACTURER.	Alcohol (per cent by volume).	FROM
1489	Diehl's Neu-Bru. Contents not less than 7 ozs. Contains less than 1-10th of 1% Benzoate of Soda.	Osceola Bottling Works, Kissimmee, Fla.	0.54	Osceola Bottling Works, Kissimmee.
1509	Wine	.....	5.90	Angus Morrison, Crawfordville.
1510	Teddy Beer. Contents 12 ozs. Alcohol less than 2%.	The Consumer's Brewing Co., New Orleans, La.	2.40	E. R. Isler, Tallahassee.

SPECIAL FOOD AND DRUG ANALYSES, 1914—Continued.

SUGAR CANE.

Number.	NAME.	Juice (per cent).	Bagasse (per cent).	Analysis of Juice.				FROM
				Brix at 17.5° C.	Sucrose (per cent).	Invert Sugar (per cent).	Coefficient of Purity.	
1493	Sugar Cane No. 1 (D-74).....	66.60	33.40	16.6	14.75	0.58	88.85	V. W. Helm, Miami.
1494	Sugar Cane, No. 2 Red Cane. (H. M. Viele).	67.78	32.22	13.2	10.10	2.38	76.5	V. W. Helm, Miami.
1495	Sugar Cane No. 3 (Green Cape Sable Cane).	69.30	30.70	15.7	13.2	1.27	84.1	V. W. Helm, Miami.

SPECIAL FOOD AND DRUG ANALYSES, 1914—Continued.

MISCELLANEOUS.

No.	LABEL.	ANALYSIS.	FROM.
1487	Distilled Vinegar	Total solids (%)=0.25 Acetic Acid (%)=3.94 Ash (%)=0.01	Gulf Provision and Commission Co., Pensacola.
1488	Schooner Brew. Preserved with 1-10th of 1% Benzoate of Soda. This bottle contains 11 ozs. Bottled by Marianna Bottling Works. Bottled under authority of National Beverage Co., Chattanooga, Tenn.	Alcohol (% by vol.)None Net weight=11⅛ ozs.	Marianna Bottling Co., Marianna
1490	Cane Sugar and Guava Syrup	Caramel (%)=Small amount. Not added. Artificial colors=None. Commercial Glucose=None. Sucrose (Cane Sugar)=70.7%	Winnifred Cooper, Tampa.
1491	Syrup	Cane Sugar—69.9%	C. J. Clark, Milton.
1492	Flour (self-raising)	Bleaching test=Negative Sodium Bicarbonate=Present Alum=Present Phosphoric Acid=Present	I. L. Gunson, Hinson.
1497	Milk No. 1	Butter Fat (%)=5.0	E. H. Sellards, Tallahassee.
1498	Milk No. 2	Butter Fat (%)=4.3	E. H. Sellards, Tallahassee.

DRUGS.

No.	LABEL.	ANALYSIS.	FROM.
1496	Pearl La Sage's Complexion Treatment.	Sodium Carbonate, colored with Phenolphthalein.	Miss B. M. Hannon, Haines City.

DEPARTMENT OF AGRICULTURE—DIVISION OF CHEMISTRY.

R. E. ROSE, State Chemist. FOOD AND DRUG SECTION. L. HEIMBURGER, Asst. Chemist.

Samples Taken by State Inspector Under Section 12, Act Approved June 5, 1911.

OFFICIAL FOOD ANALYSES, 1914.

BAKING POWDERS.

Number.	LABEL.	Alum.	Phosphate.	Tartaric Acid.	Carbon Dioxide (CO_2) Available (per cent.)	Carbon Dioxide (CO_2) Total (per cent).	Net weight.	REMARKS.
1509	Good Luck One Spoon Baking Powder, 15.5 ozs. The Southern Mfg. Co., Richmond, Va.	Present	Trace..	.....	13.60	13.97	16, ⅞ oz....	Legal. An Alum Baking Powder.
1510	Royal Baking Powder, 16 ozs., Royal Baking Powder Co., New York.	None...	None...	Present	12.82	14.15	16 ozs.....	Legal. A Tartaric Acid Baking Powder.
1511	Rumford Baking Powder, 1 lb. Rumford Chemical Works, Providence, R. I.	None...	Present	.....	7.87	11.74	1 lb. ⅞ oz..	Legal. A Phosphate Baking Powder.
1512	Sodarine, 7.5 ozs. The Sea Gull Specialty Co., Baltimore and New Orleans.	Present	Trace..	.....	13.21	22.98	8, ⅞ oz....	Legal. An Alum Baking Powder.

BAKING POWDERS—Continued.

Number.	LABEL.	Alum.	Phosphate.	Tartaric Acid.	Carbon Dioxide (CO_2) Available (per cent.)	Carbon Dioxide (CO_2) Total (per cent.)	Net weight.	REMARKS.
1513	Eddy's Reliable Baking Powder, 16 ozs. net. Eddy & Eddy Mfg. Co., St. Louis, Mo.	Present	Present	.....	7.11	14.54	13 ½ oz....	Illegal. Misbranded; short weight. An Alum Phosphate Baking Powder.
1696	Davis O. K. Baking Powder, 1 lb. R. B. Davis Co., Hoboken, N. J.	None...	Present	.....	10.23	15.73	1 lb. 1, ½ oz.	Legal. A Phosphate Baking Powder.
1697	Sodarine, 7.5 ozs. The Sea Gull Specialty Co., Baltimore and New Orleans.	Present	Trace..	.....	13.03	21.76	8, ½ oz....	Legal. An Alum Baking Powder.
1698	Rumford Baking Powder, 1 lb. Rumford Chemical Works, Providence, R. I.	None...	Present	.....	10.03	14.40	1 lb. ½ oz.	Legal. A Phosphate Baking Powder.
1690	Royal Baking Powder, 16 ozs. Royal Baking Powder Co., New York.	None...	None...	Present	13.05	17.54	16, ½ oz...	Legal. A Tartaric Acid Baking Powder.

1700	Good Luck One Spoon Baking Powder, 15.5 ozs. The South Mfg. Co., Richmond, Va.	Present	Trace	.....	13.85	17.83	15, ½ oz.	Passed. An Alum Baking Powder.
1701	Parrott & Monkey Baking Powder, 7.5 ozs. The Sea Gull Specialty Co., Baltimore and New Orleans.	Present	Trace	.....	15.84	16.26	8, ½ oz.	Legal. An Alum Baking Powder.
1702	A. & P. Baking Powder, 1 lb. The Great Atlantic & Pacific Tea Co., Jersey City, N. J.	Present	Present	.....	13.32	21.98	1 lb. 1, ¼ oz.	Legal. An Alum-Phosphate Baking Powder.
1703	Hosford's Self-Raising Bread Preparation, 5 ozs. Rumford Chemical Works, Providence, R. I.	None	Present	.....	8.08	14.33	5, ¼ oz.	Legal. A Phosphate Baking Powder.
1704	Cleveland Superior Baking Powder, ½ lb. Cleveland Baking Powder Co., New York.	None	None	Present	11.44	21.85	8, ¼ oz.	Legal. A Tartaric Acid Baking Powder.
1705	Campbell's Baking Powder, 16 ozs. Kinton Baking Powder Co., Cincinnati, Ohio.	Present	Trace	.....	17.46	21.62	1 lb. 1, ½ oz.	Legal. An Alum Baking Powder.
1706	Watermelon Brand Baking Powder, 7.5 ozs. The Sea Gull Specialty Co., Baltimore and New York.	Present	None	.....	13.23	19.04	8 ozs.	Legal. An Alum Baking Powder.
1796	Good Luck One Spoon Baking Powder. The Southern Mfg. Co., Richmond, Va.	Present	None	.....	13.76	16.88	13, ¾ ozs.	Illegal. Misbranded; no statement of net weight or measure.
1797	Sodarine, 7.5 ozs. The Sea Gull Specialty Co., New Orleans and Baltimore.	Present	Trace	.....	13.97	17.72	7, ¾ ozs.	Legal. An Alum Baking Powder.

MISCELLANEOUS.

No.	LABEL.	RESULTS.	REMARKS.
1730	"Honey Bee" Brand Beans with Sauce. Contents 2 lbs. 2 ozs. Distributed by Torsch Packing Co., Baltimore, Md.	Physical condition.....—Normal. Microscopical examination, bacteria, yeasts and molds..—None found. Net weight.....=2 lbs. 2, ¾ ozs.	Legal.