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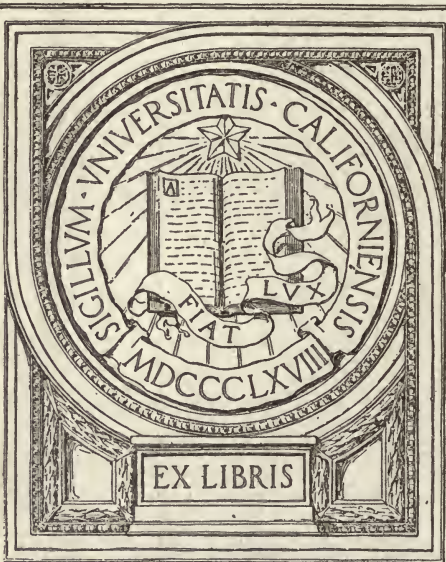
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A TREATISE
ON
THE CULTURE



OF
THE ORANGE

— TOGETHER —
WITH A DESCRIPTION OF SOME OF THE BEST
VARIETIES OF THE FRUIT, GATHERING,
CURING AND PREPARING THE FRUIT
FOR SHIPMENT AND MARKET

— BY —
GEORGE W. DAVIS, M. D.,

Horticultural Editor of the SUN AND
PRESS, Jacksonville, Fla.

PRINTED AND PUBLISHED
BY CHARLES W. DACOSTA,
JACKSONVILLE, FLORIDA.



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Fall of

Jacksonville, Florida.

Edward J. Wickson.

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Gift of Prof. E. T. Wicker
to

TO THE
MAIN LIBRARY - AGRICULTURE DEPT.

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TO THE READER.

In presenting this little Treatise on Orange Culture to the notice of a discerning public, the writer desires to acknowledge his inability to do exact justice to the subject. It is not a compilation, but a plain, comprehensive statement of facts—not theories—as he understands them; the result of ten years close observation and practical experience. Should this little work meet a long-felt want of a practical guide in orange culture, and be the means of speeding the good work along to a successful issue, the highest aim and object will have been attained, by

Yours truly,

GEORGE W. DAVIS.

Jacksonville, Florida, January 1881. .





CULTURE OF THE ORANGE.

LOCATION OF GROVE.

The most important consideration when starting an orange grove, is location. This should be near some sure and permanent line of transportation, or in the immediate vicinity of some proposed line which will be sure to be established in the near future. There are at present many fine bearing groves scattered over the State, from ten to thirty miles from an outlet; and hauling boxes of oranges that far by wagon is attended with a good deal of expense and often loss of much of the fruit by bruising, which unfits it for transportation to distant markets. In regard to latitude and longitude, we believe oranges can be successfully grown, in good locations, anywhere south of the Georgia line. There are many small groves of old trees in the vicinity of Jacksonville, in latitude $30^{\circ} 20'$, also on Amelia Island, which have borne fairly for the last forty years. Some localities are more exempt from frost than others, it

is true; but when the grove is situated on moderately high and dry land, not in the vicinity of marshes, and properly protected with timber belts, we believe, it matters but little where it is located below 31° , in Florida. Frost is perhaps more likely to occur in the extreme northern and middle portions of the State, but is more destructive on low wet places, not suited to orange culture. Undoubtedly, the most attractive locations are in the vicinity of the St. Johns river, but that is not saying that there are no other good or desirable places in the State.

Much stress has heretofore been laid on water protection, by nearly all writers who have written on the subject. They contend that a large body of water located on the west or north of a grove is pretty sure to prevent injury by frost. This, however, depends upon circumstances. In case of frosty weather, if there is wind from the northwest or north, in passing over a large body of water, the temperature of which is much above the atmosphere, the warm vapor is carried by the wind and has a tendency to temperize to the extent of from two to five degrees; but where the atmosphere is still, very little difference will be observed in the temperature on either side of the water. Frost usually goes in streaks, like wind storms, and may be noticed in some localities while others equally exposed are exempt.

The best location for an orange grove is one entirely surrounded by a belt of tall timber trees. If this cannot be had, it should certainly be protected on the north, east and south. There is more damage done to the trees and growing crop by the wind than from all other causes whatsoever. The damaging winds in this State are from the north, northeast, east and southeast, and groves exposed on

those points of the compass are very likely to suffer annually from that cause. However attractive and desirable it may be to locate a grove on the border of some lake or broad river, yet the disadvantages arising from exposure to wind storms would more than counterbalance in the end.

SOIL.

The orange will grow and thrive on almost any soil not too wet or too dry. But, like all other fruit trees, some soils are better adapted to its cultivation than others. The best soil seems to be a light sandy loam, naturally drained, moderately elevated, not less than five feet and not more than twenty feet above permanent water. As stated above, orange trees will flourish and bear very well on low moist soil, or even on a dry porous soil; but the trees are more subject to disease, and the yield of fruit is more likely to vary in quality and quantity. Because the wild orange is to be found mostly in low wet hammock, is no reason why the sweet orange will do well there. The fact that the wild orange is principally found on the borders of streams or on the shores of lakes in damp localities is accounted for, we think, by the fires which annually sweep over the dry land and destroy small trees and shrubbery: whereas the fires never devastate the moist hammock lands, and consequently the trees are only to be found in such places.

The soil on which hard timber has once grown is undoubtedly the best for the orange, as it contains more potash, and, in fact, all the inorganic elements which are requisite. The next best is first-class pine land, but this will require more fertilizers; and where high hard wood hammock lands can be had they should be preferred, other things being equal.

TIME TO PLANT.

The best time to plant the orange tree is undoubtedly when the sap is dormant, from December to March. The weather is cool and the buds not yet active; the young trees will suffer less from mutilation of the roots than at any other season of the year. Trees may be planted any month in the year under favorable circumstances, and even in the summer months if care is observed in watering, mulching and shading. But, from long observation and experiments, we are forced to the opinion that the winter months, when the tree is entirely dormant, is the right time to plant. Our most experienced orange growers, we think, will agree with us that planting at that time will produce the best results.

PLANTING THE TREES.

When it is determined to plant on newly cleared land, large holes should be excavated, three or four feet in diameter and two or three feet deep; all roots should be carefully shaken from the soil taken out, and the soil thoroughly mixed and returned to the holes. If the soil is poor it will be well to mix, when returning, one pound of fine ground bone; but if it is of the rich hard wood hammock land, no fertilizer will be needed, and the holes may be filled after sifting out the roots and rubbish. This portion of the work may be done at leisure, weeks before setting the trees. If the grove is to be planted in an old field, either bone meal or well rotted stable manure should certainly be well mixed with the soil before the trees are set, and if the work can be done some days or weeks previously, so much the better.

The distance apart of the rows is a matter of some importance. Some recommend twenty, some twenty-five,

and others thirty feet, as the proper distance. But we think twenty feet about the right figure, and then you get one hundred trees to the acre.

In selecting trees, those from three to five years old should be chosen, and these should be budded to some known and good varieties of fruit, either in dormant bud, or one year's growth will do, if thrifty.

STOCKS.

There are various opinions in regard to the stock on which the buds are inserted. Some nursery-men recommend sweet seedlings, and others are more in favor of the sour or wild stock. The sour stocks are perhaps as hardy as the sweet, and grow much more rapidly and mature several years earlier, consequently those who are in a hurry to get a bearing grove will procure the best varieties, budded low, on the sour stock. If bearing sour trees from the wild groves can be obtained, which have grown on high, dry land, carefully removed and planted, the tops cut off four feet from the ground, they will soon start out new shoots which can be budded the same season, and in three or four years a fine bearing grove may be obtained. But the sour wild groves are mostly found in low moist land and when transplanted on higher and dryer soil frequently sicken and die, or go into the dumps for several years, hence the surest way is to procure healthy, strong growing, budded seedlings, which have been grown on high and dry land.

SEEDLING TREES VS. BUDDED.

Most of the old groves in Florida are seedling trees, and there are many people now living, here who recom-

mend the planting of seedlings exclusively, contending that they will make healthier, larger trees and come into bearing as early as the grafted. We believe the theory is not tenable, and we know there is no certainty of their early fruiting. We have seedling trees from twelve to twenty years old, healthy and thrifty, which have never borne an orange, and we have also trees nine years old, budded, which are now in their third year of bearing.

In regard to the seedling tree being healthier, or growing more rapidly, or making a larger tree when thirty years old, or bearing more fruit than the budded or grafted tree, seems very unreasonable. Many seedling trees are barren, or nearly so, and even if they do bear early, there is no certainty of obtaining superior fruit, while the budded tree is usually propagated from prolific and known varieties, consequently, is never barren.

Those trees which bear early and continually, do not grow so rapidly as those that do not bear, because fruiting is at the expense of wood, but as the years roll round, if they are properly cared for, they will grow to be as large and in every way equal to seedlings in size.

Captain Burnham, of Indian river, says his trees are nearly all budded, but that an occasional seedling is standing throughout the grove, and his budded trees are now much larger (they are old) more thrifty and prolific than the seedlings. Plant budded trees by all means.

The sooner the trees are planted after being lifted from the nursery the better. The roots should never be exposed to the sun and drying winds, and the best time to plant is immediately after a heavy shower of rain. The holes should be opened sufficiently large and deep to allow of the spreading out nicely all the roots, and then the dirt should be carefully worked in, under and around the little

fibers, and the hole carefully filled up, leaving the collar of the tree one or two inches above the natural position when taken from the nursery, to allow it to settle and remain at the same level it occupied when taken from the ground. Now press the soil gently and firmly around the tree with the foot, trim off nearly the whole top and many of the branches and the work is done. No watering will be necessary if the roots are fresh and the ground moist when planting.

WATER.

Many people recommend the use of water in planting trees, and its continuance for weeks or months afterwards, especially in a dry time. This is undoubtedly good practice when trees are of necessity planted when the soil is dry; but ordinarily the time is chosen after a shower, and then there is no necessity. We were formerly in favor of watering liberally and often, but in later years we have learned by experience that if the trees were properly planted in the first place, and the tap root from eighteen to twenty-four inches long, that watering was labor lost; and, in fact, we believe it to be actually detrimental to the trees.

We are speaking now of the climate of Florida where there is usually from fifty to sixty-five inches of rain-fall annually, which is so distributed throughout the year that watering is unnecessary; but in the rainless countries like California and the Levant, where the rain-fall during eight warm months is none or very little, irrigation is absolutely necessary during the summer until the trees have reached the age of five or ten years after planting, or until the tap-root and laterals have reached down to a permanently moist soil. The tap root of an orange tree will extend

downward till it reaches permanent water, no matter what the distance from the surface; and the tree will make but very little growth upwards until that³ is accomplished; hence, trees planted on a porous soil high above water, should receive irrigation during a long drouth.

TOPPING THE TREES

We have recommended the removal of nearly the whole top of the tree at the time of planting, and our reasons are that evaporation from the leaves is rapid and more likely to dry up the circulation in the tree, and the bark to shrivel, before the roots have assumed their natural functions. We have tried all ways, leaving on the entire top, as formerly practiced here, removing a portion, and cutting away the whole as in setting trees with dormant buds, and we most decidedly give preference to the latter. In this latter practice there are no leaves to carry off the fluids by evaporation, and when the roots become established and resume their functions, adventitious buds appear and usually make a rapid and healthy growth, whereas when the entire top or a large portion is allowed to remain, the tree seldom makes any growth the first year, and does pretty well if it holds its own. We know that others hold different views on this subject, but we have arrived at our conclusions by years of experience, and believe it to be the better way.

MULCHING.

In regard to mulching, we are utterly opposed to the practice. The orange tree is the child of a sunny clime, and requires all the warmth and the actinic rays of light that can possibly be obtained in order to produce the best results. Our efforts should be directed in such a manner

as to cause the roots of the tree to penetrate deeply into the soil where it is always moist, and mulching has a tendency to produce a contrary result, by keeping the surface of the soil moist, and dark, thereby attracting the roots upwards instead of downward where we wish them to go. Besides this last effect, mulching serves as a harbor for termites, moles and other vermine, which are often detrimental to the health and life of the tree. Should it be determined to mulch, trimmings of trees, brush from the woods or other coarse material, are better suited to the purpose, because air and light thereby, are freely admitted to the surface soil. The best mulch we ever found was the frequent stirring of the surface soil with the hoe, rake or cultivator. By this practice air and light are freely admitted and evaporation and capillary attraction from the subsoil prevented

AFTER CULTURE.

When the trees begin to put on a new growth it will be well to give a light dressing of well rotted stable manure, or some one of the artificial fertilizers well stirred into the soil, if they have not already been fertilized at the time of planting. The grove should be kept entirely free from weeds and grass, by the hoe, plow or cultivator, and the soil about the trees often raked over to prevent baking. Water sprouts will soon make their appearance, and should be removed at once and only such branches allowed to grow as are desirable for the formation of the tree.

SCALE INSECTS.

Should the scale insects make their appearance they should be attended to at once, the body of the tree, branches and leaves should be treated with some soapy solution, ap-

plied with a brush to the body of the tree and a syringe for sprinkling over the leaves and branches. A strong solution of whale oil soap is an excellent insecticide and may be used liberally without danger, and with excellent effects both as an insect destroyer, and a solvent of scurf, moss and smut or mould, which often attach themselves to the leaves and bark of the trees. The application of the soapy solution should be repeated every three or four weeks or until every vestige of scale or other disease is removed. The soapy application has a very beneficial effect, even if no scale are present, by removing old bark, cleaning the surface and allowing the functions of the tree fair play.

Should the scale insects prove obstinate and refuse to yield to the milder remedies, stronger preparations may be applied. A favorite preparation of our own for obstinate cases, and for washing the trunk and braches of older trees, is composed of the following ingredients: Take ten pounds of carbonate of soda (sal soda) and five pounds of any good hard soap. Dissolve the soap in a small quantity of boiling water, and put it into a forty gallon cask, (a lard barrel is the best) add the soda, broken into small lumps, then fill up the cask with soft water and stir the mixture till all is dissolved and thoroughly mixed, when it is ready for use, and always on hand. Apply to the trunk and branches of the tree with a brush (we use a common long handled tar brush) give the trunk and branches a thorough scrubbing, then shower the tops, leaves and small branches by means of a rose nibbed syringe.

This treatment applied twice a year, spring and fall, will keep the trees free from scale, cause the leaves to look a dark green, and produce a clean, healthy appearance generally.

CULTIVATION AND TRAINING.

For the first two or three years vegetables may be grown among the trees, but should never be planted nearer than four or five feet from the tree. No crop should be cultivated without first applying plenty of fertilizers, and the whole ground should be kept clean and free from weeds. Very little pruning will be required the first year, but water sprouts must be dealt with on their appearance. In case dormant budded trees are planted, only one shoot should be trained; and this grows so rapidly, under favorable circumstances, and the wood is so succulent and tender, that it needs some support to keep it in an erect position. A common lath placed in the ground near the tree, and the shoot tied to it, will furnish sufficient support until it hardens. When the shoot has made a growth of three or four feet, pinch off the top and allow lateral branches to form. In this manner a fine branching top may be formed with a body three or four feet high.

No cultivation should be allowed after the first of October until February, when a dressing of manure should be spread over the surface about the trees and lightly worked into the soil with hoe, harrow or cultivator. The after treatment will be to keep the ground light and mellow throughout the season, and if the grove can be worked over every three or four weeks, so much the better. We prefer the cultivator rather than the plow, as it lightens and stirs the soil better and leaves the ground level.

PROTECTION FROM COLD.

The tree is young and tender now, and should cold weather set in and the thermometer go down to 30° or 28° as frequently happens in many parts of Florida, the sap vessels may freeze, expand and crack the bark on the body of the tree, which is likely to kill it. In order to prevent

this occurrence it may be necessary to protect the body by wrapping it with moss, or binding it with pine boughs, or setting a shingle or barrel stave close to the tree on the south side, which will shade the tree from the direct rays of the sun at midday. An orange tree will stand ten or fifteen degrees of frost, provided the sun's rays may be excluded from the frozen surface. We have tried several modes of shading the bodies during the winter and prefer the shingle; as in this manner the circulation of air is not interfered with, and this we regard as important. It may be observed that when the tree is frozen and exposed to the sun, the mischief is done to the tree on the south side from three to six inches from the ground. The bark soon turns black, becomes spongy and soft; and when this occurs, the sooner the tree is sawed off near the ground the better. But if properly shaded, nothing of the kind will occur in an ordinary cold snap. The treatment is not always necessary, but it is little trouble to do it and then you feel safe from harm by frost. We recommend this precaution for the first two or three years, or until the top has grown sufficient to shade and protect the body of the tree.

MANURES.

The orange tree is a great feeder and requires a soil rich in plant food, and if the locality chosen for the grove does not contain this naturally, the want will have to be supplied.

Owing to the porosity of most of the soils of Florida, it will be better to give the grove a light annual dressing than to apply a large quantity at once.

The growing tree, before it comes into bearing, requires more of the nitrogenous manures than it does after maturity. This fact should be strictly borne in mind, and then there will be no cause for getting the matter mixed.

The best fertilizer for the young growing orange tree is undoubtedly well-rotted stable manure. This contains all the elements of plant food, in about the right proportions, and where it can be obtained at reasonable cost should be secured in preference to any other. All hard wooded trees, and especially the orange, require potash and phosphorous in larger proportions than soft wooded trees; and the soil best adapted to the orange tree being light and leachy, the inorganic elements require to be renewed more frequently. In case stable manure cannot be obtained in sufficient quantities, there are now prepared artificial fertilizers especially for feeding the orange tree. Among several which we have experimented with, "Stowe's Orange Tree Food" seems to supply in an eminent degree the place of stable manure. It is composed largely of potash and bone phosphate, elements which are absolutely necessary to the health and vigor of the trees.

"Gould and Company's Fertilizer and Insect Exterminator" is another article that is growing into favor, and we think it merits all they claim for it. These fertilizers are manufactured at our own doors, as it were, and are likely to be genuine.

Fine ground raw bone, ammoniated superphosphate, dried blood, fish guano and many other artificial fertilizers have been employed by orange growers with beneficial effects; each person who has been successful with any one of them, recommends his favorite as the very best. The facts are, that each and every one are good, and "best" in proportion to the greatest amount of plant food in a soluble form which they contain. Young growing trees require fertilizers rich in carbon, nitrogen, phosphates and potash. Older bearing trees require manures rich in phosphates potash and lime.

MUCK.

Where other fertilizers cannot be easily obtained, muck from the swamps is to be had in abundance in almost any part of the State. Fresh dug muck applied to the soil is of but little immediate benefit, but when treated with fresh caustic lime or composted with stable manure or other materials and then applied, it has a very beneficial effect. A very good way to apply muck is to remove it from the swamp to dry land, allow it to remain in large piles for some months or until it is pretty well decomposed, then apply it about the trees in liberal quantities, spread it well, and in a few weeks sprinkle over it a peck of oyster shell lime to each tree. This should be done in January or February. After a few days or weeks it should be thoroughly worked over and mixed with the surface soil with hoe or cultivator. The plow buries it too deep and does not mix it with the soil so well as the cultivator.

All fertilizers should be applied to the surface and worked into the soil as evenly and lightly as possible. In this condition the elements play an important part in converting the different articles into plant food which is carried down to the roots by the rainfall. Another mode of enlarging the manure heap by the use of muck, is to cart it to the cow-pen, hog-pen or horse stable, and allow it to receive the fluids and droppings of animals. In this way, from its well known powers of absorption, all the inorganic properties of manures will be saved, and after the muck has become sufficiently saturated with the animal excretions it should be thrown into heaps and allowed to ferment, when it will be in a fit condition to apply as a dressing to the soil. One of the best fertilizers we ever used for the growing orange trees was a compost of muck, hard wood ashes and fine ground bone—three parts muck, two parts

ashes, and one part bone. Sink a large box in the ground sufficient to contain the amount of compost you desire to make. First, a thick layer of finely decomposed muck; then a layer of finely ground bone; then ashes, and so on alternately till your compost is complete, finishing off with a thick layer of muck; moisten thoroughly with water, and at intervals of two or three weeks renew the moistening; when in about three months the solution of the plant food will be complete. No escape of ammonia will occur while the ashes are dissolving the bone, as the muck will absorb that as fast as it is developed. Remove from the box, mix thoroughly and you have a complete manure, rich in plant food.

We have stated that the orange tree requires a liberal supply of potash and phosphorus. The sandy lands of Florida are very deficient in these materials and the soil, being leachy, requires frequent application of fertilizers containing these substances.

COW PEAS AS MANURE.

Cow peas make an excellent green fertilizer. Some recommend the growing of the cow pea and turning under with the plow when the peas are in bloom. This would be an excellent way to prepare the land before planting the trees, and may do very well afterwards if care is taken not to plow deep close to the tree so as to disturb the roots. A better way, we think, is to grow the peas in the summer and when in pod cut and pile around the trees, not too near, and allow them to rot on the soil, which they will do in a few weeks if the season is wet. When pretty well rotted stir into the soil and the effects of the dressing will be observed in a short time by the vigorous growth and fine color of the trees.

It will be noticed that we have given a good deal of

of attention to the subject of thorough fertilization, but it may be as well to state that on the light poor lands of Florida no success will attend the cultivation of those who neglect it. It has been promulgated by some theorists that stable manure is too heating and stimulating and, if used, will produce the "die back" and other calamities on young growing trees.

We believe the theory is not a good one, and that the disease of the trees may be traced to other causes, such as bad locations, wet, soggy soil, the action of wind and rain storms, moss and fungoid growths, etc. However others may regard these heating manures, we have seen the best of effects from their use, and shall continue to run the risk till otherwise convinced.

OTHER HELPS.

One of the greatest helps in the successful cultivation of a young orange grove, is a flock of fowls. The small breeds which have a disposition to range, like the Hamburgs or Leghorns, are undoubtedly the best. They will clean out the grasshoppers, worms, butterflies, slugs, moles, small snakes, lizards, toads, frogs, and every other crawling, flying and hopping thing which is not too formidable for them to cope with. We have a flock of fifty, which have the range of our home grove of seven acres, and it is amusing to see these lively creatures range over the field in pursuit of insects and other animal food. Hardly a foot of the field but what is scoured over every day; and besides, they destroy a vast amount of grass and weeds and obnoxious things generally. They will pay their way better than any other stock.

A flock of turkeys would very likely be better, because their proclivities for ranging are proverbial. But then it

would require a high fence to keep them anywhere in bounds. Any kind of fowls are useful in an orange grove and should be employed wherever practicable.

SOME DRAWBACKS.

One of the greatest drawbacks to the Northern settler in Florida is the fence laws. These laws seem to have been enacted for the special protection and encouragement of the "cracker" and "squatter," who own or work but little land, own from one to a dozen head of cattle, five to ten hogs, and pay little or no taxes. These animals, according to law, are allowed to run at large and range wherever they list, and the settler who cares to raise any crop or keep his grove free from depredations, must "fence them out." No redress for grievances of any kind, and as fencing material soon rots out in this climate, the expense of keeping fences "hog proof and stallion high" amounts to no inconsiderable sum. We hope and trust when our legislature meets, they will see the wisdom of curtailing this perfect freedom of range, or the "hoggish" part of it at least. A very good practice prevails in some portions of the State. A neighborhood or community make laws for their own protection in the hog business. They agree among themselves to keep up fences sufficient to turn cattle, and the hogs found strolling about are made into pork on sight. Hogs are not prevalent to any great extent in such communities, and we hope to see the same regulations carried into effect in other localities. It has been asserted to us by individuals that the damage done to crops every year, in some portions of Florida, by hogs and cattle being allowed a free range, is more than the actual worth of the animals. To the new settler, it is a sore grievance and one of the greatest set-backs to the settlement of the country.

The fence laws as now in vogue and understood are a prolific source of coolness and contention among neighbors, and lead to the commission of many crimes; and we believe several murders in the State have been committed from feuds growing out of the same. We hope our next legislature will remedy the evil.

THE FROST LINE

Much has been written, said and sung in regard to the "frost line" and the "orange belt" in Florida. There is no portion of Florida where frost has not been observed sometimes; but except in the year '35, we have never heard of any particular damage by frost below the twenty-seventh parallel of latitude, and but seldom has it occurred below the twenty-eighth. About the twenty-eighth to the Georgia line, there are more or less cold waves during the winter, and in many localities considerable damage is done to orange trees, and sometimes the cold is severe enough to injure the fruit. In 1870-71 many young trees were killed to the ground and large quantities of fruit was frozen solid on the trees. The same thing occurred in 1876-7, but the freeze was not so general nor severe in some localities as in others. The cold wave seemed to go in streaks, and was very severe in all the counties lying along the St. Johns from the Georgia line to Brevard. It was very severe in many localities in Duval, St. Johns, Putnam, Volusia and Orange. In Duval, where the writer resides, it occurred only in particular localities. Some groves below, about and above Jacksonville, were hardly singed. The writer lost three hundred young trees (they were not protected), while his neighbors close by did not receive a scratch. And so it seemed to travel, touching here and there, as far south as Lake Jessup. Even in that year many oranges were frozen

on the trees. We remember at the State fair in Jacksonville, in 1877, the only oranges on exhibition that had been frozen were grown in a county, more than one hundred miles due south of Jacksonville, and the orange that took the first premium for quality, was grown two miles below Jacksonville. We might cite many other instances to prove that there is no such thing as the "orange belt" and "below the frost line," except in the brain of interested parties. There will be occasional failures from frost in nearly all sections of the State which are habitable, and parties wishing to locate need not be alarmed by the bug-bear stories of land speculators.

VARIETIES.

A gentleman last winter, while conversing about varieties of the orange, said: "There is no orange grown in Florida that is not merchantable." He was a stickler for seedlings, having a large grove of those "varieties." The same might be said in regard to apples, pears and potatoes; but that there are some varieties of oranges better than others, more palatable, better shape, better size, better shipping qualities, etc., no one who has had much experience in handling oranges will pretend to deny.

The writer has been one of the committee on nomenclature of the Fruit Growers' Association, and one of the judges on fruit at all the State fairs which have been held in Florida, and has had fruit under consideration from all parts of the State, and under the circumstances believes he can name varieties which will give general satisfaction. We would advise by all means that the young grove be planted with budded varieties. While planting, the better varieties may as well be obtained and set, as the ordinary kinds.

In the coming future, oranges will, like apples, pears and other fruits be marketed by specific names, and only the best known varieties will have any standing with the public. Such being the fact, it behooves those engaged in the business to possess, as far as possible, the best varieties now known.

For the convenience of those interested, we will give a short description of a few named varieties, which have received the sanction of the Fruit Growers' Association of Florida, and will name them in the order of excellence.

Magnum Bonum.—Size large to very large; color, clear light orange; Skin thin, smooth and glossy; pulp fine, tender, melting, juicy, sweet and vinous.

Homosassa.—Medium size, skin very thin, remarkably smooth and satiny; color, bright; pulp very fine, remarkably juicy, sweet, vinous and fine flavor.

Nonpareil.—Size above medium; bright color; skin thin, pulp tender and melting; juice sub-acid and vinous.

Old Vini.—Size above medium; color, dark orange; skin rather rough, medium; pulp rather coarse, juicy, sweet and remarkable for a sprightly aromatic flavor.

Navel.—Size large to very large; skin rough, rather thick and tough; pulp very fine, melting, tender, juicy, sweet and good flavor; valuable for late ripening and carrying qualities.

Tardif.—Large dark orange; skin smooth and thin; pulp rather tough, grain fine, juicy and sweet; an ordinary orange, but valuable on account of its late ripening qualities.

Arcadia.—Size large, color deep, skin smooth, medium; pulp deep rich color, coarse, melting, juicy and sub-acid.

Sweet Seville.—Small, color dark, skin thin, pulp very fine, juicy, melting, and very sweet and sprightly.

Mandarin, or Tangerine, Kid Glove—Medium or small size, color dark orange; skin medium, irregularly ribbed, flattened or tomato shaped; pulp coarse, readily parting from the skin, and the sections also part readily from each other; juicy, sweet and highly aromatic. This orange is becoming very popular as a table fruit on account of the ease with which the pulp may be got at without soiling the hands. This orange is known in Florida under the cognomen of *Tangerine*, but is undoubtedly the old Mandarin. There are several seedling varieties, one of the best of which we ever saw was exhibited last winter at the State fair by Doctor Wall, of Tampa.

Sugar Sweet.—Small, globular, smooth, thin skin, pulp fine, tender, juicy, very sweet and delicious. A beautiful little orange, called sometimes the “picnic orange” on account of its size and the number which will go in a box. Tree said to be very prolific. Every grove should contain a few trees for variety, and on account of its early ripening (October), and for the excellence of its fruit.

Satsuma.—A native of the island of Kiusiu, Japan, and named after one of the chief cities of that island by request of Mrs. General Van Valkenburg.

The trees of this variety and species were introduced into Florida by Dr. George R. Hall in 1876 and also by Mrs. Van Valkenburg in 1878. The trees were imported direct from Japan.

The variety belongs to the loose rinded species, *Citrus Aurantium Japonicum*. The fruit is medium size, flattened, deep orange color, smooth thin skin, which is sweet,

aromatic and easily detached from the pulp. Color of pulp dark orange; segments part freely; fine grain, tender, juicy, sweet and delicious. There is none of that peculiar rank odor which characterizes most other varieties belonging to the same class and species. The tree is thornless, the leaves peculiarly thick, lanciolate, serrated, medium, pitiole linear, and the fruit is seedless.

The fruit of this variety will doubtless take high rank for the table and dessert. We regard it a rare and desirable acquisition.

Phillips' Bitter Sweet.—Large, thin skin, pulp tender, juicy, sub-acid, slightly bitter and aromatic. Doubtless a hybrid of the wild and sweet orange. Among other good features, the tree is thornless. An excellent summer fruit. A few trees should be in every well regulated grove.

Dummit.—Large, bright, juicy, sweet, sugary; a first class orange, except the skin is thin and tender, which renders it difficult to ship,

Dixon.—Fine large orange, first-class, good shipper.

Spratt's Harmon.—Excellent every way. Said to be very prolific.

Parson Brown.—Large, sweet, juicy, fine. Said to be excellent.

Higgins.—Medium, fair; skin smooth and thin; pulp fine, juicy, sweet and excellent. This variety was awarded the first premium at the fair last winter for quality.

Mediterranean Sweet.—This variety has not yet been fruited in this State. It is described as large, bright, thin skin, juicy, sweet and delicious, and highly commended for its earliness, prolific bearing, and from the fact that its branches are thornless. This one fact alone would be a

good recommend. It comes to us from California and is regarded as the very best, or one of the best.

There are many other varieties of the orange which are considered "the best," by those who grow them, and in the vicinity of their locality. Some of them are undoubtedly above the average, but when exhibited side by side and compared and tested with some we have named, prove to be only ordinary. Many foreign varieties are being propagated now, and we may find in some of them fruit superior to our present stock, but we do not look for any such event.

PRUNING.

But very little pruning seems necessary in cultivating the orange tree, especially if you wish low-headed trees. It is better to let them grow about as they list for the first three or four years, except pulling off the water sprouts as they appear, and keeping the tree in a symmetrical form. Trees headed low shield the trunk in frosty weather, and when they commence bearing the fruit is more easily reached; and besides, in case of wind storms, the tree and fruit are less likely to suffer injury than trees which are trimmed high. An orange tree will seldom bear when growing in a compact upward form; but will bear soon, when the branches begin to extend laterally; hence, trees which have a tendency to go skyward should be topped and caused to spread out their arms laterally.

CULTURE OF MATURE GROVES.

When the orange tree has reached the bearing age, the treatment may be varied from that which was necessary during its rapid growth. It will be remembered that the employment of nitrogenous manures was highly com-

mended, such as stable manure, dissolved bone, fish guano, dried blood, etc., composted with muck. But such stimulating articles are no longer necessary, except in so far as to keep up the steady growth of the tree and furnish food for wood growth. It will be noticed that after a liberal application of stable manure, or cow-penning the soil, the trees put on an extraordinary growth, and if fruiting at the same time, the fruit will be large, coarse, rough, tasteless and watery, and will show very few of the characteristics which it presented under different treatment of the trees.

The best fertilizer for a bearing grove is fine ground bone, with the addition of ashes or muriate of potash, or a light dressing of common salt. The soil should be frequently stirred with the cultivator throughout the season. Muck, well decomposed, is always in order, and every three or four years a good dressing of oyster-shell lime, say half a bushel to a tree, will be very beneficial. From eight to ten pounds of raw ground bone, scattered broadcast around each tree and well harrowed in, will furnish phosphorus sufficient to last four or five years. It is slowly decomposed by coming in contact with carbonic acid gas, which is generated in the soil by the decomposition of vegetable substances, and in this way furnishes an abundance of phosphorus for the wants of the trees, Potash requires to be applied more frequently, as a superabundance of that material, dissolved by the rains, and what is not appropriated by the roots, washes down out of reach of the feeding roots; hence it should be applied oftener, and in smaller quantities, say about two pounds to each large tree, annually. The required amount of these non-organic elements

to keep up a healthy growth of tree and fruit, varies with the consistence of different soils.

The treatment here recommended applies to light sandy soils without bottom; but where the soil consists partly of clay, or has a clay subsoil, a much smaller quantity of any manureal substance will be required. The clay holds the inorganic elements, and the roots take them up as needed. The leaves which fall from the tree and decompose on the soil, furnishes sufficient plant food to keep the tree in a passably healthy condition; but if you wish an abundance of fruit, you must feed your trees accordingly.

CARE OF THE TREES.

The trees should have every attention in order to keep them healthy, and in good condition to furnish annual crops of fruit. All superfluous wood and twigs on the inner branches should be carefully removed in order to admit light and air to the center of the tree.

Cobwebs and all collections of debris should be brushed away, and the trunk and branches brushed over with the soap and soda solution mentioned heretofore, and the tree entire showered completely over with the same solution. This application should be made once a year, before the trees bloom. It not only cleans the trees from moss and dirt, but has a tendency to free them from insects; the scale in particular, and besides the soda solution acts as a powerful fertilizer by dissolving materials inert in the soil and converting them into plant food.

DISEASE OF ORANGE TREES.

The orange tree, as a rule, is not subject to many diseases. If the proper soil and conditions are present, the tree will continue to grow, remain healthy and vigorous, and live to a good old age, even centuries. We are of the

opinion that to location and soil may be attributed all the diseases to which the tree is subject.

“DIE-BACK,” AND “GUM-DISEASE.”

In many localities a disease is somewhat prevalent, which, for want of a better name, and as it describes in a measure the characteristics, has received the above cognomen. The principal symptom is the issue of gum through the bark, and its collection in tears or drops on the surface. The gum disease may develop in any portion of the tree and branches, but it usually makes its appearance through solitary rapid growing shoots, and at the collar of the tree near the surface of the ground, but makes its appearance in every part of the diseased tree if the bark is cut or wounded. Of the cause but little is known. It is undoubtedly a disease of faulty nutrition. It is very prevalent in Louisiana and in many localities in Florida. The disease is met with more frequently in soils which are low and composed largely of humus, and especially where underlaid with a ferruginous clay hard-pan. It is believed that the rich soggy soil contains elements not well calculated for the healthful condition of the trees. Acidity of the soil is probably the cause, and lime and potash is the remedy. Better locate your grove where no such conditions exist.

It has been observed that insects are more likely to attack trees which are diseased. Whether there is a difference in the consistence of the sap, or whether, like the human family, they manifest a disposition to kick the individual on the down-hill road and help him along, is not so patent; but sure it is that a diseased orange tree attracts more bugs, spiders, scale and other abominations than a

carcass does buzzards. The effects of the disease have often been mistaken for the cause. The sap is not properly manufactured by the roots; the laboratory below has not the right kind of material to work up a healthy circulating medium,—hence, the leaves do not elaborate the sap into the proper elements for wood growth, and the result is pale, succulent, rapid growing sprouts, which contain a disproportion of gum and glucose. These unhealthy growths, not being able to resist the effects of the sun's rays, often blister and crack; the sap oozes out, dries on the surface in the form of tears, which are sweet and succulent, and thereby attract all sorts of insects and ants. These sprouts not having the elements necessary for healthy branches, often wither and die back to the part of the tree from which they started; hence, we have the "die-back" and the "gum disease" all in one. The cause is undoubtedly at the root; the effects dyspepsia, from defective or pernicious plant food; the remedy, proper location, cultivation and a potash, soda and lime diet.

The same dyspeptic symptoms in the tree, may sometimes be produced by over feeding, or a surfeit of rich nitrogenous manure, but we think such instances are rare, and the disease more likely to occur from too much acidity in the soil.

RUST ON THE ORANGE.

Although rust on the rind of an orange is not considered detrimental to the qualities of the fruit, yet it detracts from its external appearance wonderfully, and reduces its market value in a corresponding degree.

There has been much speculation as to the cause of this abnormal condition, and the experiments of investiga-

tors have not yet determined the whys and the wherefores.

Some individuals are of the opinion that it is caused by the punctures of insects—the orange mite—through the outer rind into the oil cells, thereby causing the oil to ooze out and spread over the rind, which oxidizes and produces the stain as we find it. Others think it is caused wholly by the excretions of microscopic insects; while others still, maintain that it is natural rust of a fungoid character. Our investigations, which have been rather extensive and thorough, leads to the belief that the rust is the result of both the workings of insects and a fungus.

It is noticeable that the rust seldom covers the entire rind. Sometimes one side only is stained; sometimes a ring extending around the middle, and sometimes only a spot or specks will appear. When in the way of observation, it has been found that the orange is green and smooth up to half its natural size. Then a smooth, light colored substance would appear in places, or over a portion of the surface of the fruit, seeming like the light glary trail left by a snail. Examination of portions of the rind at this time with the microscope, has revealed the presence of minute insects, and also the presence of the ordinary orange scale. The light glary substance was found evenly spread over portions of the surface, corresponding to the rusty surface, which subsequently appeared. Subsequent examinations with the microscope revealed minute fungus spread over the entire surface of those bands and patches covered by the glary substance. These occurrences leads to the belief that the light glary substance seen on the rind was a secretion of the insects, which remains and forms a fit lodging place for the spores of fungi to develop.

What confirms us more strongly in the belief that in-

sects are at the bottom of the mischief, is, that of all the fruit examined which was rusty, not a single specimen could be found that did not show the presence of scale on the fruit or branches of the tree. Another fact still more favorable to the insect hypothesis, is this: In the year 1879, the scale insect prevailed to a fearful extent, and the orange crop was as fearfully rusty, while this year, the scale has not made such astonishing havoc, and the orange crop was never brighter, or presented a more healthy appearance.

In regard to a remedy for rust on the orange we have none to offer, except that the trees should be so cultured as to keep them properly healthy, and such appliances used as to rid the trees of the scale insect. This we believe is the only remedy. In regard to other appliances, such as lime dust, kerosene and the like, there is no hope except as they may be the means of getting rid of the universal pest.

SPLITTING OF THE ORANGE.

During the later growing months of the orange, from July to November, the rind of the fruit sometimes cracks, exposing the segments of the interior to the weather, and the fruit soon decays and drops from the stem. Sometimes but few fruits are so affected; sometimes many. Some trees seem worse than others standing in the immediate vicinity, and some seasons none are lost from this cause.

The cause has generally been attributed to a season of drowth, followed by excessive wet, thereby causing the pulp to grow faster than the rind, which, not being able to withstand the pressure from within, splits; and hence the result.

The present season has been one prolific in split fruit;

and yet, there has been no unusual drowth, nor has there been a lack of moisture, especially during the months of September, October and November. Many oranges have split and fell all through the season, even up to late in November, and it has been noticed that trees standing on low ground, where plenty of moisture was always at hand, have been affected equally with those growing on high, dry soil. Our observations leads to the belief that the cause of splitting of the orange is not well understood, and that the theory generally accepted has but little foundation in fact. More light on this important subject is desirable, and we hope more attention will be given the subject in the future, and that the cause and the cure may be fully ascertained. Many thousands of oranges are lost every year by this strange, unnatural phenomenon.

INSECTS.

There are many insects which are more or less injurious to the welfare and successful cultivation of an orange grove. Among the many, the grasshopper plays a conspicuous part. They exist in countless thousands, and live by devouring the leaves of the trees, and young succulent shoots. There are several varieties which prey upon the leaves; but perhaps the meanest of all the tribe is the green, flying insect, commonly known as the Katy-did. These creatures will destroy and mutilate about as great an amount of leaves as the silk worm, and accomplish the task in an incredible short space of time. The common brown grasshoppers are also numerous, but not so ravenous as the Katys.

The only effectual remedy are the birds and a flock of fowls. These useful helps are to be highly commended, and should receive every encouragement to do their duty, by

not feeding them much of anything except what they get in the range. It will not do to feed fowls much if you wish them to do their duty in an orange grove.

The orange dog is a large spotted worm, the larvæ of a very large spotted black and gold butterfly. They prey upon the orange leaves, and should be destroyed by hand picking.

Termites, or white ants, commonly called wood lice, are very destructive to the orange trees. They are to be found under old wood, logs and rubbish. They frequently attack the orange tree at the collar, just under the surface of the soil, and eat the bark entirely away, completely girdling the tree at the roots, which is fatal.

Dig around the trees occasionally in search of them, and if found at their work, disturb their quarters; show them to your chickens, and they will devour the last one of them. If you have no fowls, dig out their nest and apply the soda solution, or some hot suds. Remove old wood, brush, and mulching from the trees, as these form a convenient harbor for them.

ORANGE SCALE.

Perhaps no other subject on orange culture is of greater importance than the one at the head of this paragraph. The scale insect or bark louse has never until recently received much attention; but the people have now become thoroughly aroused to its importance, and the Agricultural Department at Washington, has commissioned its entomologist, to study the species, their habits and development. Prof. J. H. Comstock, the entomologist, has spent nearly a year in Florida and California in this investigation, and has succeeded in classifying about fifteen

species which are injurious to fruit trees and other plants, several of which are to be found on the citrus fruits.

It is not the purpose of this little work to go extensively into the history, habits and description of the scale insects, injurious to the orange, but it is enough to say that they exist in countless millions, and that scarcely a grove or tree is to be found which has not more or less of these pests among its leaves, fruit or branches.

They attach themselves to the bark of the leaves and branches, or rind of the fruit, and live by sucking the juice from the tree. They multiply very fast, and a few individuals finding lodgement on a tree will soon cover its entire surface if no means are employed to lessen their numbers.

For a description of the scale insects, their classification and habits, the reader is referred to the writings of Prof. Comstock, Dr. C. J. Kenworthy and W. H. Ashmead. These gentlemen have investigated the subject thoroughly and given a minute and graphic description of these miserable little nuisances. When a tree has become affected with scale to any great extent, it soon takes on a sickly appearance. The leaves, which were a dark shining green before, now look sallow and pale; the trunk and branches which were smooth and lively, are rough and shriveled, and the bark looks as though it was drawn tightly over the wood; in fact the tree has the appearance of being "hide bound," and ceases to grow almost entirely. The business of the fruit grower is now to rid his trees of the scale, renovate the trees, and cause them to begin life anew.

REMEDIES.

The scale insect has become such a nuisance and so difficult to destroy, that many remedies have been prescribed for its extermination. Hardly any two individuals agree on the best thing for the purpose, consequently we shall mention a number which have been recommended.

The soap and soda solution mentioned on a former page has given the best results in our hands, and we believe if persisted in, will entirely eradicate and exterminate them from the grove. Besides being an excellent insecticide, it benefits the tree in various ways; removes old bark, washes the leaves from honey dew and smut, kills the bugs, and stimulates the tree into activity, and causes it to look green and healthy.

It should be applied as directed, every three or four weeks, until the scale is entirely eradicated.

Kerosene has been highly extolled. It is dangerous to apply in its undiluted state, but is sure death to the bugs. To a strong solution of any kind of soap, add one gill of kerosene to a bucket full of the suds. Mix thoroughly by stirring and apply with a brush to the trunk, and with a syringe to top and branches. Stir the mixture often while using.

Strong solution of whale oil soap is an excellent application, especially to young trees and those in the nursery. Use it often.

Vinegar or acetic acid, diluted, is said to be an effectual remedy.

Carbolic acid, largely diluted, has proved efficacious. Tobacco decoction is used by many.

Many other applications have been recommended; in

short, almost every man you meet knows the best one, and it is sure to differ in some respects from all others.

Remedies for the destruction of scale, are as numerous as are those for the cure of rheumatism. All are good and if persevered in will result in success.

The best general remedy for scale, is, to keep your trees in vigorous health by thorough fertilization and cultivation. Stir the soil often with the cultivator or hoe; keep down the weeds and grass and your grove will not require so many remedies to exterminate the insects.

We believe there are few other insects that require much attention. Squash bugs, thrip, ants and green flies are only attracted by the secretions of insects, or the exudation of sweet fluids from the leaves or branches, and the collection of honey-dew on the leaves.

The "mealy bug," is very destructive, but it is classed with the *coecidæ*, and the same remedies will exterminate the mealy bug that are used for other scale, if thoroughly applied, and often. Vinegar is used to destroy this pest in many countries of the East, with very good success.

There are a few other insects which attack the fruit and leaves, such as the red bug, which punctures the fruit in some instances and localities; the leaf notcher and the leaf roller; but these do not damage to any great extent, and as there are no remedies except hand-picking we pass them over as nuisances.

BARREN FRUIT TREES.

In old orchards of fruit of any kind may be found trees which seem to grow thriftily, are mature and of bearing age, yet seldom produce any fruit. The same will be found to occur on all soils and situations, and among all

kinds and varieties of fruit. It is true that some kinds of fruit trees and some varieties of the same kind, are more subject to barrenness than others; but the facts remain, and no satisfactory explanation has yet been promulgated. The phenomena has been attributed to many causes by various authors who have experimented and written on the subject, but scarcely any two of them ascribe the fault to the same conditions.

The orange tree is no exception to the general rule, and many large trees, which are aged and thrifty may be found scattered about in most groves, and solitary, which have produced little or no fruit and failed to perform the important functions which nature intended them to fulfill.

Many remedies have been recommended to cure the evil by those who have given it much attention, such as root pruning, summer pruning, bending down the branches below the horizontal to check the flow of sap upwards; girdling and debarking. The first, is attended with a vast amount of labor, besides it has a tendency to destroy in a measure the equilibrium and vitality of the tree. The second, is impracticable to any great extent, or when applied to large trees. The third remedy "girdling," seems the most rational and practical; is attended with little inconvenience; is sure to accomplish the object, and is not likely to compromise the life or usefulness of the tree; although it has a tendency to dwarf it somewhat.

The practice of girdling to produce fruitfulness in barren trees, and also to bring into early bearing and ripening, of the fruit on young trees, has been employed by pomologists, frequently, for the last one hundred years, but not until recently has the method come into extensive use for the purpose. Some of the extensive fruit growers of the

West are using this method to bring their young trees into early bearing with astonishing success.

One gentleman, a Mr. Spaulding, of Illinois, has an apple grove of fourteen thousand trees, and has been experimenting with "girdling" to produce early fruitfulness and large and fine fruit, with such success, that last year, he girdled three thousand trees in his young grove. A writer, who visited his place recently, describes the result as wonderful—astonishing.

Alternate rows of young unbearing trees were girdled in June, 1879, and this year they are loaded to the ground with large, fine fruit, while trees along side of them not girdled, had little or no fruit on.

The effect of girdling is twofold. When early bearing is desired, the ring of bark should be removed while the tree is growing, the year before. When increase in size of fruit and early ripening is the object sought, girdling should be performed the same year, after the fruit is set.

The operation of "girdling" consists in removing a ring of bark from one to three-eighths of an inch wide entirely around the trunk of the tree, or large branches. It may be performed with a knife, or saw with the teeth set wide; but the neatest, cutest and most effectual little implement for the business, is a tool used by mill and lumbermen for the purpose of marking lumber. This little instrument is handy to use; does its work neatly, and makes a clean cut one-eighth of an inch wide down to the wood.

There is every reason to believe that the practice of girdling on the orange tree, will prove as successful in its results as it has in regard to apple, pear, peach, grape and other fruits, and those who have recalcitrant orange trees, which are a way along up in their "teens," or out of them

in regard to age, and refuse to produce liberally, can bring them to a realizing sense of their duty by the process in question

Objections will be raised to the practice, undoubtedly, as being unnatural and all that, but the same may be said of many other pomological experiments, which have resulted in success.

Let us live, in a measure, for the present, and enjoy the fruits of our labors as we go along, and not work and wait through life for the benefit wholly of our grandchildren.

Those who wish to try the experiment of girdling, and are a little doubtful about its utility, and liability to harm the trees for future usefulness, may begin on some of the lower branches of the tree, which, if the operation should not succeed to their satisfaction, need to be cut away in the future. In that way no harm will have been done, if the process turns out unfavorable.

Another method of girdling, or which amounts to the same thing in its results, is performed by ligating the body of the tree or branches, by winding tightly around the part to be girdled, a few coils of copper or other wire so tight that the return flow of sap will be effectually impeded. By this last process the bark is not mutilated, but where it is thoroughly done the effects are about the same. Some pomologists recommend excessive fertilizing; enriching the soil by cow-penning and by applying large quantities of other rich manures during the winter months, contending that in this way both fruit buds and wood growth may be had at the same time, and the "bearing and off-year" habits of trees dispensed with.

The practice may be good, on very poor land, but fruit produced by excessive fertilization, is generally coarse,

insipid and unsatisfactory. Girdling the orange tree, to produce fruit next year, should be performed from June to September; and to produce large fruit and early ripening, the same year in April, after the young fruit is set.

OTHER CITRUS FRUITS.

In former pages the remarks were confined wholly to the cultivation of the orange. While the orange is to be regarded the principal fruit to be depended on for profit, yet other species of the citrus family may be cultivated for profit, ornament or curiosity.

LEMONS.

The lemon is a more tender plant than the orange, and therefore, in its cultivation, more regard must be paid to location in order to shield the trees from cold. In all other respects the lemon should be treated the same as the orange, except that it requires less rich soil and less fertilization. The lemon is a rampant grower, and has a tendency to straggle, without any regard to symmetry in its shape. Light sandy land, not over rich, seems best adapted for the lemon, because if the soil is rich in plant food the tree grows rapidly and unshapely, the wood is soft and succulent, and a light frost while in this condition will cut young trees to the ground, and materially damage older ones,

The tree matures several years earlier than the orange, and the first crops are likely to yield large specimens of fruit, which have thick rind and often spongy and coarse pulp. These characteristics will gradually disappear as the tree grows in years, when the fruit will become of ordinary size and quality.

The best lemons are those weighing about two and a

half to three ounces ; thin skin, oval shape ; few seeds, solid pulp, strong acid juice ; sweet rind and highly aromatic. Lemons which are large, thick skin, spongy pulp and bitter rind, are not marketable ; hence it is better to procure trees budded with fruit of known and tried qualities than to trust to seedlings, as they often turn out to be worthless.

A statement has lately been going the rounds to the effect that in the gathering of lemons for market, a lemon was ripe enough to gather when it was large enough ; that is, when it had arrived at a certain size. It has generally been understood that leaves have their time to fall, and fruits a season of maturity ; and we question whether a lemon gathered green, although of a certain size, possesses all the qualities requisite in a perfect fruit. The theory may hold in trees of old age, and among that variety which are said to be ever bearing, but it is open to doubt.

The lemon tree is too uncertain in Florida, on account of its sensitiveness to cold, to warrant extensive planting, except in very favored localities ; and besides, the profits are likely to be less than the orange, from the fact that large quantities are imported at prices which are not considered remunerative as compared with the orange.

However, a few trees should be planted in the most favored localities about the premises, in regard to the cold waves, and moderately fertilized and pruned, to produce the best results.

LIMES.

The next fruit in importance to the lemon is the lime. The tree or bush is still more sensitive to cold than the lemon, and requires more care in exposed situations. The fruit is generally small, tender rind, and does not bear

transportation very well ; hence but little attention has been given to its cultivation. It is very wholesome, strongly acid ; in fact, is said to contain a greater amount of citric acid than the lemon, and is preferred to that fruit by some. A few trees, or rather bushes, are all that is requisite.

CITRON.

The citron is a large fruit, having all the characteristics of the lemon, and chiefly cultivated for its very thick rind, which is preserved in sugar and forms the well known sweet meat to be found in the shops, under the name of "preserved citron." There are several varieties, some of which possess a very bitter rind ; those having a sweet rind are to be preferred. A tender shrub or bush.

SHADDOCK.

This is generally a large fruit, varying from two to eight pounds in weight. Globular, white or pink pulp, seedy, juicy and disagreeably sour. The pink variety is the largest. Useful only when other fruits cannot be had, and as a curiosity. A tender bush or shrub.

BERGAMOT.

A hybrid of the orange and lemon. Small, yellow or orange in color, thick skin, juicy, sour-sweet and flavorless. Cultivated chiefly for the oil, which is distilled from the rind, and is known in perfumery as "oil of bergamot." A tender bush.

KUMQUAT.

This is a dwarf, thornless variety of the orange. Fruit very small, oval, deep orange color, skin thin and sweet ; pulp tender and juice very acid. Tree ornamental and useful as a conserve.

The above includes about all of the citrus which are desirable, and all but the lemon, lime and kumquat, are more ornamental than useful.

The wild orange is useful in the manufacture of marmalade, and some attempts have been made to utilize the citron for a conserve, but without any satisfactory result as far as we have seen, the product being flavorless and insipid.

The Florida lemon is another fruit easily grown. It is large, orange color when ripe; rough, thick, spongy rind; sometimes bitter; juice acid but flavorless. The tree or shrub is a rampant grower, but tender like other lemons. Nursery-men sometimes use the seedlings as a stock for budding the sweet orange; and if budded low, the trees grow rapidly and come into bearing much earlier than when budded on orange stock.

Cost and Profits of Orange Culture.

So much has been written on the cost of starting an orange grove, and the profits to be realized from the sale of the fruit when it begins to bear, that it is with a good deal of reluctance we broach the subject. Those who have written heretofore, usually have presented the rosy side of the picture, and forget to record the failures, the disappointments and other contingencies; hence, many fanciful stories have been told, which are calculated to mislead the unwary, and bring into contempt the honest statements and facts which govern the case. Extreme cases are pointed out, and the stranger is made to believe it is no exception to the general rule.

An orange tree will bear when it has arrived at maturity, which is usually—if all the conditions have been favorable—from the eighth to the fifteenth year from the

seed. Some varieties, or the seed from certain trees, will reach the bearing age years before the seed from other trees. This fact is not confined to the orange tree, but is a well known physiological occurrence in both the vegetable and animal kingdoms. We often see in an orange grove ten years of age, a few trees which have more or less fruit on; while the rest of the trees, seemingly just as large and healthy, have none at all. We are often told that after a tree has borne its first fruit, it will continue to double its yield every year for a long time. This statement is not true, as every one knows who has much knowledge of the laws which govern the vegetable kingdom. Trees are very likely to preserve the old routine of bearing and off bearing years, in spite of all the theories and remedies which can be brought to bear.

Some groves, if properly cared for, will come into profitable bearing at ten and twelve years; while others, similarly situated, will not bear in less than from twelve to fifteen years.

Land suitable for orange culture may be had at from one dollar and a quarter to one hundred dollars per acre, according to location and other contingencies. Cleared land from five to one hundred dollars. Labor for seventy-five cents to one dollar per day. Five year old trees, twenty-five to fifty dollars per hundred. Good, budded to the best varieties, thrifty trees, for fifty dollars per hundred.

A grove of five acres,—five hundred trees,—if properly cared for, fertilized, fenced and pruned, will cost at the least calculation one thousand dollars, and it may cost much more at the end of five years. Orange groves do not grow by magic, neither are they purchased for a song.

When your trees are ten years old,—five years old from planting,—if all the conditions have been favorable, they will likely begin to bear, and at twelve to fifteen years, or seven to ten years after planting, may be expected to yield from ten to twenty dollars per tree.

Frost sometimes interferes with the best regulated groves. Wind, rain and drouth, have been known to shorten the crop; insects are troublesome,—so that it is to be expected you will meet with disappointments in orange growing as well as in other pursuits.

A grove of five hundred or one thousand trees, at twenty years old, if well cultivated, will yield an income sufficient to satisfy the wants of any one not over-extravagant in his notions.

GATHERING AND CURING ORANGES.

One of the most important features in successful orange culture, is gathering the fruit and curing it for market. However lucky you may be in bringing your grove to early and full bearing, if the gathering and curing of the crop is not intelligently conducted your profits will not meet your most sanguine expectations.

The orange, when under-ripe, is plump and solid; the skin is hard and largely composed of water, and at this stage if bruised, or the skin abraded in any manner, decay soon begins and extends, and in a very few days the fruit is rotten and worthless.

The fruit should never be pulled from the stem. The stem of the orange is hard and tough, and the fruit adheres to it with wonderful tenacity.

In all cases where it is desired to preserve the fruit, the stem should be cut with a knife or shears, the fruit handled carefully without bruising, and carried directly to the

DRYING HOUSE.

The drying house should be a building prepared for the purpose, light and airy, and with means to close it tightly in case of cold or storm. We have stated that the rind of the orange, at the usual time of gathering, was hard and contained much water; and it is for the purpose of getting rid of the water in the rind that a drying house is necessary. Hence, the fruit should be gathered in a clear, dry day, and placed in such a position as to hasten the evaporation of water from the rind, which when thoroughly accomplished, renders the fruit smooth and elastic, toughens the skin and prepares it for a long journey.

The drying house should be constructed with shelves or stalls, about three feet wide, running along the sides of the building. the first shelf two feet from the floor, and then one foot above that another, and so on to the ceiling above, if necessary. The bottom or shelf should be composed of slats one and a half inches wide, and placed one and a half inches apart, with the edges or corners beveled off so as not to mar or injure the fruit. Now trim off the stems smooth and close to the fruit with the shears, and place the oranges on the slats only one tier deep. Here they are left to dry from two to six days, or longer if desired; and when sufficiently dried, which can be known by a little experience, they are ready to pack for shipping.

The practice formerly in vogue, and which is still continued to some extent here by some shippers, was to gather the fruit and pile it into heaps of several bushels, and eighteen or twenty inches high, covered with blankets, and leave the fruit in the heaps till it underwent a "sweat" of a few days, and then uncover, dry and pack. This sweating process would seem to us the very worst treatment that the

fruit could be subjected to, as the process would certainly soften the skin and render it more susceptible of decay.

What is required in the premises is, to evaporate the water from the skin and thereby render it tough and elastic. This, the drying process by the slatted shelf system, does to perfection, and the fruit thus prepared may be packed and shipped to Europe with every assurance of success.

The drying house should be supplied with counter, tables and such other appliances as the ingenuity of the packer may suggest, for the purpose of assorting the fruit, wrapping and boxing.

BOXING THE FRUIT.

The ordinary orange box is 12x12x25 inches, inside measure, with a partition in the middle, each compartment measuring just one cubic foot. The end pieces and partition are one inch thick, which should be planed smooth; the sides should be one-fourth of an inch thick, three and a half inches wide, planed, so that three slats will form a side, leaving a half inch space between the slats for the purpose of ventilation. The boxes should be nailed together firmly, leaving one side off until the fruit has been placed therein.

When the fruit has become sufficiently cured, it should be assorted into two or three grades. Each grade should be made up of fruit of the same ripeness, size, color and consistence, and marked accordingly. Each orange should be wrapped in manilla paper and placed carefully and snugly in the box layer by layer until the box is full, and the last layer should project above the box about an inch, so that when the cover is placed and nailed it will cause the fruit to be pressed firmly together, which will prevent shucking loosely around when handling. No fear of crushing the fruit by this means. It will carry much better, and arrive at its destination perfect.

Too much care can not be exercised in assorting and selecting the fruit, as one imperfect or decayed specimen may contaminate the whole and result in much loss. The oranges should be counted and the number marked on the box, together with the grade. The box should now be firmly strapped at each end, and if to be transported far, it would be better and safer to strap around the middle.

There can be no question about the superiority of the drying process of curing the fruit, over the "sweating" process. The first, has a tendency to toughen the skin and tissues by evaporating the aqueous fluids, while the other softens the skin by a heating and fermenting action, thereby hastening decay in the tissue, which was designed to protect; and no one, we think, who will give the subject careful consideration, and view it in the light which chemistry affords, will hesitate for a moment to concede the drying process to be the better way. An orange which is ripe and everyway perfect, placed in a light, dry, airy situation, will keep for months, or until it shrivels and dries to a crisp; while one which has passed through the sweating process, will soon begin to soften and the skin first, and then the pulp melt into one mass of decomposition. The one mode is common sense; the other nonsense. Light and a dry atmosphere have a wonderful preservative power; while darkness, warmth and moisture are equally effective in promoting decay.

SOME AFTER THOUGHTS.

In speaking of the different mode of treatment which a growing tree required from a bearing tree, it was stated that from the time the tree was planted till the bearing age fertilizers rich in nitrogenous compounds were required to push the growing tree. Well rotted stable manure, com-

posted with muck is undoubtedly the best, but where that can not be obtained, other materials, such as dried blood, guano, fish scrap, raw bone and the like made into a compost with muck will answer very well. The amount necessary can only be known by trial.

If the land is poor and sandy, a liberal supply must be used, but if a loam or clay soil which will retain fertilizers without leaching, less will be required.

When the tree has been pushed until it begins to bear, a change in the treatment should be pursued. The tree no longer requires nitrogenous and carbonaceous plant food, but such materials as contain potash, phosphoric acid, soda, and sulphuric acid. These materials are contained in all soils which have once grown hard wood timber, and which have a liberal supply of clay in their composition. Such soils are found in high, hard wood hammocks, and they require less attention to fertilizing under any circumstances.

The fruit of an orange tree bearing one thousand ordinary oranges, will weigh about five hundred pounds; and of this there will be found four pounds of potash, three pounds of soda, one and a half pounds of phosphoric acid, some lime, with traces of iron and magnesia. All soils contain more or less of these materials under all circumstances; but sandy, leachy soils are likely to be deficient. Hence the necessity of annual application of these manureal substances if we wish to obtain the best results. These elements are most readily found fit for immediate use in the following: Acid superphosphate of lime, fine ground bone, wood ashes, sulphate or muriate of potash, sal soda and common salt. An annual dressing of some of these materials which are thought most required, will produce a wonderful effect on the fruitfulness of the grove and

quality of the fruit. Soils which contain these elements, naturally, are to be preferred when locating your grove. The trees will grow more uniform and thrifty, bear better and more fruit, and attain a greater longevity.

The subject of thorough fertilization and cultivation occupies much space in this little volume, the importance of which will be apparent to those who give it the most heed; and success in orange culture will be proportionate with those who make of it the most intelligent and practical application.

ORIGIN OF VARIETIES.

Very little has been said in this work respecting the origin of some of our best fruit. In a practical point of view, perhaps it is not necessary; the main object of the grower being to obtain the best varieties, no matter what or whence their origin. But there are those who may take some interest in the matter, and consequently, we will gratify them to the extent of our knowledge. Many people, we may say most, have an idea that because Florida produces the most superior oranges in the world, that of necessity, they must have originated here, but such is not a fact. The best varieties we have, had their origin elsewhere. *Magnum Bonum* and *Homosassa* come from South or Central America. Blood orange is native of Malta, Navel is a native of Brazil. Sugar-Sweet, Sweet Saville, Moore's Thornless and Seedless are of Spanish origin. *St. Michaels* is native of the Azores. Mandarin, Tangerine and their congeneres, we believe to be natives of Japan, and belong to the species *Citrus Aurantium Japonicum*.

A friend of the writer, Mr. Harry Comstock, of New York, a man of close observation and unquestioned integrity, who spent several years in China and Japan, informed

the writer recently, that the noble orange of China, the one most highly esteemed by that people, and called by them Mandarin, is a small, globular, smooth, thin-rinded fruit, with the pulp adhering closely and firmly to the rind; and, that the loose-rinded orange that goes by the name of Tangerine and Mandarin here, is not common in China, and considered of little account, compared with the thin-skinned, smooth fruit of that country Gallesio, also, gives the same description of the China orange.

Mr. Comstock further informs us that the loose-rinded orange is undoubtedly native to Japan; that it arrives at its greatest perfection there, and is, par excellence, the orange. Judge Van Valkenburg, who was formerly Minister to Japan, and Dr. Geo. R. Hall, who has spent many years in that country, confirm Mr. Comstock's views on the subject, in the main. *Satsuma*—formerly noticed herein, belongs to this class, and bids fair to rival any other orange of the loose-rinded or kid-glove variety.

The Japanese and Chinese dwarf their fruit trees by budding on some slow-growing stock, and produce orange trees grown in pots, only two or three feet high, and bearing hundreds of fruits to a tree.

Our Northern friends, by adopting the Eastern method, could have quite an orange grove in their conservatories.

The stock chiefly used for dwarfing the orange is the *Citrus Trifoliata*, a hardy shrub of the citrus family, which is well adapted for the purpose. To Dr. Geo. R. Hall, is due the credit of introducing into this country many rare and valuable plants, from Japan, among which are several specimens and varieties of the orange tribe, this among the number.

PROPAGATING AND BUDDING.

The orange is propagated by seeds, layering, cuttings and grafting or budding. The object of raising plants from seed is to furnish stock for budding and for obtaining new varieties. Seedlings do not generally come in bearing with any degree of regularity; some trees will bear at seven or eight years old, and all the way up to twenty and twenty-five years; hence the necessity of budding or procuring budded trees when starting a grove, if early fruiting is desired.

The operation of budding is very easy and simple, and may be performed by any one having a little tact and patience. The best time to bud is when the sap is in brisk motion. March, in this climate, is usually chosen, but it may be performed in any month when the sap flows freely.

The operation consists in making a vertical incision, where the bud is to be inserted, about one inch long, through the bark down to the wood, and a cross or horizontal incision at the lower extremity of the vertical cut, that is in the form of an inverted letter T, thus, J. Raise the angular corners of the cut bark slightly; prepare the bud by cutting it from the stick a half-inch above and below the bud, and crowd it upwards into the slit prepared for it. Tie the bud firmly in its place by wrapping it with candle-wicking, bass, or strips of clo h. Thirty minutes' practice with an experienced budder will impart more information than reading volumes on the subject. The other modes of propagation are seldom practiced in this country.

FOREST PROTECTION.

We cannot close this little volume without again urging upon orange growers the absolute necessity of forest protection to the grove. It is an easy matter when selecting your location to choose a spot protected on the wind-

ward side of your grove; or, on that side from which come the prevailing winds or gales. In East Florida the prevailing winds and gales of long duration are from the northeast, east and southeast. On the Gulf coast, some of the gales come from the west, south and southwest. It is better to be protected on all sides by tall forest trees, if possible. In all orange-producing countries one of the requisites considered of special importance is, the protection of the grove from high winds and gales. This is accomplished by the erection of high walls, planting belts of forest trees, locating the grove in sheltered valleys, or on leeward side of mountains.

Dr. C. J. Kenworthy, who has travelled extensively through the orange-growing countries of the world, informed the writer that the practice of protecting the orange groves from the effects of wind-storms, is universal; and is considered of vital necessity wherever the business is prosecuted successfully.

During the late gale of August 29, 1880, which visited the State of Florida, a grove situated near the coast, on Indian river, which was not adequately protected on the windward side, suffered a loss of 40,000 oranges, besides damaging the trees to a fearful extent, by uprooting, winging and twisting the branches, whipping off the leaves, etc. All this might have been averted if the grove had been located with a view to protection from wind. Other groves on Indian river, and throughout the State, in the track of the storm, suffered more or less, in proportion as they were exposed to the hurricane winds and rain. Thousands of dollars worth of property was destroyed, which, if the proper precautions had been observed when locating or planting the grove, might have been saved.

In East Florida wind-storms sometimes spring from any point of the compass, but these, except the easterly, are of short duration. The long-continued gales are chiefly from an easterly direction. In September, 1879, a high wind from the northeast, accompanied with rain, prevailed for nearly three weeks, and the result was, that trees exposed in that direction were nearly denuded of their foliage, which, of course, was highly detrimental to the health of the tree, besides the loss of fruit which resulted.

Many writers on orange culture recommend locating a grove in a forest only partially cleared of the timber, in order to furnish partial shade for the young trees; and also to shield them from harm, from violent wind-storms.

An occasional forest tree left in the grove, or even planted at the time of planting the orange trees, will be of great value as wind-breaks. Some trees are better for the purpose than others. One species of the live oak; the one having a fine bark, tall-growing, and deep-rooted, is the best, as it out grows the orange rapidly, and its roots permeate deeply into the soil, not interfering with the growth of the orange in the least. Water oaks are not suitable, as their roots run near the surface; so with many other trees. Those should be chosen for the purpose of promiscuous planting which grow rapidly tall, and root deeply. If the grove is planted in the open field, wind-breaks should be planted at the same time. Any kind of evergreen forest trees may be planted in double rows, such as the various oaks, pines, cedars, etc., which will grow rapidly and be long-lived.

The tree which we believe to be the best adapted for the purpose of a wind-break for an orange grove, and for a general shade tree is the Carolina cherry, *Cerasus Caroli-*

niana; or, as it is erroneously called in Florida, wild olive.

This is an evergreen tree, a rapid grower, and forms one of the most symmetrical and beautiful shade trees in nature. The head of the tree is full and dense, leaves a dark, shining green, never changing color nor falling off until new ones are formed. The tree is hardy, free from disease, and if planted in a generous soil will reach a height of twenty to twenty-five feet in ten years. Two rows of trees, ten feet apart, and twenty feet apart in the rows, planted alternately, will, in a few years, form a dense wind-break, and present a line of beauty pleasing to behold.

The only objection to this tree is its disposition to send up sprouts and suckers from the roots. It is a shallow-rooted tree, that is, the feeding roots run near the surface of the soil, consequently it would not be advisable to plant anywhere in the vicinity of an orange tree.

Again we say, plant timber belts around your orange grove. If this one important feature is neglected, you will, in all probability, have cause for regret in the future.

ORANGE INSECTS.

Since the foregoing pages were written, Mr. Wm. H. Ashmead, Entomologist to the Florida Fruit-Growers' Association, has issued a very comprehensive and illustrated work on the injurious and beneficial insects found on the orange trees of Florida.

This work supplies a long-felt want, and will be of vast importance to the orange interests of the State. Every one owning an orange grove, or who contemplates the same, who desires to study the history, habits, and *modus operandi* of the insects, should be supplied with this valuable book.

THE COLD WAVE OF DECEMBER, 1880.

The orange growers of Florida are again called upon to record another visitation of frosty weather, which for severity excels any one experienced here within the last ten years.

In December, 1870, the thermometer marked about the same figures, as in the same month in 1880, and the damage done to the young-growing trees at the former freeze was much greater than now.

In the freeze of 1870 the freezing cold weather continued for six days: freezing every night, with bright, sunny days; whereas, the intense frost of the late cold snap lasted but one night and day, and the weather continued cool, cloudy and rainy for two weeks afterwards, which was favorable.

Like other visitations of the frost king, some localities were more lightly touched than others; but from accounts received, nearly all portions of the State north of the twenty-eighth parallel, and some places even further south, were more or less scorched; however, in the northern and middle counties, the thermometer ranged lowest, and the damage done will likely correspond, at this season of the year. A severe frost in February is more likely to do damage further south on account of the trees being more forward in leaf and blossom.

Those who contend for the "frost line," below which bananas, pine apples, guavas, and other strictly tropical fruits, can be cultivated without protection from frost, will be obliged to move a little farther down the peninsula. Frost is reported to have occurred at Chuckaluskee, below the 26th parallel. Although the damage done by the freeze of December 30th, 1880, has been great, especially

to those having ungathered fruit frozen, yet there seems not much reason for discouragement. The orange trees have suffered but little, except the shedding of the leaves on the older trees; and the young trees with late grown shoots will be likely to wilt back to the older and tougher wood. We think few of the young trees are killed out-right, and all should be encouraged to bring their groves to healthy and successful bearing, and trust that the frost king, hereafter, will make his visits few and far between.

Those having bearing groves, need have no fear for future crops of fruit; for in Florida the crop is sufficiently mature by the first to the twenty-fifth of December, before the period of killing frosts, to gather and house, and if fruit houses are constructed on correct principles, like the one described on a foregoing page, the fruit may be gathered and kept for many weeks and months, and then be in better condition to ship than when freshly gathered from the tree.

We think the orange growers of Florida have little cause for discouragement, and every inducement to continue and persevere in the good work until their efforts shall be crowned with success. The late cold wave which swept over the State has demonstrated some facts heretofore not well understood in regard to the different species of the citrus family, to withstand freezing. The lime, lemon and shaddock, have suffered severely in both fruit and wood; the sweet orange trees, both seedlings and budded, range next; the wild orange suffered least, scarcely shedding its leaves in exposed situations; while the *Satsuma*, or Japan orange tree, heretofore described, was not affected in the least, not even the leaves turning yellow or dropping from the branches.

Dr. Hall informed the writer that at his place, on Fort George island, near the mouth of the St. Johns river, at this writing (January 15th), while all other orange trees have shed their leaves and the late growth or angular branches have been killed,—yet the *Satsuma* seems not to have been affected in any respect, and is as green and flourishing, both imported and budded trees, as before the frost.

Mr. A. I. Bidwell, also, has observed and noted the same peculiarities in regard to the *Satsuma*.

These facts in respect to the ability of different species of citrus to endure a low temperature, is a matter of much importance to those planting groves, and should be taken into consideration when selecting stocks and varieties to be planted in exposed situations. The sweet orange, budded on lemon stocks, although making rapid and large growth, have suffered more than on any other; hence, all things considered, the wild orange stock is to be preferred for budding the sweet orange. For hardiness and ability to flourish on any soil, wet or dry, rich or poor, the wild stock is the best.

CONCLUSION.

The writer desires to state that in preparing this little work for the press, no particular style or phraseology has been attempted, but on the other hand, he has endeavored to present facts as they appeared, in as plain and direct a manner as possible. He has strenuously avoided the use of all technical terms, and striven to present his ideas in language that all could understand.

It is not pretended that this book presents all the facts worth knowing in the culture of the orange. There are many things yet to learn. Neither is it claimed that the writer's mode of culture is the best. Others, by pursuing a somewhat different course may reach satisfactory results.

But after some years of close attention and experience, with a fair share of success, he believes his conclusions are entitled to some degree of consideration. It is believed, with his present knowledge of orange culture, the writer could accomplish as much, or more in six years, than he has in the last ten; and that any one who will follow the hints herein set forth may succeed equally well.

With these remarks, this little volume is respectfully submitted to the scrutiny of an intelligent and liberal public.

FLORIDA.

“ Know'st thou the land where the lemon trees bloom,
Where the gold orange glows in the deep thicket's gloom,
Where a wind ever soft from the blue heaven blows,
And the groves are of laurel, and myrtle and rose ?”

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