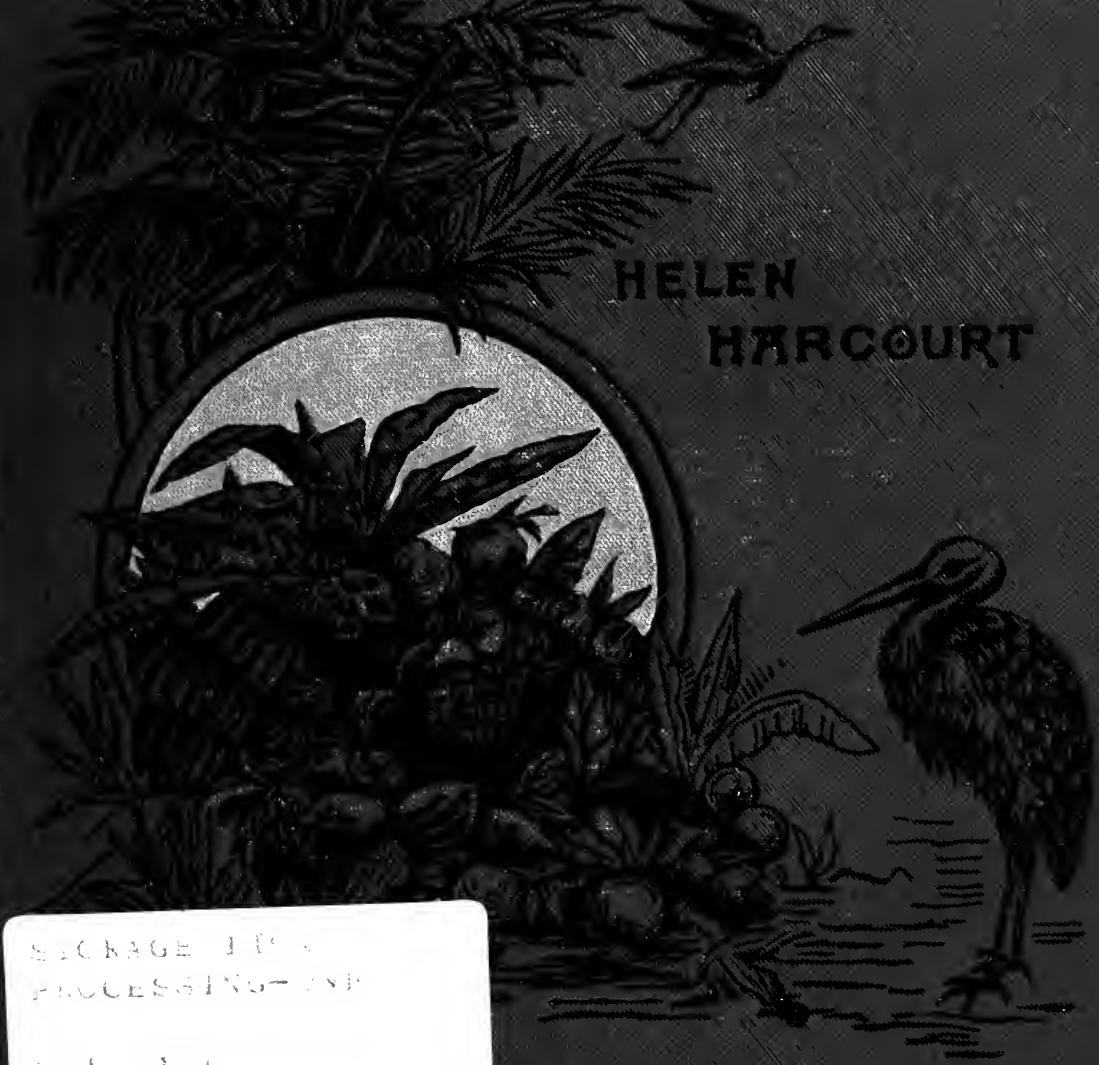
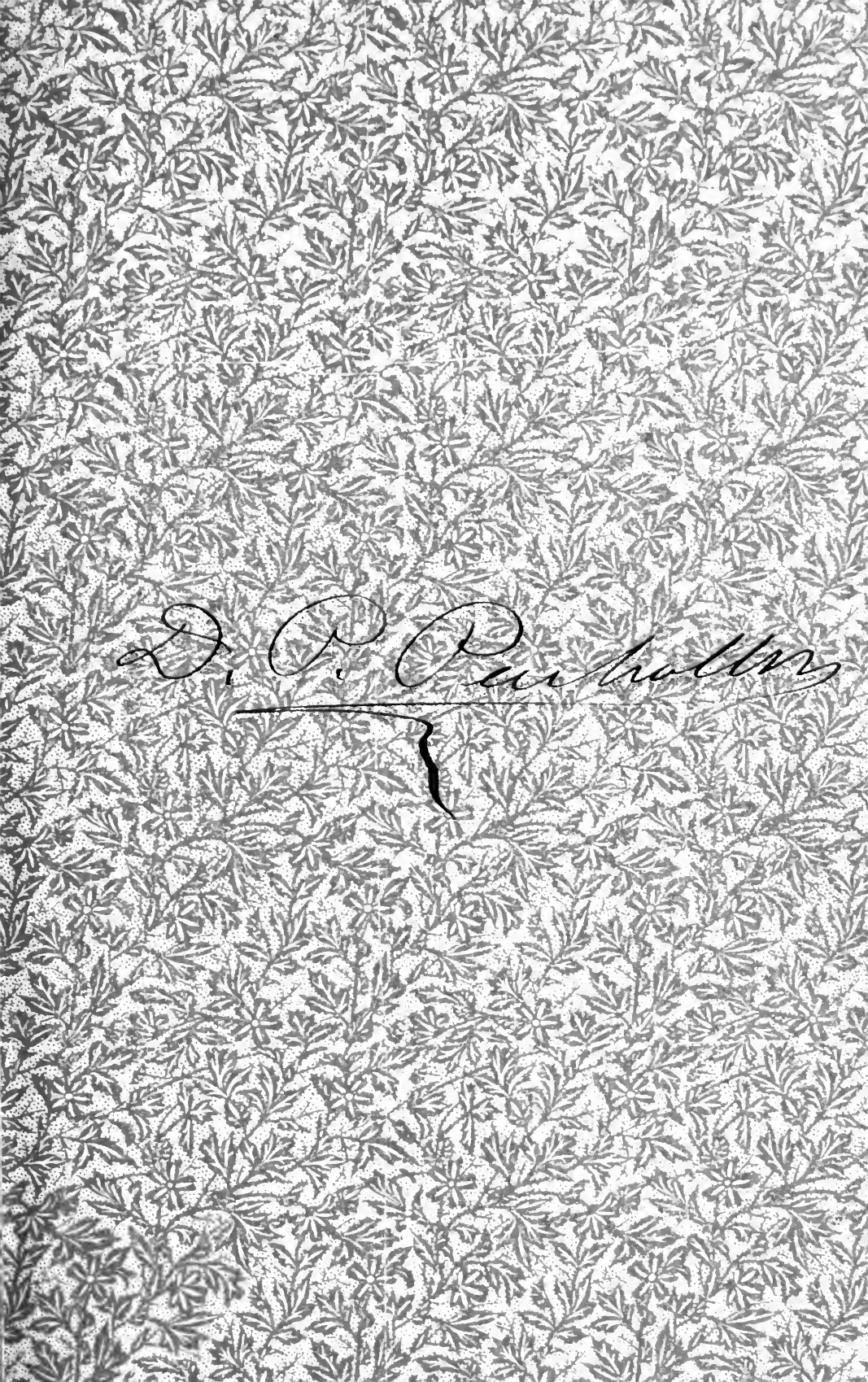
FLORIDA FRUITS

HOW TO RAISE THEM

HELEN HARCOURT





FLORIDA FRUITS

AND

HOW TO RAISE THEM

BY

HELEN HARCOURT.

REVISED AND ENLARGED EDITION, WITH ELABORATE INDEX OF SUBJECTS.

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PREFACE.

In laying the present revised and enlarged edition of "Florida Fruits and How to Raise Them" before the public, the writer gives tangible expression to the growing belief that not in the citrus fruits alone will Florida find the Alpha and Omega of her horticultural wealth.

While oranges are now, and will probably continue to be, the chief staple in such sections of our great State as are best suited to their culture, there are numerous other fruits making, year by year, rapid strides to the front.

A few years ago the question was, "What can be grown in Florida?"

To-day the question is, "What can not be grown in Florida?"

For instance, it was said that strawberries could not be raised in quantity; already, in the last three years, they have won recognition as one of the most profitable "quick crops" that can be raised any where.

"Peaches could not be grown in Florida" was the assertion only four or five years ago, and now it has been proven that peaches can not only be grown over nearly the whole State, but grown in abundance and in perfection. The peach crop is already a very important item in the western and central sections, and yearly becoming more extended both in quantity and area.

And so we might go over a long list of fruits already proven to be adapted to Florida's soil and climate, but these examples will suffice to show that in the horticultural possibilities of our beautiful sunny State we stand yet upon the threshold.

And as it is with the list of fruits, so it is, in a great degree, with the manner of their culture; to a certain extent we yet grope in the twilight, and must be content to observe, to inquire, to compare, to study, to experiment, seeking to avoid the errors of some and to imitate the successes of others.

To place at the service of the Florida fruit grower the result of years of patient observation and experience, both personal and collected from trustworthy sources, in a plain, concise, and practical form, so that the veriest novice may make a success of his new pursuit in his Florida home, has been the earnest purpose of the author. How far and in what degree this purpose may have been attained, it is left to the reader to decide.

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FLORIDA FRUITS.

CHAPTER I.

RISE AND PROGRESS OF ORANGE CULTURE.

Throughout the length and breadth of the horticultural world there is at this moment, and will be for years to come, no one tree or fruit possessing so all-absorbing an interest as the far-famed, luscious orange. And good reason there is for this pre-eminence of the "golden apple," as we shall presently see—its fame is not built upon a sandy foundation, but upon a gold-bearing rock, and as such it shall stand forevermore.

An orange grove is at all times intrinsically beautiful, whether laden down with its yellow fruit glistening amid the dark green foliage, or standing clothed in the glossy glory of the latter alone, or dotted all over with its starry white blossoms, and filling the balmy air with their sweet breath.

Most truly "a thing of beauty and a joy forever" is an orange grove to its happy possessor, and in using the word "forever," we do so advisably, for no one who owns a grove at the present day will live to see its decay, or the failure of one jot or tittle of its usefulness, rather the contrary.

We remember reading a rather sarcastic story of some young girls, who, to settle a disputed point, applied to a maiden lady of eighty years with the question:

"How old must a woman be before she gives up all hope of getting married?"

The old lady (so the story runs) shook her head, and made reply:

"Girls, you must ask some one older than I am." So with the orange tree.

At Cordova, that far-famed seat of ancient Moorish splendor and luxury, there are still remaining a number of monster orange trees, known to be seven hundred years old; their trunks are partly hollow, their bark cracked and rugged, and yet each year these doughty old giants yield up their seven and ten thousands of large, luscious golden balls, as though yet in the hey-day of their youth; and who knows? perhaps they are! Certainly, as yet, they show no intention of dying of old age, nor of retiring on half pay, nor of shirking the active business of their lives, and doubtless if one versed in their native tongue were to say to them:

"How old must an orange tree be before it ceases to bear?" they would shake their great, bushy heads and reply:

"You must ask older trees than we are."

Even in England, at Hampton Court, where the tree is raised only as a curiosity, and is carefully sheltered under glass, there are several, the register of whose birth bears date of over three hundred years ago.

So you see it is no rash assertion, this of ours, that no orange grove owner will live to see his trees cease to yield him an income, and a good one too, if he but treats them with moderate kindness, unless, indeed, some extraordinary extraneous cause supervenes to destroy them, such as fire or flood, which may be reckoned as among the impossibilities.

Before referring in detail to the mode of culture pur-

sued in Florida, in raising this justly celebrated fruit, a brief glance at its origin may not be amiss.

An earnest naturalist, Galessio, was the first to trace its history with any degree of authenticity, and the result of his careful researches he published to the world in his "*Traité du Citrus*," issued in Paris in the year 1811.

According to this author the Arabs, penetrating further into the interior of India than any foreign nation had done before, discovered the orange family flourishing there, and held in high esteem by the natives.

From this point the Arabs conveyed the sweet, now called China oranges, into Persia and Syria; and the bitter orange, now called the Seville, found its way into Arabia, Egypt, the North of Africa, and Spain. From these points the orange traveled into other countries, notably China, and in this latter empire it so flourished and spread far and wide, that by and by it came to be a fiction believed in by Europeans that the orange was indigenous to China.

Galessio shows, however, that the so-called "China orange" is by no means a spontaneous production of that country, and his statement is further corroborated by the absence of all mention of this fruit in the exceedingly minute and circumstantial account given by the father of modern travelers, Marco Polo, of the productions of China.

The orange was not known to the ancients, either in Europe or Syria, and the palm of its introduction to the world must be accorded to the Arabians, whose anxiety for the extension of medical and agricultural knowledge was almost equal to their zeal for the propagation of the Koran.

The sweet orange which they carried to Spain spread thence into Portugal, Sicily, St. Michael, and the Mediterranean islands, and the West Indies.

In each and all of these various places has the difference

in climate and soil produced varieties and changes in the characteristics of the original common stock, so that in these days the Sicily, St. Michael, Maltese, Havana, and a great number of others are well-known and established varieties of this noble fruit. To suppose, as many do, that the orange is a spontaneous production of the soil of the New World is to make a great mistake; only where the early Spanish or Portuguese landed and penetrated into the country is the wild orange of America to be found.

On the banks of the Rio Cedeno, in the midst of a great forest, Humboldt, to his amazement, came upon a broad belt of wild orange trees, laden with large, sweet, and most delicious fruit. "Surely these must then be indigenous to the soil," he thought; but subsequent inquiry led to the discovery that those grand old trees had once formed a portion of extensive groves planted by the Indians from seeds obtained from their early Spanish visitors and conquerors. And to this same source does Florida owe her beautiful wild groves; only here, whether by the accident of soil or seed, the wild fruit is sour not sweet.

Ponce de Leon and his successors, but most of all the unfortunate French colony, barbarously massacred by cruel Menendez, "not as Frenchmen but as Lutherans," were directly instrumental in introducing into the "Land of Flowers" the noble fruit that is rapidly becoming the chief source of wealth and happiness to its adopted home. Briefly, the orange is not a native but a naturalized citizen of the United States.

Looking back only a few years from our present point of enlightenment as to the inestimable value of this once neglected tree, it is very hard to understand how it is that the native Floridian did not long ago wake up to the realization of the wealth within his grasp, of the golden apple lying neglected at his feet. And yet there were, it is true,

several causes conducing to perpetuate this strange blindness. For one thing, Florida, though it contains within its borders the oldest city by forty years in the United States, has ever been, owing to a conjunction of circumstances, one of the least known and most sparsely settled of them all; owned first by one European power, then by another, before finally passing into the Federal States; torn and distracted by Indian wars and raids, and lying in a remote corner of the Union, completely out of the general line of travel, it is not to be wondered at that Florida was, except to a very few, a sealed book. It is true that there were a a few intelligent, wide-awake Southerners who held the orange at an approximate to its true value, but these men were content to set out and cultivate their trees on a comparatively small scale, and they never penetrated further into the country than the St. John's River and St. Augustine, where, too often, a severe frost would injure the tender trees and discourage their owners.

Beyond the points just mentioned few settlers were to be found, and those few were, almost to a man, of a low and ignorant class; men who were satisfied to saunter lazily through their days, existing on "pork and hominy," or whatever else was "easy to grow, and could take care of itself," in which category were included vast herds of cattle, which ever and anon they drove to the nearest sea-port for shipment to the West Indies. To such as these the luscious sweet orange of Europe, so well known in the Northern States, was a boon unknown and undreamed of; they knew, it is true, that, scattered over the central and southern portions of Florida, were wild groves of beautiful trees, bearing a large, yellow fruit, but that fruit was exceedingly bitter and sour, and held by them in no esteem.

It was not until our unhappy civil war had come to a

close, and the *ancien regime* was broken up, that a new people began to press beyond the borders of Florida, bringing in their midst the commencement of a new era in its hitherto stagnant civilization.

Even then it was some time before the attention of these new-comers was drawn to the capabilities of the wild sour orange groves scattered all around them in the rich hammock lands, and the first bold pioneer who ventured to experiment upon their true value, met, as is usual in such cases, with no encouragement from his neighbors, but rather determined opposition and ridicule.

A case, in illustration, was related to the writer recently by a neighbor, a lady who is now the proud owner of several fine bearing groves: Fourteen years ago she removed with her family from the northern part of the State down into the "Great Lake Region," and "Orange Center," building a home in the piny woods for the sake of health. The want of shade was at once apparent; to supply this *desideratum* several large sour orange trees were transplanted from a wild grove near by. They flourished exceedingly well, but their fruit was allowed to rot upon the ground uncared for. One day there came a stranger, who argued so eloquently upon the great gain to be obtained by cutting their tops off, and inserting buds from a sweet orange in their trunks, that, sorely against the will of our informant, her husband proceeded to follow the stranger's advice. "I scolded and cried, and cried and scolded," she said, "but it was of no use; the tops of those splendid trees were sawed off, and the little green sticks the stranger gave us were put into the bark of the poor bare trunk. In a few months, seeing how fast the buds were growing, I began to think perhaps there was some truth in the stranger's words, and in three years, when I saw a fine crop of splendid oranges, the sweetest I had ever tasted, I

blessed the stranger, and thanked my husband for cutting off the tops. We succeeded, some time after, in getting a few sweet oranges from New Orleans, and planted the seed, and some of our neighbors did the same; we also budded a few more sour stumps. But even then none of us ever dreamed of making a business of raising oranges to sell. We knew so little of the North, and were so shut out from the busy world, that it has only been within the last eight or ten years that our people have really waked up and begun to plant out groves in earnest."

Having thus endeavored to show why this great industry of the future has lain so long in abeyance in a land where all the essentials of its pursuit, even to the wild fruit itself, have existed ever since its earliest settlement, we will pass at once to the practical details of orange culture.

At the very outset the Florida orange grower labors under a disadvantage; his business is a new one, and consequently he is, to a considerable extent, dependent on a series of experiments. The new-comer finds but a limited store-house from which to draw his practical information; his neighbors have bought and are still buying their own experience, and he must do the same in a great measure, for the points in orange culture on which all growers agree are very few. How can it be otherwise with an industry which is only in its infancy?

The oldest orange trees in Florida are but babies, as it were, and comparatively few, out of the thousands of groves set out, have even as yet reached the age of maturity; it will be many years still before orange culture will have reached the perfection of a science, as has the culture of the older orchard fruits of the North.

We are apt, at a distance, to associate poetry and romance with the very name of an orange grove, but when one sets to work in earnest to "make" one for himself, the

cold, stern facts that ever beset the business life of man come to the surface, and he learns that some money, more time and labor, muscle, patience, and perseverance are necessary before his embryo grove becomes self-sustaining.

It is not play to plant and conduct an orange grove from infancy to bearing and paying maturity, and it is because the idea that it is all play, all "fun," to "make a grove" has been so prevalent, that there have been so many disappointments, so many discontents returning to the North with the report that "orange groves are humbugs."

The more thoroughly the incoming settler realizes that orange and other fruit growing is a regular business, requiring, like other business pursuits, the investment of more or less capital, and a good deal of care, time, judgment, and perseverance—the more thoroughly he realizes this, we say, the better prepared he will be to meet and conquer the various vicissitudes and drawbacks that are sure to occur during the long years of work and waiting that must be encountered before he can sit down at last for the rest of his life in the enjoyment of a good and steadily increasing income.

Far be it from our wish to discourage the would-be orange grower, rather would we urge him who seeks health and competence, aye, more, wealth, to come to Florida and make unto himself a "Fortunatus' purse" of the golden orange, but we would have him come realizing that here, as elsewhere, the great law of nature, which decrees that nothing that is worth the having can be obtained without toil and patience, is in full operation.

So many have come to Florida full of enthusiasm, full of the idea that it was only necessary to stick the trees in the ground, any where and anyhow, and then sit with their hands in their pockets, as it were, for a year or two, in order to reap a full grown fortune, that we feel it our

bounden duty to give full warning that though an orange grove is a glorious thing to own, and will give its possessor competence and wealth, it is not to be obtained without time, labor, and patience, or their equivalent in money. The latter, when the settler is fortunate enough to be able to purchase a grove ready made.

And right here is another point to which we would call attention:

We often hear complaints of the "high prices" asked for bearing groves; now, these so-called high prices are, as a rule, very low prices in reality, when one stops to consider the years of toil and care and perseverance that have gone to "make" each grove, through all the time of their slow growth; not only so, but what of the actual money value of said grove?

Why does the would-be purchaser want to buy?

Because he expects a good income from his grove? Exactly so. And now we will ask one more question:

If he went to an office where annuities were sold, would he expect to purchase an annuity, annually increasing in amount, for a mere nothing? Scarcely!

Yet that is just what these men who are not willing to pay a fair price for an orange grove are seeking to do.

CHAPTER II.

THE VALUE OF ORANGE GROVES.

Having pointed out the rock on which so many fair barks have foundered, let us now look at the other side of the picture and see what has been done and may be done again by those who start aright, and regard orange growing not as a pleasant pastime, but as a serious, earnest business, to be carried out faithfully, carefully, and intelligently, like any other business in which success is desired, and to be learned and studied as such.

What reasonable man would expect to be successful in a pursuit entirely new to him, without seeking such sources of practical knowledge thereof as might lay open before him?

And yet there are men who would bristle all over with indignation were it to be hinted that they do not possess common sense, who yet embark in a new life as orange growers, and think they will succeed, while they scorn advice, refuse to seek counsel of those whose experience is of many years' standing, and turn their backs scornfully upon the books and periodicals written by practical men familiar to the business so new to them.

Such self-sufficient egotists as these will fail as orange growers, and either leave Florida, pronouncing her noble groves humbugs, or else turn back to the beginning and wisely seek the course they before despised.

The man who meets with as few drawbacks as possible, and pushes forward his grove to its utmost capacity, is the man who is not too proud to confess that he does not know more about astronomy than the astronomer, more about geology than the geologist, more about farming than the

farmer, more about orange culture than the life-long orange grower.

Therefore, ask opinions and advice from older settlers; do not take all you hear for facts nor all for fiction; take notes and compare them; weigh conflicting opinions and strike a balance; look about you with a view to learning something useful for you to know; do not trust entirely to hearsay; find out all you can by actual trial and experiment; study reliable books relating to your new business; take one or more weekly papers devoted to the same cause; be energetic, persevering, careful to do your best and make the most of the advantages you possess; never use nor practice those three most reprehensible words in the English language, "too much trouble."

Do these things, and in eight or ten years from the day you set foot in Florida a penniless man, perchance, you will be in comfortable independence; aye! more than independent for all your life to come, and your children and grandchildren after you.

Every man who has succeeded in raising a grove has done so by pursuing just such a course as we have suggested; and no man will fail who is content to follow in his footsteps.

One of our earliest pioneers in orange growing was an Englishman, John Eaton by name. He served in our army during the Seminole war, and when discharged at its close, in 1837, accepted the offer of the Government to give one hundred and sixty (160) acres of land to any soldier who would settle on and cultivate a portion of it.

We, in these enlightened days, know how to envy this man the grand opportunity for selecting choice lands that lay before him, but he had not our knowledge. The wondrous value of the wild orange tree was a sealed book to him; he was a plain working man, and at that time an

invalid; all he sought was a quiet place in a mild climate, that "his days might be prolonged in the land;" so he selected his homestead on the St. John's River, in Orange County. He built him a little hut on a small shell-mound, where about fifty wild orange trees were growing, and there, with fish and game at his door, and a small garden patch by his side, he dwelt alone for twenty years.

Some one came along after he had been there a short time, and initiated him into the mysteries of budding; and then, more from curiosity than with any thought of profit, he budded his fifty wild trees.

He "builded better than he knew;" in a few years these hitherto despised trees brought him all, and more than all the cash he needed.

When the lonely recluse died no heir came forward to claim his property, so after due time the State stepped in and sold it to the highest bidder. And thus John Eaton's grove became the property of the Hon. W. W. Woodruff, for the sum of three thousand dollars.

The property would have brought much more if it had not been that the soldier had made so very poor a selection of land that only a few of the hundred and sixty acres are good for any thing, and these are only a few feet above the river, so that in unusually high tides the grove suffers; besides this, the only building site is so near the river that it is not healthy to live there, and so much overflowed land extends all around it that whoever dwells there must be content without neighbors.

Yet in spite of these serious drawbacks the little place sold, at Mr. Woodruff's death, for nine thousand dollars, triple the price, you see, that he paid for it.

There are, we have said, only fifty trees in this grove, but from those fifty trees crops often net from fifteen hundred to eighteen hundred dollars in a season.

Who has not heard of the famous "Big Tree" of Florida, which oftentimes has ten thousand oranges at once; oranges so fine that they have sold for two dollars and forty cents per hundred, thus netting from this one tree two hundred and forty dollars in one season? It seems incredible, does it not? Yet it is strictly true; and not only so, but this tree is only one fiftieth part of a grove, where each individual tree seems to take a pride in bringing to its fortunate owner an annual offering of from two to five thousand oranges. This famous "Big Tree" stands apart from the rest in solitary grandeur, and is a glorious sight, whether clad in its every-day uniform of green, or dotted all over with its fragrant white blossoms, or laden with golden fruit. Note the fact that it is of the same age as the rest of the grove, was budded with them, and has received the same treatment, but it stands alone. We shall have more to say in this connection by and by.

So now we have seen what one poor ignorant soldier did, in a careless, hap-hazard way; he might have done much more had he known all that we know nowadays.

John Eaton died, but his trees lived on and prospered, and their fame at last reached the ears of a relative of his, then living in Canada, and he came to Florida to try to claim the estate, but we believe he failed. The story he told of the events that led him here may well seem to "point a moral and adorn a tale" in the wonderful contrast between the work of the pioneer of the North and him of Florida.

Ten years before Eaton settled in Florida the father of the gentleman alluded to settled in the wilds of Canada. For thirty years he toiled and endured hardships and privations, and by that time he had cleared and brought under cultivation one hundred acres of land. But all the time he was working, the climate was working too; it killed

three of his children with consumption, killed his wife by a combination of diseases brought on by working in the snow and mud, and finally killed him also with inflammatory rheumatism.

The one son who was left rented the farm, won by thirty years of toil, for the paltry sum of one hundred and fifty dollars a year, and fled to our genial State to save his life and reflect at leisure over the vast contrast between the results of the thirty years of toil on his father's part and the twenty years of ease of his cousin, John Eaton. It was all in the difference of location; one settled in a cold, inclement country, the other in a mild, genial clime, one of Nature's garden spots.

Of course it is easy to go north, to any of our old settled States, and point out fine fertile farms worth many thousand dollars, places that have been carved out of the wilderness by the work of one generation. But then, what if the same amount of time, money, and intelligence had been spent in Florida? Why, the difference would have been as startling as that between the work of John Eaton and of his cousin in Canada.

And now let us come down to later times, and to men who were not pioneer hermits but pioneer settlers.

We know of an island in Lake Griffin, containing three hundred acres of rich land, studded over with orange trees, once wild, but now budded, and yielding luxuriant crops. Fourteen years ago the first small improvements were made here, the land and work together costing fourteen hundred dollars; ten years later the proprietors received six thousand dollars for their crop, and refused an offer of forty thousand dollars ($40,000) for the property.

Thirteen years ago a father and two sons, ruined by the war, purchased eighty acres with a wild grove on it for five hundred and fifty dollars. The trees they budded

with the sweet orange, and they took care of them as best they could; they were so poor that they were compelled to use their own strong arms to cut down trees, with which they built a rude house to shelter them, and the little furniture needed was fashioned with their own hands. They managed to live somehow—it is easier to rub on over a hard road in a mild climate than in an inclement one—and took good care of their trees; though they themselves might suffer for food, they were determined their trees should have "full and plenty," for they knew them to be the "geese that would lay golden eggs." And they were right. Last year that hard-won grove brought them in nine thousand dollars, and it has really just begun to bear.

The hard working days of this trio are over, they may take their ease, while a skillful man, at a good salary, looks after their "golden geese," and they have merely to sort and pack the "eggs;" and this, by preference, as wise men who would make sure that the fruit is properly cured, graded, and packed, for, on these important points, depends the good or bad fortune of the crop; what matters it if a grove yields its thousands of luscious fruits if those fruits are rotted and valueless by the time they reach the market? As we have said, thirteen years ago these three men were penniless, now seventy-five thousand dollars would not tempt them to sell their grove.

In 1870 a gentleman whom we know purchased a wild grove on Lake Harris for five hundred dollars; now he has twenty acres of bearing trees, and refused to sell for fifty thousand dollars.

Two years later, another settler bought forty acres of land for less than four hundred dollars, budded the few trees growing wild, set out more, and now has sold land to the amount of two thousand dollars, and holds the balance at twenty-five thousand.

Now, look at these figures for a moment, and ask yourself what safe, reliable, legitimate business could you engage in at the North with a capital of five hundred dollars, and in ten or eleven years have augmented that capital to such an extent. Yet one more example, and we are done.

In 1874 a gentleman bought, for six thousand dollars, a rich hammock tract of five hundred and sixty acres. On this tract were four acres in a wild grove, six hundred large, bearing trees besides many young seedlings. The bearing trees he budded, leaving some as they stood, but moving others where they were too crowded. The trees thus moved were of course set back several years in growth, but from the four hundred that were left in their original position, when three years only from the bud, the neat little sum of twelve hundred dollars was obtained; at four years from the bud these same four hundred presented their fortunate owner with sixteen hundred dollars; and at five years, one hundred of the transplanted trees having advanced into the ranks of the bearing ones, the crop netted seventeen hundred dollars, and would have brought one thousand more but for a severe gale that blew off a large proportion of the fruit.

Now this is the showing of just four acres out of five hundred and sixty purchased for six thousand dollars. How about the rest? Two hundred and sixty acres have been sold for twenty-one thousand dollars. Three hundred acres and the grove referred to remain in the purchaser's hands; and on these three hundred acres, laid out in young groves for sale, are six thousand flourishing trees, budded on sour stocks, raised on the place, besides two thousand more in the nursery. Sixty thousand dollars would not purchase these three hundred acres with the bearing trees and young groves they contain. Think for a moment!

Eight years ago the investment of six thousand dollars was made, and to-day eighty thousand dollars is a low estimate of its value.

We could go on multiplying instances indefinitely, but these will suffice to show that the culture of the orange, when properly conducted, is a good money-making investment. Even for the man who does not need the income from his grove for the support of his family, there is no better investment for his surplus money, and it would be difficult to find a safer one.

When an orange tree is in full bearing it is valued at one hundred dollars, all over the State; and this is no fictitious value either, for certainly a tree is worth the money which it represents. Now, a tree bearing one thousand oranges, at one cent each, represents an income of ten dollars, the principal of which, in Florida at eight per cent, is one hundred and twenty-five dollars. As the trees become older the orange-bearing also increases.

There is no probability of the supply of oranges from Florida ever exceeding the demand, as the orange belt is confined within narrow limits, while the population of the country is rapidly increasing and is capable of almost indefinite expansion.

But while an orange grove is a splendid investment for a rich man, it has also its bright side for the poor man. Nine tenths of the prosperous orange growers in Florida came here less than a dozen years ago, some with a few hundred dollars in their pockets, but more with only a few hundred cents. One gentleman arrived here with less than a cart-load of household goods and ten dollars of borrowed money. He patiently bore privation, and worked for his neighbors, using his surplus money in improving his homestead little by little; now he is in the enjoyment of many thousands of dollars.

There are thousands of young men in the inclement North toiling wearily along through the years in the hope of ultimately winning a home for some dear one who is patiently waiting for the happy day to come. Let these, and such as these, turn their faces southward, and in less than "seven years," amid Florida fruits, they will have won independence and their Rachel.

CHAPTER III.

FROM SEED TO GROVE.

Few amateur orange growers realize the importance of good, thrifty stock at the very outset, but it is a point that can not be too strongly insisted on, for herein lies the corner-stone of a successful grove. Given poor, diseased, stunted stock, and you may lavish time, money, care upon it, and be worse off in five years' time than when you began; given good, thrifty stock, and half the time, money, and care will find you, in the same space, the owner of as fine a young grove as one would need to possess.

How to secure such reliable stock?

Well, there are three ways: one, to go to a neighbor who has preceded you by several years and has seedlings for sale, purchase them and bud them yourself; another, to purchase trees ready budded from a reliable nurseryman; and still another, which will best suit a shallow pocket, is to plant the seed, and when the trees are a suitable size bud them yourself.

There is a right and wrong way of doing every thing in this world, and it is sometimes curious to see how frequently the wrong way is chosen when the right way seems just as easy, and is certainly productive of more satisfactory results. Now, in this apparently simple matter of planting seeds, most persons will take the seeds haphazard from any orange they may happen upon, and going out, will punch a hole in the ground with a finger, drop in a seed, give it a pat downward, and go away exultant, and return in a week or two expecting to dig up a fine, healthy plant. Others will push the seed down into boxes and water them carefully every day and rot them;

while others will not water them at all, but leave the sun to shine upon their covering of soil and dry it to a powder. And then they wonder and scold—these three types of amusing people—because "these seeds won't come up, bad luck to them!" And so it was truly "bad luck" for the seeds when they fell into such hands.

But there is a right way of doing this simple thing, and let us now see what it is:

In the first place there are seeds, *and* seeds, and by no means are all fit to plant because they are called "seeds." A seed should never be planted except from large, ripe, well-shaped and fine-flavored fruit, no matter whether your ultimate object be a seedling grove or only stock to bud on. And not every seed from these should be planted either, but only the plump, sleek, and well-to-do looking seeds; these alone will make thrifty growers, either for seedling or budded stock. Never allow your seeds to dry off before planting, if you do, throw them away, as they will either never germinate, or else make sickly plants.

If it is not convenient to plant a few at a time, as you collect them, either allow your choice oranges desired for seed to rot, the seeds remaining inside, or better still, get a small box, half fill it with sand, saturate the latter with water, put it in a shady place, and mix in your seeds with your sand, being sure they are well covered; if you have no shade convenient, it will do to mulch with moss heavily or with trash. But mark this, do not water your box again or the seeds will rot. Thus treated, seeds may be kept in good condition for planting for several weeks. Examine them every two or three days, and if they show signs of sprouting, hurry them into their permanent burying ground.

We would advise every settler to have a nursery of young trees, even if he is able to purchase all the trees he

needs for his grove; the trees will never come amiss, and they require but little care once fairly started on their life's journey.

For raising a limited number of seedlings, say two or three hundred, cast off boxes, such as may be had at any country store, are to be preferred to the open ground. Even better than several small boxes is one large one, such as can be made at home in a short time. Make a box ten inches deep, two feet wide, and as long as your boards will allow, twelve, sixteen, or twenty feet—a bottom is unnecessary; nail on braces to keep the boards from spreading; fill the box with sand mixed with well-rotted stable manure, or with a small portion of commercial fertilizer mixed through it; pack it down firmly; pour on water until the ground is thoroughly saturated; then with a pointed stick make a number of parallel grooves about one inch deep and about six inches apart; drop your seeds three inches apart in the little trenches thus made, drawing the soil on top, and with a small piece of board press it down as firmly as possible. Now mulch your box with grass or moss (and when we speak of moss, now and hereafter, we mean the gray "Florida Moss"); the moss is the best, as it does not pack, and while it retains moisture allows a ray of sunshine to penetrate now and then to the soil to coax into being the little embryo which is buried that it may live; let the sun reach the seed-box during a greater part of the day—all day, even, would do no harm—if the mulch is heavy; do not water the seeds more than once a week, and not then unless the soil is dry. More seeds are lost by being rotted by a superabundance of water than from any other cause; the soil in which they lie *perdu* should be moist but not wet. This is true not only of seeds of the citrus family, but of all seeds.

This mulching of seeds is not, we believe, the usual practice, but our own experience has proved again and again that seeds thus kept uniformly moist will germinate in one half the time required by the same seeds when subjected to the usual alternations of dry and wet, which is the inevitable fate of those that are not thus protected. But if young plants are desired by the thousands and tens of thousands, then the seeds must be sown in the open ground.

Here, too, there is a right and a wrong way, a careless or a systematic method of doing the work, and the latter always comes out ahead.

In laying out the seed-beds it must be borne in mind that you will hereafter want to hoe and weed your young plants; therefore leave a space two feet wide between them, the beds themselves being three feet in width. This will allow you to reach the center from each side. See that the seed-beds are well cleared of trash, grass, sticks, etc., and make them level and smooth; then make your trenches six inches apart, and drop your seed as in the boxes, or sow broadcast if you prefer it, being careful not to sow too thickly; press the soil down firmly, then cover your beds with a mulch of pine straw, grass, well-rotted sawdust, or moss; it matters little what is used so that it keeps in the moisture and shields from the hot sun.

A barrel of oranges will furnish from four to eight thousand plants. To separate the seed from the pulp, when such large quantities are to be sorted, one needs a sieve with a quarter-inch mesh, a good, stiff brush, and an abundance of water. The ground should be moist when the seeds are planted, either by rain or profuse artificial watering, and should be kept so until the seed are up, which will be in from ten days to two weeks; without mulching they are often four or five weeks in making an

appearance. As soon as the first plants are fairly up, remove a part of the mulch so that they will meet with no resistance in pushing their way upward, and after a few days remove it entirely. Keep the seed-bed watered until the plants are about three or four inches high, and then, after a drenching rain, replace the mulch around the slender stems. It is an excellent plan to soak the mulching material in liquid stable manure (twenty pounds to a barrel of water) for a few hours before applying it to the nursery bed. Orange, or any other plants, in fact, thus raised and cared for will make such a thrifty growth as will astonish their owner and amply repay all the time and trouble lavished upon them.

There is another way of protecting the young trees from the direct rays of the sun, a method that is extensively practiced in many large nurseries; it is more troublesome and expensive than the process just described, but as it has the indorsement of practical horticulturists, we give it for the benefit of those who may prefer it to mulching.

Drive stakes four feet long into the ground to the depth of one foot, along the borders of the bed, six feet apart; nail narrow strips to the top of the stakes, or rope or wire may be used if more convenient; then stretch over the frame-work thus prepared some thin, gauze-like material, coarse bagging or the sleazy muslin called cheese-cloth, for instance. If the beds are more than three feet wide, it will be well to place stakes four and a half feet long at each end of the bed in the center, with a strip running from one to the other; this will raise the awning in the center like a double pitched roof. Sheltered from the fierce heat of the sun, yet receiving plenty of light, air, and moisture, the young plants will grow very rapidly, but more weeding will be required than when the mulching is used. By the time the plants have attained the

height of twelve or eighteen inches they are ready to be removed from the seed-bed to the nursery, and further shelter may be dispensed with. The same canopy protection may be used over the seed-beds as well as over the plants already up.

In raising plants of the citrus family, especially in the open ground, there is an active little enemy to combat against, an enemy whose name is legion, and who, if allowed to follow out its own plans, will nip off the embryo leaves of the plants the moment they appear above the ground. We refer to those very industrious creatures whom the primers hold up to us as an example to emulate, but it could be wished that their proverbial industry was more tempered with judgment in consideration for struggling humanity. We mean ants of course; they evidently regard young citrus leaves as especial dainties, and must be taught to keep their distance. An application of air-slacked lime or hard-wood ashes will dampen their ardor.

And now, having got our trees ready for the nursery, let us see what is the proper location for the latter, and how best to remove the embryo "gold mine" to its nourishing care.

It is an important thing to make a good selection for a nursery; because the plants are small is no reason why they should not have the best possible care, unless you want them to remain small indefinitely. Hammock land, dry, with the roots thoroughly cleared out, and mellowed by frequent workings, is good, but pine land is better; trees reared from their earliest infancy in rich hammock soil, and then transplanted at three or more years of age to pine land, will be apt to droop and pine, and either die outright or else linger along for years only half alive, just as a child, tenderly reared and cared for, will droop if suddenly transplanted to a life of exposure, with coarse

and insufficient food; for every nursery tree that is set out in a hammock grove, one hundred at least are set out on pine land; therefore, let them start out in life on the kind of food they are to have in after years, then, when they set forth on their life work in our great groves, there is no violent change in their nurture, and thrift and vigor are assured.

The site for a nursery should be on a slight rise to insure proper drainage without ditching; hard pan or clay should be not nearer the surface than three feet; the exposure should be southerly, and the site protected as far as possible from high winds. If water can not be easily procured from a neighboring lake or pond, dig a well in the center of the nursery; it will repay its cost by the number of young trees it will save, for water they must have, and plenty of it, during their first summer in the nursery; after that they are old enough to take care of their own water-supply.

Here again mulching is of great advantage in preserving the requisite moisture, and although it may, as some demur, bring the roots to the surface, that is just what you want in a nursery, as it facilitates the final digging up of the trees, and fewer roots are broken in the process than would be the case if they were more deeply rooted.

Lay out the ground for the nursery carefully; a little extra care now will save a great deal of work and annoyance in the future. Run the rows north and south four feet apart, so that the sun may reach the whole surface of the ground; let the latter be as level as possible and free from trash; and if you work in a light dressing of well-rotted manure, or muck, or commercial fertilizer, so much the better. The length of the nursery rows should never exceed three hundred feet, as at this distance apart, running at right angles with the rows, there should be road-

ways for horse and cart not less than eighteen feet; this allows for turning without trampling on the beds.

With regard to laying out the nursery in the manner described, we can not do better than to transcribe here a method taken from a valuable work by Thomas M. Garey, termed, "Orange Culture in California":

"Provide a strong rope, cord, or wire, a few feet longer than you wish the rows to be, a four-foot measure at each end of the section with which to mark off the distances between the rows, two good hard-wood stakes, or iron pins, which are better, and tools with which to drive them firmly into the ground. Fasten one end of the rope, cord, or wire to a stake driven at one end of the proposed row; straighten it if necessary. For marking the spaces in the row use a tool made similar to a hand roller with triangular pieces a few inches long fastened lengthwise to the roller a foot apart. Four feet in circumference, or a small fraction more than fifteen and one fourth inches in diameter, is a convenient size for the roller. To use this tool, take hold of the handle, place the roller on the tightly stretched line, and push it forward or draw it after you along the line; the pieces on the roller will mark crosswise of the line at regular distances of a foot. If any other distance be desired, it can be regulated by the diameter of the roller and the distance between the strips. Remove the line to the next proposed row. This leaves a mark lengthwise crossed at regular distances ready to receive the plants. A roller of greater diameter would require less power to use it."

Now these directions may seem uselessly complicated and troublesome, but try it once and you will try it again. It saves a great deal of time and trouble, and lays out the rows more accurately than is possible in any other way, and the after-ease with which the trees can be cultivated

will amply repay for the extra care at the start; it is much easier to plow a straight row than a crooked one.

The four feet space between the rows permits the cultivator, harrow, or plow to be used, and the one foot space between the young trees allows of thorough hoeing. The ground should be thoroughly moist, both in the seed-bed and in the nursery, when the plants are to be moved; never under any circumstances attempt to transplant when the soil is dry, either wait for a soaking rain or water the ground artificially. Loosen the plants carefully, thrusting the spade down perpendicularly, and work it back and forth until the soil is detached from the roots. The moment the plants are out of the ground put them in the shade, and in a tub of water; if they are left in the latter for ten or twelve hours, so much the better—this is true of all trees, large or small. Be careful to exclude the sunshine: more harm is done to trees, old and young, by allowing the sun to touch their tender roots even for a few minutes than many people realize. Never take up more than a thousand at a time unless there be a large working force, for it is of the utmost importance to keep them out of the ground as short a time as possible. Sort the plants and throw away all the stunted, inferior ones, for they will make only stunted trees; the Spartan plan of putting to death all the weakly, sickly infants is a good one to practice here. Prune back the tops and make them as uniform in size in each row as possible. It is a good plan to place the trees in small boxes and throw wet soil on the roots, withdrawing them one by one as they are set in the rows, or else keep the roots in pails of water while planting.

In planting press down and back and forth a nurseryman's dibble at the intersection of the rows and cross-lines; spread out the roots in the hole thus made, pack the soil down firmly around them, being sure to leave no vacant

spaces any where. Then mulch the plants, keep down the weeds, give them a sprinkling now and then of some kind of fertilizer; not too much, however, for it is not wise to accustom them to too "rich living." For the first year after setting out let them grow as bushy as they please; the foliage will shade the tender bark of the stem, and encourage the formation of a mass of fibrous rootlets; but after the first year it is well to prune surplus branches, leaving one leader to form the stock of the future tree; do not let the little shoots that put out along the stem do any more than show themselves before you pinch them off; keep a foot or two of the stem clear of branches.

From the first year on, you can bud your young seedlings with some choice varieties, and then in from one year from the bud each little tree will be worth thirty cents, and in another year forty or fifty cents, according to variety and growth; or, as seedling two-year-old trees, sell at twenty cents, three years at thirty, four years forty, each year adding ten dollars per hundred to their value.

There is now, and will be for years to come, a brisk demand for young trees, both budded and seedlings, and the thrifty far-seeing settler may readily clear several hundred dollars annually with the investment of no capital save that of a little care in planting seeds and raising a nursery.

CHAPTER IV.

HOW TO BUD AND GRAFT.*

In transferring a scion of some choice variety to a new and independent life on a strange stock there are two modes of procedure—either to bud or graft the one upon the other. Grafting and budding are almost identical, save in the mode of approach of scion to stock; in the former whole twigs, or even large branches, are used as scions; in the latter, only the little dormant buds that lie *perdu* in the axil of every leaf. In grafting the top of the tree is cut off, usually close to the ground; in budding only the tips of the growing branches are pinched off—and right there lies the secret of the universal preference for budding over grafting—for if the bud refuses, as we may say, to suckle its foster mother, the tree is not injured in the least, and, if the season permits, another trial may be made at once; while if the graft fails, the stock has at best been put back a year or two in its growth and indeed may never recover from the shock at all.

The operation of propagating varieties by budding is full of mystery and wonder. We take a tiny bud, not even developed so as to be visible to the eye, but given a growing leaf we know that it conceals this embryo bud at its base. We cut a slit in the bark of a tree, and cutting off this tiny bud slip it into the aperture, and from this invisible germ a great tree in time springs forth, bearing fruit like unto its parent. How is it done? We know that it *is*, just as we know that our hearts beat, our lungs inflate; we can see the outward result, and watch its prog-

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ress, but as to what mysterious inner force is at work to accomplish the marvelous result, who can say?

We know that it is the cambium or proper juice of vegetables that serves as the means of junction between the scion and the stock—this is why they must be of similar nature. Just exactly as in ourselves the two lips of a wound are drawn together by the coagulable lymph which the blood deposits between them, but we do not know how nor by what inner force this result is attained.

Examine carefully the wound of a bud when it has "taken," about two weeks after the operation, and you will observe a thin layer of small, green granulations in the midst of a viscid fluid, and joining the two parts that have thus been successfully brought together. These granulations are the rudiments of vegetable organization, and are deposited by the cambium, soon becoming fully solidified and complete; and wherever there is a wound on a tree you will find this knitting going on, just like the mending of a bone in a human being, provided that the air has been carefully excluded from the wound.

Before entering upon the practical details of the usual methods of budding let us fully understand the several requirements necessary for its successful operation.

First of all, both scion and stock should be in active growth, both should be strong and healthy, as otherwise the value of the future tree would be seriously impaired; the scion should be taken from fully matured shoots of the current year's growth of a bearing tree, and always from the lateral branches, as they, for some unexplained reason, will produce fruit much sooner than a scion from the uppermost branches; also, where it is practicable to place a bud with fruit already growing on it in the stock, fruit will be obtained much sooner than by the simple bud alone. We have just shield-budded a Sicily lemon, with

fruit as large as a walnut on its upper end, and we expect to see that lemon come to perfection in the bosom of its foster mother, and to have brothers and sisters two years hence.

In two weeks after the operation of budding its success or failure will usually be apparent. During this interval, and longer, if the bud "takes," the scion should be partially shaded from the too fierce rays of the sun by a light wrapping of moss, or better still, as it avoids the risk of too much moisture from heavy rains, by a board inclined against the trunk in front of the scion.

Another point, and one not generally known (we have only learned it ourself by personal experience), is this: Always insert your bud on the north or northeast side of the stock; glance at the shadows cast by our hot summer sun during three fourths of the day, and you will see the reason why—the southern and western portions of the stock being all that time exposed to its scorching rays, and insuring the broiling or frying to a brown cinder of your tender scion.

Still another thing to be attended to before beginning the actual operation of budding is the mode of wrapping after the insertion of the scion. Some people give no protection to the bud at all, and these slovenly folks lose three fourths of their work, as they deserve to do; others put a little daub of grafting wax over the edges of the cut, and these scarcely less lazy people lose at least one half of their time and labor, and those scions that do "take" do not grow with half the vigor that they would if properly treated at the outset.

But there are still other persons, wise in their generation, who put faith in those grand old sayings that

> "Whatever 's worth the doing
> Is worth the doing well;"

and "a little trouble in the present saves much trouble in the future;" and these sensible individuals, before proceeding to bud their trees, prepare a quantity of strips of strong muslin or calico, about a quarter of an inch wide, dip them into melted grafting wax, take them out with little sticks and hang them up to dry. They will keep good for years if need be. They are then ready to wrap tightly around the scion after its insertion in the stock, the end and edges are rubbed down firmly with the finger, and kept in position by tying a piece of string around it. By this simple method the scion and stock are held securely in close contact, and air and water are excluded while the process of junction is going on, a necessity, as we have already seen, to its success.

To illustrate the difference between smearing with wax and binding with waxed strips, we quote from a writer in a New York rural publication. He bound a part of his scions with strips and on others used only wax:

"Those wrapped with strips all grew; of the others, about one half grew; also many of the former grew eight feet in one season, the waxed ones, without the strips, not making over half that growth. I claim that there are absolutely many chances in favor of the strips over the other way."

Even in the old method of regular grafting, where the whole top of the tree is cut off, these waxed strips are just as much to be preferred over the wax daubs as in budding. Try it and see, and our word for it you will never again set about this kind of work without plenty of waxed strips at your side.

There is a regular recipe for making the grafting wax most commonly used; it is this: "One part beeswax, one part tallow, two parts rosin; melt together till thoroughly incorporated."

Now, it may be presumptuous in us to meddle with this time-honored recipe, but still we will venture to insinuate, with all due respect, that in our own experience the rosin may, with advantage, either be omitted entirely, or else only half as much be added to the beeswax and tallow instead of double as much. We find that the strips dipped in the latter only are fully as effective and far more agreeable to handle; neither do they, as some claim, become rancid without the rosin.

Lastly, a very sharp-pointed, thin-bladed knife is necessary—and now we are ready to select our scions, which, as we have elsewhere stated, must be taken from, as well as inserted in, a growing plant, or one at least with "loose bark." Considerable judgment must be exercised in this selection, as a "stick" of buds may be either too old or too young. It is too old if the shoot taken be of more than a year's growth; too young if it be not fully matured—the woody parts hardened and the embryo bud developed beneath the axilla of the leaf. It is always best to use the growth of the current season just as soon as this stage of maturity has been reached, and a short experience will enable you to judge accurately when this point has been attained. These remarks apply to all scions, whether orange, lemon, peach, plum, apple, or any other of the great vegetable tribe.

And now, at last, we come to the practical details of the actual art, for it is an art, of budding. There are several modes of introducing the scion to the stock; of these there is one largely practiced, we are sorry to say, that can not be reprehended too severely. A man cuts off a short stick containing two or three buds, shapes one end to a flat point like a pen, then makes a little cut crosswise in the stock, thrusts the "pen bud" down into the slit, and passes on to scar another tree and waste another

bud, boasting of how many he can do in an hour. True, it is a quick way of playing at budding, in one sense; but when, by and by, he comes back again and again to replace dead buds and search for fresh spots on the poor, devoted stock, where its once smooth bark is not all roughened and scarred by old wounds; if then, we repeat, he will only keep count of the time thus occupied after the work should have been completed, and the time lost in the growth of the buds while the season is passing relentlessly on, he will come to the conclusion that a little more time and care in the first place would have been time and trouble saved, and loss of buds and of the growing season saved also. And therefore we would banish the "pen buds" as the resource of lazy, ne'er-do-wells, who will reap as they sow.

The one kind of budding that is pre-eminent over all others for its invariable success, if properly done, is called "shield budding." See that your stock is cleared of all twigs that may interfere with the wrappings; then make a vertical slit about an inch and a half long, any where from four inches to two feet above the ground, then make another cut across at the base, the two cuts presenting the appearance of the letter T reversed thus, ⊥; the cross-cut is often made at the top, but it is not the best way. Now pass the point of your knife, or the flat handle, if it is a regular budding-knife, carefully along the upright cut, slightly raising the edges, giving the knife a certain little twist, easily learned, at the base so as to leave the corners a little turned back like the "dog-ears" of a book. Now take your knife and carefully cut off a bud from your "stick," take as little of the wood as possible, and let the bark extend about half an inch below and above the bud; now take this little strip in your hand and, with the woody side upward, bend the end slightly till the thin layer of

wood remaining separates at the end from the delicate bark, then thrust your thumb nail between the two, and now, holding the bud uppermost so as to keep it straight and unbroken, gently pass your nail along, bending the woody layer downward until it is entirely detached, leaving in your hand a nice, clean strip of bark with the bud intact; if, however, the wood has not parted readily, but has torn the bud or left a little hole in it, be sure that it was not in a fit condition for budding and throw it away.

This may seem a difficult and delicate operation at the first glance; but difficult? no, not after a little practice; delicate? yes; but one can not expect to treat a tender bud roughly and have it live. If you prefer you can omit to remove the woody layer, provided you cut it as thin as possible, but it does not make either so sure a junction or so sightly in the years to come, for, as the alburnum or wood will never unite with the stock, neither be absorbed, there will always be an ugly knot or ridge marking the point of junction between stock and scion, whereas the strip of bark only, unites completely in every part, leaving in after years a smooth, straight trunk, with no unsightly prominence.

And now you are ready to insert the bud, which is to be done upside down, for the same reason that you made the cross-cut at the base of the perpendicular instead of the top, namely, because in this position, as you will see, it sheds rain, and allows no water to lodge and soak in between the bandage and the bud—it is always better to leave the leaf attached to the bud—as this avoids leaving open any channel for air or moisture to penetrate, and, moreover, the sap in the leaf nourishes the bud; but, with or without the leaves, insert your bud upside down; push it gently up from below till the upper end of the cut is reached, be sure that the bud-bark lies smoothly, and that

the lower end does not project below the cross-cut; this accomplished, start the wrapping just below the lower end of the cut, holding the end firmly while you wrap, pulling tightly all the while.

Some employ two wrappings, one above and one below the bud, as it is all important to leave the bud itself—and only the bud—exposed to light and air; but a skillful worker will use only one strip, giving a certain downward slant to the last turn above that will carry it below the bud in front, and then continuing the wrapping until the cut is well covered, tying the strips, as we have already said. In two weeks you will know whether your work has been "for better or for worse;" the former, certainly, if all has been done "decently and in order." The junction always takes place at the top first; therefore, as the edges swell and unite, the top wrapping should be first loosened, say in ten days after the sprout has started, and the lower wraps a week later; it is better to loosen at first than to remove them entirely, as the newly-formed bark needs some protection for a month or two.

Having thus investigated the mysteries of the more popular art of budding, let us next "interview" that which may well be termed its "elder brother."

Far, far back in the olden times, the theory and practice of grafting or multiplying and perpetuating remarkable varieties or monstrosities, by the union of a young shoot from one kind of plant with the stem of another, was almost as well understood as at the present day. It is not an art which admits of much progress or alteration. There is but one means of securing success, and therefore as we graft nowadays so did the ancient Greeks and Jews and Chinese before us. The New Testament refers to the art as practiced by the Jews; Pliny and Virgil tell us that it was familiar to the Greeks; but nowhere can we trace the

first discovery of what, though so common, is one of the most wonderful phenomena of nature. As to the Chinese, the first Roman Catholic missionaries who ventured to penetrate the then mysterious fastnesses of heathenism taught them the art, and so readily did they take up the new idea thus presented to them that very soon they excelled their teachers, just as, at the present day, they surpass all other nations in the practice of curious and unique modes of grafting shoot upon shoot, stem upon stem, until ofttimes six or eight, ten or twelve kinds of fruit (of the same natural family, of course) may be seen borne upon the same tree, all flourishing, all strong and healthful.

There is no one function of the horticulturist more important than this; it accomplishes the propagation of particular varieties more surely and more speedily than is possible by seeds or cuttings or layers, and besides this, is invaluable in hastening and increasing the fruitfulness of fruit trees. Another thing, too, when a root is still vigorous and healthy, but its stems and branches old and weak, a graft or bud near or upon the thrifty root will, in a very short time, replace the worn-out branches with a new, strong healthy growth, into which all the strength of the large root is thrown at once. The stock should always have strong roots; about the graft or scion it does not matter so much, though, of course, it is desirable that it also should be of vigorous habit; but if it is not, a healthy stock will impart to a weak but not diseased scion a large portion of its own thrift and vigor. Grafting should always be performed early in the spring, when the sap is just beginning to circulate; the grafts may be either shoots of the current year's growth, or those of several years back; and herein is one of the most marked differences between grafting and budding, for with the latter the scion must invariably be of the current season's growth,

containing an embryo bud. The stock does not change the species of the scion, but it does very much affect the quality of the fruit. A weakly stock will make small and insipid, a vigorous one large and fine-flavored fruit.

The great art in grafting, and it requires no small degree of skill and care and patience, is to unite exactly the inner bark of the scion with the inner bark of the stock, and thus to keep them in close contact until the union is complete; it is a more troublesome and more uncertain operation than that of budding, besides being more injurious to the stock in case of failure, but it has the one advantage of giving a quicker and larger start to the new tree in the event of success, for, while the budded tree has but one tiny bud to start from, the grafted tree may have one or a dozen whole branches, sometimes even the entire top of a tree.

There are several methods of grafting, and to the details of these we will now proceed:

The most simple, and therefore most commonly successful, is that called "grafting by approach" or "inarching." For large plants it is impracticable, but for smaller plants, one of which at least is in a box or pot, it is invaluable. The two plants, stock and scion, being brought close together, wounds are made upon each part to be grafted exactly corresponding to each other; in other words, plates of bark of equal size are removed, and the new parts thus laid bare are bound together in close contact, with a prepared wrapping which keeps out the air. In one month (not in two weeks as in budding) if the work has been properly done, union between the two will have taken place, and then all that is necessary is to cut loose the scion from its original parent, and bring down its foster mother to the level of the "child of its adoption," when a new plant of the desired kind will be the result, without

injury to that from which it was taken. By this method stems, roots, and branches may be united, and fruit, or even flowers, be grafted upon leaves; in short, "grafting by approach" is grafting *par excellence*, and affords scope for curious experiments, such as we have just indicated; experiments that any skillful and ingenious gardener may vary and multiply indefinitely.

In some cases, while the junction between scion and stock is in progress by this method, the plants are placed in moist hot-houses (not beds), or under bell-glasses, and if an accumulation of too much moisture is carefully guarded against this plan is a good one, as the union takes place more surely and expeditiously. This is the favorite method of grafting in cases where the plants in question, either stock or scion, are too rare and valuable to risk their destruction by ordinary methods in the event of failure to knit.

And next we come to "whip" or "tongue" grafting, usually practiced on small nursery trees. To perform this operation in the most perfect manner, the top of the stock and end of the scion should be of equal diameter, and therefore this kind of grafting, unlike the others, may be done on smaller stocks. Both scion and stock must be cut obliquely as nearly at corresponding angles as it is possible to get them. The best way to secure accuracy in this respect is, first to cut off the stock and then place the extremity of the scion alongside and a little below the oblique cut, to scratch the line of the latter on the scion, and then make a clean, smooth cut along the slope indicated.

Next, the tip of the stock must be cut off horizontally, and a narrow slit made nearly in the center of the sloped face of the stock downward, and another corresponding one in the slope of the scion upward. The tongue or

wedge-like strip, which now passes the upper part of the sloped face of the scion, is next to be slipped downward in the cleft of the stock, the inner bark of both being brought closely together on one side, so as to prevent all chance of slipping out of place in tying, and this tying must be done at once tightly and neatly.

The last-named operation in grafting as in budding is a most important item in the work, and while strips of bast-matting are most commonly used, we can not too highly recommend the employment of strong muslin dipped in equal parts of melted tallow and beeswax. Where these wax strips are not used, however (and sometimes in large stocks even where they are), grafting clay must be employed. There are several ways of preparing it: one is to beat up well together three parts of stiff yellow or blue clay, or clayey loam, with one part of horse dung, and a little chopped hay; another, that chiefly used by the French and Dutch, is to mix one half fresh cow dung with one half loam. But whether waxed strips, bast-matting, or grafting clay are used, every part of the wounds of stock and scion must be well and thoroughly covered, as the whole end and purpose of both clay and strips is to prevent air, rain, and light from penetrating to the wounded parts.

The French method of grafting differs from ours, which is copied from the English, inasmuch as, no matter how large the stock may be, they never cut off more than the width of the scion; and as their nation excels the English as gardeners, it would, we think, be well to take the hint thus thrown out. A true-born Johnny Bull scorns to accept a lesson from the despised and hated Johnny Crapaud, but not so his old-time friend and ally, Uncle Sam; so let us, Uncle Sam's children, take heed and profit.

And, in point of fact, it would seem useless as well as hurtful to inflict a larger wound than necessary upon the

stock, thus giving it more work to do to heal over its cuts just at the time when its full energies are needed in the proper sustenance of its foster child; and therefore we would advise the adoption of the French method, and the cutting away of the major part of the stock after the graft has taken firm hold, not before.

"Cleft" grafting is next in order. Here the head of the branch or stock is cut off obliquely, and then the sloped part cut horizontally to its middle; then, with a sharp knife or chisel, which latter is best, a cleft two inches deep is made in the crown downward, at right angles to the sloped part. Be very careful here not to injure the pith, or yours is "love's labor lost." Leave the knife or chisel placed horizontally in the base of the cleft to keep it open, and take up your scion; now with a sharp knife cut its extremity for an inch and a half in the shape of a wedge, leaving it about an eighth of an inch thicker on the outer or bark side, and bringing it to a finer edge on the inner side; and now you are all ready to slip your scion down into the cleft as deep as the wedge you have cut—one and a half inches—this done, with the thicker or bark edge placed very carefully even with the inner bark of the stock, draw out your knife from the cleft below it, and you will be surprised to see how closely and firmly the scion is held. Two or three scions may be inserted in this way into the same stock in separate clefts, the whole being tightly wrapped and closed up.

"Crown" grafting is employed chiefly on thick stocks, long branches shortened, or headed-down trees, and as many as a dozen scions may be used if desired. First you saw off the head of stock or branch as level as may be and pare off the surface smooth; then cut one side of your scions flat and sloping, one and a half inches long, making a little horizontal cut or shoulder at the top to rest on the

crown of the stock. Your scions ready, slip a thin blade or the ivory handle of a budding-knife about two inches downward, between the bark and wood at the top of the stock, pass it gently around the latter, withdraw it and thrust in its place your scions, one after the other, their number being limited, if you like, only by the size of the stock, till they stand up like a crown around the top of the stake, their little shoulders resting on the level surface for support. And now the inevitable wrapping and the operation is completed, "for better or for worse," as a month will tell.

Yet another method of grafting is there, termed "side grafting." This is often also called "tongue grafting," and differs only from "whip" or "tongue grafting" proper in being performed on the side of a tree instead of on the top of a cut down stock. Where a valuable tree has lost a branch from any cause, as often happens, and an ugly lopsided appearance is the result, "side grafting" is resorted to to supply the deficiency. Having selected the spot where you wish a new branch, you pare off the bark and a little of the wood, cut the scions to fit as nearly as possible, and wrap them closely together.

In all these various modes of grafting, while their success or failure will be evident within a month by the aspect of the buds on the scion, yet it is not safe, if good fortune has attended your efforts, to remove the wrapping or clay for at least three months, until the graft be completely healed over, and even then the removal should be gradual. In some cases, to be determined by the judgment of the operator, a ligature around the graft, or a stake to which the young shoots of the scion should be tied, may be advisable for a year or more, and often a bandage of moss wrapped lightly around the point of junction will be of great advantage in retaining moisture and warding off the

hot rays of the sun until the wounds are completely healed over.

There is still one more mode of grafting which may aptly be termed a "cross" between it and budding. This is called "flute or ring grafting," and consists in taking a ring of bark, with several buds on it, cutting away a corresponding ring from its stock and putting in its place the scion ring, so that the edges of the bark equally join. This must be done in the spring, when the bark parts most readily, and is the surest of all modes of grafting because it so nearly approaches budding pure and simple. Care must be taken, however, not to encircle the tree completely in cutting the scion or stock, as this would girdle it and check its growth, or perhaps even result in its death.

In grafting it is always better to take the scion from the lateral branches, because more fruitful, and also to remove them from the tree an hour or two before using, that the sap may partly dry out, leaving place for the sap from the stock to enter more freely.

CHAPTER V.

WHERE TO PLANT.

And now, having brought up our young trees to a point where they are ready for setting out, let us consider the best location for their permanent home, where their life work may be most perfectly accomplished.

At the very outset it becomes a mooted question whether to locate the grove in pine land or hammock. Some growers advocate the one, some the other; but the fact is, that as time rolls on and brings further experience in this new calling of orange culture, the friends of the pine land groves are becoming more and more numerous.

Until very recently there was one point on which both cliques were in accord, and this was that the orange tree would not flourish on low lands, but that a high, dry location was imperative. But now several well-known reliable growers have come to the front to prove that orange trees will do, have done, and are doing well on low hammock and on low flat woods; that they grow as thrifty, bear as profusely, and their fruit stands shipping as well as though the trees were set on the high lands.

One of these growers, Mr. E. H. Hart, of Federal Point, Florida, gives it as his opinion, based on the experience of many years, that "the crusade against low lands for the orange is an arrant humbug that ought to have been exploded long ago. It has been kept up chiefly by those having high lands to sell, and by persons who, living upon land of a different character, knew no better." The gentleman referred to has for fourteen years successfully raised and cultivated a large grove on just such land as has been condemned heretofore as absolutely worthless for orange

culture, flat pine woods, with clay and hard-pan only eighteen inches from the surface.

In very rainy weather the soil becomes so saturated with water that it fills up and runs over into the furrows and ditches prepared to carry off the surplus moisture; yet in defiance of this and of the "croakers" who declared the trees would die as soon as their tap-roots reached the hard-pan, Mr. Hart's grove is to-day one of the finest in the State, although, as he says, "on several occasions the river (St. John's) rose to an unusual height, and stood for several weeks a foot or more deep in the lower parts of my grove, the higher ground being also completely soaked by reason of no drainage. So far from suffering injury, the trees appeared rather benefited by the irrigation." Also this same orange grower, having ditched his grove afterward, decided that a simple, shallow furrow was all that was needful.

In Sardinia there is a famous grove, a square mile in extent, where a stream of water running through the center is employed to lay the whole grove under water every two weeks, all through the summer.

Now, here are well-authenticated instances going to prove that the orange is more "given to drink" than used to be believed, and that it will grow on low lands if properly looked after; and by "properly" we mean that, in planting, the trees should be set a little higher than the surrounding land, and that shallow ditches or furrows, a hundred feet apart, should be run through the grove. Therefore, while we would not advise the settler to select "flat woods" for a grove, other things being equal, yet if such lands offer decided advantages as to price, location as to transit lines, society and health, over other lands offered in the desired vicinity, we would say, "take them, set your trees high, furrow your grove to lead off superfluous water,

put out a few *Eucalyptus globulus* trees here and there, and have no fears of the result."

The orange tree is a good deal of a cosmopolitan, and will flourish in a variety of soils; in clay, sand, shell, or loam; in low or high hammocks; in pine land or black-jack lands. Very much depends on the treatment it receives, but when it is as easy to obtain pine land or high hammock, they are to be preferred, as giving equal or even better results than the others with less labor.

Given two tracts of land, one hammock, the other good pine, at equal cost, and equal advantages in all other respects, many would doubtless select the former. But we, with the experience gained by eight years' residence in Florida, would select the pine land for a permanently satisfactory grove.

Undoubtedly the hammocks are the richest lands at the start, but their fertility is deceptive, that is, it is not lasting; trees and vegetables grow finely for several years, but the fertility given to the soil by the once falling leaves of the deciduous undergrowth (cut away to make room for cultivation) is soon exhausted, and after that every year increases the need of fertilizers in the hammock groves. But with pine lands it is just the reverse, they are poorer at the outset, but improve steadily with each year's cultivation.

Pine land, with clay subsoil, is rapidly coming more and more into favor as the best possible basis to work upon; it has "bottom" on which one can depend to retain all surplus fertilizers until the trees can utilize them. When you can find clay subsoil any where from two to six feet from the surface, there be not afraid to locate your grove.

It is not always safe to depend on surface indications, or the reports of others; the most trustworthy plan is to take a spade yourself and dig here and there on the land

you propose to use for your grove, and thus avoid the possible application of the fable of "The Lark and Her Young Ones."

We have never yet met an orange grower whose trees were located on good pine, with clay a few feet below the surface, who was not thoroughly satisfied with the progress of his grove. Then the hammock land is much more expensive than the pine; when the latter can be had of the best quality from ten to twenty dollars an acre, the former is held from fifty to seventy-five, or even a hundred dollars.

The expense of clearing the land preparatory to cultivation must also be taken into account. The hammock land is full of underbrush, young trees, roots, vines, and palmetto; all these must not only be cut down, and either be burned or piled up to decay, and furnish by and by nourishing food for the future grove, but the numberless roots must also be grubbed up at no light expenditure of time and money; time, if the settler is a strong man, able and willing to work; money, if he has to hire the clearing done for him.

It does not cost less than forty or fifty dollars to clear an acre of hammock land as it should be cleared, and for a year or two afterward the fight against the upspringing roots must be waged unceasingly, or the clearing will go back to its original state, and all the time and money already expended be thrown away.

In clearing a piece of hammock for a grove it is only the undergrowth that should be got rid of entirely; nearly all, if not quite all, of the grand old live-oak trees should be left standing to flourish as of old, before civilization had dreamed of intruding upon their time-honored domains. This is a very important point in the well-being of the grove, especially in one formed by budding a former "wild grove."

It should be remembered that these trees have grown up from earliest infancy to maturity beneath the protecting shelter of these giant oaks, whose wide-stretching arms, heavily draped with moss, ward off the high winds, frosts, and the fierce heat of the mid-day sun; alter these conditions by cutting down all the protecting oaks, the "Orange Guard" they may well be called, and you at once give the trees it is your interest to care for, such a shock as they will never recover from, and expose them to hardships such as they never encountered before. The thriftiest young groves in the State have been grown under just such shelter as the great oaks delight to bestow upon them.

The value of these "Orange Guards" was thoroughly demonstrated two years ago, when groves supposed to be too far south or too well shielded by water protection to be imperilled by frost were severely damaged, and some of the trees killed to the ground by a sudden nocturnal visit from erratic "Jack Frost."

These groves were not sheltered by overhanging trees; but further north by many miles was a far-famed grove on Orange Lake that was thus guarded, and adjoining it another wherein all the trees had been cut down. When that disastrous frost came, the latter grove looked as if a fire had swept through it, the trees being stripped of their leaves, and thousands of dollars' worth of fruit lying under them; while the former was totally uninjured, its leaves as green as in midsummer, its fruit untouched. The owner of the unsheltered grove now declares that he would gladly give twenty thousand dollars for a few of the stately forest trees that once sheltered his domesticated wild grove.

We have said enough to demonstrate the importance of this point, so will pass on to the consideration of pine land suitable for orange culture.

The growth of timber on these lands is, as its name denotes, chiefly pine, with here and there small oaks, shrubs, wild persimmons, hickory, and a few other trees, sometimes solitary, but more frequently in groups; and where the latter occurs it is called "scrub hammock." The rule is, that where tall, straight pine trees are found, large in size, and about seventy to the acre, and no undergrowth, except the wire-grass may be so termed, the land is first-class; where the small oak trees are scattered thinly about, it is second class, and where these oaks surpass the pines in number it is less desirable, being inferior to the others. There is something to be said, however, even for this; it is very poor at first, it is true, but it responds quickly to fertilizers, and even the poorest of it can be brought to a high degree of cultivation, and thereafter continually improves year by year.

There is only one way of clearing hammock land, and that we have mentioned; there are, however, several ways of preparing pine land for a grove. One way is to girdle the trees, which deadens them and puts an immediate stop to the great drain of their wide-spreading roots upon the plant-food lying latent in the ground. The trees thus girdled are left standing, and then the land is ready for fencing and plowing: but in a few months the dead limbs begin to fall, and so continue for several years, and the branches must either be carried away from time to time, or else allowed to remain where they fall to be an eye-sore and a constant annoyance in cultivation.

The first cost of this method of clearing is very little, only about two dollars per acre or less, but it is a very unsatisfactory way, and likely to cost more in the end than it saved in the beginning.

After a few years' time, when the orange grove is fully under way, the deadened trees will begin to fall during

a heavy rain or a high wind, or frequently without these provocations; down they crash, now here, now there, and as they are not remarkable for good judgment, they are just as likely as not to come down on an orange tree and put it beyond the pale of recognition. And then the fallen giant must be chopped up and either hauled away or burned, the expense and trouble of doing which are now just as great as they would have been at first, plus the loss of some of your best orange trees.

The claim made that the dropping branches, bark, and sap of the pine trees left to decay on the ground furnish a valuable fertilizer is a specious one; and even if one is willing to have his grove strewn over with branches that trip up his horse and interfere with the plow, the amount of gain to the soil is so small that a few cart loads of rotten sap and grass hauled from outside and spread around the orange trees would far surpass it. Altogether we can not recommend this method, for we do not think the gain, even considering the small first cost, at all commensurate with the "after-claps" of the falling pines, crushed and ruined orange trees, the inevitable final clearing up of trash, and last, not least, the certain introduction of the destructive wood-lice among the orange trees.

Another and better way is to hew down the trees, have rails split from all that are suitable for the purpose, then pile and burn the remnants; this method costs for the clearing from twelve to eighteen dollars an acre, according to the number of trees to be disposed of, and the amount of "small deer" in the shape of small bushes and young oaks to be grubbed up by the roots.

But then the stumps of the pine trees remain in the ground, and it is a sad mistake to leave them there, as so many do; they are not only a constant eye-sore (that is the least of the objections), but no matter how often and

how carefully the land is cultivated, these stumps scattered all over it will harbor ants and weeds, especially that curse of a cultivated field in the South called "maiden cane" grass, which it is almost impossible to eradicate; once it is established, its roots run down to a depth of several feet, and every joint makes a new plant. For this enemy the pine stumps afford first-class rallying points; it is simply impossible to destroy it in a field where they are. And even if the maiden cane can be kept at bay, as the orange trees grow larger the pine stumps encroach upon the space they require, and by this time, when it is at last deemed advisable to get rid of them, fully one half will have to be chopped out laboriously, because the orange trees near them would be injured if they were burned out. Better, by far, burn them out in the first place, and have your land smooth and clean, and no broken or crooked lines among your orange rows because of stumps interfering with setting them out in their proper places. It will cost you fifteen or twenty cents apiece to do this, but it is cheaper in the end.

A still better method, because cheaper and just as effective, is one that is more rarely practiced than the other two, only because it is newer and not generally known as yet in Florida. This is to dig a hole quite deep against one side of the pine tree, cutting off the large roots there and laying bare the tap-root, and then build a fire in the hole beneath and against the tree; by keeping the fire constantly smoldering, and in contact with the tap-root, the latter is burned off, and the tree, having thus lost its balance, topples over and comes crashing to the ground all at one time, and it only remains to burn the tree, fill up the hole, and the land is clear and smooth, ready for the plow for all time to come; no falling branches or trees, no weed-gathering stumps. This method of clearing costs

from twenty to thirty dollars an acre, not so much indeed as first cutting and burning the trees, and then having the stumps burned out.

The land cleared, plowing is next in order; this can be done at an expense of three dollars an acre, not a high charge for breaking new land, as it is no easy or quick work even in our light Florida soil.

Rails for fencing are split from the pine trees at a cost of a dollar a hundred, and it is well to have them split before the trees are burned, as among those cut down, would be many suitable for the purpose. Hauling the rails and building the fence (Virginia worm-fence is the rule) will cost fifty cents a hundred; the total cost of inclosing one acre, eleven hundred rails, will amount to sixteen dollars and fifty cents; five acres, between forty and fifty dollars.

But however much or little the land may be cleared for a grove, or whether pine or hammock be selected, it should invariably be located near some assured and permanent transportation facilities, either in the present or the near future, when the grove will have "come into profit."

When groves are twenty or more miles from an outlet (and some very fine groves are thus situated), the hauling by wagon is expensive and tedious, and the cause of great loss, by bruising the fruit so as to render it unfit for market. Also do not go too far north in the State, thinking that all places are equally favored for orange culture; it is best not to venture beyond the thirtieth degree.

A good deal has been said and written about water protection, and there is no doubt that a location near to and south or west of one of our large lakes, or a cluster of small ones, is desirable. But the vicinity of the water does not always ward off frost; it all depends upon how the frost approaches. A warm vapor always hangs over a large body of water, and if a cold north or northwest

wind comes rushing across the placid bosom of the lake, it has force sufficient to carry this warm vapor on with it, and by the time the south shore is reached the captive air has raised the temperature of its captor by several degrees, so that its frosty quality is lost. But if the cold wave comes quietly and by stealth, as it were, and creeps slowly over the water it chills the warm vapor, and so reaches the south as cold as when it left the north shore.

Besides this it has been clearly proved that frost, like wind storms, travels in streaks, often with clearly defined margins, so that a grove that may escape one frost may be touched by another less severe, apparently "without rhyme or reason."

And so, after all, the best protection a grove can have is from a belt of timber land, either inclosing it entirely, or else guarding it on the north or west, since these are the quarters whence come the highest and coldest winds. This is a shield that can happily be obtained in almost any locality in Florida, for nearly every settler takes his land at first or second hand, and forest land still predominates throughout the State; nowhere do we find immense contiguous tracts of land all cleared and under tillage as in the older settled States.

CHAPTER VI.

BUDDED TREES OR SEEDLINGS?

The former most emphatically.

Time was, and that only a few years ago too, when the majority of growers favored the seedling tree, because it was said to grow larger, fruit more prolifically, and bear longer than the budded tree. But the tide of opinion has decidedly veered around nowadays, as a greater degree of experience is gained and fuller scientific investigation brought to bear on the mooted question.

Thomas Meechan, editor of the *Gardener's Monthly and Horticulturist*, of Philadelphia, who is one of the recognized authorities on horticultural matters in the United States, tells us most decidedly that budding orange trees does not dwarf them in the least, unless a dwarf scion is used; and this opinion, coming from such a source, should carry conviction with it, even if there were no other available testimony, of which, however, there is plenty. It is impossible to understand the foundation upon which the theory has been based, that by budding we sacrifice size of tree and quality of fruit, for certainly experience does not demonstrate either of these charges. In the first place budding orange trees is comparatively a new thing with us all, while seedling trees date back for many years. Where a fair comparison between the trees is attainable it is proved that the budded trees are fully as large as the seedlings of the same age.

There is one thing that has probably misled many superficial observers in this connection, and that is that trees that bear early and continuously, as budded

trees do bear, do not increase so rapidly in wood, year by year, as where the tree's whole energy is devoted to making wood, but where the budded tree has become as large as a seedling bearing tree, it will be seen that the after-growth of the budded tree surpasses that of the seedling.

Captain Burnham, of Indian River, tells us that his trees are nearly all budded except a few seedlings scattered here and there in his grove, and these latter are decidedly smaller and less thrifty trees, though of the same age. In fact, the further one goes into the subject the more majestically does the once maligned budded tree loom up and the seedling retire into the background, to be brought forward again simply as stock, in which character we have no word to say against it.

Seedlings *versus* budded trees? Why, the seedling has no case at all. It has been proven that it does not grow larger or bear more fruit than the budded tree, and, when we look at the question financially, its case is more hopeless than ever.

Why is it that we dig and delve and toil to make an orange grove? Truly, that it may return our labor in good solid coin, and that, as soon as may be.

Did any one ever hear of a tree budded from a bearing one that did not fruit until it was eight, ten, twenty years from the bud? Yet the two first dates named are those the seedlings usually attain before they bear at all, while it is not uncommon for them to reach the age of fifteen and twenty years before bearing a single orange, and sometimes they are forever barren. Very few settlers there are, even with very limited means, who could not struggle along somehow if their trees could be made to yield a small return in four or five years, but who, if compelled to wait a return for ten or twelve years would fall down worsted in

the fight and suffer a financial shipwreck. In short, as a well-known orange grower emphatically asserts:

"It is universally recognized that budding shortens the period before fruiting. Is not this, then, a strong reason financially why we should adopt the budded system? My own experience teaches me the necessity of budding. I can see no dwarfing tendency or results; on the contrary, my budded trees are larger than seedlings of the same age, and the fruit is certainly as good. I have not been able to see that the production is fewer in numbers. I therefore give my unqualified opinion that it will not only pay to bud the orange tree, but that as intelligent men we can not afford to do otherwise."

There is also another strong argument in favor of budded trees that we have not yet touched on. Years of experience have taught every horticulturist that the attempt to produce certain varieties of fruit from seed almost invariably results in failure. The seed either produces an inferior fruit or an entirely new variety, which is likely to be poorer rather than better than that which produced the seed, and before any result can be attained years of care and waiting must elapse. Every grower who has carefully observed the fruit produced by the various trees in a seedling grove can not have failed to notice a great difference therein. Let the seeds that produced these trees be ever so carefully selected, some of the trees will produce better oranges than others with the same care and treatment.

Now this is not the case with budded trees. From the moment the first tiny little leaf starts out, the germ of the future tree, its destined work is marked out and known. If a bud from a bearing Mediterranean Sweet, Navel, Homosassa, or Mandarin is used, then we know what the budded tree will bear, and thus we not only secure beyond

doubt a fine variety of fruit, but the identical variety we have selected as preferable. Surely this one advantage alone should be sufficient to tip the scale in favor of the budded tree. It is no slight thing to know for a certainty that, after several years' expenditure of care, money, and patience, we have secured the most desirable varieties of fruit.

Not many years since the sour orange was the favorite for budding stock; of late, however, the scarcity of this tree has led to experiments which tend to prove that there are several kinds of stock to be preferred to the sour orange.

There are several strong objections to this wild stock from the hammocks. First—and this is a very important matter—it is almost impossible to secure a sufficient quantity of roots in comparison to the size of the trunk; again, they have grown up from seed to maturity in rich land, protected from sun and wind by the dense foliage around them, and when they are transplanted to a grove they suffer from change of habit. If they live at all their growth is feeble and sickly. They will put out, perhaps, a few sprouts, and then stand still for months or even years, the vitality of the trunk being exhausted, and the roots not having sufficient life to supply further nutriment.

As an example we give an instance of our own personal experience: Five years ago we set out a grove of sour stocks, taken from the hammock—to be budded in due time—on pine land, at an expense of one dollar each. A few of the transplanted stumps died almost immediately. The others lingered on, just alive, most of them too feeble to take a bud. After two years of lost time and patience, the majority were pulled up and thrown away, to be replaced by thrifty budded trees from the nursery. This

year still more have been dug out in disgrace, while the few stumps that nourished their foster children, the sweet buds, are only now, after four years, beginning to make a respectable growth. Had these sour stumps been stock of the proper kind they would have grown right along and accepted the bud in due time. The grove then set out would now have been a bearing one, beginning to pay back the money, care, and time expended on it. As it is, four years are totally lost. So much for setting out the wrong kind of stock.

The stocks that are now coming into competition with the once universal sour orange are lemon, lime, grape fruit, and the sweet seedling. The three former are stronger growing trees than the latter, but this also is as thrifty as need be, and is becoming a great favorite with many growers.

One of Florida's foremost nurserymen, Mr. A. J. Beach, of Palatka, takes a decided stand in favor of the sweet seedling for stock, especially because, in the event of a frost severe enough to kill orange trees to the ground, the sweet seedling sprouting from the ground would still bear a sweet orange without requiring to be again budded; supposing, of course, that its roots had attained a bearing age.

But what then? The fruit would still be only a seedling orange of no special variety, and more likely poor than good; so that budding would be just as desirable for the same reasons as it was at first. Consequently, while we acknowledge the sweet seedling to be good stock, we can not admit that it would not require re-budding, the same as any other, in the event of its being killed to the ground.

In consequence, the sweet seedling is preferred to any other stock, it having been shown by various experiments

that it is the safest for the orange and lemon buds. Its roots are large, strong, and healthy, and intended by nature to minister to the needs of a large, majestic tree. It is rarely affected by the gum or any other root disease, and both orange and lemon buds have a close and strong affinity for this stock.

The lemon also does well as stock for the orange, although some claim that here, as well as with the lime and citron, the stock exercises an influence upon the fruit, and it is apt to be coarse flavored, with a pungent, acid flavor. These same growers admit, however, that the sweet orange raised on lime, grape fruit, and lemon stock, is of larger size and in greater quantity than that raised from the orange stock.

Of all the citrus stocks named the citron enjoys the least favor, and we think deservedly so.

The lemon seedling is a good thrifty grower, but will not thrive in so great a diversity of soil and situation as the others.

The lime makes a strong, rapid stock, and will flourish with less care and in poorer soil than any of the others. Owing to its rather dwarfish habit it would be better to bud it with one of the half-dwarf varieties of the orange—such as the St. Michael or the Mandarin—thus avoiding the danger of the top outgrowing the trunk.

The size and quantity of fruit borne on lime and lemon stock is largely increased over the original, but it is claimed by some that the quality is rather deteriorated. As, however, it has been proven by our most eminent botanists that the stock does not in any way influence the character of the fruit borne by the scion, except in so far as a thrifty stock makes a thrifty tree, and *vice versa*, we can not but believe the asserted effect of the lime and lemon on the orange to be fanciful, not sustained by fact.

It must, however, be borne in mind that these two, the lemon and lime, are more easily affected by cold than orange or grape fruit, and hence are not safe stock in localities exposed to frequent frosts.

The grape fruit germinates as readily from the seed as the sour orange, and grows off as vigorously from the very first. It is as hardy as the sweet orange, is less subject to disease, and makes an excellent stock for the latter. Personally, we prefer it to any other.

In budding one's own nursery-raised seedlings, no matter what the stock may be, it is best to bud them in the nursery when the stock is one year old; then, as soon as the bud shows it has taken, take up the trees carefully and set them out in the grove, where they are to remain, for when you have your trees at hand it is better to set them out as young as possible while the roots are so small that it is easy to take them up without losing any, and thereby giving the tree a set-back.

Do not cut back entirely until the transplanted tree has had time to grow. If all the trees in the nursery are not needed for budding at the same time, it is a good plan to bud alternate trees. Those that remain will have a space of two feet in which to grow another year, or the space thus left vacant may be filled in again with fresh stock from the seed-bed.

In buying from the nurseries, and this we would advise all to do who have not their own nursery, it is best to purchase stock three years old and one year bud. These trees are of a size that renders them easy to handle and set out, and they grow off finely, being neither old enough to lose many rootlets in the process of transfer, nor too young to bear a temporary cessation of growth.

Trees such as these, of the best varieties grown, are to

be had at fifty dollars per hundred; trees of two years' bud, with stock of four or five years' growth, at seventy-five dollars; and a still larger size at one dollar each. When the sweet seedling is purchased for setting out in a grove, it should be not under three nor over five years for the best result to be obtained.

Setting them out from your home nursery, it is better to put them out just as soon as they are a year old, putting stakes to protect them from the plow and cultivator until they are large enough to take care of themselves. This precaution is, of course, necessary with the young budded trees as well; and it is especially needful to tie the bud to a stake, lest a high wind should wrench loose its as yet tender hold upon its foster mother; many are the promising young trees thus lost, from sheer carelessness.

CHAPTER VII.

HOW TO PLANT.

The last thing, before you are ready to set out your grove, is to have the ground thoroughly plowed. This should not be the first time, however, for it is not well to plant trees in freshly plowed land, as the soil is always more or less sour, and needs sun and air to sweeten it. If it is practicable to break up the land for the future grove several months before setting out the trees, and to plant and turn under a crop of cow-peas with or even without a light sprinkling of lime, so much the better, although this is not absolutely necessary. The ground thus prepared, the next thing in order is to lay it out in grove form.

Supposing that your fences lie at right angles with each other, as they should do, this will not be a very difficult matter; measuring the distance you wish the first row to be from a parallel fence, first at one end and then at the other of the proposed line, stretch a rope (or wire preferred) from a stake driven down at the point of measurement at one end and to its corresponding stake at the other. Before this is done, however, tags at the desired distance apart should have been tied to rope or wire in such manner as to preclude their slipping out of place. Now, keeping your measuring cord tight, drive down a stake at each of these tags; these mark the position of the tap-root of the tree. Now, whatever space you have chosen for your trees to set apart, as just staked out, whether twenty, twenty-five, or thirty feet, measure this distance at a right angle for your first row at each end, remove your measuring line to these new points of depart-

ure, and drive down your stakes to mark the tags as before; this gives the second row of trees. By adopting this simple and easy mode of measurement, crooked and irregular rows are avoided, and the grove thus laid out will present a regular and pleasing effect to the eye, and be much more easily cultivated than one whose trees are set here and there, irregular in distance and in line. The plow or cultivator can run much closer to trees that are set in a straight line, and very little work is left to be done by the hoe.

There is great diversity of opinion as to the proper distance to set apart orange trees, and yet it is a question of vital importance. We do not set out our groves for ourselves alone, but for our posterity also, for generations to come. We should, therefore, bring our best judgment to bear upon a permanent arrangement for the position of the trees. He who successfully brings to maturity a grove of orange or lemon trees is preparing a noble heritage for his heirs, and his work should be well and carefully done.

The trees look small and puny when first set out, but do not forget that they are put there to stay, and that for years to come they will continue to increase constantly in size, until by and by the day will come when each of those trees will be forty or fifty feet high, with a trunk which two men with outstretched arms can not entirely encircle, and with a fruitage of from five to ten thousand oranges. It seems incredible, does it not, that these little trees, many of them no thicker than your finger, should ever attain such a size? Yet others have done it, and these will do it in time; not in ours, perhaps, but in that of our children and children's children.

If the trees are planted too close the grove will be dwarfed and almost wrecked, as the years roll on, until some day it will become imperative to remove a part of

the trees, and unless this is done with regularity and the alternate trees taken out the effect will not be satisfactory, and the whole symmetry of the grove destroyed, to say nothing of the loss of half the fruit for many years.

There are two budded groves, not a mile from the writer at this present moment, where ten or twelve years ago little trees were set out fifteen feet apart. To-day, many large bearing trees have had to be removed from one of these, and their profit lost for years to come, while in the other the sun never reaches the ground, and rain, only as it drops from and through the branches that closely interlock and dwarf each other. Until the alternate trees in this grove are removed it will never do half as well as if the trees had at first been placed at a proper distance apart. It will not be long before the owner will be compelled to thin out his trees.

Another grove, too, we know of, where the wild trees, budded where they stood twelve years ago, are now crowding each other to such an extent that the owners are about to remove a large number, although doing so will entail a loss of several hundred boxes for several years to come.

Now, these are things that "try men's souls," yet they have to be done sooner or later when the grove is originally set too close; hence the importance of judicious spacing when first planting. There are still a few growers who recommend planting in squares of fifteen or eighteen feet, but many have gone to the other extreme, and advocate squares of thirty-five or even forty feet. The great majority, however, have paused half way, and consider from twenty-five to thirty feet the best spacing for the orange or lemon grove, and undoubtedly they are in the right. Such a distance apart gives the trees ample room to spread, and yet wastes neither land nor labor. Where

there is or is likely to be superabundant moisture, plant the trees thirty feet apart, to give the sun a better chance to reach the ground. On high lands set your trees at twenty-five feet.

And now, the ground prepared and spaced off, you are ready to dig your holes. The depth and diameter of these will depend on the size of your trees. Give plenty of room, and do not crowd the roots or curl them up. Throw the top soil to one side, the subsoil to the other; if you have well-rotted stable manure, compost, muck, or commercial fertilizer ready, mix it sparingly, half with the subsoil half with the top; but this is not necessary.

The removal of the tree from the nursery to the grove is not the simple thing many conceive it to be—that is, if it be properly done. Let your trees be improperly handled while being dug and set out, and if they grow at all it will be a sickly, stunted growth, that will be a perpetual reminder to their owners of the old and truthful adage, "Whatever is worth doing is worth doing well."

The work of taking up and transplanting trees whose roots are chiefly fibrous, like those of the citrus family, is one requiring time, care, and patience. Don't try to do too much at one time or you will repent it.

In digging trees preserve every root and rootlet that is possible. If they are to be carried to any distance or kept for several days out of the ground, it will pay well to puddle the roots—in other words, dip them in a paste made of clay and sand, made just thin enough to let the finest rootlets be plunged in it without breaking, and yet thick enough to cling to them like a close-fitting garment. Roots thus protected, put away in a shady place, and watered so that they do not get dry, will keep in good order for two or three days. Under no circumstances must the tender rootlets of the citrus family be permitted

to dry off during the interval between digging and planting, for, being evergreens, they dry off very quickly, and will never revive again. Never let the sun touch them.

In packing for shipment the roots should be thoroughly enveloped in moss, straw, or grass, very slightly dampened; more trees are lost in transportation, through rotting and over-heating, than by being too dry; in conveying them in wagons, even a short distance, damp Florida moss should be thrown over them. Take them from under this shelter, one by one, as you are ready to plant them, never drop them ahead of the workmen.

The soil should be damp, both when the trees are taken from the nursery and when they are set out. Place the roots in water for twelve hours before planting, and use water freely when setting them out. In planting, the bottom of the hole should be slightly raised in the center, sloping downward toward the sides; then, with a small spade or a pointed stick, make a hole in the middle of the mound for the tap-root; and just here is an important item. The tap-root—it does no harm if it is cut partially away—should rest in the hole thus prepared for it, *to such a depth as will bring the top lateral roots of the tree about an inch above the ground after the soil is all filled in around the tree.*

Too much caution can not be exercised about this, for if the tree is set too deep it will be a long while, perhaps years, before it will flourish, for it will be compelled to send out fresh surface roots to take the place of those smothered from the air and warmth by too deep planting.

Remember that freshly plowed land is always raised several inches above its general level, and also that trees always settle after being planted from one to two inches, according to their weight. Therefore, let the upper roots, where they stand out from the stem, be in full view after your work is done, then you are assured it is well done.

Before the tree is placed in the hole trim off with a sharp knife all the bruised or broken roots, and cut back the tree severely, allowing a few, but only a few, leaves to remain; then push the tap-root down into the hole prepared for it, pack the top earth you have thrown out around it, spread out the lower layer of the lateral and fibrous roots, holding out of the way the upper roots, pack down the soil firmly on them with your hands, spread out the upper layers and pack the earth firmly on them with your feet, then pour on a half pail of water, when that has had time to settle spread the sub-soil around the tree and level off the ground, and that completes the operation.

A day or two after the trees are set out examine them and see if any of them need straightening, also if any of the holes need more filling. Trees, if possible, should be pruned a week or two before removal from the nursery to enable them to recover from the shock that is always attendant upon severe pruning. For at least several months after planting the trees should be mulched, in order to prevent the possibility of the upper rootlets becoming dry before they have had time to establish themselves in their new quarters.

We may have seemed tedious and unnecessarily minute in treating of this matter of "how to plant," but the experience of all orange growers teaches that the most critical period in the life of the tree is that in which it is moved from the nursery to the grove, and in the manner in which that is done depends its after career for better or worse; it is the corner-stone of the future grove.

The following table will be found convenient for reference in laying out a grove and in ordering trees:

NUMBER OF TREES IN SQUARES PER ACRE.

20 x 20 feet.....	108 trees.	30 x 30 feet.....	48 trees.
25 x 25 "	70 "	35 x 35 "	35 "

CHAPTER VIII.

HOW TO CULTIVATE.

Under this heading we come to the most vexed question among the many that perplex the orange grower. Doubtless twenty years ago, before orange culture became an established industry, the few men who counted a small number of these trees among their possessions deemed that they knew all about their culture. But nowadays the orange grower is feign to confess that there is much yet to learn in his business, that time and experience are still required before the best results can be certainly obtained.

One lesson at least has been brought home to every orange grower, and it is one that all new-comers should heed, since second-hand experience is cheaper than that paid for out of one's own pocket, and this is, that when an orange grove is the Alpha and Omega, the sinew and backbone of a Florida home, it must be treated as such.

Who would think of embarking in any commercial business, stocking one's store, for instance, and then going off here and there, leaving the business to take care of itself, and the stock at the mercy of thieves? Yet such a course would be quite as sensible as that pursued by those who set out an orange grove and then leave it uncared for, save, perhaps, by a semi-occasional plowing, which is given more in the interest of corn, cow-peas, or some such crop planted among the trees, than in that of the latter themselves.

Those who have bought their experience personally have waked up by and by to the fact that all the time spent in waiting for the trees to take a start, while being treated in this shabby manner, is just so much time lost.

The orange will bear a great deal of harsh treatment and neglect without actually dying, but it will not thrive nor come quickly into profit, unless it is carefully tended and nurtured, just as one would look after any other business that he expected to be profitable, or to become his future support.

But, as we have just said, how best to accomplish this desirable result is a much vexed question, for the calling, being a comparatively new one, there are almost as many systems put forward as there are orange growers, and between them all the new-comer can not but become bewildered and confused. A great deal may be learned by comparing methods and results in one's own neighborhood, finding out who has failed and who has succeeded, and the cause which led to each result, and then guiding one's own course accordingly.

The advocates of plowing, once a numerous body, are becoming fewer and fewer as time proves that there is no tree or plant that will respond more generously than the orange to proper cultivation, which is not with the plow.

"Let the weeds and grass grow in the grove and plow them under two or three times in the course of the season," used to be the text preached to the novice, and practiced by the old-system growers. This is the plan still followed by some, but the majority have come to the belief that the plow should not be allowed at all in a grove that is bearing or nearly approaching it, for by this time the ground will be closely matted with roots thrown out by the trees, and as the majority of these are surface roots, the plow will tear and loosen them, and thus, by the old method, "two or three times in a season" the trees were rudely deprived of a portion of their food caterers, and their growth checked while Dame Nature paused to replace the fibrous roots thus torn away.

So the turn-plow should be banished from the bearing grove, and in fact from every grove after the trees are half grown, and a single thirty-two-inch sweep used in its place. Many use the cultivator and harrow, but the sweep is better than either; it is more uniform in its depth of cutting than either the plow, cultivator, or harrow. It cuts off weeds under ground better than the two latter, and, taken altogether, does better and cheaper work in a grove free from stumps, and is superior to any other implement we know of.

The ground throughout the grove should be kept level and the surface stirred with sweep or cultivator to a depth of no more than three inches, as far out as the roots have extended. Each time the cultivator or harrow passes through the grove it should be followed by the hoe, not only to cut down all grass and weeds, but to draw any soil that may have been thrown against the trunks of the trees, or piled up on top of the crown of the lateral surface roots.

We have in a previous chapter referred to the importance of allowing the crown of these roots to be level with or slightly above the surface of the ground, and now refer to it again because it is a point the why and wherefore of which is but little understood or heeded, even by those growers who are esteemed most intelligent and wide awake to the best methods of culture.

If the crown of these laterals is left a little above the soil when the young tree is set out, as nature intended it to be, they will develop very rapidly, and as these are the main channels for conveying food and drink to the inner parts of the tree, the importance of this point is readily seen. It is exactly on the same principle that we draw away the earth from around an onion to hasten the growth of the bulb, and every where among the forest trees we

see Dame Nature employing this method to brace and strengthen their growth.

As a general rule clean culture from February to June, suspending culture from the latter period, gives the best results, where the ground is dry and rolling. Where it is low and damp, allowing the grass to grow, cutting it once or twice in the season and leaving it to decay on the surface is the better plan. The former is the best for pine lands, the latter for wild hammock groves, although circumstances may, in individual cases, modify these rules, but generally they hold good.

We know of a pine land grove, where for several years grass was allowed to grow, and three or four times in a season plowed under; the trees did not grow well or bear well; they became sickly and insected, and the oranges rusted. Then clean culture was tried, and a cultivator passed through the grove every two weeks from January to October. It was curious to see how those trees brightened up under what was evidently congenial treatment, for that time, at least. Before the season was over they started to grow vigorously, throwing out thrifty shoots from top to bottom, the insects disappeared, the trees lost their sickly yellow look and joyously donned their wonted dark green livery, and the fruit was large and fine and bright.

Another instance we know: A wild hammock grove, where clean culture was practiced for several seasons, the trees, hitherto healthy and in vigorous growth, drooped, turned yellow, became the prey of insects, dropped their oranges, and seemed likely to die. Then the owner stopped plowing and cultivating, allowed the luxuriant grass to grow at will, and when it became too rampant had it cut and left it where it fell. Almost immediately the drooping trees lifted up their heads, the insects fled, and to-day, when the ground has not been stirred for more

than two years, this erewhile sickly grove is one of the finest and most beautiful sights to be seen in Florida.

And just here we see why it is so difficult to lay down a given rule as a safe guide in all circumstances for the would-be orange grower to follow. It is emphatically true in orange culture, as in many other things, that "circumstances alter cases." While the trees are young, and their roots extend over but a small portion of the ground, it is a good plan to cultivate the grove as a vegetable garden.

The fertilizers used for the latter do double duty, as any surplus left by the vegetables goes toward enriching the land that by and by will be invaded by the hungry army of orange rootlets; the green stuff also that remains after the crops are gathered supplies a very necessary element to the successful grove, namely, vegetable humus. During the first two seasons, when the trees are only four or five years old, the vegetable rows may approach the trees within four feet, but every year afterward the distance should be increased one foot, until the cultivation of vegetables finally ceases, and the orange rootlets run riot over the whole grove, reveling in the rich soil that has thus been prepared for their coming.

It behooves every orange grower to keep his eyes open, to read, to watch, to observe, not only his neighbors' methods and experiences, but also to note the results of his own work, and alter his course if it seems likely to wreck his particular barque.

CHAPTER IX.

MULCHING AND PRUNING.

In the question of "Mulch or not to Mulch," we come to another disputed point. Some advocate mulching orange trees both old and young, advocate it most emphatically; others oppose mulching at all, just as vehemently, while others again say, "mulch young trees and those just set out for a year or two, but never mulch otherwise."

Who is right and who is wrong? No doubt in this, as in other questions where opinions differ, there is some right and some wrong on all sides.

Taking it altogether, however, there is much more to be said in favor of mulching than against it. Its opponents are in the minority now, and likely to become still more so as time rolls on and brings greater experience in orange culture.

In one of our most reliable agricultural works we find the following concise declaration as to what mulching does: "Mulching holds moisture in the soil and retains the atmospheric ammonia, breaks the force of the rains, and thus prevents the ground from being baked; prevents also the soil from freezing so easily as when exposed; prevents rapid thawing during the heated season, and cools the earth. These are the principal advantages to be derived from mulching, and yet they are sufficient to make any farmer think favorably of it."

And we will add, not only farmers, but especially orange growers. Mulching their trees has been practiced by our oldest growers, and the fact that they still continue the practice speaks volumes as to the result of their years of experience.

The objections made to its use by some are, that it tends to increase the surface roots and increase their liability to injury from frosts.

The first of these statements is true—mulching does produce more roots at the surface—but what then?

It is to these very surface roots that the citrus family is indebted for its chief supply of food; these are the main purveyors of the tree, the large roots serve as anchors and canals through which nourishment is conveyed, but the tiny, fibrous roots that creep here, there, and every where, are ever on the lookout for food supplies, and where they find it most abundantly there they go. They seek moisture and warmth; beneath the shelter of the mulch they always find it ready for them. The warmth they might have had without the mulch, but not the moisture. The more of these surface roots there are the better, as the orange is a surface-feeding tree, and, as the mulch rots away, a rich vegetable mold accumulates around the tree which is of immense benefit.

A grove where the trees are well mulched does not need half so frequent cultivation as one where the ground is left entirely bare. Whatever portion is covered by the mulch is kept free from weeds and grass, the ground is rendered porous and friable, and the roots which would be near the surface, even without the mulch, are protected from their greatest enemy, drought, very effectually.

Some advocates of mulching go so far as to recommend shading the entire surface of the grove. Now this is profitable under some circumstances, where the trees are large and shade a good portion of the ground by their foliage, so that the mulch need only cover the intermediate spaces; but when the trees are young it would require so great an expenditure of time, labor, and money, as to be almost impracticable. It is all-sufficient that the ground be cov-

ered to a depth of several inches, leaving a bare space of about a foot around the trunk. The mulch should extend about two feet beyond the outer roots; this is very important. Never allow the mulch to touch the trunk, it will soften and rot the bark and encourage insects to settle around it.

We have not yet touched on the second objection of the anti-mulchers—that "of increased liability to frost."

In reply to this we give an extract from the report of one of our well-known Florida growers, and another from a prominent planter engaged in orange culture at Pass Christian, Mississippi. The Florida man says:

"It has been urged that mulching makes the orange tree tender and more liable to freeze. Believing a statement of this kind, I was kept from mulching for three years, and then I only began by the trial of a few trees at first. I am satisfied, by careful experiments and observation, that no harm can come to trees on that account if properly applied. Old trees and young trees, trees just set out, and trees bearing five hundred oranges each, have been alike benefited. Trees that were mulched during the freeze of last winter came out of it much better than those that were without mulching; and now, during the present dry weather, while other trees are becoming yellow and curling the leaf at mid-day, the mulched trees retain a dark green, healthy color, and are growing right along."

So much for our Florida witness; now for the voice from Pass Christian:

"My grove of five thousand trees escaped very serious damage during the severe cold of two seasons ago. I attribute this exemption to a thorough mulching of the soil, which protects them from the intense heat of summer as well as the cold of winter."

Surely the experience of these two men should count

for something, especially when in almost every paper we glance at we see notes here and there, showing that others have made the same discovery.

Altogether, mulching bids fair to play no unimportant part in the future of orange culture.

The least expensive way of mulching is to spread dried or partly decayed vegetation (no woody fibers) around the trees in the way we have already mentioned, several inches deep, a foot from the trunk, and two feet beyond the outer roots—grass, weeds, leaves, straw, pine needles, well-rotted sawdust, bagasse—all these are good, and always to be had in quantity merely for the labor of gathering them. When the mulching becomes thin, as it will in time, when the lower portions decay and work down to feed the little rootlets, replace it, and at the same time enlarge its area, remembering that the trees are growing all the time, and their roots reaching out farther and farther. A top dressing of lime, ashes, or potash will hasten the decay of the mulch; it is, at the same time, of great benefit.

It is wonderful how a tree thus treated will flourish, even when it has been in poor condition up to the time of applying the mulch. An instance in point is that of a bearing grove where the oranges were dropping off, the leaves yellow, and the trees sickly. At this juncture the owner caused two cart loads of mulch to a tree to be spread on the ground so that the entire space between the trees was covered, at a cost of twenty-five cents per load. In two weeks the oranges ceased to drop, the leaves went back to their healthy green color, and the trees bristled with new growth. It was two years before the mulch had to be renewed, and in all that time neither the expense of hoeing nor cultivating the grove had to be met, the mulch keeping the ground moist and friable, and choking out all weeds.

There is a mode of mulching that we have not referred to that is well worth general adoption, combining, as it does, the double benefit of mulching and green manuring. This is, to remove carefully the loose earth from the roots of the trees to as great a depth as is practicable without injuring them; then to fill in level with the ground the mulching material, which in this case should be grass, weeds, cow-peas, or other green stuff; sprinkle with lime or ashes if handy—it will do without, however—then tramp it down and throw on top the soil taken out. This retains the moisture, hastens decay, and absorbs gases that would otherwise escape. It is mulch and manure at the same time.

The question of pruning is one about which there is little controversy, less so, perhaps, than any other one point in orange culture, though even here there are some who differ from the great majority.

Of all domesticated fruit trees the citrus family requires the least pruning; some say none at all, but experience teaches otherwise.

Pruning is one of nature's great laws in the vegetable kingdom. Look at our forest trees; in their youth their branches are low on the trunk, they are needed then to shelter the tender stem from sun and rain. As the tree grows older these first branches drop off, leaving the stem clean and graceful. Dame Nature has pruned them. When a branch dies, by and by, it decays and falls to the ground; it is useless, so that too is pruned away. Look at the young pine trees; their branches are low and sweep the ground, but the matured trunk rises eighty feet in the air without a single branch.

Never use a dull knife, saw, or shears in pruning a tree; the sharper the tool the better. It is always best to use shears on the smaller branches rather than the knife, the

latter being apt to slip and tear the bark. When the knife must be used, however, let the cut be upward rather than downward, as this lessens the danger of damage to the limb. Bear in mind that a rough, haggled cut does not readily heal, and very often never heals, thus injuring the tree permanently; and for this reason, when limbs have been sawed off, the cut should be pared smooth with a knife, and then covered with thick shellac varnish or grafting wax to exclude sun and rain until healed, otherwise disease may be communicated to the whole tree.

All water sprouts—that is, sprouts starting near the ground—should be pinched off as soon as they appear; they are robbers of the legitimate branches above them. Watch carefully for dead limbs, and cut them away as quickly as possible, taking a portion of the live wood with them to be sure that none of it remains. "Once upon a time" it was thought though a dead limb was unsightly and useless it did no actual harm, but it has recently been proven otherwise. A dead limb not only evaporates the sap that should go to the nutriment of the tree, drawing it up by capillary attraction like a sponge, but the elements of decay it contains flow back into the tree and so promote disease; therefore, never let a dead limb remain to counteract all your good works. Some branches there will be, not dead but diseased, so that they either develop no leaves, or else sickly ones. Let these be pruned away also for the same reason.

Do not trim the branches up high on the trunk; encourage low growth, especially while the trees are young. This is Nature's plan for protecting the tender bark from the sun, and should not be interfered with. As the tree grows taller cut away the branches gradually, until, when the tree is in bearing, you can just get under it by slightly stooping, but can stand upright against the trunk. The

most successful groves and the healthiest trees are those where the lower branches, when laden with fruit, barely escape or even touch the ground. Keep an open head to the tree so that the sun and air can reach freely to all parts, leaving the most vigorous lateral branches and cutting away the weaker ones. Never allow your young trees to become matted with branches inside so that the trunk can not be seen. Sooner or later they will crowd each other so much that you will be compelled to cut them out, and then all their vigor of growth will be just so much vitality thrown away. Better keep the head open from the start and allow no such wastage of time and thrift.

By pursuing this course systematically, by the time the tree is ready to bear it will be in fine shape—"a thing of beauty and a joy forever." It will then need very little after-pruning, except to clear out dead branches.

If you have set your trees twenty-five or thirty feet apart, keep the tops low to facilitate gathering the fruit; if, however, they are set only twenty feet apart, higher tops will be desirable, since the ground must not be too densely shaded by the foliage. The orange is emphatically a child of the sun, and will not thrive unless sun and air can circulate freely about and above its roots.

Prune in the spring, in January, February, or March. Fall or winter pruning is apt to be injurious as promoting new growth at a season when growth should be checked.

Whenever possible cut away the large thorns that not only make gathering the fruit a slow and delicate operation, attended with torn flesh and clothes, but puncture the oranges when swaying in the breeze, and thus render them unsalable.

CHAPTER X.

HOW TO FERTILIZE.

This is a subject of great importance, and one that it behooves every farmer and fruit grower to study closely. It is the corner-stone of his prosperity, the back-bone of his wealth.

There are many commercial fertilizers in the market of approved value, and it is well to use them in conjunction with home-made manures when one has the means to do so; but scarcely one in ten of the embryo Florida orange growers is able to procure these, and so his chief dependence is on the home-made compost heap. This is by no means a despicable resource, as we shall presently see; in fact there is no excuse for any man in Florida who owns a horse and cart for not having an abundance of valuable fertilizer for his trees, at merely the expenditure of time, the light labor of collecting trash, and hauling it home.

The man who has not the means to purchase the needed food for his trees, and yet has no great heaps constantly preparing for such, is simply a lazy man, and not such as will ever work his way to better times, even in Florida.

We do not need to discuss the question of applying commercial fertilizers, as each manufacturer publishes his particular directions, and these should be followed in each case.

In forming a compost heap the farmer should bear in mind the particular purpose to which it is to be applied, since neither all trees nor all crops take kindly to the same kind of food. There is as much difference, comparatively, in the food of the different members of the vegetable kingdom as there is in that of the animal. A horse will not

eat flesh, nor a dog hay; neither will all trees flourish on the same nutriment.

Every intelligent horticulturist is aware of this fact, and acts accordingly, being guided in the application of manures by the analysis of the ash of such plants and trees as he cultivates. It is on this principle and on this basis that the "special manures" are manufactured, each containing the particular ingredients needed by the particular plants to which it is intended to be applied; one may need a larger amount of ammonia than the soil naturally furnishes, another more phosphates, another more nitrogen. When these special fertilizers are made by honest manufacturers, they are very valuable aids to the farmers and fruit growers, either used alone or mixed with the compost heap.

Analysis shows that the ash of the orange tree and fruit contains a large percentage of potash, lime, and phosphoric acid, besides smaller quantities of other mineral ingredients; hence, these are substances, conjoined with sufficient vegetable matter to retain moisture, that the orange grower must feed to his trees.

And now, how are these to be obtained? Easily, and by every man who chooses, for they are all about him in profusion, needing only to be utilized by a provident and thrifty hand.

Pine land, on which the bulk of the orange crop is raised, is deficient in vegetable humus, which is as necessary to the proper growth and nourishment of the tree as any other ingredient; perhaps more so, since this humus has proven to be the most important vehicle of assimilation of the other foods; for instance, the analysis of a soil may show lime to be needed, and lime is forthwith applied, and without effect; but, powerless to work alone, combine it with humus, which, as every one knows, is simply

decayed vegetable matter, and then its effect will be quickly visible.

Here is one of the many proofs that there are two distinct classes of manures—one serving as the actual food of plants, the other assisting in preparing that food by combining with the substance in the soil, and bringing it into a form that the plants can assimilate, or by changing such as would be inimical to vegetable life. Thus, for instance, when we apply lime to a newly-broken piece of land which is mucky, we say that the lime has "sweetened it," because its action on the carbonic acid contained in the muck is such as to change by combination that which would otherwise be hurtful to vegetation, and to transform it to a valuable manure.

Every orange grower should prepare a compost heap as one of the very first steps to successful cultivation.

Make a pen of any desired size with posts for the corners, boarded sides, and a tight board floor; for convenience in filling it is well to have one side made so that the boards can be added or taken away at will; two perpendicular strips at each end, with space between to allow the boards to move up and down, will be found very handy. The tight board bottom is very important, as it saves all the liquid manure that would otherwise wash down in the ground and be lost; but even more so is a roof to cover the compost from the destroying effect of the sun, and also to shed heavy rains, at least partially.

No thrifty or intelligent man will allow his compost or stable manure to be exposed to the sun and rain, knowing, as he does, if he have any ordinary knowledge of his business, that fully two thirds of its value is thus wasted. A pile of stable manure or compost leached by sun and rain is a pitiable spectacle of slovenly farming, and the man who pursues this method may be sure he will never pros-

per, no more than the man who leaves his store open for thieves to enter and carry off his most valued stock in trade.

The compost pit prepared, the first thing to do is to put in a layer of muck about six inches thick, or if muck is not to be had, grass, weeds, sawdust, pine needles, pine burrs, rotten sap-wood, and dead leaves will answer almost if not quite as well. This supplies the humus element of plant growth; next a layer of cotton seed. This is a valuable fertilizer, especially so when thus composted, and contains four per cent of nitrogen, three per cent of potash, and three per cent of phosphoric acid—a ton of the seed being worth seventy-two dollars as manure—another layer of muck, then one of stable manure; another of green trash with muck again. These thoroughly wetted at the time of piling, and worked over once or twice, will, in three months' time, furnish the thrifty orange grower with as fine a fertilizer for his trees as any money could purchase, especially if, some days before applying to the trees, his means permit him to whiten the ground with lime or land plaster.

The capabilities of a compost heap are, in fact, almost unlimited; it is a take all and hold all receptacle, of which one may truly say "all is fish that comes to its net."

Nothing that is subject to decay comes amiss—rags, old clothes, old shoes, old newspapers, trash of all sorts, kept moist with liquid manure or house slops, etc., will in a few months become useful and available plant-food.

Every animal that dies on the farm should be dismembered and buried deep in the compost to become a valuable element thereof. Lime, land plaster, ashes, poultry guano, all these add vastly to the supply of plant-food furnished by the compost. But be it known and heeded that ashes and poultry guano should never be mixed, as the ammonia

of the former will thereby be liberated; neither should lime and stable manure be composted together for the same reason. Land plaster may, however, be freely used with great benefit, especially when applied directly above a layer of either guano or stable manure, as it prevents their ammonia from escaping.

Where one can afford to purchase bone-meal, making sure that it is genuine, it will pay liberally to apply light layers of it to the compost heap.

A few years ago the relative value of bone-meal and stable manure was tested with the following results:

1. One bushel of crushed bone is more than equal to twenty-five bushels of good farm-yard manure.

2. That bone-meal is more permanent in its effects than any putrescent manure usually produced on a farm.

3. That its effects on good land are more manifest than on inferior.

4. That when combined with putrescent manure or composted, the effect, both instant and remote, far exceeds that of any manure known.

About twenty years ago a Mr. Bonner, of the State of New York, patented a process of quickly rotting manure which was tested with great success, the manure being ready for use in fifteen days. The patent expired long ago, but the process has only lately been made public, and is now open to all and should be generally adopted, as the expense is very trifling and the labor of handling no greater than that of any other compost.

At the foot of the pen should be a vat or hogshead, partly sunk in the ground for convenience' sake, of a capacity of six or seven barrels. Into this vat all the soap-suds, house slop, drainage from the barn-yard, etc., are to be poured. If it takes too long to half fill the vat in this manner, fill in with water; or, better still, with liquid ma-

nure, two pailfuls of stable manure to one barrel of water; let it stand twenty-four hours before using. When the vat is from one half to two thirds full add following mixture:

Unslacked lime,	two bushels.
Soot,	two bushels.
Salt,	four pounds.
Saltpeter,	two pounds.
Unleached ashes,	two bushels.
Land plaster,	five bushels.
Condensed manure, such as hen guano, privy manure, or bought fertilizers,	three barrels.

These amounts are sufficient to decompose a ton of dry wash, or ten tons of green stuff, and of course can be easily reduced in quantity when desired. Mix these ingredients with the water, adding the lime, ashes, and land plaster last of all.

Place in the pen a layer of muck, dirt, or sawdust, about three inches thick, then add the materials to be rotted, straw, grass, leaves, sawdust, etc.; wet them thoroughly with the liquor from the vat, well stirred before using, then add another layer of muck and wet that, and so keep on, alternating muck and trash until the pan is full, wetting each layer as you proceed.

Your pen should have a roof, as stated elsewhere; and this is a very important matter, and one especially insisted on by Mr. Bonner, in his patented formula given above.

Repeat this wetting every four or five days, first making holes with a crow-bar worked back and forth, and then pouring the liquid from the vat freely over the whole pile. In fifteen days the manure will be in perfect condition, well-rotted and fine; heat will be generated in one week, and, should it seem too great, may be moderated by the use of water. Do not be sparing of the liquor at the time of first piling the heap.

In this formula it may be noted that substances known to be antagonistic are brought together—ashes and hen guano, lime and stable manure—yet here their mutual destroying propensities are conquered, and in achieving this desirable result lay Mr. Bonner's patent. Let us look into the chemical action that takes place among these various materials and see how he explains it.

The fermented liquor starts the heat, assisted by the lime. The lime being a hydrate is caustic, and a re-arrangement of the particles takes place, owing to the eagerness of the lime for carbonic acid, which is generated immediately the heat begins. Ammonia is formed from the ingredients of the heap, but first from the liquor in the vat. The formation is also hastened by the lime and potash; the saltpeter also liberates nitric acid. Ammonia, though gaseous, exerts a mysterious effect of its own in the heap, and greatly assists decomposition.

But it may be asked why the lime and potash do not set free the ammonia from the heap. Such would be the case in an ordinary barn-yard heap, but here the process of decay progresses under different conditions. First, the heap is kept wet with the liquor, as the wetting occurs every few days; second, the muck, sawdust, and other absorbents are a protection. Water absorbs and retains ammonia, and the rotting of the heap is so rapid, and the chemical changes are so numerous, that it is finished before an escape can be made.

At the end of fifteen days, as we have said, fermentation ceases, and then the mass should be overhauled, well mixed with dry earth, muck, or sand, and put away under shelter, which will prevent its heating again, and preserve the volatile matters until ready for use. So thorough is the fermentation that it would be a difficult matter to create heat again, even if desired.

The utility and economy of this process consists in the converting of leaves, corn-stalks, cotton-seed, rotten sap, etc., into ready-made manure. All seeds are destroyed by the process, so that any noxious weed may be fearlessly cast into the heap; bones broken into small pieces will be dissolved at once, and become valuable plant-food. A compost made by this formula is not only ready for use in so short a time, but its value is double that of ordinary stable manure, and contains all the elements of plant-food.

And all this valuable fertilizer can thus be made at home by Bonner's process at a mere nominal cost of five dollars per ton. This is the *ne plus ultra* of compost heaps.

If the soot called for in the formula can not be obtained, use more saltpeter; if ashes turn up missing, substitute ten pounds of caustic potash; and remember, never to leave the pile uncovered—nor, we may add once more (for this can not be too strongly impressed on the fruit grower), any other manure heap, if its full value is desired to be preserved.

A word or two about the best manner of preserving stable manure while collecting: nine out of ten of the Southern farmers stable their horses in stalls with the ground as the only flooring. This is a great mistake, and occasions a waste of the most valuable portions of the manure, the liquid or urine.

In a valuable little book called, "Talks on Manure," by Joseph Harris, he tells us that one ton of stable manure contains only twelve pounds of nitrogen, six pounds of phosphoric acid, and thirteen pounds of potash, and these are its only elements of practical value. Think of it, out of two thousand pounds of matter, only thirty-one pounds of manure, all the rest waste; and here is the plan Mr. Harris proposes (and has proven for years to be all that

he claims) for increasing the properties of the proportions of nitrogen, phosphoric acid, and potash, and reducing the amount of waste to be handled:

"Instead of throwing the manure out of the stables and putting it in piles to be leached and sun-dried, keep it where it drops; keep the stable well littered with straw, grass, pine-needles, and sawdust, which answer the double purpose of making good beds for the animals to lie on, and of absorbing the liquid manures and the gases of the other fermenting excrements. The urine of domestic animals is worth much more than the dung, and this I have found the best and cheapest way of preserving it. Keep a good supply of 'trash' on hand, and every two or three days, as the stalls become foul, cover them with a fresh layer.

"Let it stand during the whole season, and in the spring haul it out and distribute it. The whole mass will be decomposed and comparatively dry. One load of such manure is worth half a dozen that has been made in the usual way, and all the labor of repeated handling will have been avoided."

We have now said quite enough to prove our assertion a while ago, that there is no excuse for any man in Florida who can procure the services of a horse and cart, for not having a sufficiency of fertilizer for his grove. If he has no horse of his own, it would be an easy matter to go out in the piney woods or hammock, rake up a number of piles of trash, and then hire a horse and cart for a day to haul them to his compost pen.

In applying fertilizers to trees, the latter should be treated rationally. A surfeit of rich food will derange the animal system, and so it will the vegetable. Too large quantities of manures—rich in nitrogen, for instance—will cause die-back and fungoid diseases.

While the trees are young and in rapid growth they will

bear heavy manuring, just as a growing child will eat more in proportion than an adult; but if the system of high manuring is continued after they have arrived at the bearing age, eight or ten years, it will almost invariably retard their fruiting, as too rich a soil has a tendency to make wood rather than fruit. Therefore, after the seventh year, the quantity of manures should be gradually lessened, and only enough used to keep the tree in a healthy slow growth condition.

In manures for young trees nitrogen should be present in larger quantities than for bearing trees, the latter requiring more potash, phosphoric acid, lime, and other kindred manures.

Yellowish leaves indicate a deficiency of nitrogen in the soil; dark green leaves show that there is plenty of it.

When the clay is five or six feet or more below the surface, so that manures are liable to be washed down below the roots, three or four light manurings, one in January, another in March, another in June, and the last in August, are better than one or two heavy manurings. The first should be heavier than the rest, however, as tending directly to help the latest buds and young fruit. Liberal manuring as early in the spring as possible—and by this we mean the Florida spring, which begins in January—conduces to a larger and finer fruit crop than can be attained when this is neglected. Frequent experience has proven this as an invariable rule, other things being equal. When clay is within three or four feet of the surface, two heavy applications of manure, one in January and the other in July, are all that is necessary, the clay serving as a base to retain it until the roots can assimilate it.

CHAPTER XI.

ENEMIES, AND HOW TO FIGHT THEM.

So much has been said and written about the enemies of the orange tree that one might think it one of the most delicate and cruelly afflicted trees in the vegetable kingdom, while the contrary is really the truth, and it escapes very lightly. For instance, there are no less than sixty insects that prey on the apple tree, twelve on the pear, sixteen on the peach, seventeen on the plum, thirty-five on the cherry, and thirty-one on the grape.

And yet we have heard orange growers grumbling over the constant fight against the insects that attack their trees. To such we commend a glance at the above host of enemies upon which the northern fruit growers are waging constant and not always successful war. Many of these are borers, and their work is done in secret, and in an almost impregnable fortress; whereas, an orange tree has no borers, all its foes being open and aboveboard, and hence easily detected and conquered.

The renowned scale insects are the most injurious, and, before the best means of fighting them was discovered, did much damage to the trees, and threatened a wide-spread destruction to the orange interest in Florida, when it first appeared in the State, which was at Mandarin, about twenty years ago, being carried there on orange trees brought direct from China.

It may seem surprising that from a few trees, and from one grove, this minute enemy of the orange tree should have spread all over the State, and that, too, in a very short time; but when one comes to consider the matter it is not so wonderful after all.

For one thing, there are several small beetles, and some large ones, found in all our groves, that feed on the scale or *coccids*, and as the latter are very minute and are often seen to mount on the backs of their unconscious enemies, they are thus carried by the beetles from tree to tree, and also from grove to grove.

Again, the shrike or butcher-bird dearly loves to select the long, sharp thorns of the orange tree, on which to impale his victims, insect, lizard, or small snake, as the case may be. He prefers trees that have low branches, and these are the very ones, as a rule, that are most thickly infested by the scale insects, especially the long scale.

In impaling his prey on the thorns the bird moves his little claws freely over the branch, and some of the insects clinging to it are sure to adhere to them; then he flies off to another tree or grove, and the scale is rubbed off and finds a new field for its work. The butcher-bird also frequently transfers his impaled victims from one tree to another, and if the first has been infested with the scale and the second has not, the latter can not much longer boast of its freedom; and even when the bird eats his prey from the thorn on which it was first impaled, some of the scale insects that are certain to adhere to it will cling to his beak and probably be rubbed off on some other tree.

We have a friendly feeling for the butcher-bird; he is such a neat, Quakerish-looking, fat, chubby little fellow, and so familiarly saucy withal; and we are sorry we can not acquit him of helping to spread the enemies of our groves, albeit he does it without *malice prepense.*

High winds and spiders are also important and wide-spread factors in the distribution of scale insects, all of which are small and light; nursery stock and matured fruit itself are also active agents in the matter. What is this much talked of, much fought against scale insect, you ask?

For full and detailed information on this point, as on that of all the insect enemies and friends of the orange, we would refer our readers to the valuable work on "Orange Insects," written and published by William H. Ashmead, of Jacksonville, Florida; and also to those of Prof. Comstock, Dr. C. J. Kenworthy, and the recent pamphlet issued by the Agricultural Department, containing the result of the investigations of its special agent as to the "rust mite." These books, being devoted exclusively to the one subject, deal more extensively with the enemies of the orange than the limit and object of our present work permit us to do.

Briefly, therefore, we will note the most injurious of them only, that they may be recognized when seen, and the proper weapons used in the battle against the invaders.

The long or mussel-shell scale insect is a very tiny fellow, rarely to be seen; unless revealed by a powerful microscope; then it appears like a very lively louse, quick and active in its movements, and when alarmed instantly seeking concealment under the scale it has created as its dwelling, which has first served as a home for its eggs, which are purple and laid in two parallel rows, and then as a shelter for its young.

The latter, the moment they emerge from the eggs, begin to suck the sap from the bark or leaf to which they may be attached. They will then scurry around and become visible through their movements for three or four days, then insert their beaks in a suitable spot and come to an anchor forever. In a few days the waxy substance of which their scale house is composed begins to arch over their backs; their legs, useless now, drop off, and the fly, reversing completely the order of things, returns to a larval shape, lays its eggs and dies; soon the eggs hatch and the round of reproduction begins again. One would

hardly think that such a tiny thing could do so much damage to a noble tree; but the trouble is in their number, which is legion.

There are several kinds of scale, but all are to be plainly seen on the leaves, twigs, and even on the fruit. All are enemies to the tree, and all may be killed by the application of the remedies given at the conclusion of the present chapter.

The white scale is the most noticeable, its color and the large size of its scale house, in comparison with that of the mussel-shell scale just described, making it very conspicuous. This scale is highly arched, and of a pinkish-white at maturity, with seven well-defined dots, three on each side and one at the posterior. Just before the eggs hatch the scale becomes more globular in form and the top takes on a brown tint. The insect, which is pale yellow, and looks, under the microscope, like a wood-louse, crawls about for a few days, then strikes its beak into the bark and the waxy scale begins to form. This completed, the eggs are laid, over one hundred in number.

Mr. Ashmead, in his work already referred to, makes a calculation of the progeny of one of these scale insects, for one season, and it amounts to the frightful total of one million.

If it were not for that Providence which is ever watching and planning for man's welfare, his fight against the spread of these destructive insects would be an almost hopeless one; but he is not left to battle single-handed. Even the most minute insects have their relentless "war of races," and thus the scale insects have enemies, who, had they happily been imported into our country at the same time, would never have allowed them to spread far and wide, and create the panic they did among the orange growers.

Chief among these staunch friends of the orange tree are the orange scale *apelinus*, the twice-stabbed lady-bug, minute *scymnus*, red mite, and orange *chrysopa*.

The first-named, the orange scale *apelinus*, is a four-winged fly, about 0.2 of an inch long; it lays one egg under each scale among the eggs of its foe, and as soon as the larva, which is a white footless grub, is hatched, it begins to feed on the latter, changing into its pupa state only when the last egg is gone; a few days later it punctures the top of the scale, and emerges in its perfect fly-shape.

The next of our good friends, being more noticeable, is often, alas, ruthlessly slaughtered for an enemy by those who, if they knew its true character, would carefully protect it. From February to November, in this State, one often sees a little round, dark bug with two red spots on its wings, and also a dark, slate-colored larva crawling among the orange trees. They are one and the same insect, the twice-stabbed lady-bug, and so valuable a friend to the orange grower as to be worthy of importation to any grove where it has not voluntarily settled.

They breed throughout the year and in the fall lay their eggs where the scale insect is most abundant; then, when their eggs hatch, the dark, spine-like larvæ at once commence feeding on the scales around them; soon they crawl off to a retired spot, affix themselves to a leaf or branch, and become pupæ, which, in a few days, again change to a soft, pale-colored beetle, without a sign of the spots and dark wings shortly to appear.

If there is any Spanish moss on the tree the larvæ will be found there in greater numbers than elsewhere.

The minute *scymnus*, large *scymnus*, and red orange mite, are so small as to be rarely observed by the naked eye, and hence they are exposed to the same danger of destruction by those they serve, as are those heretofore mentioned.

The two former are beetles, whose larvæ, hatching in the spring at the same time with the scale insects, wage relentless war upon them. They come in April and disappear in June, to reappear when the great fall broods are hatched.

The orange *chrysopa* is another most helpful friend; it is a small, lace-winged, yellowish green fly, much resembling a tiny dragon-fly; its eggs are suspended on a delicate thread to the orange leaf, the larva covers itself with minute pieces of dried leaves or bark, feeding on the scale inside until the time comes for it to form an oval moss-like cocoon on the under part of the leaf, whence in a few days the perfect fly emerges.

The blood-red lady-bug is also an exceedingly active helper to the orange grower, devouring the scale insects by the million; the pupa emerges from a gummy substance attached to a leaf, and becomes a perfect beetle (red) without spots or markings. We have been thus particular in describing the appearance of these little friends of ours that they may be recognized as such, and their lives spared. Other friends the orange tree has besides, but we have not space to enumerate them.

The mealy bug is one of the most serious enemies, not only of the orange but of the pine-apple, and if not relentlessly fought, threatens to become a worse enemy than the scale. It makes no scale shelter, is ever moving about, and places its eggs beneath a cotton-like substance. In twelve days they hatch, and the young begin their career of destruction, sucking the juices from the tender leaves and twigs, the odd, mealy substance from which they take their name forming meanwhile all over them. They increase very rapidly, breeding all the year, and seem to defy any wash that does not contain kerosene; this, however, is fatal to them.

The leaf-footed plant bug is another destructive foe to the orange, and also to the plum, rice, and many other vegetable productions. The young are a bright yellowish red, without the leaf-like extension to their legs that afterward appears. The adult is a curiously-shaped reddish brown bug, having a long sharp beak, and a transverse, yellowish white band across its wings; when the latter are raised, its back is seen to be flat and hollow, red in color, with black spots; its hind legs are oddly shaped like narrow leaves. It sucks the sap from tender shoots and terminal branches, thus killing them outright. Mr. Ashmead gives the only remedy known, of catching them in a butterfly net and scalding them.

Grasshoppers and katydids are also destructive foes to orange trees, devouring leaf after leaf in an incredibly short time; their quick, active movements make them hard to deal with, and the best known weapons with which to fight them are the birds and a flock of chickens and guinea fowls in the grove.

There is a large, beautiful butterfly that may be seen every where in Florida from early spring to winter; it is black, with two yellow bands across its wings, formed by a series of yellow spots.

Under the rule of "Handsome is as handsome does," the orange grower has reason to regard this beautiful insect as hideous, since it and the orange dog or puppy are identical.

Whenever you see a little round egg sticking to an orange leaf, crush it at once; the orange butterfly has laid it there, and directly it will become a peculiarly marked worm, with a large head, from which it projects red filaments, and opens its large mouth like a snarling dog when disturbed, emitting a pungent odor.

Until within the last year or two there were various

opinions about the cause of the rusty appearance of so many Florida oranges; now, however, no doubt remains on the subject. It is caused by a minute insect called the rust mite, that would never have been discovered but for the microscope being applied to the orange while still on the trees, for within half an hour after the fruit is taken from its parent stem every insect has disappeared. The mite punctures the oil cells, the oil exudes and becomes oxidized, and hence the dark appearance, and hard, rusty skin of the fruit.

This appearance damages the sale of the orange, but does not impair its quality; in fact, it appears rather to develop its saccharine qualities. Place before a Florida child two oranges, one bright, one rusty, and it will seize the rusty one first. The rusty orange, protected from the air by its hard, dry skin, ships much better than the bright; and so, if it were not for the damage done to the looks, and hence to the sale of the fruit, there would be little fault found with the mite.

This one consideration, however, is enough to cause war to be declared against it; but fortunately, remedies have been found, to which we shall presently refer.

One other insect we shall mention, because it is very easily seen, and its destructive operations openly conducted right under one's eyes—he is a bold, fearless marauder. Professor Riley, of the Agricultural Department, calls him *Euthoctha galeator*. He resembles greatly the well-known squash bug, and delights to insert his strong proboscis in the tenderest shoots to be found, causing them to wilt and droop to their death, even while he robs them of the food on which they live. The insect is one of the chief causes, if not the chief, of the so-called disease of die-back.

We have now described, so far as the limits of our present work will permit, the chief enemies and friends of the

orange tree, and will now proceed to give the most effective weapons with which the former may be conquered.

It is not enough to know the formulas of washes to be applied to the tree, but also at what time the application should be made to be effective.

Let us take the long or mussel-scale insect first: the first brood hatches from the middle of April to the first week in May; the second from the last of July to the middle of August; and the third and last from the last of September to the middle of October.

The white scale has also three broods; the first in April and May; the second from the middle of July to the first of August; and the third from the last of August to the second week in September.

He who waits until their protecting shield has been reached may as well spare his labor, for his most powerful washes will fail to penetrate it, or to disturb the insect. Applied at the right time, however, as given above, just after the eggs are hatched and the fly has left the scale house, it is easily exterminated.

When trees are very badly infested it is well to cut off and immediately burn the smaller limbs; then, with a fountain spray pump, drench the tree thoroughly with one of the preparations given below.

FOR SCALE INSECTS.

No 1.

Sal soda,	10 pounds,
Hard soap,	5 "
Water,	40 gallons.

Dissolve the soap in a little boiling water, place in a tight barrel, break up the soda in small pieces, add it; fill up the barrel with soft water, and stir the mixture till well mixed. Keeps good indefinitely. Apply to the trunk

with a brush, rubbing in well; drench top and leaves with a rose syringe. Apply twice a year, spring and fall; oftener if the grove is seriously infested.

No. 2.

Tobacco stems,	5 pounds,
Copperas,	5 "
Water,	40 gallons.

Boil tobacco in sufficient water to extract the full strength; strain and measure liquid; put in a barrel and add enough water to make up the forty gallons; then add the copperas and stir till dissolved. Apply as before stated.

No. 3.

Whale-oil soap,	10 pounds,
Kerosene oil,	5 gallons,
Water,	5 "

Common soap will do if the other is not to be had. Dissolve the whale-oil soap in hot water, then add the kerosene; churn them together until well mixed. For use: add one quart of the emulsion to two gallons of water. Apply as before.

This preparation is destined to supersede the lately discovered "kerosene butter," made by combining the condensed milk and kerosene, as being much cheaper, quite as effectual, and much less labor to prepare. It does not injure the most tender shoots, and kills the scale at once; is also a valuable fertilizer, and as it falls back from the leaves and sinks into the ground, drives away other insects that may be hiding around the tree.

No. 4.

Cotton-seed hull meal or ash; syringe the tree with water, then throw up the ash into the tree.

This is effectual for small trees but not so good on large, because the upper limbs are apt to escape.

FOR THE MEALY BUG.

The formula given as No. 3 is the safest to apply to the bug, as the other washes seem to injure it very little if any; kerosene will destroy it.

LICHENS, SMUT, HONEY-DEW.

For ridding tree trunks of lichens and old half loose bark, for removing smut and that sticky substance, the excrement of insects called honey-dew, formula No. 1 is very effectual, used with a scrubbing-brush on the tree trunk for lichens and old bark, and with the hand-pump for smut and honey-dew.

ORANGE PUPPY.

As a rule this worm, to which we have already alluded as identical with the the large butterfly, is not seriously aggressive, and can be kept down by hand picking, because its numbers are not great in any one grove, except in some few cases; the mocking-birds, woodpeckers, and butcher-birds proving excellent remedies against its alarming increase. Where, however, it becomes so troublesome as to really injure the trees by robbing them of their foliage; drenching the tree with lime-water will prevent the mother butterfly from depositing her eggs among them, as no butterfly will settle on a plant syringed with lime-water.

DIE-BACK

Is, as we have noticed elsewhere, caused by the attack of insects that kill the terminal branches and young shoots as fast as they appear. Now, with every new shoot its corresponding roots die also; and so, ere long, the whole tree

feels the loss of its needful nutrition, and twig after twig, branch after branch dies back, often puzzling the owner to determine the trouble.

Chief among the insects that have been proved at last to be the cause of the trouble, are the leaf-footed plant bug and the *Euthoctha galeator*, which, not being stationary, are hard to rout, but may be driven away by several drenchings of No. 3; but the tree must be carefully pruned of every dead or sickly limb, or even, if necessary, its whole top cut away to give the few roots left alive a chance to recover their vigor.

THE RUST MITE.

The recent report of the special agent of the government entomologist on this insect is so full of interest and instruction, that we embody it in the next chapter.

CHAPTER XII.

THE RUST MITE.*

Discoloration of the Fruit. The brownish discoloration of the rind of oranges, familiarly known as "rust," has, since the production of this fruit became an important industry in Florida, given great concern to the producers, and occasions annually serious loss by affecting injuriously the salableness of the fruit. In appearance the rust varies from a light- or dark-brown stain beneath the cuticle to a rough incrustation resembling an exudation of resinous gum upon the surface. In the former case the golden color of the ripe orange is more or less obscured, and in the latter entirely destroyed by the discoloration. When entirely coated with rust the surface becomes finely chapped and roughened, giving to the unripe fruit a likeness to russet apples.

The season during which rust makes its appearance includes nearly the entire period of growth of the fruit, beginning in early summer, when the fruit has attained less than one third its full size, and continuing late into autumn. Its most rapid increase is, however, in August and September, as the orange approaches maturity. Rarely is there any real increase after the rind begins to ripen, although the discoloration usually attracts attention just at this time, and frequently occasions unnecessary alarm. On the contrary, there is always a perceptible brightening as the fruit attains its full color, and oranges slightly affected, or affected early in the season, when fully ripe show but little trace of rust.

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*Report of H. G. Hubbard, Special Agent, to the United States Entomologist.

Is Rust a Fungus or an Exudation of Gum? The term "rust" is very indefinitely applied to a great variety of plant diseases, some of which are clearly due to the presence of fungi, and others are considered pathological conditions of the plant, attributable to, for the most part, unknown or conjectural conditions of soil or climate.

A good example of the first class is found in the common and very destructive rust of the fig. Any one who will take the trouble to examine with a good glass the brown discoloration upon the surface of the leaves, may easily detect the sacs or asci of the fungus, filled to bursting with the spores, or pouring them out upon the surface.

Nothing of this kind is seen upon the leaves or rusted fruit of the orange. A microscopic examination of the fruit rind reveals no forms of fungus, but shows the oil cells to be more or less completely emptied of their contents, and the outer layers, the epithelial cells, clogged with brownish resin, or entirely broken up and divided by fissures, which permit evaporation of the fluids from the underlying cells. The rind of rusted fruit, therefore, shrinks and toughens, and loses by evaporation or oxidation the greater part of its essential oil.

Reasons for Considering it the Work of a Mite. If we examine critically with a hand lens of considerable magnifying power the surface of a rusted orange, we will find here and there in the depressions, groups of minute white filaments adhering closely to the rind. Carefully transferring one of these filaments to the stage of a compound microscope, and applying a power of several hundred diameters, the character of the object is clearly shown. It is the cast skin of an insect.

If the examination chance to be made in winter, when the fruit is ripe, the number of these exuviæ will not be strikingly great; but if made in autumn or late summer,

the surface of every orange showing rust will be found thickly sprinkled with them, and we shall be forced to conclude that we have before us the relics of a numerous colony, which at some former period infested the fruit.

Extending the examination to fruit that as yet shows no indication of rust, we will, if the season is not too far advanced, obtain abundant confirmation of this conclusion, and find these colonies in the full tide of their existence. The former occupants of the cast skins prove to be elongate mites, of honey-yellow color, too minute to be seen as individuals with the unassisted eye, but visible in the aggregate as a fine golden dust upon the surface of the fruit.

The Mite on the Leaves. Having tracked the mite by means of its tell-tale exuviæ, and detected it at work upon the fruit, if we turn our attention to the leaves it needs no prolonged search to discover it here also, and in even greater abundance. In fact it is evidently upon the leaves that the mites exist and propagate throughout the year; for not only are they found upon fruiting trees, but upon plants of all ages, in the nursery as well as in the grove.

Nothing resembling the rust of the fruit follows their attacks upon the leaves. Each puncture of the mites gives rise to a minute pimple or elevation, until the surface of the leaf becomes finely corrugated, loses its gloss, and assumes a dusty and corroded appearance.

This tarnished appearance of the foliage is very characteristic, and remains a permanent indication of their depredations after the mites themselves have disappeared.

First Appearance of Mites on the Fruit. From the time when the cellular structure of the rind has completely developed, and the oil-cells have begun to fill, until the fruit is far advanced into the process of ripening; in other words, from early spring until late in autumn, it is liable

to attacks of the mites, but it is in the intermediate period of its growth that the fruit offers conditions most favorable to their increase.

Attacks of the Mite always followed by Rust. The evidence that rust follows as a sequence upon the depredations of this mite is circumstantial rather than direct, but is also cumulative. Oranges marked and kept under observation, but allowed to remain upon the tree, have in all cases rusted after being overrun by the mites. Those upon which no mites made their appearance remained bright to maturity.

A very large number of observations show a close connection between the occurrence of mites upon the foliage and rust on the fruit, so that it may be stated as a rule, when the foliage of a tree retains its gloss, the fruit also will be bright, and, conversely, when the condition of the leaves indicates the presence of mites in great numbers, the fruit will be discolored.

This is found to be true, not only of the entire tree but of restricted portions. Thus the upper, the lower branches, or one side of an orange tree may produce rusty fruit while that on the other parts of the tree remains bright. In such cases there will always be a marked difference in the condition of the foliage upon the two portions, and the leaves surrounding the affected fruit will indicate more or less clearly the work of mites.

Other and perhaps more exclusive reasons for considering the mite responsible for rust will be better understood when the habits of the mite itself have been considered.

Interval between the Disappearance of the Mites and the Appearance of Rust. As has been indicated, the mites do not permanently infest either the surface of the leaf or the rind of the fruit, but wander off to fresh feeding ground when, through their combined attacks, all the accessible

oil-cells have been emptied of their contents, or the tissues have been too much hardened by advancing maturity to be easily penetrated by their beaks.

The effects of their puncture upon the cellular structure of the plant, however, continue after their departure, and upon the fruit rust develops with a varying interval, depending possibly upon the relative humidity of the air. Usually the discoloration is very apparent after the lapse of a week, and the rind continues to harden indefinitely, or as long as it is exposed to the air.

Description. The so-called rust insect is a four-legged mite, honey-yellow in color, and about three times as long as broad. The body is cylindrical, widest near the anterior extremity, and tapers behind, terminating in two small lobes, which assist the animal in crawling and enable it to cling firmly to the surface upon which it rests. The front is prolonged in a conical protuberance, which appears to be composed of two closely applied lobes. The upper surface at its widest part is marked on each side with shallow depressions, which are faintly prolonged on the sides and reach nearly to the terminal lobes. The abdomen consists of about thirty segments; the beak, a short, curved tube, is usually retracted between the organs of the mouth. The latter form a truncated cone, concealed from above by the projection of the front, and difficult to resolve into its component parts. Under high powers it can be seen to consist of at least two thick lobes, which in the living mite have a reciprocal forward and back movement.

The two pairs of legs are placed close together, at or very near the anterior extremity and project forward. They are four-jointed, and terminate in a curved spine, with opposing bristles. The intermediate joints bear one or two very long bristles. Several fine bristle hairs arising

from the under surface of the body, curved upward at the sides, and two very long bristles at the caudal extremity, curving downward, are trailed after the mite as it crawls.

The length of the adult mite is 0.14 millimeter (.005 inch). The young do not differ essentially in structure from the adult mites, but are thick and short, almost cordiform, and the legs are very short.

The eggs, which are deposited singly or in little clusters upon the surface of the leaves, are spherical, transparent, with a yellow tinge. Their diameter is more than half that of the mite at its widest part, and they probably increase in size by the absorption of the moisture after they are laid, otherwise the body of the mite could not contain more than three or four fully developed ova. The embryo is curved within the egg, its head slightly overlapping the tail.

Life History. In hot weather the eggs hatch in four or five days, but in winter their development is more or less retarded by cold, although it is not entirely arrested, even by frost, and the duration of the egg period seldom exceeds two weeks.

The young mites are bright, translucent, yellow in color. Within a week or ten days they undergo a metamorphosis or molt, during which the animal remains dormant for about forty-eight hours. With its legs, which are placed close together and stretched out in line with the body, and with its two-lobed anal proleg, it clings closely to the surface of the leaf. The form becomes more elongate and spindle-shaped. The body of the transforming mite separates from the old skin, which becomes pellucid and empty at the extremities, and finally splits longitudinally, releasing the renovated mite. The rejected pellicle is left firmly adhering to the surface on which it rests, but is in time removed by the action of the weather,

and much sooner from the leaves than from the rind of the fruit.

The adult mite is slightly darker than the young in color, and becomes more opaque as it grows older. No sexual differences have been distinguished, nor has the act of coupling been observed.

Owing to the difficulty of confining the mites without interfering with the conditions necessary to their existence, it has not been possible to determine the duration of their lives. It is, however, safe to conclude that they live several weeks after reaching the adult stage. The number of eggs deposited is also uncertain, but it is probably not abnormal, and the enormous populousness of their colonies must be attributed to rapid development and comparative immunity from enemies and parasites, rather than to excessive fecundity.

Food. This evidently consists of the essential oil which abounds in all succulent parts of the orange and its congeners, and which the mites obtain by penetrating with their sucking beaks the cells that lie immediately beneath the epidermis. That they do not feed upon the chlorophyl is shown by the color of their intestinal contents, which has no tinge of green but a clear yellow, unmistakably indicating the source from which it came.

Wandering Habits. While engaged in feeding, the mites remain quiescent for a length of time varying from a few minutes to half an hour. They then move on a short distance and again become motionless. If disturbed they have a habit of erecting themselves upon the leaf, clinging to its surface only by the anal proleg.

When dissatisfied with their surroundings, or when food becomes scarce, they wander restlessly about, and undoubtedly travel to considerable distances. Their rate of progress on a smooth surface is quite rapid, and amounts to ten

to twelve feet per hour. It is therefore not surprising to find them changing their position frequently; disappearing suddenly from one portion of the tree, and appearing as suddenly in great numbers upon another and distant part of the same tree.

It is not to be understood that the mites show any concert of action in moving their colonies, or that they are in any other sense gregarious than that they are usually found very thickly scattered over those parts of an infested plant which offer favorable conditions for their support. Thus the new growth of many orange trees becomes occupied or infested by them as rapidly as the leaves fully mature, and the number upon a single leaf may be estimated by many thousands.

Numerical Abundance. The following examinations, made in January, will give an idea of the extent of the brood during the coldest parts of the Florida winter:

From a large number of leaves in late autumn growth one was selected which showed an even distribution of mites upon its surface. An area of one square inch was accurately marked out with a needle, and subdivided into sixteen equal squares. The number of mites and their eggs upon four of the small squares taken at random was counted, and found to aggregate 1,142.* This gives for the square inch under observation 4,568 mites. The leaf was then cut into squares and triangles, and was found to cover fifteen square inches upon a sheet of paper.

On the supposition that the experimental square inch gives a fair average, the number of mites upon the upper surface of this leaf was 68,520. Certain portions, not exceeding one quarter of the whole, were, however, more

*The number of eggs exceeded that of the mites, a phenomenon not often observed, and which may be attributed to the unusually cold and unfavorable weather at the time of the examination and for several weeks previous.

or less thinly populated. Deducting, therefore, twenty-seven per cent from the above, we have 50,020 mites, the approximate population of the upper surface. The under side of the leaf was less thickly infested, but the number of mites may be estimated at one half that of the upper face or 25,000. Thus the number of mites and their eggs upon a single leaf is found to reach, even in mid-winter, the enormous sum of 75,000.

In early summer, when the breeding is active, these estimates will be greatly exceeded. At times an orange tree may be so completely infested with the mites that, of its thousands of leaves, very few can be found free from their presence. If, then, we attempt to calculate the number that may exist contemporaneously upon a bearing tree, we find it represented, not by millions but by billions, and the figures obtained convey no definite inpressions to the mind.

Preference shown for Half Shade. An examination made on a bright, sunny day shows that, while the mites can not long endure the direct light and heat of the sun, they also avoid dark shade. At midday they are more abundant upon the under side of exposed leaves, and although they at all times show a marked preference for light, they desert those parts of the leaf or fruit upon which it falls brightest. On a leaf partially exposed to the sun the mites congregate near one edge in the morning, and in the afternoon cross to the opposite side of the same surface, following the shifting shade which, by reason of its curvature, the edges of the leaf throw upon one side or the other.

Rings of Rust on Fruit. On the fruit, this preference of the mites for half shade causes a phenomenon which will be recognized as very common on rusty oranges. This is the occurrence of rust in a well-defined ring obliquely en-

circling the orange, as the ecliptic does the earth. The rust ring is seen most plainly on the fruit from the upper portion and south side of a tree when it stands with others in a grove, and will be found to mark the band of half shade between the portion of the orange most directly exposed to the sun's rays and that in densest shadow. The surface covered by this penumbra band is precisely that upon which the mites gather most thickly in the middle of the day. Here their attacks upon the rind will be most severe, and its after effects most noticeable.

There is also observable in rusted fruit a marked difference in the amount of discoloration upon the opposite sides. Even where no plainly marked ring is visible the side of the fruit which upon the tree was turned opposite the sun frequently presents a bright spot, and the opposite side an area of lighter bronze, with less sharply defined boundaries.

These facts, taken in connection with the observed habits of the mites, may be regarded as the strongest evidence showing a connection between rust and their attacks upon the fruit.

Influence of Weather. It has been already observed that the hatching of the eggs, although retarded, does not cease in cold weather, and that the breeding continues throughout the year. Frost, which is sometimes severe enough to kill the adult mites, does no injury to the eggs, and the severity of a winter has little if any effect upon the prevalence of the mites during the following summer. In droughts, however, there is some evidence that many of the eggs dry up and are exterminated. The extremely dry seasons of 1881 and 1882 have been followed in the winter of 1882 and 1883 by the brightest crop of fruit that has been known for several years.

Agencies which Assist in the Distribution of the Mites. The

activity of the mites and their readiness to climb upon any thing they meet in their path, renders it evident that any living creature which passes from one tree to another is competent to transport the mites with it. The tail feathers of birds must sweep thousands from the surfaces of the leaves, and spread them from tree to tree or from grove to grove.

So readily do they relinquish their hold when brought into contact with a moving body that the point of a needle swept across the surface of an infested leaf will usually be found to have several mites adhering to it.

The same agencies which assist in the spread of scale insects undoubtedly serve to scatter the mites. Not only do they climb readily along the web of spiders, but they may frequently be seen upon the bodies of the spiders themselves, which do not seem to be at all disturbed by the restless movements of their little attendants.

The wandering habit of spiders is well known; their method of bridging great distances by casting out hundreds of feet of silken line to be wafted by the winds and caught in distant trees has often been noted. There is little doubt that of all other modes of dissemination both of the scale insect and rust mite, that of transportation by spiders is the most important, the most constant and regular. The spiders bear with them upon their hairy bodies the young bark lice and the adult mites, conveying them in their own migrations to distant points, and colonizing them under their protecting web whenever they chance to select the leaves of the citrus plant as their resting place.

And here is found the solution of that puzzling influence of the wind so often remarked in the case of scale insects, and which has led many to believe that they are disseminated directly by this agency, and therefore spread most rapidly in the direction of the prevailing currents.

Spiders of the web-making kinds are necessarily dependent upon the wind in making long voyages. The warm southeasterly winds of spring excite in them the migratorial instinct, and at a time when the orange trees are swarming with the quickened life of scale and mite, from a thousand projecting points of branch or leaf the spiders are sending out their lines of rapid transit, and are bearing with them, "on the wings of the wind," the seeds of mischief to the orange grower.

The Mite known only upon Plants of the Citrus Family. The rust mite attacks indiscriminately the various species of citrus in common cultivation, but has not been observed to feed upon plants of any other genus. It is found upon the lime, citron, shaddock, bigarde, and tangerine, and none of the varieties of the orange are known to be in any degree exempt.

Upon the leaves and fruit of all these species of citrus, the effects of its attacks are essentially the same, although the rust is more noticeable on the sweet and bitter orange.

Effect of Attacks upon the Foliage. Like certain internal animal parasites, which feed only upon the fat of their host and do not touch its vital organs, the mite does not destroy the vital functions of the leaf. The chlorophyl is untouched, and the plant is robbed of a portion only of its essential oil. The leaves never drop, no matter how severely attacked, but there is a loss of vitality, and the growth of the plant is checked. This is especially noticed in young trees, which are frequently overrun by the pests in early summer, and during the remainder of the year make little progress.

The foliage of affected trees wears a dry, dusty appearance, and loses color. The leaves are without gloss, and become slightly warped as in droughts.

Rusted Fruit. If severely attacked by rust before it has completed its growth, the orange does not attain its full size. Very rusty fruit is always small; its quality is, however, improved rather than deteriorated. The toughened rind preserves it from injury and decay, prevents evaporation from within, and carries the ripening process to a higher point.

Rusty oranges can be shipped without loss to great distances; they keep longer both on and off the tree, and when they reach the Northern markets are superior to the bright fruit in flavor. Consumers, not being aware of this fact, however, prefer the latter, and the reduced price of the bronzed fruit more than offsets to the producer its superior keeping and shipping qualities.

Geographical Distribution. Rust appears to be known upon the orange only in Florida. Within the limits of the State, however, its presence is universal. No section, whatever claims may be made to the contrary, is exempt.

Influence of Soil and Methods of Cultivation. The effect upon the prevalence of rust of various systems of cultivation and of applications to the soil, for the purpose of changing its nature or supplying assumed deficiencies in its composition, has been the subject of endless discussion, and of experiments affording negative or conflicting results, which can not profitably be reviewed here.

Suffice it to say, no method of combating rust by special treatment of the soil, or other indirect action through the plant, has been proven effective. By forcing with fertilizers and high cultivation, no improvement is affected in the color of the fruit. This depends not upon the condition of the tree, but rather upon the number of the mites, which is, in fact, increased by an abundant

supply of new growth and a constant succession of fresh and vigorous leaves.

It seems, however, to be an established fact that the fruit is less liable to rust upon low than upon high lands. Groves planted upon moist, rich hammock produce, as a rule, brighter fruit than those upon high, sandy pine lands. This result is commonly attributed to the abundance of moisture in low ground; but it may be more directly due to the denser shade afforded by a more vigorous foliage and reduced radiation from a darker soil. In the native wild groves, which are always densely shaded by forest, neither rust nor mites are found, and the same immunity is enjoyed by cultivated trees planted in similar situations.

Preventive Measures. It is not at present possible to suggest any preventive measures that can be universally adopted, nor are precautions likely to avail much against an enemy which already exists, even if it does not always make its presence known, in almost every grove and nursery in the State.

Those who advocate forest culture for the orange may justly claim for it the advantage of comparative immunity from rust, but a decision on the merits and demerits of this and other systems of cultivation must be left to the horticulturist.

It may, however, be proper to suggest that where isolation is practicable, much can be accomplished toward the exclusion of such pests as the rust mite and the scale insects by properly arranged natural screens. Narrow belts of original forest, with its undergrowth, may be left at least on the southeast side of the grove, or, on high land, the tall pines may be supplemented by hedge-rows of the native holly, the jujube, or other evergreen shrubs which thrive upon uplands in the South.

Such wind-breaks not only protect the bearing trees and

fruit from the whipping action of southeasterly gales, but afford the best and only hindrance to the spread of mites and bark lice, prohibiting their direct importation upon spiders and other insects through whose aid they are disseminated.

Application of Insecticides. As the rust mite lives exposed upon the surface of the plant, neither inhabiting a gall nor making any protective covering for itself or young, it is not a difficult matter to reach it with insecticides thoroughly applied. The adult mites are very delicate, and readily succumb to applications of moderate strength; but the eggs possess much greater vitality, and require for their destruction solutions of great penetrating power. The immature mites, while undergoing their transformation, are also difficult to kill, and appear to be specially protected by the old skin, within which their changes take place.

These three stages, the adult, the molting young, and the egg, exist simultaneously at all seasons of the year. The development of the mite has been shown to be very rapid; the eggs hatch in four or five days, the time extending rarely, in winter, to two weeks. Molting takes place in seven to ten days, and lasts two days. Eggs are probably laid in a few days after the molt.

In applying remedies it follows from these *data* that if the mites alone are killed and their eggs left alive, young mites reappear immediately; adults are found in ten or twelve days, and fresh eggs are deposited within two weeks. If the molting mites are also left alive very little good can be accomplished, as a fresh crop of adult mites and eggs will be produced in two or three days.

In combating the rust mites the difficulty in killing the eggs compels us to adopt one of two alternatives. We must either use powerful insecticides, in solutions even

stronger than are required for scale insects, or else make several applications of washes competent to kill the mites only. In this way the trees may be freed of mites, by killing the young as they hatch, and not allowing any to reach the adult stage and produce a fresh crop of eggs.

The following substances have been tried and their effects noticed upon the mites and their eggs:

Whale-oil Soap. The action of this substance upon the mites is peculiar; a trace of it in solution causes them to relinquish their hold upon the leaf. All other liquids that have been tried, even if they kill the mites, increase the tenacity with which they cling to its surface. All the free* mites are at once removed from leaves dipped in a solution of one pound to one hundred gallons of water. Stronger solutions are, however, required to kill them or their eggs and the dormant (molting) young.

The following experiments made in the laboratory upon infested leaves show the action of solutions of various strength. In order to retain the mites upon the leaves the liquids were beaten into foam, which was spread evenly upon both surfaces, care being taken to wet every part of the leaf:

Solution: One pound to five gallons. Adult mites all killed; molting mites apparently all dead. Eggs evidently affected, not all killed, but many collapsed by the second day.

Solution: One pound to one gallon. (This solution is nearly solid when cold.) Mites all killed. On the second day all the eggs appeared collapsed and dead.

The whale-oil soap usually supplied by dealers is inferior to that used in the above experiments. As an effective remedy for rust mite a solution of one pound to five

*This term includes adults and young not dormant or undergoing transformation.

gallons of water may be recommended. It should be applied in early spring before the new growth begins. Two or three applications will be required, which should be made at intervals of one week. The cost of the wash, at the ordinary retail price for the soap (ten cents per pound), is two cents per gallon.

Very weak solutions may be made effective if used at frequent short intervals, but the labor and expense of making the numerous applications required will be very great.

A solution of one pound to a gallon will not injure the trees but may cause the blossoms to drop. No directions can be given as to the greatest strength of solutions that can be used upon blooming trees without loss of fruit, as this depends largely upon the condition of the tree. Solutions of one pound to ten gallons can probably be safely used in most cases, and will be effective if several applications are made at intervals of a few days.

Sulphur. The mites, both adult and young, are very sensitive to sulphur, and are killed by it in any form in which it can be made to act upon them. The eggs, however, are not readily affected, and even survive an exposure to the fumes, which will kill the plant. Fumigation can not be resorted to without extreme danger to the life and health of the tree. The finely powdered (sublimed) flowers of sulphur does not affect the plant; it adheres more readily than might be supposed to the smooth surfaces of the leaves, and especially when they are roughened by the mites; it is not entirely washed away by heavy rains. Although it does not kill the eggs, it effectually exterminates the free mites, which are sure to come in contact with it in their wanderings, and if it can be made to remain upon the plant, the young, as they are hatched out, are also destroyed.

Flowers of sulphur must, therefore, be regarded as one of the cheapest and most effective remedies for rust mite, and it may be used to great advantage in connection with whale-oil soap and other insecticides. It may be suspended in water and applied in spray. With proper appliance the dry powder may be sifted or blown upon the foliage when wet with dew or rain. A little wheat flour added to the powder would increase its adhesiveness.

CHAPTER XIII.

GATHERING AND PACKING.

It is a proud and happy day to the orange grower when he gathers in the first golden herald of the good time coming, and thus receives the glad assurance that the reward of his years of toil and patience are close at hand—that the night is past, and the dawn of prosperity is near.

It is not every one who knows how to gather and pack his crop so that it will reach its distant market in good order, and yet this point is so important that, if not properly understood, it matters not how full a crop the tree may yield, since the fruit will yield no profit but rather loss, for freight must be paid whether the fruit will sell for enough to cover it or not.

This matter of proper shipping is a rock on which many a goodly barque, sailing out into the world with fair hopes and prospects, becomes an utter wreck. And the worst of it is that such shipwreck as this, at the last moment, is caused almost invariably by culpable carelessness on the part of the owner of the fruit, whether he does the work of picking and packing with his own hands, or trusts it to hired help who have no interest in the well-being of the crop or its ultimate fate.

As soon as the oranges begin to show by their yellow tinge here and there that ripening has commenced, the trees should be examined every two or three days, and all specked or defective fruit taken off, the ripest first. This serves two purposes: first, such fruit is always the earliest to ripen, and if carefully handled and shipped it will pay well to send it forward while the market is comparatively empty; second, the removal of such defective fruit, which

will only get worse if left on the tree, will benefit the fruit remaining.

Step-ladders are usually employed in gathering such oranges as can not be reached from the ground, as it is almost impossible to find a secure resting place for an ordinary ladder, and besides it is constantly catching on side limbs. Better, however, as well as cheaper than either, is another sort of ladder, which may easily be made by any one out of materials nearly always to be found "lying around loose" on the farm. The steps are made of strips three inches wide, about fourteen long, nailed at proper distances apart, on a plank two inches thick and from six to eight inches wide, the last strip resting on the ground as a base.

This simple ladder is easily handled and rests securely on a limb where the ordinary ladders would shake back and forth, while the projecting side pieces or steps serve a useful purpose when it is desired to hang the bag or sack of the picker on them.

This bag, its mouth held open by an oval piece of wire, should not be too deep nor too large; if the former, the first oranges picked are apt to be bruised in dropping; if the latter, the bag will interfere with the picker's movements, and will become too heavily weighted to be carried with ease, no matter how broad the band that secures it around his shoulders.

The orange should never be pulled from the stem, as this rude severing almost invariably tears the skin and "plugs" the fruit, which is then unfit to be shipped, since it will surely rot on the way and damage the whole box.

A sharp knife or small shears are the proper things to use, and the stem should be so clipped that from one eighth to one quarter of an inch remains on the orange until cured, when it will drop off.

If the oranges are of different varieties each kind should be carefully kept by itself.

As soon as a cart load has been picked they should be hauled away to the packing-house; and if this is any distance from the grove, or if the road, though short, is rough, moss should be placed at the top and sides of the cart to avoid bruising the fruit, for the orange, when just "under ripe," as it usually is and should be when picked, is plump and solid; the skin is composed largely of water, and if its tiny cells are bruised and broken, decay at once sets in.

Every shipper should have a house or room set apart for curing and packing the fruit. There are two methods of preparing it for shipment, of which the old method, which is termed "sweating," would seem the very worst treatment to which it could be subjected, and we believe it to be so, and to have caused the loss of thousands of dollars to Florida orange growers.

As we have said, the skin of the newly plucked orange contains a great deal of water, and before packing it for shipment we want to get rid of this surplus element of decay. In order to accomplish this desirable result it used to be the universal custom, and one that is still too much in vogue, to put the oranges in a large heap and cover them with blankets, leaving them thus for several days, until they had undergone a sweat, a number being rotted and crushed by the process, and the inevitable germs of decay generated in many others. Those that appear sound after this ordeal are spread out for a day to dry, and then shipped, almost invariably to be reported, "arrived in bad condition."

Who can wonder? They have been coaxed and encouraged to decay before their journey was commenced, by having their tender skins heated, steeped in moisture, and their cells crushed by pressure.

A far more sensible plan of curing oranges and lemons is that adopted by the more progressive growers. Around the walls of a well-ventilated room or house shelves should be made, as deep as one's arm can conveniently reach across, the first shelf about two feet from the floor, and the others about one foot apart. These shelves should be composed of narrow slats two inches apart, their edges carefully rounded off to avoid bruising the fruit, and one of the slats placed on edge at the front to prevent the fruit from rolling off. When different varieties are to be gathered, separate shelves should be set apart for each kind, the name being placed in a conspicuous position, that there may be no mistakes made.

The oranges should be gathered on a clear, dry day, after the dew has dried off of them, and arranged carefully on the shelves, one tier deep only, and not pressing against each other. Here they remain from four to six days, or longer if desired; when the skin feels dry and firm they are ready for sorting and packing.

No one who has ever tried the drying process as above, will any longer feel a doubt as to its infinite superiority over the old method of "sweating."

The last method toughens the skin by evaporating, in a quiet, natural way, the watery fluid.

The sweating causes a heating, fermenting action, totally opposed to nature, that expands the cells of the skin and at once starts a decay, which very often does not appear outwardly until the orange is many miles on its way to market, and thus the fruit arrives in bad condition, very likely does not even pay expenses, and then the grower tears his hair, and more than half the time blames the transportation companies (who have sins enough of their own to carry) for what is entirely due to his own ill-advised treatment of his luscious fruit.

A plump orange, in good order, as when picked from the tree, may be laid away in a dry, well-ventilated place, and will keep good for months, in perfect condition, its skin finally shriveling and hardening, yet the fruit remaining juicy and sweet; but place alongside of it one that has passed through the sweating process, and very soon it will soften and become a decomposed mass of pulp. We have tried both processes and "know whereof we speak," as do hundreds of others. In the light of this new process of curing oranges the old method of "sweating" will quickly become obsolete, and when all our growers awake to this truth, and also to the fact that our golden fruit can be kept for months in perfect order for shipment, if only proper care is taken in gathering and handling, so that no bruise shall start decay before the the aqueous fluids have evaporated, when they awake to these things then will thousands of dollars be saved to them annually.

Impress on all who are employed in gathering the fruit that now, when it is plump and full of moisture, the least fall or blow will be the signal of decay. An orange will bear five times as hard usage after drying as when fresh from the tree.

The operations of sorting and packing are, as we have intimated elsewhere, of so vital an importance to the grower, as affecting his profit or loss on his entire crop, that if he is unable to perform them with his own hands, he should at least attend to them personally, and keep his eyes wide open.

Oranges of one kind and one size should go in one box; not all sizes mixed together, as we have often seen.

After being assorted, not only with regard to size, but also as to bright or rusty or half rusty, each orange should be wrapped in a square of the manilla paper that comes prepared for the purpose, already cut, in graded sizes for

wrapping the various grades of oranges. This paper can usually be obtained from the nearest store, but always at Jacksonville, as can also the boxes for packing. These last contain two cubic feet, inside measurement, with a middle division. They are delivered to the purchaser unmade, the various pieces being put up in bundles, ready for nailing together.

In making these up, one side, rather than the top, should be left off for greater convenience in packing the fruit, which should be in layers close together, so they will not shake about. The top layer should project from a half inch to an inch above the box, so that when the side is nailed on, it will press down firmly, tighten the whole box, and prevent jarring, even after the fruit has shrunk, as it will inevitably before reaching a distant market.

Be extremely careful to throw aside every specked or defective orange; two or three in a box may ruin the whole lot.

Let the oranges in every box be, as nearly as possible, of uniform size, color, and texture.

The number of oranges should always be plainly marked on the box, and each shipper should have his own stencil brand, by which his fruit may be known at a glance.

When he has made a reputation for good packing and a uniform quality of fruit, as marked on the boxes, he will then find no difficulty in obtaining the best prices for his crop, as his brand will be sought for and picked out by those who are willing to pay for honest fruit.

It would be useless to attempt to give here the proper marks for the various grades of oranges, as these are often changed, and personal inquiry at the time of shipping will elicit all necessary information on this point.

We earnestly recommend the newly created "Florida Fruit Exchange" to every shipper, as, if properly supported by them, it must result in a vast increase in the net results of shipments to those who have heretofore been wholly at the mercy of irresponsible commission men, and without redress for the false returns too frequently made.

Several methods of packing oranges away, so that they will keep in perfect condition for months, have recently proved successful, thereby enabling the grower to hold his fruit, if he chooses, for the highest prices late in the season, or even in midsummer.

One of these is to pack the fruit in thoroughly dry sand, making sure that they do not touch each other; another, to pack in dry sawdust; and another, in cotton seed.

Still others have buried the fruit in the sand, under a rain-proof shelter, and found them perfect after six months or more.

These are facts to be well heeded when the market is glutted, or prices for any reason not satisfactory, and above all, when (if ever again) comes the warning from the Signal Service office of "severe cold" approaching.

In the recent almost unprecedented cold wave that swept over our fair State, while this work was in press, hundreds of thousands of oranges were lost upon the trees that might have been saved had their owners realized the danger, and been marketed months later.

CHAPTER XIV.

ABOUT VARIETIES.

In selecting the best varieties of orange trees for a grove there is need for the exercise of sound judgment. Some oranges ripen early, others late in the season. The fruit of some trees is large, of others, small; of some, rough-skinned, of others, smooth.

The point is to select such as will come into market at the best time, and such as will present the most attractive appearance.

The first object may be attained by planting a number of the earliest and latest ripening varieties, that may be placed on the market just at the time other oranges are scarce, and therefore bringing the highest prices. The second point is met by having the fruit of medium size, or rather over medium size, and the skin smooth.

A grove of trees, one third earliest, one third medium, and one third of the latest maturing sorts, will bring in to its owner much larger profits than one where the trees have been selected hap-hazard, without any regard to the two important points just mentioned.

The first among early oranges is

BEACH'S NO. 1.

This is a very sweet fruit, of a rich, high flavor; it is nearly round, and has a very dark orange-color skin; it stands shipping finely, and has no equal as an early orange. Time of ripening, from September 15th to October 1st.

BEACH'S NO. 2

Is above medium size, rather pear-shaped; eating qualities same as above; is a fine shipper. Ripens November 1st.

CHARLEY BROWN

Is of excellent quality; a strong, rapid grower; nearly thornless; greatly flattened at stem and blossom ends; circumference very large. Ripens in October and November.

ST. MICHAEL.

A fine, delicate-flavored fruit, pear-shaped, of a pale yellow color; thin skin and medium size; one of the earliest to fruit from budding; is very prolific, so much so as in many cases to dwarf the tree. Ripens in October and November.

BEACH'S NO. 3

Has a peculiar, tender pulp; pleasant acid when ripe; a favorite sort; size, medium; color, light orange; shape, flat from stem to blossom end; a fine shipper. Ripens in December.

Extract from the report of the Pomological Committee of the Florida Fruit Growers' Association for 1878: After comparing and testing, in the most thorough and impartial manner, a large number of varieties, your committee feel warranted in recommending for general cultivation the following: Homosassa, Magnum Bonum, and Nonpariel.

HOMOSASSA.

Size, medium; somewhat flattened; very heavy; color, bright; skin remarkably tough and dense, but one of the thinnest; pulp fine, sweet, vinous flavor.

MAGNUM BONUM.

Size, large to very large; flattened; color, light orange; skin, smooth and glossy; pulp, tender and melting, sweet and vinous; fruit, very juicy and heavy.

NONPARIEL.

Size, above medium; rather flattened; color, true orange; pulp, tender and juicy; flavor, sub-acid and vinous.

NAVEL.

This peculiar orange is also known in Florida as the Umbilical, Bahia, Embiguo, and Seedless orange.

It is well to know that there are two distinct varieties of the Navel orange; one was imported into California from Australia, the other was brought from Bahia by the Department of Agriculture at Washington.

The latter is in every respect the superior, and in California is known as the Riverside or Washington Navel; the former is called the Australian Navel.

The Navel, Bahia, etc., of Florida, is identical with the Riverside Navel.

The tree is not very thorny, and is a good grower and early bearer, frequently bearing fruit the second year after budding, even on small stocks. Size, large to very large; color, dark orange; has a protuberance on the blossom end, hence its name and trade-mark; stem inserted in a shallow-ribbed cavity with deep lines; skin, smooth and glossy; pulp, melting and tender; juice, sweet, sprightly and aromatic; first quality. Ripens in January.

TANGIERINE. *Citrus nobilis*

This is the general name of a peculiar type of orange, which is well known as the kid-glove species. Some bot-

anists regard it as a distinct species, while others contend that it is merely a marked variety of the sweet orange.

MANDARIN.

This is a very beautiful tree, distinguished by its small lanciolate leaves and slender flexible branches, which cause it to resemble the weeping willow in appearance; is rather dwarfish, and of a formal habit of growth; the flowers are volute, and smaller than those of the sweet orange.

The first fruit is small, flattened; skin of a deep saffron color, and so loosely attached to the rind that it may be pulled away, and the pulp, which is very aromatic and pleasant, may be eaten without soiling one's gloves; hence the popular name of this type of orange.

CHINA,

Or, as it is sometimes called, the *Willow-leafed orange*, or St. Michael's Tangierine. Tree dwarf, with willow-like foliage; remarkably hardy. A very ornamental and desirable species; the fruit is small, flattened; skin thin and of a deep yellow; loosely adhered; pulp, dark orange color, spicy and aromatic.

MORAGNE'S TANGIERINE.

Tree largest of its family; size and foliage more nearly resembling the sweet orange; fruit large, flattened, of a deep crimson color; skin adhering lightly to pulp; juice sweet and aromatic.

BIJOU,

Or, as it is often called, Dancy's Tangierine. This is a seedling of the Moragne Tangierine, and resembles it closely, except that the fruit is of superior quality. The tree is a strong, upright grower.

SATSUMA.*

This is another of the kid-glove oranges only recently introduced, and is destined to take high rank as a table and dessert fruit. It was brought to Florida from the island of Kimbin, Japan, in 1874 and in 1878, and takes its name from one of the chief cities of that island. The tree is thornless, the leaves peculiarly thick, lanciolate, medium size, petiole linear.

The fruit is medium size, flattened; skin, deep orange color, smooth and thin, easily detached; pulp, dark orange; segments part freely, fine grain, tender, sweet, and delicious; best in quality of the kid-glove family.

This tree has one quality which will render it a valuable acquisition to our list of oranges—it is remarkably hardy. During the cold winter of 1880 the cold wave of December 25th, which injured so many trees in the northern and central portions of Florida, the Satsuma stood unharmed. On Fort George Island, near the mouth of the St. John's River, where the Satsuma was first planted on Florida soil, lemons, limes, and shaddocks suffered in fruit and limb; sweet oranges lost their leaves and young tender growth, while the Satsumas, close by their side, did not suffer in the least, either in fruit, leaf, or branch, the leaf not even turning yellow or dropping; and in January, 1881, the same experience was repeated.

SPICE.

Another of the kid-glove oranges, introduced into the State by Col. Codrington, editor of the *Florida Agriculturist*, from seed planted nine years ago; hence is yet rare.

*For some unexplained reason the Satsuma does not thrive when budded on sour orange stock, hence it should never be used, a slow, stunted growth resulting. Always bud the Satsuma on the sweet orange, grape fruit, lime, or lemon stock, the former two only, however, in the more northern sections of the State.

It has a small, thick leaf, rather larger than the Tangierine, and in smell strongly aromatic; fruit grows in clusters; is small; of a rich, red color. "The prettiest orange we have," says Col. Codrington, "and if cut in bunches and shipped North before Christmas, would command high prices for decorating trees and churches.

During the severe cold that has so recently (January, 1886) visited this State, the Tangierine family have proven themselves almost frost-proof in the following order: Spice, Satsuma, Bijou, Mandarin. The fruit of the Satsuma not being injured.

This closes the list of kid-glove or Tangierine varieties, which are all favorite market varieties, and figure largely at balls and public banquets.

And now we come to the latest ripening varieties.

BEACH'S NO. 5

Is the largest orange grown in the State; pear-shaped; skin smooth; dark orange color; pulp, tender and sweet; fine shipper; tree very prolific; is the only orange that makes a full crop every year. Ripens in February, when it blooms again for next crop.

ACIS.

One of the finest late varieties; of large size and very fine quality; tree a very strong grower.

HART'S TARDIFF,

Or *Hart's late*, as it is sometimes called; skin smooth, with deep pits; color, pale yellow; sometimes seedless, at others has from one to five seeds; pulp, sweet, juicy, with a brisk racy flavor. Ripens late in January, and will keep in perfect order on the tree till July or August. A good fruit for market.

PHILLIPS' BITTER SWEET.

Fruit large; skin thin; pulp tender, juicy, and sub-acid; slightly bitter and aromatic; an excellent summer fruit; the tree is thornless; is a hybrid between the sweet and sour orange. Every grove should have a few trees.

MALTESE BLOOD.

Fruit large, sweet, juicy and seedless; takes its name from the peculiar color of the pulp, which is blood-red in flakes when half ripe, but entirely so when ripe. A favorite fruit; the tree is thornless.

There are many other varieties of the orange cultivated in Florida, but these are widely known and highly esteemed, and a wise selection from those we have named will be all-sufficient to secure an ample reward of the golden fruit, although it would doubtless be well to set out a few of each new variety introduced, and thus gradually determine the most valuable.

CHAPTER XV.

MISCELLANEOUS.

In closing our remarks upon the culture of that golden fruit, the orange, we should leave it incomplete did we not gather in a few "odds and ends" of ideas and experiments that are floating about, here and there, in connection with this interesting subject. One of these is the question of "overproduction," which seems to be disturbing the minds of many superficial observers. We say superficial observers advisedly, for those who take a second glance into the matter know such a thing to be impossible.

Orange culture can never be overdone in this country; the markets can never be so glutted as to make the prices obtained unremunerative, if concerted action be used.

And why? Because the extent of country where oranges (and lemons) can be successfully grown is very small compared to the extent of country ready and willing to purchase them.

In the Mediterranean countries you see all the people eating this Queen of Fruits; they have been educated to consider it as a necessity, as a part of their daily food, to be bought in preference to other food if there is not money enough to purchase every thing desired. A beggar will buy oranges and go without meat.

The people of the United States do not yet appreciate the full value and health-giving properties of the orange as an article of food; it is eaten now rather as a luxury than a necessity; but they are just coming to a truer appreciation of its real value, and before long the voice of one of our most eminent physicians, who has said that "if each of his patients would eat an orange before breakfast,

his practice would soon be gone," will be re-echoed all over the land.

There are thousands of persons in the United States who have never seen an orange, and other thousands who never obtain one, except at almost probibitory prices. Some day, as the number of oranges placed on the market increases, these people will be reached, and oranges placed in their hands at the prices for which the more fortunate citizens of our Eastern cities obtain them at present.

It is quite true, as often stated, that thousands upon thousands of orange trees are being planted all over Florida; but it is safe to add that fully one third of those planted will never come to bearing maturity; many will fail from wrong treatment; many will be abandoned by non-persevering owners; and many more will die because they have been planted too far north, and their strength will be exhausted by too frequent frosts.

But even supposing that every tree planted came to maturity and bore its load of golden fruit, and that every foot of ground on that one twentieth part of Florida, which is all that can ever be utilized for orange culture, should bear its dozen oranges, what would all that amount to when divided among the nearly fifty-eight millions of inhabitants of the United States, such being the population of the present year, 1886—a population immense now, and doubling every thirty years? The population will increase almost indefinitely; the year 1940 will witness a population in the United States of more than two hundred millions. But nature has fixed the limit of the orange-bearing belt in the United States, and nature's laws are irrevocable.

The vast markets of the West and the Northwest have never yet received an adequate supply of oranges, the majority of them none at all, and it will be many years before the supply will meet the demand.

Florida oranges are admitted to be superior to any other in the world, and for this reason, although their numbers are yet comparatively few, they occupy the foremost place, and are eagerly sought for at the highest prices. The genial climate of Florida, and a soil peculiarly adapted to the growth of the orange, coupled with the long period of warmth and sunshine, perfect and concentrate its juices without destroying its aromatic flavor.

These advantages, joined with a proximity to the great markets, which allows the fruit to remain on the tree until ripe, gives, and always will give, the first rank to Florida oranges in the United States.

If the orange growers of Europe find it to their advantage to ship their inferior fruit to America, the expenses of freight, commissions, and a tariff (secured by General Sanford, of this State, for the protection of home growers), if, we say, the European growers still reap a good profit, in spite of their drawbacks, what should not the home grower reap, with better fruit, lighter freight, and no tariff?

Those who only see the tempting-looking Mediterranean fruit, as set forth for the inspection of the retail consumer, have a very feeble conception of the real extent of the business, or the frequent losses to the shippers. To those who do know, the wonder is that the foreign growers still persevere in sending their fruit so far to meet with such frequent losses.

Quite often the loss from decay on cargoes from the Mediterranean and the West Indies amounts to fifty, seventy-five, or ninety per cent. In many cases not enough is realized from the cargo to pay the freight. When, however, the cargo arrives in good order, its sale often gives the owners a large profit, and so they keep on, after each reverse hoping for "better luck next time."

Nor would these profits accrue to the foreign orange as often as they do, were it not for a trick of the trade adopted by some dishonest dealers. Knowing the eagerness with which Florida oranges are sought, they select the best looking foreign oranges, usually those from Valencia, in Spain, mark them "Florida," and sell them as such to unsuspecting or ignorant customers.

In New York alone, during the Christmas holidays, over fifty millions of oranges are sold, and nearly all of them are labeled "Florida oranges." A dealer in New York, who largely supplies the Washington and Fulton markets, tells us frankly that all of the best imported fruit is labeled "Florida" to meet the popular demand.

The day is coming, however, when the superior orange of Florida will drive the inferior imported fruits out of the markets, and there will no longer be any temptation to deceive the consumer.

It is quite likely that the prices of Florida oranges, as ruling at present, will fall somewhat in years to come, but they will never fall so low as not to be remunerative. Even supposing that the impossible should become possible, and the United States should find more oranges raised on her soil than she could consume with profit to the grower, there is England ready, as has been proven by actual experiment, to buy our oranges at a higher price than she gives for the sour Mediterranean fruit—a price that yields a handsome profit to the producer; but we shall never, in all probability, have need to seek a foreign market for our oranges.

To further show how preposterous the cry of overproduction is we will ask how it is that, with the immense area of country devoted all the time in the United States, to raising apples, peaches, plums, cherries, there has not long since been overproduction?

So far is this from being the case, and so profitable have these orchards been to their owners, that instead of any overproduction, the people, like Oliver Twist, call for "more, more," and the demand for nursery stock to set out new orchards is considerably on the increase, although in these fruits nearly all the States are competing with each other, and are able to raise their own temperate climate fruits on their own soil.

Overproduction of oranges! when there are just as many people waiting to consume the Queen of Fruits as there are to consume all the apples, pears, and peaches raised on ten thousand times the area.

The question that faces the orange grower is, how to supply the future increasing demand.

Superior varieties of fruit will always bring superior prices; a fruit with a known name and reputation will rank higher than one unnamed.

An experienced orange grower said: "Seedling trees are generally eight to ten years coming into bearing, and no two trees in a grove are sure to produce alike, or of as good a quality. While we only get twenty dollars a thousand for seedling and unnamed varieties, we get from forty to fifty dollars per thousand for our select varieties. The sooner orange growers understand this the better it will be for them."

Even supposing that the price of oranges should drop to ten dollars per thousand, which it is not likely to do for the best qualities, the grower would still realize as follows: Given seventy trees to the acre, and each tree bearing only five hundred oranges, that would be five dollars a tree, or three hundred and fifty dollars per acre; so that a ten-acre grove at these moderate estimates would give an annual income of thirty-five hundred dollars.

Can you find ten acres North that will give so good a

return to the farmer? except, perhaps, a specialty like cranberry raising, for which but little land, comparatively, is available.

Italy has 4,800,000 lemon trees, which now produce 1,200,000,000 lemons per annum, while Florida has not reached the *a b c's* of orange culture, and virtually has not touched lemon growing; yet we hear no complaint that Italy has even reached the "alarming" point of overproduction.

Having, as we trust, laid the ghost of overproduction to rest, the next point for consideration is a method of inducing barren trees to bear, that has only lately come into vogue among our more progressive orange growers, and is still undreamed of by those who prefer the old time-worn grooves. It is not a new method, having been practiced for years past in many places, and upon many kinds of fruit trees, with uniform success.

In all groves or orchards, of whatsoever kind, will be found here and there trees that flourish and grow thriftily, yet bear little or no fruit. These are termed barren trees; and the method we have referred to is designed to produce fruitfulness in these lazy, ne'er-do-wells of the vegetable kingdom.

There are a good many orange trees at the present time, scattered about, which are old enough and thrifty enough, but never bear a crop.

Girdling a non-productive tree in order to retard the flow of sap, and encourage the formation of fruit buds rather than wood, is the method we have mentioned, and though only now coming into extensive use, has been known and practiced by pomologists for the last hundred years.

It is rather curious that we girdle a tree to kill it and girdle it to make it live and be useful. But in the one

case we cut deep through outer and inner bark; in the other we carefully remove a ring of the outer bark only, from one to three eighths of an inch wide, cutting entirely around the tree or branch, if we only desire to try the experiment on the latter. A knife or small saw, with the teeth set wide, will do the work effectually.

There is an apple orchard out West where alternate rows of young, unbearing trees were girdled, and two years after they were loaded to the ground with the finest fruit, while the rows between them, of the same age, not girdled, had not a single apple on them.

This practice of girdling is both rational and effective, and is destined to give the intelligent fruit grower considerable command over his trees.

When early bearing is desired the ring of bark should be removed while the tree is growing, during the previous year. For early ripening and increased size of fruit, girdle just after the fruit has set. Another way of girdling, which we prefer, consists in winding wire two or three times tightly around the tree, so that the return flow of sap will be retarded.

Still another way of inducing barren trees to bear, is to drive into the trunk a circle of nails close together; this has the double effect of girdling the bark sufficiently to retard the sap (which always leads to the formation of fruit), and of introducing into the body of the tree an element which is as needful to vegetable health as it is to human—namely, iron.

Yet another method of producing fruit was discovered in rather an amusing way some years ago. A high tempered man became angered at two of his neighbors, and as they would, in all probability, have objected to his relieving his feelings by beating them, he went into his garden, where stood two thrifty old plum or pear trees that

had never borne fruit. These trees he named as his obnoxious neighbors, and taking up a club, soothed his feelings by giving their tree-namesakes a tremendous drubbing. This was in the summer; the trees did not grow quite as fast as usual, and the next season, for the first time, they bore large crops of fine fruit. Investigation proved that the whipping they had received had bruised the bark so as to retard the flow of sap, just as if they had been girdled.

Girdling orange trees by any of these methods should be done from June to September, when fruit is wanted for the next year; and to make large and early fruit, late in March or early in April.

The China berry tree is said to be a great fertilizer, when planted in the "diamonds" between the orange trees. It profusely drops its foliage, adding a rich humus to the soil. It will abundantly fertilize the soil for a space of thirty or forty feet around it.

From Australia comes a voice that is echoed from many parts of Florida, saying: "We have found, not the remedy, but better still, the preventive for the scale insect." What is it? A tree that has been making considerable stir in the world of late, because of its anti-malarial and draining properties, the Eucalyptus.

It is a well-known fact that insects dislike the smell and taste of this remarkable tree, and it has never been known to be attacked by any of their mischievous race.

Who does not know the peculiar aromatic odor of the Eucalyptus, as from afar the winds waft its perfume? Place some of these trees among your orange trees—the more the better—if your land is inclined to be too moist, and whatever orange trees are near enough to get the benefit of their odor, will be free from insects, even though others around them may be infested with them. This is

especially true as regards the scale insect, which appears to have a very great dislike to the Eucalyptus tree.

It is also claimed that strips of the bark of this tree, tied around the trunks of other trees, will keep insects at bay, just as a few of its leaves scattered about the floor will drive fleas away. These assertions being true, we should judge that a wash made of a strong effusion of Eucalyptus leaves or bark, would be a very effectual weapon wherewith to fight our insect enemies.

The following tables will be found very valuable for reference in measurements:

TABLES OF MEASURES.

Plants and Trees to an Acre.

DISTANCE APART.	NUMBER.	DISTANCE APART.	NUMBER.
6 inches by 6 inches, ..	174,240	13 feet by 13 feet	258
9 " " 9 " ..	77,440	14 " 14 "	223
1 foot by 1 foot, ...	43,560	15 " 15 "	193
1½ feet by 1½ feet,.....	19,360	16 " 16 "	171
2 " 2 "	10,890	17 " 17 "	151
3 " 3 "	4,840	18 " 18 "	135
4 " 4 "	2,722	19 " 19 "	120
5 " 5 "	1,742	20 " 20 "	108
6 " 6 "	1,210	25 " 25 "	69
7 " 7 "	889	30 " 30 "	48
8 " 8 "	680	35 " 35 "	35
9 " 9 "	538	40 " 40 "	27
10 " 10 "	435	50 " 50 "	17
11 " 11 "	360	60 " 60 "	12
12 " 12 "	302	66 " 66 "	10

Boxes for Measures.

A box 19 x 19 inches, 18 inches deep, holds 1 barrel or 3 bushels.
A box 16 x 16 inches, 8⅔ inches deep, holds 1 bushel.
A box 8½ x 8⅔ inches, 8 inches deep, holds 1 peck.
A box 8 x 4 inches, 4⅕ inches deep, holds 1 gallon.
A box 4 x 4 inches, 4⅕ inches deep, holds 1 quart.
A box 48 x 41 inches, 32 inches deep, holds a ton of coal.

Dimensions of One Acre of Land.

A piece of ground 5 yards by 968 yards.
A piece of ground 10 yards by 484 yards.
A piece of ground 20 yards by 242 yards.
A piece of ground 40 yards by 121 yards.
A piece of ground 70 yards by $69\frac{1}{7}$ yards.
A piece of ground 80 yards by $60\frac{1}{2}$ yards.
A piece of ground 60 feet by 726 feet.
A piece of ground 110 feet by 396 feet.
A piece of ground 120 feet by 363 feet.
A piece of ground 220 feet by $197\frac{8}{11}$ feet.
A piece of ground 240 feet by $181\frac{1}{4}$ feet.
A piece of ground 440 feet by 99 feet.

Capacity of Cisterns for each Twelve Inches in Depth.

25 ft.	in diameter	holds	3,672 gal.	9 ft.	in diameter	holds	476 gal.
20	"	"	2,350 "	8	"	"	376 "
15	"	"	1,322 "	7	"	"	288 "
12	"	"	846 "	6	"	"	211 "
10	"	"	587 "	5	"	"	147 "

A measuring cord should be part of the furniture on every farm. To make one, procure sixty-seven feet of strong rope, one inch round; make a loop or fasten a ring or bar at each end, and make these precisely sixty-six feet apart; this is four rods. Then tie a piece of red rag in the center. One acre of ground will be a piece four of the cords (chains) long and two and a half wide, equal to sixteen by ten rods, making one hundred and sixty square rods to one acre. The advantage of the ring or loop is that one person can measure alone by driving a stake in the ground to hold the rope while he stretches it out. The rope should be soaked in tar and dried, which will prevent it from shrinking when wet.

CHAPTER XVI.

LEMON CULTURE.

All that has been said in these pages regarding orange culture will apply equally well to lemons, with a few slight modifications.

One of these differences relates to pruning; as we have seen, the orange tree will admit of considerable lopping off of its branches, and with benefit. The lemon, on the contrary, resents any such meddling with its branches, unless they are dead; then, of course, they must be removed. One single cutting away, especially of the lower branches, that nature intended to shield its trunk from the sun and wind, will put back the tree from one to two years in growth, and seriously affect its vigor and health.

We remember a case in point: A gentleman had one especial lemon tree near his house, and wishing to make it an ornament to his grounds, determined to curb its straggling propensities, and "train it in the way it should go." With knife, saw, and shears, he pruned and lopped until the tree had assumed the desired symmetrical proportions—tall and rounded, its trunk smooth and bare instead of being well nigh hidden by sheltering foliage.

The tree was expected to bear fruit the next season, but it did not; it devoted its energies to replacing its lowermost branches. Carefully they were pinched and pruned away; not a very arduous task was this either, for the growth was weak and slow; then the leaves turned yellow, new shoots were scarce, and the whole tree assumed a sickly appearance.

Still the true cause of the trouble was not even surmised, and once more the limbs were cut back; another

year, two years, and though the tree still lived, that was all it did do; a few weakly blossoms came straggling out, gave a weary, hopeless sigh, and sank to the ground.

Then the owner of the tree resolved to cut it down, root and branch, but the gentle housewife pleaded for its existence; it was near the dwelling, and sickly as it was it gave some needed shelter.

"Very well, then, let it stay; but I'll do nothing more with it. I'll let it alone entirely."

So it was "let alone," and that was the greatest boon that could have been granted that unhappy tree. Slowly and cautiously, as though fearful of attracting attention, and hearing more sharp, cutting remarks on its behavior, it put forth new branches low down on its trunk. They grew on until their drooping leaves shaded it once more; then the top took a start, and all through the season it grew, becoming more and more vigorous. In the spring it set a hundred or more fine lemons, and the next year bore a heavy crop, just because it was "let alone."

Again, while orange groves may be planted with profit on hammock lands, a lemon grove can not. The trees will not flourish at all in the hammocks; we do not know why. No explanation of the cause has ever been given, but the fact remains, even with regard to high hammocks.

The lemon requires a dryer soil than the orange; hence some locations that suit the latter will not answer at all for the former. The quality of the soil, however, is not of so much importance for the lemon tree as it is for the orange, the latter being a grosser feeder. The lemon will grow well and thriftily where its more epicurean sister would languish for want of food.

As a rule, the lemon tree is less hardy than the orange; a degree of cold that does no harm to the latter wilts the young growth of the lemon and causes its leaves to drop.

There are exceptions to this rule, however, as we shall see presently, when we come to note the different varieties.

The culture of the lemon in those of the United States adapted for its growth—Florida, Louisiana, and Southern California—has not yet received the attention due to its national importance; on the contrary, it has been greatly neglected.

This state of affairs is largely due to a prevailing opinion that it is useless to try to compete with the foreign or Mediterranean lemon; and certainly the latter is far superior in quality to the orange from the same localities, a fact abundantly proved by recent statistics, which show an enormous increase in the importations during the last few years, and a corresponding decrease in the amount of oranges brought into this country.

Now, there is no reason whatever why the hundreds of thousands of dollars annually sent out by the United States in exchange for this popular and necessary fruit should not be kept at home, and go to enrich our own citizens rather than foreigners.

The whole trouble has originated, first, in the inexperience of the growers in properly gathering and curing the lemon for market; second, in the general and erroneous impression that the lemon tree is more liable to become diseased than the orange; third, the fact that nearly all seedling lemon trees bear fruit with a rind so bitter and coarse as to be unfit for market; and fourth, in a totally mistaken idea on the part of the growers as to the kind of lemon most popular in the markets.

But latterly, our people have waked up to the importance of the subject, and these old-time rocks in the sea of lemon culture are being at last blown to atoms before the "Hercules powder" of investigation and common-sense.

The first rock—that of the lemons reaching market in bad condition—has been removed. They used to be picked when quite ripe, packed at once, and sent off, to be found almost invariably heated and rotten at their journey's end. But now they may be kept perfectly good for six months or more by proper treatment, and they will improve rather than deteriorate by being so kept.

It is a very simple matter, this preparation of lemons for market, being exactly the same process we have already described as applied to oranges, namely, an avoidance of moisture while curing, by spreading the fruit on well-ventilated shelves, and afterward sorting in grades and wrapping in manilla paper.

But at the outset there is one point of difference, and this it is which is of paramount importance, involving success or failure. The orange will keep well, even if picked when quite ripe; the lemon will not. It must be picked when just commencing to turn yellow, and at least one half of the rind is still green; picked in this condition it should be kept on the drying shelves for at least six or eight weeks.

This is the secret of *curing lemons* successfully, as recommended by a special committee of California citrus-fruit growers, appointed expressly for the purpose of investigating this important subject.

The second rock that has stood in the way of lemon culture in the United States—the idea that the tree is more subject to disease than the orange—doubtless arose from the pioneer trees having been planted on soil too moist for them, under the belief that wherever the orange would flourish, the lemon should do likewise.

As a matter of fact the latter, in suitable locations, outstrips the orange in the rapidity of its growth, even though on much poorer soil; it is even less liable to dis-

ease, and scale insects more rarely attack it. Where an orange tree will bear one thousand oranges, a lemon of the same age will bear from three to five thousand.

It is rather a notable oddity that the first two or three crops, even of the finest varieties, are apt to be coarse and spongy, and totally unlike the after-crops. One might almost imagine the tree to be following the example of the "lords of creation," and "sowing its wild oats" in its youth, before settling down as a staid, demure "dealer in first-class fruits only."

The third rock on which the lemon barque of the United States was erewhile threatened with shipwreck, was the "sporting" tendency of the seedling lemon. But our growers have learned at last not to put their faith in trees of this class, for, after patiently waiting for years, the fruit, in nine cases out of ten, is worthless. The moral of this is, raise no seedling lemons for their fruit; they make good, thrifty stocks, and that is all they are good for.

Bud approved varieties of lemon on lemon, lime, or sweet orange stock; the last is best of all for the colder sections, as it renders the tree more hardy. Never waste time waiting for a seedling lemon to bear, unless you wish to taste of the "Dead Sea Apple."

The mistaken idea as to the popular lemon called for by the public is well set forth (in all good faith, however) by the following extract from a work quite recently published about Florida:

"The tree grows more rapidly, produces fruit sooner, and has larger and better flavored lemons than are found any where else. I have seen and picked lemons of one and a half to two pounds in weight, and at the State fair saw lemons weighing two and a half pounds."

Now, here is the very rock on which many a lemon-

laden barque has gone down. Who wants lemons that weigh from one and a half to two and a half pounds? Not the saloon-keepers, they will not, when sliced, go into their tumblers; not the confectioners, their rind is too coarse and bitter, and the juice too scarce; not the private family, they are too much for one and not enough for two; in fact, no one wants these monsters, and erewhile our growers were striving to see who could produce the largest lemons that would sell the least. Very large lemons are not only rough-skinned, but their centers are hollow and the pulp contains comparatively little juice.

This is why the common Florida lemon is good only for home use; it will not sell in the markets, but is valuable to the growers for family purposes, because it fruits early from the seed, is very prolific, bears constantly, blossoms, ripe and half-grown fruit, and buttons just set, all hanging on the tree together.

Growers are finding out their mistake now as to the right kind of lemons to put on the markets to compete with the foreign fruit. The latter meets the popular want; therefore, in size, aroma, color, texture of the skin, freedom from seeds, and the absence of bitterness in the rind after being a long time in water, in all these points we have our model ready at hand, and it must be followed if we of America would drive out the foreigner.

This same special committee to which we have referred has also pointed out the way to do this; it collected for investigation lemons from all quarters of the globe—Palermo, Messina, Malaga, Sicily, and Spain, California, Mexico, South America, and Florida. The appearance of the fruit, its size, quality of rind, percentage of acidity, bitterness, flavor, and quantity of juice, are the points that were made a basis of comparison.

And this was the result of long and patient examina-

tion: that a lemon weighing, when cured, about three ounces, with a soft, smooth, golden-colored rind, is the favorite in all the great markets, and will sell readily at the highest prices where larger and rougher skinned fruit will scarcely sell at all at any price.

And the directions given, so that this desired quality of fruit may be home-grown, are to discard all trees that after a fair trial continue to show bitterness; to raise no seedling lemons for fruit, and to exercise great care in selecting buds from trees of proved excellence, that are free from bitterness and rich in citric acid.

Some of the budded varieties already introduced in California and Florida were pointed out as well worthy of cultivation, and as already commanding as high a price in the great markets as the best imported lemons.

Of these, Gary's Eureka stands foremost. Of this lemon we are told that it originated from a chance California seedling, and that the original tree, when only seven years old, produced over two thousand lemons, and that many other trees budded from it on orange stock, three years from the bud, are fruiting heavily; and that while the ordinary Sicily lemon brings only ten dollars per thousand in San Francisco, the Eureka brings thirty dollars per thousand. Mr. Gary tells us that he has for years been in search of a truly good lemon, and now he has at last found it, wherefore he cries, "Eureka!"

And now let us pass on to our notice of the different varieties that have been proven worthy of cultivation, and, as we have seen, first and foremost comes the

EUREKA.

The tree is thornless, a strong grower, and an early and prolific bearer; fruit, medium size, rind sweet, no bitterness—a strong, pleasant acid, and seedless.

VILLA FRANCA.

A very fine lemon; tree an early bearer, and more hardy than most lemons. A growing favorite every where.

LEMON OF GENOA.

Introduced from Genoa, Italy. Tree thornless; an early and heavy bearer; fruit medium size; sweet rind; strong, pleasant acid.

SICILY.

Tree a prolific bearer; fruit medium size; very juicy; skin very thin; a good keeper and shipper.

FRENCH'S SEEDLING.

Tree a strong grower, almost thornless; fruit small, rather flattened; skin very thin, tough, and dense; pulp fine, juicy, and highly flavored; fully equal to the imported Sicily.

BIJOU.

This is a superior fruit that has suffered much injustice in this State, owing to the fact that, whether accidentally or otherwise, a lemon really worthless, the Bergamot, has been placed on the market under the name of Bijou, the two being very distinct varieties. The true Bijou is the hardiest among lemon trees, and will bear as much cold, uninjured, as the orange; leaf broad and small; smooth thin skin; very juicy; fine acid. Commences to ripen August 1st.

VARIEGATED.

Strong grower; leaves mottled with white; pale straw color, and several shades of green; very ornamental; fruit smooth, thin-skinned; fine acid; medium size; very superior.

NAPOLEON.

Prolific bearer; fruit medium size; thin rind; very juicy; shape, oblong. Excellent for shipping.

AUGUST.

Tree a rapid, vigorous grower; new growth, deep purple; fruit medium size; smooth, thin skin; fine acid; shape, elongated; a splendid shipper. Ripens August 1st.

BELAIR PREMIUM.

A very fine variety; tree strong and thrifty. Fruit of the best; small size; pleasant acid; smooth, thin skin, without bitterness.

CHAPTER XVII.

OTHER CITRUS FRUITS—LIMES.

Next after the orange and lemon the lime ranks as the most important member of the celebrated citrus family, and the day is not far distant when the hitherto modest lime will step forward and assert itself as the full equal of the lemon.

The production of limes in quantity is one of the latent interests that will spring up in the near future of Florida. The lime tree is an early and prolific bearer, and will bring its owner a revenue more quickly than any other of the citrus fruits.

The lime, which is found scattered over the State, and known as the "Florida lime," is in reality the Mexican lime, and is well worthy of extended culture. It never "sports" like the lemon, but is a quiet, steady-going tree, coming true to its seed always, growing rapidly, and producing abundantly good fruit in poor soil when only three years old.

Wherever the lime is introduced it receives a warm welcome; its acid is more pleasant than that of the lemon; its juice far more abundant in proportion to its size, and, being smaller than the lemon, is highly esteemed; and, in fact, preferred before the latter for hotel, saloon, and culinary uses.

Pickled and preserved limes are justly celebrated, and a jelly made of limes is also delicious.

With all these points in its favor, how is it that comparatively so few limes are planted?

There are two reasons, we are told. First, because the lime tree is the most delicate, as regards cold, of the citrus

family, and is often touched by frosts; second, because the fruit does not ship well; and third, because the prices it brings in market are not as great as those for oranges or lemons.

Granted—the first reason; but the injury done by the cold in South and East Florida is, after all, infrequent, and rarely amounts to more than killing the tender new growth which the lime is ever putting on, regardless of season, drought, or poor soil, and this does not really hurt the tree. It is true that the area of successful growth of the lime is limited; all the better, then, for those who dwell within that area; there is no danger of their enterprise being overdone. Therefore, South and East Florida may pass by this first reason for non-cultivation of the lime as of minor importance to them at least.

Now for the second—"the fruit will not ship well;" we move an amendment: "It *has* not shipped well;" and then we grant this too. But this is not the fault of the fruit any more than that of the sweated orange, which, started on its downward journey by heedless or ignorant hands, reaches its destination in an unsalable condition. This frequently happens, yet we never heard any one say that the "orange will not ship well," nor does any one refuse to set out groves of the same on this account.

The truth is that the lime will ship just as well as its kindred fruit, the lemon, if picked when only a quarter or half ripe, cured on drying shelves, and packed just like oranges and lemons.

But we have never known a single instance where this ordinary care has been taken with the lime. It has never had a fair chance given it to reach its market in good condition. Nor is the absence of the curing process the only trouble, as a prominent grower plainly puts the case:

"Our producers have not selected their fruit. They

have not sent to market only first-class fruit, but have sent instead a heterogeneous collection of large, small, ripe, green, and in some instances, from sheer carelessness, half-rotten fruit. Of course the merchant returned account of sales '*nil.*' I will say, in this connection, that I have just received account sales of my last shipment of limes, returning me, net, seven dollars and forty-five cents per thousand, and written on the margin was, 'Good, well-selected limes looking up.'"

This tells the whole story. Prepare and pack limes properly, that they may be fairly introduced into the great fruit marts, and the convenience of using them, as compared with the large lemons, will soon make them formidable rivals to the latter.

A citric acid manufactory, to take up the "culls" of our lime trees, would be a great boon to this State, and put thousands of dollars in the pockets of the people very speedily, for there is no tedious waiting for ten or twelve years for limes to come into profit. Commencing to bear at the third year from the seed, they rapidly increase in bearing capacity, until, when they are twelve years old, they bear from three to five thousand limes.

Now, suppose one hundred seedling orange trees and one hundred limes to be set out at the same time; at twelve years of age the one hundred orange trees, carefully cultivated and fertilized, will yield little if any income. The one hundred lime trees, much neglected and unfertilized, will be each bearing, say three thousand limes. Suppose they sell for only three dollars per thousand, net; well, here we have an income of nine hundred dollars for the hundred lime trees occupying less than one acre of ground.

The lime tree is of low, bushy habit, and does not so deeply resent trimming up as does the lemon. Tall, upright trees, with smooth, bare trunks, have been shaped

from the lime; but it is better to let nature take her own way, and she intended the lime to be a tall, pyramidal bush, rather than a tree. All that is desirable is to prevent the lower branches from lying on the ground, and to trim out the center so that air and sunshine may reach every part.

In raising seedling limes always select the seed from the largest and most perfect fruit, and the fruit from this is sure to be of the same quality as the parent; a seedling lime destined to bear the best quality shows it at once by the dark color of its new growth. There are only two or three varieties of the lime, and these are the

Tahiti. Strong grower, nearly thornless; very early and heavy bearer; fruit large; strong, rich acid.

Florida. Introduced from Mexico, and known in California as the Mexican. Fruit medium size; skin smooth and thin; juice, acid, rich and abundant.

Sweet or Dulcis. Large, thick-skinned, pulpy; valued only as a variety, and for preserving.

Persian. Lately introduced; a very superior sort. Fruit large, and often exceeds the ordinary lemon in size; juice a very pleasant acid; pulp tender and seedless; bears frost well.

THE CITRON.

The citron, like the lemon and lime, is more susceptible to cold than the orange, and is the least esteemed of the citrus family, with the single exception of the shaddock. The tree is rather dwarfish, attaining the height of eight feet; is erect and irregular in growth, and has many drooping branches, with short thorns.

The fruit is quite large and heavy, and of several varieties and shapes. In Florida but two kinds are extensively known, but in Europe six varieties are cultivated, the common, the flat-fruited, the forbidden-fruited, the round-fruited, and the thick-leaved. In all these sorts there are

two rinds—the outer one thin, with miliary glands, full of a very fragrant oil; the inner thick, white, and fungous. It is for this thick rind only that the citron is valued, it being used extensively in confectionery, both in its candied and "preserved" forms. The United States has always received its supply of candied citron from abroad, as it has been supposed that the fruit, as grown here, could not be as well cured as the foreign grown.

This idea has lately, however, been proved to be incorrect, and now, in San Francisco, we find a wide-awake firm advertising for all the citrons that can be raised in California, and that, too, at good paying rates to the grower.

In Florida some of our energetic house-keepers have been quietly experimenting, and the result has been a better and finer article than the imported candied citron, bringing the highest price whenever placed on the market.

The sooner our people realize that there is money in the citron, the better it will be for them. The fruit is easily prepared for market and is very profitable. The tree is readily propagated from cuttings, which bear fruit in two or three years; it also grows readily from seed. The varieties grown in Florida are the

Orange. Shape round, like an orange; size large; skin pale yellow, rough and glossy; inner skin white, coarse, and thick; a very desirable variety.

Lemon. Shape oblong, like a lemon; size very large, weighing from two to eight pounds; skin light yellow; rough and glossy; inner skin thick, spongy, and aromatic. The best sort for general cultivation.

THE SHADDOCK.

The shaddock is a strong, thrifty grower; its general appearance closely resembles the orange; its leaves, however, are larger, and have a broad-winged petiole, and its

habit of growth is more irregular and spreading; the fruit is very large, and not greatly esteemed, although the sub-acid juice is very refreshing. It ripens in the early winter, and continues on the tree in good condition until May and June. Varieties are:

Mammoth. Fruit very large; skin smooth, glossy, pale yellow; rind thick, spongy, and bitter; pulp green, watery, and sub-acid.

Blood. Resembles the mammoth in all respects except that the pulp is red, and the flavor of juice more delicate.

Grape Fruit or Pomolo. This fruit is held by some to be a distinct species, but it is no doubt a variety of the shaddock, and the most esteemed. Fruit is pale yellow, small compared to the other varieties of the shaddock; skin smooth, rather thin; pulp sub-acid and very refreshing, with a decided grape flavor; hence its most popular name. It is rapidly coming into favor in the Northern markets; many prefer it to the orange.

CHAPTER XVIII.

PINE-APPLES.

Next in importance to the culture of oranges and lemons in Florida, and destined to rival even these fruits in the future, comes the pine-apple, most fragrant of all fruits, and second to none in delicious flavor.

This industry, like those just mentioned, is still in its infancy here, and consequently there are many conflicting opinions as to the best soils and modes of culture.

From a mass of opinions on this subject we have endeavored to sift out facts, and to recommend a mode of culture which may be relied on as safe to follow, and reasonably certain to lead to success.

One writer on pine-apple culture tells us that "the best soil for them is new, rich land, closely underlaid with clay;" another says, "the soil should be very rich, and is better to be all clay," while others recommend rich hammock land.

Now, all this may be true in certain places and latitudes, but it is not true in Florida, as a rule. Pine land gives the best result in every instance upon record, and it needs but little fertilizing either.

It is a mistake to suppose the pine-apple needs a very rich soil to do its best; it is a plant that wants only moderate food, and is easily surfeited, and its growth actually retarded by too much fertilizing: and in this fact lies the secret of the failure of nearly all who have not succeeded in raising this delicious fruit successfully.

Rarely, indeed, is the man who set out his pine-apple plantation on rich hammock land found extending it—at least not on the same soil—while, whenever a patch has

been started on pine land, and moderately cared for, you will find the owner preparing to plant more and more in sheer delight at the "treasure trove" he has discovered at his feet. Even the poorest pine land, moderately fertilized, with a yellow subsoil close to the surface, has been proved to give better plants and larger fruits than rich hammock lands adjoining.

Another mistake, that is not made so frequently as it used to be, was setting the plants on moist land. The pine-apple is closely allied to air plants, and therefore is not only a moderate feeder, but also a moderate drinker; its long, narrow leaves draw no small share of its required nutriment and moisture from the air, leaving the roots little to do.

Pine-apples, unlike most other fruits, are not propagated from the seed, for it is a singular fact that not more than one fruit in a million of the cultivated varieties contains a single seed; hence, if compelled to depend on seeds for their increase, we should be badly off indeed. When seeds are found they are regarded as great treasures, and carefully planted; for from this source only can new varieties be obtained; sometimes they prove valuable, more times not.

The pine-apple plant, like the banana, bears fruit but once and then dies down; if the old root is left in the ground, suckers rise up from the base of the leaves near the ground. As soon as these attain a sufficient size, the root should be raised and cut, with one sucker to each piece, and these pieces set where they are to stay.

At the top of the fruit is a crest of leaves called the crown, and surrounding this, at its base, are other tufts called crownlets; while at the base of the fruit itself, surmounting the stem upon which it grows, are still other offsets termed slips. Upon the stalk which bears the pine

are "eyes," which, treated like grape cuttings, are also used to increase rare varieties.

From these sources—suckers, crowns, crownlets, slips, and eyes—pine-apples are easily and abundantly propagated, and these are usually sought after in the order named, from the idea that suckers fruit first, crowns next, and so on.

This too, however, has been shown to be an erroneous impression; the fact is, that the size of the plant alone governs its fruiting. Given a large sucker and a small slip, and keep them growing equally fast, then, of course, the sucker will fruit first, the slip last; but reverse these conditions, take a large slip and a small sucker, and the slip will be the first to yield up its luscious treasure.

It is of no advantage to send to a nursery or elsewhere for ready-rooted plants. Get as large sized plants as you can to start with, but any roots that they may have before coming into your possession you may count as *nil.*

Pine-apple rootlets are of so tender and perishable a nature that even if they survive transplanting, they will be longer in reviving and going to work again than new roots will be in forming and taking hold; consequently, rooted plants are no *desideratum.*

It is a very easy matter to root suckers, crowns, crownlets, and slips after you have them on the ground ready for planting, and it is better to start them on their rootward journey before setting them out in their permanent places.

As a preliminary, carefully pull off the overlapping leaves at the base for an inch or half inch, according to the size of the offsets; this will facilitate the rooting process; then make a bed of damp moss, keep it damp, and place them, base downward, in it, just as you would place

them in the ground when planting; cover them with more moss, not damp, and place them in a shady spot.

After they have lain thus a week or two examine them, and plant those that have sent forth slender white rootlets a half inch or more in length; some will take several weeks longer than others to do this, but it is best to wait their time before setting them out, and they will grow off more surely and thrifty by this method than by any other.

Some planters recommend leaving the offsets exposed to the sun for weeks or even months to facilitate rooting; but while the plants will really root under this heroic treatment, it is at the expense of their ultimate thrift, and the rooting in the damp moss and in the shade is by far a better plan, and one that makes a certainty of the after well-being of every offset; not one will be lost by this method.

But no matter how the plants are rooted, it is necessary to see that after being set out they do not lack moisture until thoroughly established—a period that will be known by a wider opening of the offset in the center, and new leaves appearing there; after that they may be mulched when the soil is moist, and left to take care of themselves, so far as moisture is concerned.

In preparing ground for a pine-apple plantation, parallel lines three feet apart should be laid off, and a compost of well-rotted stable manure and muck, or leaves, or muck and bone-meal spread in along these lines for a width of about eighteen inches and a depth of one foot.

The trenches thus prepared should be settled by one or more heavy rains before setting out the plants. The latter should be placed two feet apart, not closer, to insure each plant plenty of room; too close planting will, of a surety, stunt both plant and fruit.

In the West Indies and Bahamas, the growers plant close to keep down the weeds, and they succeed admirably in keeping down the fruit also. They plant from twenty thousand to twenty-five thousand on an acre; this is why we see so much small and inferior fruit thrown on the American markets.

Planted as the experience of our leading Florida growers recommend, as given above, an acre will contain, say six thousand five hundred plants; these, at twenty-five cents for each fruit, will bring their owners the respectable sum of one thousand six hundred and twenty-five dollars—no mean showing as the earnings of one acre of ground; and in addition to this amount of hard cash must be added its representative in the shape of the suckers, crownlets, and slips that remain after the fruit is ready for market, enough to set out two or three acres of land.

Sometimes fruit is obtained in twenty months, oftener in two years, and sometimes not for three or more from the setting out of the offsets; it all depends on the care they receive, and, above all, on their proper protection from frost.

Pine-apples once started need little care, almost none if the ground about them is heavily mulched; they should be mulched to keep down weeds, this latter being the extent of their requirements after being properly prepared at the outset. Some growers prefer frequent cultivation with hoe or harrow instead of mulching; it is as yet an open question as to which mode is preferable. Soil and location must decide this matter in individual cases. The question of frost protection is a most important one to the Florida grower, for the plant is essentially tropical, and the least frost injures it more or less; a light frost only kills the leaves, and if the plant is not near fruiting this injury will only diminish its size and retard the fruiting season.

But let the plant be large and well on toward the fruiting time, and then if the leaves are killed the fruit will be small and unmarketable, while if water should be standing in the little cup formed by the center leaves, when a sharp frost sufficient to freeze the water chances that way, woe to the plant itself; its tender life currents will be so chilled and shocked as never more to grow, and the plant will droop and die, to be replaced by feeble suckers.

But there is no need that such mishaps should occur with a careful planter; a slight protection will insure the safety of the pine-apple in sections where frost sometimes occurs.

While the plants are small a couple of sticks—shingles are convenient for making them—stuck down so that their tops meet above the plant, with a handful of the long gray moss so abundant in the hammocks—which, by the way, is no moss at all, but belongs to the pine-apple family, and is an air-plant—dropped over them, is all-sufficient.

When they become too large for this, two ten- or twelve-inch boards, nailed together at a right angle, and then placed over the plant like an inverted trough, afford an excellent shelter. If the boards are not over ten feet long, one man can easily lift them into position on the approach of a threatening night, for it is at night that the Florida frosts nearly always occur.

Another method of protection is to drive down low stakes among the pine-apples, to lay small scantling or rails from stake to stake, and on these pile brush, corn-stalks, any thing that will serve as a shelter; cloths or bagging are also often stretched over the protecting frame-work, and these, though a little expensive at the outset, are really economical in the end, since the one expense serves for season after season, while brush must be collected and removed each year.

Yet another way of protecting pine-apples, and, in fact, any plant from frost, is to make ready here and there, especially to the north and west of the plantation, small piles of heavy timber, with light-wood knots ready for kindling on the approach of frost. Plenty of leaves and dampened brush should also be at hand to cast on the blaze when once fairly started, so as to make a "smudge fire"—that is, one that will give out a sufficient heat while not burning away freely or clearly, the more smoke, the better.

The cold winds that sweep Florida once or twice in ordinary winters invariably come from the northwest, and in arranging these protecting "smudge fires," this should be held in mind, and the cold winds made useful by wafting the warmest air just where it is wanted.

Although, as we have seen, new varieties can only be obtained from those very rare jewels, pine-apple seeds, and not more than one in a hundred of these is of any value, yet by long years of patience and perseverance a number of varieties have been secured. Of these the following have been introduced and successfully cultivated in Florida; doubtless others will follow:

SPANISH.

This pine-apple has a bewildering number of aliases, as follows: "The Red Spanish," "Red Pine," because of the reddish tint of its leaves and bloom; "Black Spanish" and "Black Jamaica," because in certain stages of its growth the fruit is very dark, almost black; and last, "Commercial Pine," because of its fine shipping qualities, which cause it to rank high in a commercial point of view.

This plant fruits sooner than the Sugar-loaf, and bears a greater degree of cold without injury, and also grows more thrifty on poor land, but the quality of its fruit is not so good. The latter drawback, however, is not con-

sidered of much importance in its commercial value, and the Spanish to-day is the favorite pine-apple with the "large" Florida planter.

SUGAR-LOAF.

This is a superior fruit, fragrant and delicious in flavor, but inferior in size to the Spanish, and for this reason not so generally cultivated for market. The Egyptian Queen or Trinidad, and the smooth-leaved Cayenne are fine varieties, the fruit of the former being considered superior to the Sugar-loaf, while the large fruit and the smooth leaves of the Cayenne makes it a very desirable sort to cultivate; one of the drawbacks to pine-apple culture being the torn clothes and flesh that are apt to follow quick or careless movements among its prickly leaves.

In the Azores where, as in Florida, freezing winds sometimes sweep over the islands, pine-apple culture is one of the great staples, and vast conservatories are built on purpose to preserve the fruiting plants from the uncertainties of the climate.

Fruiting plants, we repeat—for there is a distinction made between plants too small and those large enough to bear fruit—the former are left in the open ground to take their chances as best they may, until they are nearly ready to fruit, then they are carefully taken up and placed in the conservatory, where the whole energies of the gardener are devoted to the task of coaxing out of them the largest and finest pine-apples possible.

This plant, as we have seen, does not fruit at any given time of year, but according to its size: and it is a point with Azorians to place their best fruit in the London market during the Christmas festivities and the height of the "season." They have found a method of making their plants fruit at the proper time by constant attention, to

hurry their growth, or none at all, to retard it. Sometimes they even resort to the heroic treatment of sacrificing the bloom, so as to induce the immediate starting of the suckers that always appear at the blooming season, ready to grow off rapidly and bear fruit on their own account at a more suitable season than that essayed by their parents, whose career was, as we have seen, "nipped in the bud."

Great care is taken in handling and packing the fruit, so that it may reach its market in full perfection. Choice specimens, frequently weighing twelve to fifteen pounds, are cut with the stem several inches below the fruit; then an ordinary flower-pot, or even a tin can is filled with mold, and the stalk inserted in the latter in such a manner that it looks as though it were grown there; each pine thus prepared is placed in a wooden skeleton case, just large enough to hold it, the pine being first wrapped in paper; in this way it can be transported without risk of injury. Extra choice fruit, such as we have described, is frequently sold in London for from twelve to fifteen dollars each, but usually the best prices obtained are from four to five dollars each.

The Florida grower has not the incentive of such extraordinary prices for his pines, but still there is profit enough even in the American markets, to induce careful culture and packing; and, therefore, he would do well to follow the example of the Azorian grower.

Pine-apples, growing as they do on a tall stem, must naturally, as they grow large and heavy, incline to one side or other, and finally, if not prevented, will lie prostrate among the leaves or on the ground, exposed on the one side to rot from undue moisture, on the other to sun-scorch from the direct rays of the sun falling on it while moist with dew or rain. The pine-apple stalk should, therefore, be secured to a stake to keep the fruit upright.

In its wild state, when the ripe fruit falls over in this manner, the several crownlets and slips at the base of crown and fruit send down tendrils and take root; and then, thus established in life on their own account, they become detached from the parent fruit. It is by this method that large tracts of country become run over with pine-apples in a very short time; in the wild state, moreover, they ripen but once a year.

When pine-apples are nearly ripe, and unusually wet weather sets in, it is well, if possible, to shelter the fruit from excess of moisture, as the latter, at this stage of growth, is likely to cause blackness and acidity at the center.

It has also been noticed that when the long leaves of the plant are drawn up around the pine, it colors better and ripens more evenly.

CHAPTER XIX.

GUAVAS AND BANANAS.

The guava is one of those fruits which, introduced and acclimated in Florida some years back, is not yet fully appreciated at its proper commercial value. Year by year, however, the guava is winning its way to the front rank of Florida fruits, and it only needs the establishment of guava-jelly factories to give an immense impetus to the planting of this valuable fruit, the chief drawback to its extended culture thus far having been its perishable nature, its skin and general texture being much like that of a pear, only that it is more juicy, and in transit this juice is apt to be pressed out.

But no energetic person, as we shall presently see, need wait for the establishment of neighboring factories for making jelly of the fruit he raises, for it can be made at home, and the large profit therefrom accruing be placed directly in his own pocket. Or, if he is so circumstanced as not to be able to do this, there has lately been opened a way to ship his fruit without danger of loss in transit, and that is simply by drying it, just as any other fruit is dried. There are small family fruit evaporators now in the market that can be procured at a cost of only a few dollars, but as it is not every one who can afford even these few dollars, or who can conveniently procure the evaporators, even when the money to do so is forthcoming, we give below the plan of a home-made evaporator, which can be made by any one of ordinary intelligence. This will be found useful, not only for guavas but for all other fruits that one may wish to preserve by this method.

Three things are requisite—a hogshead; a long, narrow

box, twenty inches deep and wide, and about six feet in length, such as is used for shipping tall nursery trees, and a small stove.

The hogshead is placed on end and a door sawed out of the side to admit the stove; a hole eighteen inches square is then made in the top of the hogshead to allow the heat from the stove to pass up into the box, which is stood upright over the hole, the lower end being knocked out, and is carefully fitted down on the hogshead, so that none of the ascending heat shall escape. A hole, surrounded by tin, is made in the side of the hogshead, opposite the stove, through which to pass the stove-pipe, so that none of the smoke can ascend into the box.

That which would be the lid of the box if it were on the ground, is fitted on hinges so as to open like a door, thus giving easy access to the interior, which is fitted with open sliding shelves, resting on cleats about three inches apart, one above the other. These shelves should be of wood, with numerous small holes perforated in them, or better still, of stout galvanized wire netting.

Place the fruit to be dried, cut in strips, on these shelves, close the door, which must fit as tightly as possible, keep up a gentle fire in the stove, and in ten or twelve hours you will have as sweet a dried fruit as you ever tasted, and the cheapest, too, by far, but perhaps not the handsomest looking.

Guavas dried in this way can be preserved for home use all through the non-bearing season, or shipped to jelly or marmalade factories without risk, and at a much less expense as regards freight than if the ripe fruit were shipped in its natural state.

Guavas, if well cultivated and moderately fertilized, bear fruit in eighteen months from the seed; they are also easily raised from layers or slips.

The guava is usually less a tree than a broad, straggling bush, although sometimes trimmed up into tree-shape, and in the more southern parts of Florida it grows so large that it becomes a veritable tree, with branches stout enough to support a person climbing among them, like an apple tree.

Over considerably more than half the State, however, the "common guava" attains the height and shape of a large bush only, from twelve to fifteen feet high, because, unless carefully protected, it is apt to be killed back by frosts; but even when this mishap does occur the roots are not injured. Very often the main branches are also unhurt and the plant at once puts forth an amazing amount of energetic growth, and in a few months replaces all it has lost, losing but one season's crop.

It is a common saying among growers that "if only one crop in three years is secured it pays well to raise guavas;" but there is no reason why a crop should not be secured every year, the guava being naturally a constant and heavy bearer.

In setting out guavas where liable to frost, it is best to place them in rows twelve feet apart each way; this gives them plenty of room, and yet is close enough to render it easy to protect them from frost by driving down stakes here and there along the rows, as close as possible to the main body of the plants on each side, and then nailing to these, long, slender slats, in such a manner that the outlying branches will be pressed inward in a compact mass. The stakes should be high enough to permit a covering of moss or pine boughs to be laid across the top, from side to side, supported by cross-slats here and there. This top cover is very important, as it is the heavy dew that falls on frosty nights, succeeded by the hot rays of the morning sun, that makes all the trouble. To prevent this cold dew and hot sun from touching his tender plants is the one object of the Florida grower's winter protection.

Another method of cheating "Jack Frost" of his prey is to have ready piles of wood, the bulk of it trash, that will make plenty of smoke to the north and west, since the hurtful winds always come from these directions. Then, when a frosty night is expected, the fires should be kindled and kept "smudged," so that they will burn slowly, yet sufficiently, until dawn.

If neither of these precautions can be taken, the next best way is to throw earth around their trunks, as high as possible, and let it remain thus until the end of January, and in unusually severe winters even later; then, if the upper branches are "nipped," enough is saved for another vigorous starting point. But the guava is well worth a great deal more trouble and expense in affording it winter protection than is required by any of the methods we have named.

There are more guavas being set out this year than ever before. Those who do not care to make their fruit into jelly can either dry it for shipping, as we have seen, or else sell it in neighboring towns, where there is always a demand for it at from one dollar to two dollars a bushel; and even at the latter rate it is very easy to see how profitable a fruit the guava is when an acre contains over two hundred plants, yielding each, at three years old (if not killed by frosts), nearly a bushel of fruit.

Popularly there are supposed to be three distinct varieties of the common guava cultivated in Florida, all of them large, averaging five to six ounces, but some specimens reaching eight and nine, or more rarely even ten ounces.

One of these varieties has a bright pink flesh, another yellow, and the third and favorite, white. The skin of all is green when unripe, yellow when matured, and all resemble pears in shape.

But these three apparent varieties are in reality the same; take the seeds of one sort, plant them and the fruit will not come true only to the kind planted; some will have yellow flesh, some white, some pink, thus proving that the varieties are identical.

The guava scorns the longest drought, and responds generously to good culture and plenty of food. It needs no pruning except an occasional pinching off of the end of a limb that has grown inordinately long without branching, and a cutting off or layering (for another plant) of such limbs as lie on the ground. The guava is a thrifty grower, not stopping to rest even during the cooler months, and this is why its young growth is so liable to be killed by frost.

Recently there have been introduced into Florida two varieties of guavas that are frost-proof, and hence are destined to be extensively planted as soon as known. The fruit is similar in shape to the common guava, though much smaller, but the bush bears no resemblance at all to its commoner brethren.

The leaf of the latter is rather large, pea-green, lanceolate, and ribbed; the new growth being slightly tinged with pink. The frost-proof guavas are more compact and slower in growth: their leaves are small, thick, shiny, and dark green, more like those of a camellia or daphne than those of a guava.

One of these is the "Cattley guava," so named after Mr. Cattley, who was the first to introduce it into English hot-houses, from its native land, Brazil. The fruit, claret-colored, is not as large as an English walnut, but its lack of size is made up in quality and quantity, its flavor being far superior to that of the ordinary guava, and making a more delicate jelly, while the bush is extremely prolific, an eighteen months' old plant sometimes bearing nearly five hundred guavas.

The other frost-proof guava resembles the Cattley, except that the fruit is about twice as large, and is yellow. Both of these guavas have a decided strawberry flavor. The last mentioned is sometimes called the "yellow guava," but the true name is "Chinese guava."

These two varieties are scarce as yet, but this is a fault that will mend as time goes on. The grower who plants these need have no fear of frosts, and his yearly profits will be assured without the necessity of winter protection, except in rare cases, as they will survive a temperature of 26°.

In selecting seed for planting guavas, and, indeed, any other fruit, sow only those from the best specimens to be obtained. This simple precaution will assure vigorous plants and superior fruit.

The guava, as a home fruit, is extremely valuable, taking the place of the peach in the North, to a great extent, and continuing to ripen from the middle or end of July until the beginning or middle of November, according to the season. The frost-proof guavas are not unfrequently found in bloom all the year around, and this is also the case with the common guava, in localities removed from the influence of cool weather. None of the guavas bear all their blooms at one time and then are done for the year, as is the case with the peach, apple, and kindred fruits. The early spring bloom is, of course, that of the main crop, but ripe fruit and new scattering buds may be seen all through the season on the bush and stem. The various modes of preparing this and other fruits for the table and commercial purposes will be fully treated of in our concluding chapter.

THE BANANA.

This favorite fruit is susceptible of cultivation only in a much more limited area than any of the other Florida

fruits, for the reason that it, like the pine-apple, is a true child of the tropics, and can not endure the least touch of frost uninjured; but, unlike the pine-apple, it is not so readily sheltered, owing to its tall nature. In the more southern portions of Florida, especially along the coasts, the raising of bananas for market has become quite an important industry, and even much further north in the State, where occasional frosts catch the plants and kill them to the roots, they are raised in no inconsiderable quantities, and when one remembers the amount of fruit they bear, in proportion to the ground they occupy and the care they receive, it is no wonder that they should be planted wherever there is the least chance of their perfecting their fruit.

Besides their food value (they are very nutritious, and act favorably on the liver), bananas are general favorites simply as fruit, and we rarely meet with a person who is not fond of them; therefore, wherever they have any chance of reaching maturity, the Floridian sets out his banana plants, many or few, according to circumstances.

North of the twenty-ninth degree they are killed to the ground almost every winter; south of the twenty-seventh they are seldom touched by frost; while in the intermediate latitude they do well, rarely losing more than their leaves.

The banana likes a rich, warm soil—sandy loam is the best; it does well on moderately moist land, but better on dry, if kept mulched.

In setting out a plantation of bananas, the young plants should be placed in rows eight feet apart, and nine feet apart in the rows, so set that each plant will be opposite the center of the vacant space in the next row. By pursuing this plan they will shelter each other, and yet will not ward off the rays of the sun, of which they can not have too much;

and, moreover, a consideration not to be despised, their broad leaves will furnish just the amount of shade required by garden vegetables during midsummer, and the fertilizers and cultivation applied to the latter will also benefit the bananas.

In preparing for the plants holes three feet wide and two feet deep should be dug, and a rich compost of rotted leaves, muck, and manure, or commercial fertilizers, placed in the bottom of the hole, and the rest mixed with the soil that is packed around the roots.

A mistake our Florida planters usually make is, in not setting the banana deep enough in the ground. The hole, as we have said, should be two feet deep, and if the plant to be set should not be large enough to permit this depth to be filled in around it at once, then the earth should be packed in as far as possible, and the rest filled in gradually as the banana grows upward. In other words, the banana plant, to do its best, must be set at least two feet below the surface of the ground.

When fifteen months old the banana, if it has no drawbacks, will put forth, from the center of the stem at the top, a curious shaped bloom, that just appears, pointing upward from amid the broad leaves, and then droops outward and downward at the end of a stout stalk. The bloom looks much like a fat ear of corn with red husks. These latter lift slowly up, one after the other, as though hinged at the top, revealing the strange, odd-looking "fingers" of bananas, ranged symmetrically beneath them. Each leaf of the husk drops off after it has done its duty in protecting the young fruit from the sun for a day or two, and the next in order of descent raises the lid from its row of fruit.

The same red husks, brighter inside than out, are just the shape of the popular, long, shell-shaped pickle dishes,

and retain their stiffness for days; and, holding a cupful of water, they make really beautiful bouquet-holders, that the eye can not tell from the finest Japanese red lacquer ware.

The number of fingers in a cluster of bananas varies greatly, according to the variety of the plant or richness of the soil. The Horse banana, which is most commonly cultivated in Florida, bears from twenty to sixty bananas in fingers or rows of eight to ten. They are usually large, and, when suffered to remain on the plant till nearly ripe, are as fine in flavor as one need wish, but when cut green are apt to be insipid.

Another banana, Hart's Choice, is superior to the Horse banana in every respect. Both of these varieties will stand a greater degree of cold than any others of their race, and the fruit of each is yellow when ripe, but these are the only main points of resemblance.

Hart's Choice, a native of the Bahamas, is stout of stem and does not break down beneath the weight of its fruit in a gale, as the Horse banana frequently does. It blossoms early, and in warm weather the fruit may be cut in ninety days thereafter. The other variety is often from one hundred to one hundred and twenty days in ripening. Hart's Choice bears from fifty to one hundred bananas in a cluster. The fruit is four inches long and one and a half in diameter, with a clear, golden-yellow skin, slim as a kid glove; the flesh is firm, yet melting and buttery, sweet and highly aromatic, but not musky like so many of the banana tribe.

There is no finer banana than this in the world, and Florida owes a debt of gratitude to Mr. E. H. Hart, of Federal Point, whose twelve years' patient efforts and experiments led at last to the discovery of the "Hart's Choice" banana, or, as some of our nurserymen have chosen to call it, "Golden Early."

Sooner or later, for it varies greatly as to time, the banana plant will send up suckers from its roots, which in due time are to take its place; for the banana, like the pine-apple, bears fruit but once, and then, if not cut down when the latter is removed, it will soon fall prone on the ground. The best plan is to chop it up (an easy matter) in small pieces, and bury them near the growing plant, as the decaying leaves and stems of a banana plantation furnish it with no small amount of fertilizing material.

The banana will often send up from five to ten suckers, and these should not all be allowed to remain; if they are the result will be small, stunted plants and fruit. Two are enough to leave with the parent plant; the others should be transplanted when about three feet high.

It is a fact not generally known or noted, that from transplanted suckers no great results in fruit will be obtained. The planter must look for the heaviest fruiting to those stalks that have come up from the parent root and have never been disturbed. Heavy mulching during the summer months will be found of great utility.

CHAPTER XX.

THE SMALL FRUITS—STRAWBERRIES.

Only a few years ago the idea of raising strawberries in Florida for profit, or indeed, even for home use, with any measure of success, was scouted at as chimerical; though why it should have been so is difficult to tell, since they love a warm sun, a light soil, and abundant moisture, and all these they can find with ease in Florida.

That it should have been questioned whether there would be profit in the crop for export purposes is not to be wondered at. There is no fruit that requires more careful handling nor more rapid transportation to market than this delicious berry, of which it has been quaintly said: "Doubtless God could have made a better berry, but he never did." And until very recently these essential points were lacking in our midst.

In the face of many discouragements, no little ridicule, and utter ignorance of the proper berries to select for the best results in a climate and soil new to them, a few enterprising settlers, here and there over the State, set out small plats of strawberry plants for domestic use.

The first trials were sufficient to dispel the illusion that Florida soil would not raise strawberries to perfection, and further experiments, intelligently and perseveringly conducted, have demonstrated the fact that Florida's soil and climate are particularly adapted to their culture, and that this is destined to become one of the largest sources of income.

For several years past those sections accessible by rail, and therefore having the advantage of rapid transit, have shipped large quantities of strawberries to Northern and

Western markets, at an immense profit to the growers. And now, month by month, these facilities for shipping are increasing and extending; the railroads and their water connections are reaching out their stalwart arms and embracing the whole State, while several of these roads are already running refrigerator cars for the benefit of those who raise the more perishable fruits, among which the strawberry stands foremost.

Of course all varieties are not suited to light, sandy soils, nor will all pass successfully through our long summer season. Locality influences this fruit more than any other one cause; therefore, a plant that will bear large, luscious berries in a cool climate and clay soil, will naturally become stunted and bear smaller, less delicate-tasted berries under the opposite conditions.

It was probably some such mistake as this that at first created the impression that it was "no use to try to raise strawberries in Florida." But our people are wiser now about this, as well as many other things of kindred nature. Here, there, every where, at all points where rapid transport is at hand, acres upon acres of this delicious berry have been planted, bringing golden return to their owners, and constantly the acreage devoted to this crop is on the increase; it is larger now (in the spring of 1886) than it was last year, and next year it will be larger still. The man who properly plants and cares for one acre will set out five, ten, twenty acres the following season.

And no wonder; for the returns from this fruit, put upon the market at a time of year impossible to any but a Floridian, are something enormous. From one thousand to two thousand dollars per acre are not infrequently made, and sometimes more, with a favorable season and the plants in full bearing; even the first crop often yields from five hundred to eight hundred dollars.

Before proceeding to tell "how to do it," let us quote a few well-authenticated *data* of profits, carefully collected from the fortunate, or more properly speaking, enterprising recipients, for the special purpose of proving the commercial standing of the strawberry in Florida.

One lady reports from one eighth of an acre pine land, set out and tended by herself, fertilized with a compost of cow manure, ashes, and forest leaves, scattered broadcast, the plants not mulched or their roots disturbed during the blooming season, a yield of four hundred quarts, which were sold on the spot at prices varying from seventy-five to fifteen cents a quart, making a return at the rate of six hundred and forty dollars an acre.

Another cultivator, from the same space, on pine land, no fertilizer, picked three hundred and twenty quarts, and sold them at home for twenty cents a quart.

A shipment of one thousand and fifty quarts of strawberries from Jacksonville to New York, in a refrigerator car, gave a return of two thousand six hundred and thirty dollars, being sold at two dollars and a half a quart. The expense of picking and shipping was two hundred and eighty-three dollars, leaving a clear profit of two thousand three hundred and forty-six dollars.

From Gadsden and Clay counties comes the report of from six to eight thousand quarts raised on one acre; not once or twice, but many times; and others can do as well.

We have now given enough examples to establish our claim that the strawberry is destined to become one of Florida's most valuable crops, particularly in the more central countries, from Sumter northward.

We would not, however, have our readers infer that the above figures or their close approximate are invariable; it is, however, safe to count on a profit, year in and year out, of from at least two hundred to three hundred dollars per acre. This is a very low estimate.

The variety of berry planted, the mode of culture, amount of fertilization, supply of moisture, and time of ripening all influence the result. And now let us pass on to the *modus operandi.*

Strawberries love moisture, not too much but enough, and continuously supplied; hence, in selecting ground for their cultivation, choose always a low spot, but not by any means a wet spot, or one not susceptible of drainage; dry soil on top with moisture near enough to the surface to feed the down-reaching rootlets that are ever crying out for "water, water, more water," is what this berry wants and must have to thrive.

A level piece of land, with clay from eighteen inches to two feet below the surface, would be a good selection. When shelter from the north and west winds can be procured, it will be found an advantage, as these are the winds that whip out foliage and dry off moisture.

If no such spot offers, a full measure of success can not be had, unless artificial irrigation can be supplied, and as a matter of fact, in all cases where a large acreage is planted this should be given, either by means of a windmill or ram; this latter is comparatively inexpensive, and in many locations entirely practicable; and in other cases, again, where a lake or pond is at hand, standing on more elevated land than the strawberry field, a simple aqueduct or pipe line would furnish all the water needed.

The proper location selected, the next step is to clear the ground thoroughly of all roots and trash, and plow, harrow, and rake until it is smooth and level. Next lay off the beds for the plants; if in the field, for culture by horse power, mark them three feet apart; if a small garden patch only, for hand culture, eighteen inches between the rows will be ample.

Many consider the "hill" system superior to any other;

by this method the beds are made four feet wide, and the plants set out in three rows, one in the center, the others fifteen inches from it on either side, and the plants fifteen inches apart in the rows. The finest obtainable fruit is said to be secured by this mode of planting, but it requires hand culture in the beds themselves, though between them the cultivator can be used. Strong, thrifty plants in the "hill" protect each other, as the close foliage shades roots and berries.

For field culture in Florida, however, we believe the narrow row, which is also called the "hill" system, and more correctly so than the above, to be the most satisfactory in all respects. Mark off the rows as before, three feet apart, or two and a half if preferred; now, throw down upon them a liberal supply of well-rotted compost, muck, stable or cow manure (do not allow sticks or stubble), and either spade or plow it in at least a foot deep; do not make the mistake of treating the strawberry as a surface feeder; its roots, if they can find food, will go down two feet or more, as they love to do in their search for water, and spread very little on the surface.

If none of the home manures named can be had (they are to be preferred for turning under because retentive of moisture), use some good commercial fertilizer instead, and don't be afraid of it either.

The plants in the narrow row should be set in singe line, ten or twelve inches apart; if in good soil, one year's growth will make a continous line of green.

The cultivator will keep the soil clean and mellow, and leave very little to be done by hand; what there is can be readily done by a simple little iron instrument, readily made by the local blacksmith, in shape thus, T; fasten this to a wooden rake or hoe-handle, and it will be found a most excellent implement for the purpose, as it can be used flat

to scrape the surface, or, turned perpendicularly, can be thrust deeply between and close to the plants with scarcely any disturbance, yet, by a side twist, drag out the most obstinate weeds when deep among their roots.

By this system of planting, the ground is as fully occupied as it should be; each plant receives the proper share of attention, the berries are open to light and air on all sides, and the mulching, which is now considered indispensable to good culture, is easily applied.

There is no doubt that a thick mulch around the plants does exercise a very great influence on their thriftiness; it keeps the land evenly moist, not wet one day and dry the next to the detriment of the surface roots; it protects the fruit from injury by heavy rains, keeps it out of the dirt, and, to a great extent, prevents the growth of weeds.

So important is this mulching considered by the strawberry growers around Charleston, S. C., that they willingly pay one dollar a bale for pine straw, the collection of which, for this purpose, has become a regular business, and use thirty bales to the acre, covering almost the entire ground. They claim that the expense is amply reimbursed, not only in the increased yield of the plants, but in the saving of expense in keeping down the weeds. The Florida grower has plenty of pine straw at hand, free of cost, save that of gathering; wire-grass or leaves would answer the same purpose, though more liable to be disturbed by the winds.

And now a few words as to the proper mode of setting out the plants; this is a very important point, apparently very simple, yet it is very seldom done as it should be. The well-known horticulturist, E. P. Roe, speaks feelingly on this subject as follows:

"We may secure good plants of the best varieties, but if we do not set them out properly the chances are against our success, unless the weather is very favorable. So much

depends on a right start in life, even in a strawberry bed. There are no abtruse difficulties in properly imbedding a plant. One would think, if a workman gave five minutes' thought and observation to the subject, he would know exactly how to do it; if one used his head as well as his hands it would be perfectly obvious that a plant set with its roots spread out, so that the fresh, moist earth could come in contact with each fiber, would stand a far better chance than one set out any other way. And yet, in spite of all I can say or do, I have never been able to prevent very many of my plants from being set too deeply, so that the crown and tender leaves were covered and smothered with earth, or not deep enough, thus leaving some of the roots exposed. Many others bury the roots in a long, tangled bunch; others hastily scoop out a shallow hole, in which the roots are placed in the form of a half circle, with the roots which should be down in the cool, moist depths of the soil turned up toward or to the very surface."

And yet, as Mr. Roe further remarks, "It is almost as easy to set out a plant properly as otherwise," and the results are certainly very different.

Here is the right way to plant a strawberry. Make a hole deep enough to put the roots, spread out in a fan-like circle, down for their full length into the soil, holding the plant in the left hand; fill in with the right hand, pressing firmly around the roots; when the soil is even with the surface, press with both hands as close to the plant as possible, putting on your full weight until the crown is just even with the surface; if you can pull the plant up again by taking hold of the leaves, you have not made it as firm as it should be.

This method may seem hard and slow, but once it is learned it can be done very quickly. The negro women around Norfolk, Va., frequently set between two and

three thousand plants a day, and do it properly, too. Always plant in moist, freshly-stirred ground, free from lumps or trash.

If the roots, on receipt of your plants, are found to be sour, black, or moldy, and this often happens if they have journeyed far, wash them in clean, lukewarm water, and carefully trim off the shriveled ends; let them lie in water for a few hours. After they are set out, sprinkle a handful of fine bone-meal, if you have it, close around the plants, water them liberally, soaking the ground, and mulch heavily.

Unless the weather be cloudy for several days, at and after the time of setting out, shade must be supplied—palmetto leaves are excellent for this purpose—placed almost horizontally so as to shelter thoroughly from the sun; in lieu of palmetto, even a handful of grass dropped on the crown of the plant is better than nothing.

Do not allow the runners to grow until after the fruiting season is over; if you do, the plants will be less thrifty, the berries smaller, and less in quantity. But after the fruit is all gathered, then let the runners run; if there are any vacant spaces in the rows put down some, so the gaps will be filled, and this is all that needs to be done, so say some of our Florida cultivators, until the time for transplanting or setting out comes round again.

"Let the weeds grow as they will during the summer season, they will shelter the strawberry plants from the sun, and they will be found all right when you come to cut down and weed out the trash in October."

And that there is some truth in this statement we have proved in our own garden; plants utterly hidden from May to September were found to be thrifty and green when summoned from their retirement.

Another plan, highly recommended by those who have

tried it, is to dispense with the mulch after the crop is in, and instead to sow a row of cow-peas, some short, bushy variety, between the rows, and chop them down when the peas are nearly ripe, leaving the roots undisturbed; the foliage thus cut is to be left on the ground to shade and enrich it, while the cow-pea roots will at once go to work to make good their loss, and by the time setting and cultivation come around again, a second lot of foliage is ready to be cut and used as a mulch for the fruiting plants; by this simple, inexpensive method the ground is greatly enriched, the rows and straggling runners shaded during the summer, and a large supply of mulching grown on the spot without the labor or expense of hauling it.

It is not necessary, as once supposed, to make a new bed each year; a strawberry field, if well fertilized and cultivated, may, with profit, occupy the same ground for three or four years, and sometimes more.

The best time to set out the plants in our State is from the middle of September to the middle of November, but October is preferred as the month *par excellence*. Good, strong plants will begin to bear in January, and keep on, more or less, until May or June; the main Florida crop is gathered during February, March, and April; the shipping season frequently lasting over seventy days.

Remember that the strawberry is a gross feeder, it is a great drinker, a confirmed toper, but it is just as great an epicure.

A celebrated grower of small fruits thus tells how to fertilize this plant:

"Use all you think you can afford, then shut your eyes and put on as much more, and it will pay every time."

As to the best fertilizers to use: this depends so much upon the character of the soil in different localities that the wisest plan is to make local inquiries, and find out who

has succeeded and who has failed, and what fertilizers were used. Stable manure, if free from stubble, is considered one of the very best foods for the strawberry; also cow-chips and muck, the latter applied with more active material. Bone dust, cotton-seed meal, and wood ashes are also of great value; and here is something vouched for by good authority as being splendidly effective:

"Fill a half hogshead with water, and put into it one quarter of a pound of ammonia, and the same amount of niter. When the plants are blossoming sprinkle them with this solution at evening, twice a week, until the fruit is nearly full size. The result will be double the amount of fruit."

Never use lime or land plaster, as they are poisonous to the strawberry. Do not forget this.

And now as to the varieties best suited to our soil and climate.

Upon this point there is a wide diversity of opinion, owing, doubtless, to the difference in culture and soil in the several localities, which, as we have seen, exercise a powerful influence on the strawberry, both in quality and quantity of fruit.

We would advise every one intending to embark in strawberry culture to set aside a small piece of ground for experiment, and to plant therein a dozen plants or more of every variety that seems desirable or likely to prove profitable; a couple of years' culture will show which to retain and which to reject.

At present the leading market variety is undoubtedly the celebrated Charleston berry, Neunan's Prolific; this is a medium sized, aromatic berry, firm and sub-acid, and a great bearer. At the same time we believe that there are others which will eventually be recognized as superior.

The Federal Point or Little Giant is a very fine, large

berry, and either is or has become "a native of the country;" it bears well, ships well, and in flavor is superior to the Neunan berry.

With many growers the Crescent seedling is growing rapidly in favor, and deservedly so. This is a very distinct and remarkable variety; its average size does not much exceed that of the famous old market berry, the Wilson, and its flavor is about the same. Its blossoms are, however, imperfect, and a perfect flowered variety should be set in every eighth row. It is extremely productive, and has a really wonderful capacity for thriving on poor, thin land, and under almost all circumstances and in any soil; it cares nothing whether its home be in the cold clay of Canada or the warm sand of Florida. Practically it is the cosmopolitan berry. A yield of over five thousand quarts to the acre is not uncommon, even with slight fertilizing, and the bright scarlet berries are very handsome, attracting quick sales.

The chief fault of the Crescent seedling is that the berries are apt to be too soft for a long journey by rail, unless carried in refrigerator cars, as, in fact, all strawberries ought to be.

We might go on indefinitely suggesting varieties as worthy of at least a trial, but the truth is that every berry which has been proven to do well on light, sandy soil, and to resist summer heat and drought—and these are many—should be tested carefully by the Florida grower who desires to attain the best possible results, and consequently the largest profits.

Remember always that it is only the best fruit that brings the best prices, and that there is a right way and a wrong way in picking and packing, as in every thing else; and this latter part of the business is of so much importance that though all the rest may be done properly, and

the finest berries obtained, yet if this, the closing operation, is carelessly performed, all the previous work is thrown away, and a report of "arrived in bad condition, not salable," will be the ultimate result.

Never pick the berries when they are wet; always gather them when they are half or two thirds colored, and, if possible, leave an inch, or better still, two inches of the stem attached to the fruit, they will keep fresh and firm much longer.

Inspect every berry yourself, don't trust this important work to others or you will deservedly suffer for it; there will most certainly be some fruit too ripe to pack, and if not thrown out great injury will result to the rest.

Pack in neat strawberry boxes, not loosely, but so as to prevent shaking about; and you will find it pays to place the top layer stems downward, so as to show the bright red color of the berry to best advantage.

Ship always by the quickest route, and, wherever possible, in refrigerator cars or boxes.

In order to find how many plants are required to set an acre at any given distance apart, multiply the width by the breadth in feet, and see how many times this number is contained in 43,560, which is the number of square feet in an acre. For example, plants set 1 x 3 feet, each plant would occupy three square feet; therefore, by dividing 3 into 43,560 the number required would be given.

BLACKBERRIES.

Why this luscious berry has not already come more "to the fore" in Florida we are unable to see, except on the well-known principle, that "we always overlook our nearest blessings."

The blackberry grows wild in abundance here, as it does in almost if not quite every State in the Union; and just

because it is so wide-spread a blessing it meets with less consideration than it deserves. Only a few years ago it was regarded in this country, as it still is abroad, merely as a bramble. Of late, however, attempts have been made to originate "prize berries" by planting the seed, but so far Dame Nature has the best of it, as all the finest varieties now in cultivation are from chance seedlings found growing wild.

For instance, the well-known Kittatinny blackberry was found in the mountains in Warren County, N. J.; its fruit is large, very large under good culture, sweet, rich, and melting, but, like all its race, hard and sour when eaten prematurely.

For home use they should not be picked until fully ripe, but if they are to be shipped then gather them when half ripe, and pack with the same care bestowed upon strawberries.

There are two species of blackberries, out of the hundred and fifty scattered over the world, that have furnished all our best varieties for cultivation; these are the *Rubus villosus* or High Blackberry, and *Rubus canadensis* or Dewberry. Both of these are found in Florida, and both are worthy of close attention, and wherever fine bushes are found they should be carefully transplanted and cultivated; they should, however, be in a dormant state when moved, and if this precaution be taken there will be very little danger of the plants dying, as they will stand a great deal of hard treatment.

The soil should be light, mellow, moist, and not over rich; the same manures recommended for the strawberry are suitable for the blackberry, but the quantity should be less; too rich soil will produce a rank growth of canes, but lessen the quantity of fruit.

The rows should be seven or eight feet apart for field

culture, six feet for garden, and the plants three feet apart in the rows.

If the ground is not very fertile the young plants will need a start, which can best be given by scattering a compost containing muck down the furrows in which they are planted. They should have support, to do their best, and an inexpensive method of giving it is by the use of posts and wire; by this system they can be grown in one bushy row, shading and supporting each other.

The canes often shoot up five or six feet high, and this should be prevented by pinching off the ends of the shoots; this checks the upward tendency and forces side branches, which are the fruit bearers.

RASPBERRIES.

This is a fruit as yet new to Florida, but we believe that some varieties can be profitably raised, and we urge upon our readers careful and persevering experiments in this direction.

Like the strawberries, raspberries require moisture and cool manures; muck, sweetened by lime, is one of the best fertilizers for this splendid berry, but, unlike the strawberry, it does well in partial shade, although it does not require it.

As a rule, the black-cap varieties do better in light soils than the red, but there are some of the latter that appear to flourish equally well in sandy loam as in heavier lands; foremost among these stands the Cuthbert, a very fine, red berry, and one especially adapted for trial here.

Let every fruit grower try a few raspberries of different varieties, requesting some prominent nurseryman to select for him such as are worth the experiment in our soil and climate. Be assured he will not regret it.

CHAPTER XXI.

OLIVES AND PECANS—OLIVES.

The olive is a low-branching evergreen tree, reaching a height of from twenty to thirty feet; its leaves are stiff and narrow, of a light or bluish green; its blossoms appear on the wood grown the previous year, in June, July, or August; the fruit is a berried drupe, oblong, rather small, of a yellowish green color, but when fully ripe turning black.

A native of Greece, it became naturalized centuries ago in Spain, Italy, the South of France, Morocco, and kindred climates; in fact, the whole basin of the Mediterranean, from the thirty-fifth to the forty-third degree of latitude, is one great belt of olive trees.

This, like the orange tree, attains literally to a "green old age." In the valley of the cascade of Marmora, there is a plantation over two miles in extent of very old trees, supposed to be the identical ones mentioned by Pliny as growing there in the first century of the Christian era.

In Palestine, here and there, are olive trees estimated to be two thousand years old, and some of these, although their trunks are hollow and like an empty shell, bear bountiful crops; one, a few years ago, yielded two hundred and forty quarts of oil.

It is a common saying in Italy, "If you want to leave a lasting inheritance to your children's children, plant an olive."

The olive has been successfully cultivated in California for a number of years; and if in California, why not then in Florida? As a matter of fact, it has been raised and has fruited in Orange, Hillsboro, Dade, Nassau, St. Johns,

and other counties. The climate is suitable, the soil equally so, for, while this famous tree will grow luxuriantly in a clay soil, if well fertilized, it delights in a dry, sandy loam, and planted in such is thoroughly at home.

It bears fruit at two or three years old, increasing up to its fiftieth year, and in its sixth year, if it has been well cared for, begins to repay the expense of cultivation, even if the ground between the trees is not otherwise employed, and there is no reason why it should not be cultivated to annual crops, just as a young orange grove may be.

The olive, as we have mentioned, likes a dry soil; its roots run down deeply, and find all the water they need far below the surface. In California the olive growers claim that it is the only tree that needs no irrigation, especially in the foot-hills of Santa Barbara County, and around San Jose; here the frequent fogs are found to yield sufficient surface moisture for the olive, and for the olive alone.

Certain it is that it never suffers from drought. The first olive trees in California, and presumably in the United States, were planted years ago by the old Jesuit Fathers at the "Spanish Mission," north of Monterey, and the first regular orchard was set out at San Jose, thirty years ago.

From these trees came the now celebrated Mission olives so popular in the State of their adoption. Oil sweet, rich, and agreeable to the taste, has been made in California and has met a ready sale, but all the olive oil at present produced, and there is a large acreage now in bearing, is not sufficient to supply the demand from the druggists alone; and if all the land in California and in Florida suited to the culture of this valuable tree, were now planted and yielding olives, the supply would still be insufficient; or at the best, not more than equal to the demand, for good, honest olive oil is needed every where;

for daily use in the household, for medicinal purposes, in the various arts. There is no other oil that is as highly esteemed for the same uses, and when we consider that it retails in this country at one dollar a quart flask, and that an acre of olive trees in full bearing will average seven hundred and fifty quarts, a certain profit is self-evident.

In 1884 the United States paid for imported olives, one hundred and twenty-seven thousand one hundred dollars; why should we not keep this money in our own pockets?

And in addition to the yield of oil there is the pickled olive; the same fruit picked when half ripe, steeped in an alkaline solution to extract a part of its bitterness, then washed in fresh water, and finally bottled with salt and water, to which fennel or some other aromatic herb is added. The taste for the pickled olive is an acquired but still an extensive one, and the demand is large; it might just as well be supplied by home product as to be imported.

The olive does not require rich land, too much fertilizing improves neither the tree nor the fruit, hence it is one of the cheapest of all fruits to raise; and not alone for this reason, but also because the cultivation of the ground set in olives, does not at all injure or retard it. Peach or pear trees, grape-vines, corn, vegetables, all can be grown continuously in the olive orchard, rather to its advantage than otherwise.

Another point in its favor is the ease with which it is propagated; suckers rise in abundance from the roots of the older trees, and these, transplanted, become trees in their turn. The seed is frequently planted, and some claim that this is the best mode of propagation; cuttings from the olive, however, take root so readily that this is the usual method followed to obtain young trees.

A rather odd circumstance is related which strikingly

illustrates this point. Mr. Jackson, in his "Account of the Empire of Morocco," mentions a large plantation of olive trees near Messa, which struck him as being, to say the least, very whimsical in the arrangement of the trees, for they were planted here, there, every where, sometimes in large groups, sometimes in small, sometimes singly, and again in short rows or angles; order nowhere, eccentricity reigning supreme.

Inquiry brought to light the history of this unique plantation, it was as follows:

"I learned from the viceroy's *aide-de-camp*, who attended me, that one of the kings of the dynasty of Saddia, being on his journey to Soudan, encamped here with his army; that the pegs with which the cavalry picketed their horses were cut from the olive trees in the neighborhood, and that these pegs being left in the ground on account of some sudden cause of the departure of the army, the olive trees in question sprang from them. And the disposition of the trees did exactly resemble the arrangement of cavalry in an encampment."

From twenty-five to thirty feet is the proper distance for setting the olives in the orchard.

The proper time for gathering olives for the press is just as they mature; if they are left too long on the tree the next crop will be a failure, and it is to this fact that the olive tree owes the unjust reputation it has gained in some countries, in Languedoc, Spain, and Italy, for instance, of bearing only on alternate years; in these countries the crop is gathered in December and January, while in France it is gathered in November, and there the trees bear regular annual crops, while the oil, because the fruit is gathered during the first stage of maturity, as soon as it turns purple, is of a better quality and commands the highest prices.

In Europe the method in general use for gathering the olives is to knock them off with long poles, and then the women, children, cripples, and old men pick them up from the ground. This is a very poor plan, as it not only bruises the fruit and renders it liable to rot, but the contact with the earth is apt to give an unpleasant taste to the oil. It is much better in all respects, even as regards economy, to pick them by hand.

Elwood Cooper, the well known California (Santa Barbara) horticulturist, tells us of a method of collecting the olives of his own contrivance, "by which an active man can pick four hundred pounds a day."

"I have," says he, "arranged, on a ranch wagon, platforms with ladders securely fastened, so that the fruit from the different heights of even large trees can be gathered from the wagon, which is driven along the rows, and one half of the tree picked from each side. This plan obviates the necessity of moving ladders, climbing, etc., and relieves the pickers from the labor of carrying the fruit, as the sacks containing the same are always at hand on the platform. The leaves and imperfect berries are separated by passing the whole through a winnowing mill; this process leaves the fruit in the best possible condition preparatory to manufacturing the oil."

This latter process is exceedingly simple. To allow the water to evaporate and to concoct the mucilage, the olives are spread out in beds about three inches thick and left for several days. Then the fruit is reduced to a pulp, placed in sacks of coarse linen, and subjected to a light pressure.

The oil first expressed is the purest and highest priced; the cake left is moistened in water and again pressed, a second-rate oil being the result, as now the oil of the kernels, under the heavier pressure, mingles with the oil

of the fruit and deteriorates from its quality both in taste and in its keeping properties. This, the common oil, can not be kept sweet in casks for more than eighteen months or two years.

Raising olives for commercial purposes will yet become one of Florida's great industries, and not only so, but there is no reason why other of the "far south" States should not help in the good work, for while this noble tree, as we have seen, does not desire a rich soil and will flourish in sand or clay, or on rocky ground, it will also resist frost to a great degree, having been frequently known to stand uninjured through a temperature as low as 14°.

A few words as to varieties, of which there are many scattered over the world.

The Mission olive, already referred to, is late in maturing its fruit; but this, in Florida, where the mild climate would admit of every olive attaining its full maturity, is no objection, although, in a colder climate, it would be a serious drawback.

The Manzanillo olive is one of the early ripening kinds; is excellent for pickling, and yields good oil.

The Reudonvillo. Fruit small but excellent.

The Nevarillo Blanco. A copious bearer of large olives, yielding abundantly of the best oil.

The Empeltre. An excellent bearer; oil first quality; resists frost well; a valuable kind for cooler as well as warm sections.

The Gordal. Hardy also; fruit of the best for pickling or oil.

The Verdeso. Also frost-resisting; quality same as the Gordal.

These are all early maturing trees; in the late, equally good for Florida, we have the

Marvileno, bearing very large olives.

Picudo, which yields enormous sized fruit, both first quality for oil and pickles.

Madrilenzo. Fruit large, excellent for pickling, walnut-shaped; yields but little oil. Prune tree cautiously.

THE PECAN TREE.

This is another of Florida's coming crops. Our people are just beginning to realize, not that there is profit in this popular nut, but that it can be raised here, on their own grounds, to perfection.

And why not? It is native to Texas and Louisiana; it flourishes in every State as far north as Virginia, and even (near the coast line) in Maryland, Delaware, and Southern New Jersey, for it is the fact that in these States there are pecan trees, large, beautiful, and bearing heavy annual crops.

There are several fallacies that have contributed to retard the spread of pecan orchards.

First and foremost is the idea held by so many, that to plant a pecan tree is to plant only for the profit of one's grandchildren; probably this idea came from the knowledge that, as a rule, nut-bearing trees are long in coming into profit; the hickory, and some others are fifty years or more before they bear any crops worth speaking of, but it is not so with the pecans. Planted on land of ordinary fertility they usually begin bearing at six or seven years old from the seed; on rich land they are often a year or two later in bearing, because they grow faster and make such luxuriant foliage that they have no time to stop for nut-making; in either case the nuts are of the same quality, first class and thin-shelled.

So much for the first fallacy; now for the second, and that is, that the nut must absolutely be planted where the tree is to grow, because "if grown elsewhere and trans-

planted, the tap-root will be cut or broken, and if it is curtailed at all the tree may grow, but will never bear nuts."

Now, there is just as much truth in this idea as there is in the statement that the moon is made of green cheese. The transplanted pecan will grow and bear fruit just as any other tree will, even though its long tap-root is broken in moving; it is not the tap-root that bears the nuts, it is merely the anchor that keeps the tree upright and helps convey its water-supply.

If it can be done conveniently, it is better to plant the nuts three inches deep, good, fresh nuts and no others, laid on their side, where the tree is to stand, because then there is no check to the growth by transplanting, and nearly a year is thus gained.

But it is not necessary, and the great majority of pecan orchards are set from nursery trees; the nuts are started in boxes of moist earth, and as soon as they sprout are placed in the nursery rows. When high enough out of the ground they should be heavily mulched.

By the end of the first season they will be ten or twelve inches high, and if the soil is loose and deep the tap-root will be still longer than the top. And now they should be set out where they are to remain, either in the orchard, thirty-five feet apart, about forty trees to the acre, or here and there, wherever a handsome, highly ornamental shade tree is wanted, in avenues or in nooks around the house.

The pecan tree seems to be at home in all kinds of soil, so that it be not desperately poor, and has a clay subsoil—rocky, clay, or sand, dry or moist. And as to its culture: for the first two or three years it should be well mulched, and occasionally, if the soil is thin, be moderately fertilized; this is all the care it needs, for its deep-seated rootlets render it independent of surface cultivation.

It is a fact not generally known that the cutting of a tap-root, of nut-bearing or other trees, is really beneficial to the lateral growth of the tree; another little known truth is that the tap-roots of all trees, nut or others, are short-lived; they die and decay as the lateral roots grow large and strong.

In setting out the young tree or in planting the seed in the open ground, we would strongly recommend surrounding it with a circle of the woven wire netting, now so much in use for fences, arched across the top; this would not only mark the spot but protect it from injury by the plow, in raising crops in the orchard, and also from horses or cattle.

Since the pecan needs no surface working we would advise that the orchard be converted into a permanent pasture, and the ground thus made to serve a double purpose, as well as the trees, the latter furnishing a most grateful shade for the cattle grazing there, while the wire netting, raised higher as the trees grow, would prevent any injury being done to the trees.

If the seed are planted in the orchard, put two or three in the hill, they will sprout in from four to ten weeks; surplus ones can be removed; they should be partially shaded during their first summer.

December, January, and February are the best months for planting pecans, either seeds or trees.

As we have noted, the first season's growth should leave the young tree ten or twelve inches high; the second year they will grow three or four feet; and the third they will be well branched, and from seven to ten feet high.

And now, having seen how easy it is to raise a pecan orchard—there are a number of trees now fruiting heavily in Florida—let us see why we should do it as a source of income easy and sure.

The oldest pecan orchard of which we have any record is in Alabama, and is over fifty years old; the trees in this orchard now frequently yield three barrels of nuts each in the same season, producing an income, without trouble or expense, save that of gathering the nuts, of one thousand dollars annually per acre.

A barrel contains one hundred and forty-five pounds of nuts, and last year, from Florida trees, they averaged to the producer twenty-three cents per pound by the barrel. But even at only ten cents a pound, one hundred pounds to the tree, and forty trees to the acre, we have a clear profit of four hundred dollars, while the ground that supports these bountiful trees may also yield other crops or feed a herd of cattle.

There is no other tree that, with so little care, expense, or attention, will yield so much profit.

Let Florida have her pecan orchards as well as her orange groves. It has already been proved that the one is as valuable as the other, and when the Florida pecan is placed upon the market, as it is certain to be ere long, it will rank with the Florida orange and pine-apple, for no other State can equal her soft-shelled pecans.

The largest and oldest bearing pecan orchard now in Florida consists of fifty trees, the property of Arthur Brown, of Blackwater, Santa Rosa County; they are from twenty-five to forty years old, and are the pride of their owner, and, as we can certify, justly so.

Not only are the trees beautiful in themselves, but their products of several distinct varieties of thin-shelled pecans are all that any one could desire; never has the writer tasted pecans as thin-shelled, tender, and delicious in flavor as those raised in this Blackwater orchard, the pioneer of Florida's future pecan industry. The nuts from these beautiful trees were on exhibition at the New Orleans Ex-

position as coming from "Santa Rosa County, Fla.," and justly attracted general attention because of their large size, smooth shell, thin enough to be crushed in the hand, and delicate, sweet flavor.

This practical proof of what Florida had done, and could do again, at once gave the needed impetus to pecan culture, and already hundreds of young trees from this pioneer orchard are working their way "upward and onward" in almost every county in the State.

The pecan tree appears to have but one enemy, and that one obtains foothold only through carelessness. Watch the trees and keep them free from caterpillars' nests, otherwise a large worm makes its appearance and girdles the limbs, killing them in a short time. The presence of the caterpillar is easily detected, hence can be easily got rid of; so says Mr. Brown, who knows more about pecan culture than any one else in Florida.

The worm betrays its presence by the exudation of gum on the tree, which, being scraped off, reveals beneath a round hole entering the tree for an inch or two and then turning upward; a piece of wire thrust into this hole will kill the worm. If, however, the worm is not found there, but has deserted the scene of its first labors, dig around the roots of the tree close to the trunk, and it will be found to a certainty.

Mr. Brown reports that he searches for these worms, which are striped and long-nosed, every spring, but has only killed seven; hence, they are certainly not very formidable from numbers, if hunted down in this manner.

The several varieties in this pioneer orchard, than which no better can be found for planting throughout the State, or outside of it either, are named as follows, all of them being remarkably soft-shelled:

TURKEY EGG.

Very large, long; mottled marks and black stripes, very distinct when first gathered; sweet, tender, and delicious in flavor.

GEORGIA MELON.

Very large; rather round at one end, flat at the other; dark stripes over the entire nut like the famous Georgia watermelon, hence the name given it; meat of first quality in every respect. From one tree of this variety Mr. Brown gathered at one gathering (December) one hundred and thirty pounds of nuts.

REPTON.

Large; shell rather whitish, one end round, the other decidedly pointed; black points; meat sweet and tender; tree remarkably beautiful. From one Repton tree, said to be forty years old, over five hundred pounds of nuts were gathered this past season.

TEXAS.

Quite large, some very long; white hull; black points.

RIBERA.

Large; few black marks, and pointed at both ends; meat very fine.

PETITE.

Small and plump; white hull; very desirable.

In addition to these the Blackwater pecan orchard contains several varieties, large and excellent, but not yet named.

When we consider that this orchard was abandoned for twenty years, left to take care of itself, and at the mercy of hundreds of negroes and irresponsible whites, who

"gathered" the nuts by throwing sticks and stones at the trees instead of shaking them, their present production is simply wonderful and very significant.

We acknowledge our indebtedness to their present owner for many points of value given here regarding pecan culture.

It is yet too early in the history of Florida horticulture to speak very positively as to the destined value of other nut-trees in her future development. But we believe, reasoning from analogy, and from instances here and there that have come to our knowledge of experiments successfully made in different sections of the State, that the production of nuts of all kinds will eventually become one of bountiful Florida's leading industries.

Walnut and hickory and oak trees are indigenous to the State: surely this is hint enough to the wise man to press forward and use this fact to his profit.

The white walnut, the butternut, and the chestnut, especially the Japan chestnut, are all quickly maturing trees, and their nuts of superior quality. The white walnut and the butternut bear in five or six years from the seed.

They like a light, sandy soil or loam, either naturally or artificially fertilized; a clay subsoil is no objection, but it must be dry, whatever be its nature. Set the trees forty feet apart and cultivate between, either to annual crops or the smaller fruit trees, peaches, figs, plums, or grapes, or berries.

The English walnut also succeeds well, having been thoroughly tested.

The smaller soft-shell varieties of the walnut are most profitable to cultivate; when the common hard-shell variety sells for nine cents a pound, the former readily bring fourteen to fifteen; they also bear earlier than the hard-shell black walnut.

Chestnuts are very profitable, and one of the most nutritious of fruits, and the Japan chestnut has been proved to be the best of its kind. It is a small tree, and bears at three years old; of moderate size, very handsome for lawns, as well as of great money value; like the other nut-bearers, it flourishes on sandy soils with dry subsoil. The nuts are large and of the finest quality.

CHAPTER XXII.

COCOA-NUTS.

The cocoa-nut palm is one of the most valuable trees given to the world by a most beneficent Creator, and its history and wide-spread capabilities are so full of interest, especially to those who can proudly point to this great tree rising heavenward upon their own domains, that it is well worth while to pause and look upon it in its broader view before proceeding to examine the narrower one of its practical culture.

Throughout all the broad extent of the vegetable kingdom, there is no one family of plants so full of beauty, usefulness, and majesty as the family of the palms. Their prevailing form is familiar to every one, for no trees are so often pictured as these, with their leafless, cylindrical stems or *stipes*, as they are termed, surmounted by a crown of graceful, tapering leaves.

It may not be generally known that this distinguished family (like many human ones) receives its name from one of its most diminutive members, the dwarf fan-palm, the only one indigenous to Europe.

With this graceful little tree the Romans were well acquainted, and from them it received the name of *palma*, from the resemblance of its fan-shaped leaves to the human hand. Afterward, when its numerous relatives became more widely known, the great similitude of their leaves caused the name of palma or palm to be bestowed upon them all, as the common surname of the whole family.

That many of these are as yet totally "unknown to fame" is not to be doubted; each year come the tidings of the discovery of some "new palm," and while nearly

six hundred members have been introduced into the botanical world, and a Christian name bestowed upon each, it is the opinion of our savants that the entire family numbers at least one thousand individuals, each generous palm holding forth some "good and perfect gift" for man's acceptance.

Of this royal race there are two which are pre-eminently familiar to the world at large, owing to the commercial value of their products; these are the date and cocoa-nut trees.

Of these two palms it is difficult to determine to which belongs the higher rank; in genealogy, the date-palm undoubtedly has the advantage; it is the "palm tree" of Scripture, and from time immemorial has been an honored dweller in its native lands, Asia and Africa. But on the contrary, over the birth-place of the cocoa-nut there hangs a strange mystery; the only palm indigenous to both hemispheres, and having a wider geographical range than any other member of its family, yet neither in the East or West has its place of nativity been clearly proven.

In the earliest reference to the cocoa-nut palm—one hundred and sixty-one years B. C.—we find it mentioned as growing in Ceylon, upon whose shores its nuts had been cast by the friendly ocean waves.

But whence came they, from the main land of India or the far-off continent of America? This is a question that must forever remain unanswered; but fortunately for mankind the mystery of its birth detracts in nothing from the usefulness of this tree, which may well be called the "Ocean Palm."

Down upon the wave-washed coast, with the salt spray dashing over its stem and leaves and lashing its roots, the cocoa-nut loves to dwell; remove it inland, where the sea-breeze can not play among its leaves, and it will droop and languish.

Who has not read of those wondrous coral islands where the cocoa-palm is ever the first, and oftentimes the only, tree to spring up amidst the reeds?

Many a noble ship, many a precious life has been saved by this ocean-loving palm, which, nestling down upon some wave-hidden reef, sends its tall stem heavenward, flourishing even while the sea washes over its base, and waving its feathery leaves aloft in warning to the mariner, that he may avoid the danger which else must have proved fatal to him and his barque.

Familiar to many of our readers, doubtless, is an instance of this high use of the cocoa-nut palm, which lies "near unto our home."

In the harbor of Baracoa, at the eastern end of the island of Cuba, rises a mountain known as the "Anvil Mountain," because of its resemblance to an anvil, as seen against the horizon by an incoming vessel. Upon the very summit of this mountain towers aloft a solitary cocoa-nut tree; the first object seen by the sailor as he nears the eastern end of the island, and as anxiously watched for as ever is beacon or light-ship. No one knows how old it is, nor who planted it there, but there it has been since the earliest records, and great will be the dismay among the wayfarers of the sea when the familiar "Anvil cocoa-nut" is seen no more looming up grandly against the horizon.

Yet, dweller by the sea as it is, and basking in the warm sunshine, the cocoa-nut loves not all tropical shores alike; with one exception, that of St. Jago, of the Cape de Verd islands, it is never found upon volcanic shores, and in the Sandwich Islands it grows, but does not flourish with its pristine vigor; like an exile in a foreign land, it languishes as though weary of life. The tree is smaller and less hardy, and the fruit diminutive in comparison with its brethren of Ceylon, an island which it dearly loves.

Yet even thus, so highly was it prized by the natives, that for centuries a law was in force, whereby women were forbidden to taste its fruit under penalty of the dire displeasure of their gods. But the time came when this unjust and superstitious law was to be rendered null and void.

Oppressed as the native women were, they yet possessed the right, in rare cases, of inheriting the chieftainship of their fathers, and by one of these favored few was the right to partake of the cocoa-nut won for all her sex. Disregarding the threatened vengeance of the gods, as launched upon her by their priests, she broke and ate one of these hitherto sacred nuts, and, no evil consequences following, from that day the prohibitory law was abolished throughout the Sandwich Islands.

We have already remarked that this beautiful palm has a wider geographical range than any of its kindred; this is most emphatically true.

In India we find it growing low upon the wave-washed shores, and again, less vigorously, at an elevation of six hundred feet above the sea. In Venezuela it clings to life at a distance of a hundred leagues from its beloved ocean friend; and yet more, even in the heart of Africa it finds wherewithal to exist, although it there bears no fruit.

In striking contrast to these drooping exiles we need but to look upon the little islands off the coast of Sumatra, washed over by every storm, to find the cocoa-palm lifting its crowned head in the joyousness of full health and vigor. Nearer home we find the Brazilian coast, for a distance of nearly three hundred miles, heavily fringed with these noble trees, while one small island near by (that of Itamarca) yields annually three hundred and sixty thousand nuts.

Take away the cocoa-palm from the numerous islands of the Pacific Ocean, and the majority of them would at once become uninhabitable, for these useful trees, often alone and unassisted, furnish the native population with food and shelter and clothing; without their loving gifts these tropical isles would be dreary and desolate wastes.

Dwelling in the East and in the West this one palm alone is said to furnish food for no less than a hundred millions of human beings besides a countless host of animals.

How say you, is not this a noble tree? Is not its life a precious one?

Ceylon, however, that land of tropical profusion, is pre-eminently the home of the cocoa-nut tree, although, as we have intimated, it can lay no claim to being the place of its birth.

In the most ancient voyages on record mention is made of the "beautiful cocoa-nut groves" of this great island, which, in days gone by, was called "Taprobane," and again, "Serendih," while still further back it is supposed to be identical with the far-famed "Tarshish" of the Scriptures.

Those very groves described by the Arabian voyagers are still flourishing at the present day, only greatly enlarged and improved, for so valuable have their products become that the prosperity of the entire island is now intimately connected with their cultivation. And yet for many years, for long centuries, in fact, the Cingalese lived in total ignorance of the precious treasure which girdled their shores.

True, as we read in the ancient chronicle of Ceylon, the "Mahawanso," the small red cocoa-nut, grew in the interior of the island, and its milk was employed in manufacturing cement for building temples; but further than this

one variety the Cingalese knew nothing, and never dreamed of its value as an article of food.

Regarding the tardy discovery of the vast importance of the cocoa-palm, there is handed down among them a curious tradition; the exact date of the events related is, however, not given.

It seems that a great and good rajah chanced, most unconsciously, to offend the god Buddhoo by neglecting to offer sacrifices under a certain tree, which the deity had set apart as sacred to himself; not being blessed with omniscience, the rajah was ignorant of this fact, and was (most unreasonably we think) punished for comporting himself accordingly. His whole person became covered by a white, scaly substance, so that he well-nigh lost all semblance to humanity; his people, by whom he was justly beloved, offered prayers and sacrifices in his favor, while he himself patiently awaited the result.

One night he fell into a deep trance, which lasted for several days, and during this sleep he beheld a vast expanse of water rolling up against the land upon which he stood. He tasted it and found it nauseous and salt; turning his back upon the blue waters, his delighted eyes rested upon a great number of tall, slender trees, having no branches, but only a tuft of leaves at the top, and dark-colored balls nestling under this feathery crown.

The Rottah rajah awoke, and thought upon this wondrous vision; his home had ever been in the heart of the interior, where, even to this day, the cocoa-palm is unknown; he had never seen the great ocean; he had never beheld such trees as he had looked upon in his sleep. The more he thought upon it the more he became convinced that his dream had been sent by the great god Buddhoo; but what did it portend?

The Rottah rajah prayed, and offered sacrifices of sweet-

smelling flowers, and then he once more lay down and fell asleep.

But now the scene changed: he saw himself lying as he actually was, beneath a tree, and from the neighboring jungle an immense cobra di capello issued forth. The rajah regarded it without fear; it was the sacred snake of the Buddhists, and had protected their god while he walked the earth. The snake approached the dreamer, and thrice dipped its forked tongue in the leaf of water which the rajah's attendants had placed at his side; then it bowed its head over him and slowly retired to the jungle. The good prince awoke, and slept again; this time he revisited the scene of his first vision, and there beheld an old man "whose face shone with the splendor of the moon."

This was Maha Sudona, the father of the god Buddhoo. In majestic accents he addressed the rajah, bidding him arise and journey for one hundred hours to the southward, where he should behold in reality the tree of his vision; its fruit he could obtain by fire, since it could not be otherwise reached, and by making it his sole diet for the space of three moons, his health would be restored, and a long life await him.

And now, having looked at this most royal palm from what we may well term the romantic point of view, let us examine more closely into that portion of its life history which is eminently practical and useful to man. Rearing their feathery crowns to a height of from sixty to one hundred feet, these noble trees, even before the period of their fruit-bearing arrives, begin their career of usefulness in shielding the palaces and huts which are built in their midst, from the danger of the terrific thunder-storms which are of such frequent occurrence in their native land. Their tall stems arrest the fiery destroyer, and diverting it from its perilous course conduct it harmlessly

to the ground; and thus it is that accidents from lightning are of extremely rare occurrence in the vicinity of these beautiful palms.

Commencing our investigations, as is most appropriate, at the lowermost point, let us first make acquaintance with the roots of the cocoa-nut tree. These are not sturdy and far-reaching, like those of our forest monarchs, but are slight, slender, and flexible, springing singly from the bottom of the stem, and deeply fringed with those wondrous little caterers, the thread-like fibers which collect the food and pass it on into the body of the tree.

And here, in the slender roots of the cocoa-nut palm, we observe a phenomenon which finds numerous counterparts in human life: they are weak and easily bruised, yet their hold is not readily shaken, and the more rocky the soil upon which their lot is cast, the greater the obstacle which they encounter, the stronger do they become, the closer do they cling to their anchorage ground.

Do not these humble roots afford a noble example for our guidance?

And now let us see to what practical uses this, the least valuable portion of the tree, is applied.

Boiled with ginger the roots become an efficacious remedy in cases of fever, and, with the addition of the oil of the nut, the same decoction is used as a gargle.

In Brazil baskets are woven from the smaller roots, and of late the larger ones, highly polished, have come into use as canes and umbrella handles.

In the East, where the habit of chewing the areca-nut prevails, the more tender roots of the cocoa are chewed instead, whenever a full supply of the favorite nut can not be obtained.

Next in order comes the stem or *stipe*. It stands erect, without branches, often reaching to the height of over

a hundred feet, and measuring from one to two feet in diameter, while along its whole length, at regular intervals, are well-marked parallel rings, the cicatrices of fallen leaves; by these rings the age of the tree is readily ascertained.

Should its growth be retarded for one or two years, as sometimes chances in unskillful transplanting, the stem expresses its disapprobation by a permanent contraction in diameter, so that the trunk has often a larger dimension at the base and summit than at the middle.

In the interior arrangements of their stems the palms bear no resemblance to other trees; this one difference sufficing to distinguish them at once as belonging to an entirely distinct family, forming in fact the ultra-aristocracy of the tropics.

Examine the stem of a white lily and you will find that it is really a series of leaves, rising one above another, and united at their bases so as to form an apparent stem. Greatly resembling this growth is that of the palm; it possesses no bark, the surface appearing to be formed of the cicatrices which succeed the fall of the leaves and become gradually hardened by the action of the sun and the air.

The wood of the cocoa-nut improves with the age of the tree; soft when young, it yearly increases in density until finally it acquires an extreme hardness, and is consequently highly valued.

In the Maldive and Laccadive Islands, boats are made from the hollowed stem, and planked with wood from the same tree. The Polynesians it furnishes with their most valued spears, and the Puris Indians, of Brazil, manufacture from it their best bows.

Many of our readers are doubtless familiar with the wood of the cocoa-nut palm, although ignorant of its iden-

tity with the "*porcupine wood*" of commerce, a change of name more striking than euphonious, and for which it would be difficult to assign a reason other than the caprice of the manufacturers of elegant work-boxes and costly articles of furniture, by whom it is chiefly imported. Hard as ivory, of a rich chocolate color, spotted with black, and finely veined, it admits of an exquisite polish, the choice pieces frequently resembling dark agate.

Before the cocoa-nut palm becomes aged (it bears fruit for seventy years and lives much longer), the interior of the stem affords a floury substance, which is sweet and pleasant to the taste, and may be called the *bread of the tree;* in addition to this flour the stem also yields a species of gum, highly prized by the Tahitian women, who use it to plaster and stiffen their hair, according to their ideas of beauty and grace.

In Barbary guests are entertained on festive occasions with the honey or the *dipse* of the cocoa-nut palm, which is really the sap of the tree. The crown is cut from off a vigorous palm, and the top of the stem thus left bare is scooped out into the form of a deep basin.

The sap ascends on its accustomed course, unconscious of the evil fate that awaits it, and finding its return cut off flows gently, and, as we may imagine, sadly into the receptacle prepared for it. Here it collects at the rate of three or four quarts a day, during the first fortnight; after this the quantity diminishes, and at the end of two months, the sap, exhausted, ceases to flow, the tree becomes dry and dead, and is cut down for timber or fire-wood.

The *dipse* thus obtained is sweeter than honey, and of less consistency, but if not used immediately it becomes thick and ropy, and after distillation affords an agreeable spirit, which is called *ariky* by the natives, and is the "palm wine" of the ancients.

Let us now pass on to the bud which contains the incipient terminal leaf; this is sometimes used as an article of food by both Europeans and natives; boiled it becomes an excellent cabbage; steeped in vinegar it forms an agreeable pickle; but, useful as the terminal bud certainly is in these capacities, it is to be regretted that it is ever so employed, as its removal necessitates the death of the tree.

Every one has heard of "toddy;" this is a sweet juice obtained by wounding the unexpanded flower, and beating it daily with a stick, which operation facilitates the flow of the sap; a healthy blossom will yield from one to two quarts of juice daily for more than a month.

By boiling this *suri*, as it is called, a coarse, brown sugar is obtained, which is termed *pageny*, one gallon of the *suri* yielding a pound of sugar; while still warm, the thick syrup is poured into cocoa-nut shells, where it soon becomes solid. By a subsequent operation the *pageny* itself furnishes a most excellent molasses.

The *suri*, in its half fermented state, furnishes the yeast used by the bakers of Ceylon, and reaching the stage of acetous fermentation it becomes as fine a vinegar as one need wish for.

Not yet have we measured the capacity of this wondrous juice elaborated by the wounded flower, nor yet have we seen the fullness of the return of "good for evil," of which it furnishes so illustrious an example.

There is a form in which the *suri* is still more valuable than as sugar, molasses, yeast, or vinegar; this is the "toddy," to which we have already alluded. In its middle state of fermentation *suri* is transformed into this celebrated liquor, which, intoxicating in itself, is rendered still more so by the addition of the leaves of a species of datura.

In appearance *awack*—another name for toddy—is clear and transparent, and of a light straw color. Ceylon alone exports annually from five thousand to six thousand *leaguers*, each containing one hundred and fifty gallons.

Nor are these the only gifts bestowed by the wounded flower, which, be it observed, is of large size and purely white, as befitting so beneficent a spirit. By adding a small quantity of *pageny* to the sweet *suri*, a strong cement is obtained, which is capable of receiving a beautiful polish; walls are prepared for the reception of this cement by wetting them with a strong infusion of the husk of unripe cocoa-nuts, a fluid which is also used in mixing the materials.

In Madras roofs are covered, and columns and floors are overlaid with this *pageny* cement, the latter being frequently stained so as to resemble the finest marble. In Holland, too, this strange cement has been satisfactorily employed for various purposes.

We come now to the leaves, which, always beautiful, are also infinitely useful.

At the base of each young leaf, inclosing and protecting it from harm, we find a net-work of fiber, which presents the exact appearance of coarse cloth, the threads crossing each other with great regularity.

The Papuans and Tahitians convert this strange cloth into a garment, simply by joining its edges with a fiber obtained from the same tree, and leaving a hole in the center through which to pass the head. This garment is usually worn by the native fishermen; its strength, durability, and freedom from injury by sea-water rendering it especially desirable for such pursuits. When fresh from the tree it is beautifully white and as transparent as lace, its pure delicacy suggesting the use to which it is frequently applied—the construction of cradles for infants.

But soon the white cloth turns green, and is then made into aprons and other garments. Age, so far from deteriorating, greatly increases its strength, and in this stage of its existence it proves an invaluable friend to the native, providing him with an excellent water-proof cloak "without money and without price."

This cloth, so strangely woven in nature's loom, is also employed as a filter for toddy, as a bag through which to strain cocoa-nut oil, and as a sieve for sifting arrowroot and other flour.

The leaves of the cocoa-palm are, probably, of all leaves the most valuable. We have seen how, in their incipient state, they are used as a vegetable; in their next stage, still unexpanded, though perfectly formed and of a beautiful silver texture, white and semi-transparent, they are wrought into exquisite crowns, wreaths, lanterns, and valentines.

Beautiful in their youth, they are still more useful in their old age—a prototype of human life. Old and withered, their loveliness all gone, they yet furnish no despicable torches, when bound together in bundles six feet in length and several inches in diameter. The torches are called "chulls" in Ceylon, and if skillfully carried will burn brightly for half an hour.

The young leaves likewise furnish boys and girls with a beautiful material upon which to interchange verses upon certain holidays. The older leaves, after undergoing a certain preparation, are termed *ollahs*, and as such are used for graven purposes—letters, documents, books, and the like. Neatly rolled up and sealed with gum lace, these *ollahs* frequently pass through the post-office, sometimes traveling even as far as England without injury.

The young leaves are stronger than the old, and strips of them are used for all kinds of ligatures, while the full-

grown leaves, from fifteen to twenty feet long, are every where employed for thatching in Ceylon; when used for this purpose they are plaited into huge roofing-mats, with which the bungalows of Europeans are thatched as well as those of the native population.

The Malays plait the leaflets into sails for their *phras*, and wonderfully durable do they prove to be.

The uses of the cocoa-nut leaf, like that of all palm trees, are manifold. Mats for roofing buildings, for sheltering young plants, for covering cattle-sheds, for fences, for walls, for ceilings, and for human coverings; all these necessities they supply in the one article of plaited mats. Moreover, they furnish baskets, large and small, delicate and rough, coarse, or so fine and close that fluid may be carried in them as in buckets, baskets to catch fish and to carry them.

The midribs of the leaves are used for propelling boats instead of manufactured oars or paddles, and when bruised at one end this same useful midrib is converted into a brush for scrubbing and whitewashing. The smaller ribs of the leaves become formidable rivals to the pin manufactories, being universally employed by the poorer population of the "palm lands" in place of those indispensable articles of the toilet. As toothpicks, also, they perform good service; and by simply tying a bundle of them firmly together with a midrib in their center, a most excellent broom is obtained, so excellent, indeed, that no other is employed by either rich or poor.

By the South Sea Islanders, too, these small ribs of the cocoa leaf are extensively used as teeth for the combs of which they are skillful manufacturers.

The chief food of domesticated elephants is the cocoa-nut leaf, and it is a wonderful thing to observe how dextrously this intelligent animal separates the woody fiber from the thinner margin of the leaf.

In the Maldive Islands a species of fish (the bonneta) is preserved by means of the cocoa-nut leaf; the backbone is removed from the fish, and, after being placed for some hours in the sun, with frequent sprinklings of salt water, it is wrapped carefully in cocoa leaves and buried in the sand, where it soon acquires a horny hardness, and is then sold in the markets.

By skillful manipulations hats, bonnets, capes, and tippets are formed of the entire leaf, and in the Marquesas Islands the full dress of the priests is formed of these wondrous leaves, without the addition of any other material.

Soap is seldom needed or employed in the regions of the cocoa-palm, because these same leaves, when burned, yield a large proportion of potash, which admirably answers the purpose of a cleansing agent.

So numerous, in fact, are the uses of the cocoa-nut leaf that our limited space compels us to leave their value "half untold." Let us, therefore, pass on to the fruit of this noble tree, the cocoa-nut itself.

In its earliest state, small, green, and immature, it yet commences its career of service to man, for, when grated fine, it becomes a valuable medicine, and, when mixed with the oil of the ripe nut, it becomes a healing ointment. A little further advanced, the semi-transparent jelly which lines the shell furnishes a delicate and nutritious food, while the aqueous fluid or "milk" in its center becomes, when iced, a most delicious luxury, which is also frequently used in tea as a substitute for cow's milk.

In their unripe state cocoa-nuts are used as a regular article of food. The natives of Ceylon and Malacca, living upon no other food than this, will yet labor vigorously day after day, while in the Maldive Islands labor performed is more frequently than otherwise paid for in cocoa-nuts alone.

In every land where this palm flourishes its fruit forms a principal article of food, and in the East, as we have seen, the milk of the small red cocoa-nut is used as a cement in building.

In the preparation of the world-renowned East India condiment—"curry"—grated cocoa-nuts perform a most important part.

The chief product in the kernel of the cocoa-nut is an oil, which is extracted either by decoction or compression, the latter being the method generally adopted when the operation is performed upon a large scale. On an average, twelve nuts yield one quart of pure oil.

The process is commenced by cleaning the nut of the outer husk; the shell is then broken and the nut exposed to the sun for several days, at the expiration of which time its watery parts are all evaporated. In this state the kernel is called *copra*.

To extract the oil the *copra* is ground in a clumsy mill, worked by bullocks, and the substance or refuse which remains after this operation is fed to pigs and poultry. In its native lands this oil is used for lamps; the lower ranks burn it in cocoa-nut shells, the wicks being a bunch of fiber from the husk; the wealthier classes, however, pour the oil into brass lamps, four or five feet high, having several flat basins with ornamental beaks to hold the wicks.

Cocoa-oil is also used to anoint the body, and is extensively employed as a substitute for olive oil in pharmaceutical preparations. Mixed with a species of resin, and the compound melted, a substance is obtained which is used in India instead of pitch for calking the seams of boats and ships.

Cocoa-nut oil has, of late years, found two new and important uses; the one as a chief substitute for wax in the manufacture of fine candles; the other as an

excellent material for a fine quality of soap. It is also often employed as a lamp-oil in European countries, as well as in its native land; and the cloth manufacturer and glass-blower frequently prefer its use to that of olive oil.

In closing our account of the uses of the kernel of the cocoa-nut, we must not forget to mention a custom which, to us of more refined taste, is simply revolting, but which to the Marquesans who practice it is highly enjoyable and natural:

When the elder natives decide upon a grand "drinking bout," they collect together all the boys in the neighborhood and compel them to seat themselves around an immense bowl; they are then well supplied with the kernels of cocoa-nuts, and set to work to masticate them. Each mouthful, when well chewed up, is spit out into the bowl until a sufficient quantity is accumulated. Then the boys are dismissed, water is poured upon the masticated nut, the mass thoroughly stirred up, and, after being allowed to settle again, the elders assemble, and for the next few hours enjoy themselves to the full of their bent.

Now for the shells of the cocoa-nut; these are converted into beads, drinking vessels, ladles, sugar basins, and measures. They also afford fuel, and, when burned to charcoal and mixed with lime, form a coloring matter for the walls of houses.

The husk or fibrous pericarp of the nut, called *coir* (from the Latin word *corium*, the skin), is employed in various ways as cordage; it is, perhaps, most useful, and certainly the best material yet known for cables, because of its great elasticity and strength. Until chain cables were introduced *coir* cables were universally used by all ships sailing in Indian waters.

Coir is prepared by soaking the fiber in water for several months, and then beating it upon a stone with a very

heavy weight; the fibers are then twisted into yarn, from which cordage of all sizes is manufactured. The natives sew together with coir yarns the planks which compose their boats. The ropes which anchor them and the sails which give them the power of motion are made of the same material; nor does this, like hemp cordage, need to be tarred, as the sea-water, ever friendly to the cocoa-palm, improves rather than injures the coir fiber.

In Europe, as in Asia and America, this valuable fiber is preferred to horse hair for stuffing beds, cushions, chairs, and saddles, as it is indestructible, has no unpleasant smell, and never harbors vermin.

Brooms, mats, rugs, and brushes are also manufactured from coir, and in Ceylon the husk in its natural state with the fiber attached forms a first-class scrubbing-brush all ready for use.

Who will not "yield the palm" to the cocoa-nut tree as the most royal, the most useful of its race, not excepting, perhaps, even the honored date tree?

For forty years or more this noble tree has thriven and borne fruit among the Florida Keys, and here and there on the mainlands of the southernmost portions of the State.

It is rather singular, therefore, that only within the last three or four years has its culture come to be regarded as among the commercial, not possibilities, but assurances of our fair land; it is indeed "passing strange," and yet it was the same with the orange and the pine-apple, and will be with other resources now lying at our feet neglected or unheeded in this wonderful country so full of unknown possibilities.

As we have seen, the cocoa-nut palm requires the vicinity of the sea to reach its highest perfection, and this requisite is every where present in those portions of Florida whose climate is suitable to its growth.

From the Caloosahatchee River on the Gulf of Mexico, and Lake Worth on the Atlantic, the cocoa-nut belt extends southward, embracing all the numerous coast islands or "Keys."

It is not, as many suppose, necessary that the salt spray should literally lave the roots or trunk of the cocoa-nut, but it is a fact that it needs salt air, and plenty of it, and while it will grow one hundred miles or more from the sea, it will not bear fruit; the nearer its beloved friend, the ocean, the more nearly perfection is attained.

The Florida nuts are fully equal in quality to any grown elsewhere, and they possess a vast advantage over all others in being so near the great United States market.

There is no doubt but that within the next few years all the land in the State and on the Keys, suitable for cocoa-nut culture, will be set in trees, and yet, when this is done, so limited is the area convertible into cocoa-nut walks that the whole number of trees is not likely greatly to exceed one million, and consequently, the demand will always exceed the home product.

The nuts are buried until they sprout, then transferred to the field, and carefully planted where they are to remain; it is usual to make a hole two feet or more in depth, and cover in the nut at the bottom, filling up level gradually, as the young sprout pushes its way upward.

The Florida growers generally set the trees twenty feet apart; this is too close, and the time will come when the roots will intermingle and rob each other of nutriment and moisture, and then, to preserve the vigor of the rest, some trees will have to be cut down as a sacrifice.

The tree generally begins to yield in six or seven years, but not abundantly until it reaches its eighth or ninth year, and then it continues to bear for seventy or eighty years. In good soils, and especially in wet seasons, it will blos-

som every four or five weeks, so that there are usually ripe nuts and blossoms in all stages on the tree at the same time. From five to fifteen nuts form a bunch, and a thrifty tree will produce from eighty to one hundred annually, sometimes more, but this is the average.

The cocoa-nut palm likes good feeding and salt air to drink, but further than this requires but little culture.

Like all who occupy elevated positions in this world the cocoa-nut has its enemies, and formidable ones they are, too.

One comes direct from the skies, and its name is lightning; it frequently strikes these lofty trees, kills the terminal bud, and hence the tree, for death to the one means death to the other. The others are "of the earth, earthy." One is a veritable *bête noir*, or "black beetle;" it excavates a hole of about an inch in diameter, in the terminal-leaf bud, and when the leaves expand they appear full of holes, as though riddled with bullets, and the tree often dies from the injury it has received. The larva or grub of this *bête noir* is about three inches long, plump, and round in proportion, and its head is black; it is called *tucuma*, in British Guiana, and is esteemed a great delicacy by the epicures of that country. Usually it is served up by frying in a pan, but many prefer it raw; they seize it by its black head, dip it in lime juice, and forthwith swallow it with great gusto.

Ugh! Here is a nice, new dish for some of our Florida growers! Try it, somebody.

Another depredator among the cocoa-nut walks is the rat, especially the black rat, which nests in trees, and is a splendid climber; so serious has this source of trouble become in some parts of Jamaica, the rats destroying the tender young nuts by thousands, that the Director of the Public Gardens and Plantations has given the subject spe-

cial attention, urged thereto by appeals from planters all over the island, and below is what he has to say regarding his investigations and search for a remedy:

"I have had reason to look upon the depredation by rats in cocoa-nut trees as one of the most serious troubles of the cocoa-nut planters. Numerous letters have been addressed to me on the subject, and in addition to this I estimated that at the Palisadoes plantation, under my charge, the loss caused by rats among the cocoa-nuts amounts to nearly £100 per annum.

"Dr. Ferguson, of Port Maria, reports the destruction caused by rats on his extensive cocoa-nut walks as 'immense,' and the subject has necessarily occupied his attention for some time, while numerous other correspondents speak in similar terms.

"The question of protecting cocoa-nut trees from the attacks of rats is therefore a matter of considerable importance, and with the view of contributing something toward this end I have lately been in communication with cocoa-nut planters in different parts of the island, and from the replies received I select one or two which, as the result of actual experience, will no doubt commend themselves to careful consideration. This first of these replies is from Mr. Joseph Shearer, Vale Royal, Duncan's P. O., and is as follows:

"'I got out, in 1882, 1,000 sheets galvanized iron 36x12 (they stood me, with cost and charges, £35 14*s.*), and 1,000 tin sheets 36x12, the cost of which was £28 7*s.* 10*d.* Although dearer at first the zinc are preferable, as near the sea the tin sheets soon become rusted. The rats were so bad in the cocoa-nut walks where I used these sheets that I reckoned they paid their cost fully the first year. In putting them on I nailed them flat to the trees with two or three sheathing nails in each. If the cocoa-nut trees

are very close together a rat can go from one to the other across the limbs, and great care should be observed that there are no ladders near by, such as a dry limb hanging on the ground, or a mangrove twig, etc. close by, because if there be any such the rat will get up the tree independently of using the trunk, and the zinc or tin sheets would be of no use. It is a safeguard, if you can not isolate all the trees, to at least isolate clumps, as now and again the rats will find an opportunity of climbing. Care must be taken, too, to dislodge the rats from the top before putting on the tin sheets. The best thing I have found for this is sandwiches of bread and phosphoric paste deposited among the roots and fronds.'

"Mr. John Clark, Haughton Court, Lucca, writes:

"'The zinc sheets to protect cocoa-nut trees from rats have been tried here with good results; the rats that live in the trees must first of all be driven out of the trees or be poisoned; the sheets must then be nailed round the tree, simply flat against the stem, low enough in the case of short trees so that the rats can not spring from the trunk below the sheet on to a limb that may be hanging down near the trunk, which they have been known to do. Rats have been seen attempting to pass over the sheets and failing.

"'The sheets are zinc, forty-two inches by twelve inches, and apparently one thirty-second inch thick, and cost about eight pence each in London. Tin sheets last no time, and are not to be thought of. The nails for putting them on are ordered as fivepenny galvanized shingling nails.'

"Father Woollett, Reading, writes as follows:

"'I have, here at Reading, used tin bands to prevent rats from climbing cocoa-nut trees, and with very good effect; but I regret to say that, owing to the neglect of repairing damaged bands, the rats have recovered posses-

sion of the trees. The bands were so fixed that the lower part opened out trumpet-shaped, the advantage of which must be apparent. The cost of each tin, including the fixing it on the tree, was 9*d*. Each tree was well cleared of rats previously to fixing the tin on it, and a supply of poison left for the benefit of any skulkers. Probably zinc would be better than tin, stronger, and not so easily damaged by weather.'

"Dr. Ferguson, Port Maria, recommends the use of 'strips of galvanized iron in the form of an inverted funnel, or even horizontal and kept in a position by wedges of wood,' and as another idea suggests the use of 'two semi-circles of earthen-ware tiles fastened by wire in holes at the ends of the tiles. Such tiles, one half inch thick and four or five inches broad, could be made by stamping them out of clay in a press.'

"It is very probable that Mr. Shearer and Mr. Clark's plans, which require only galvanized iron (not tin) sheets thirty-six inches by twelve inches, and fastened perpendicularly on the trees by means of a couple of sheathing nails will commend itself for general adoption. These sheets cost, it will be noticed, delivered on the estate, at the rate of £35 14*s*. per thousand. This is a large sum to expend at once on cocoa-nut trees, but the bands are required only for bearing trees, and I quite agree with Mr. Shearer that where the depredations by rats are really bad, the sheets will pay for themselves during the first year."

As to the profits of a cocoa-nut walk, they are great enough to satisfy the most exacting, once the trees are fairly in bearing.

At this present time, and for several years back, the nuts have brought, by the cargo, delivered in New York, seventy-five dollars a thousand for the first quality, ranging down to twenty dollars for poorer grades.

CHAPTER XXIII.

OTHER TROPICAL FRUITS.

Among the many other fruits of South Florida fast rising into prominence, first and foremost stands the

MANGO.

This is a large, spreading tree like the walnut, with lanceolate leaves, green and shiny, seven or eight inches long, and having a sweet, resinous smell; the flowers are white and grow in bunches at the ends of the branches. The fruit bears considerable resemblance to a short, thick cucumber, and taking the average of all the varieties, "whose name is legion," is about the size of a goose egg.

Some, when ripe, are of a beautiful green, others are orange color. When thoroughly mature, ripe, but not overripe, the mango is as delicious a fruit as one need wish to taste, but let it become in the least degree decayed, and oh! what a transformation.

The writer has a very vivid recollection of one such eaten—nay, tasted—on the Isthmus of Panama; a mixture of tow and turpentine would be the nearest approach to the delicious flavor and stringy texture of that mango. It had probably not only "seen better days," but was also one of those inferior seedlings which appear now and then as "sports," although, as a rule, the seed of the mango yields fine fruit.

This seed is a rather large stone, something like that of the peach, to which the pulp adheres firmly; the fruit is very perishable, and so is the vegetative power of the seed, and when they are to be sent to any distance they should be carefully wrapped in wax.

The mango is a native of Asia and its islands, and also of Brazil, but the former are considered as superior both in size and flavor.

So highly esteemed are some of the finer trees in India, that guards are placed over them during the fruiting season; especially is this the case with the Mazagong mangoes, the most superior of all.

The mango dodol is the largest of all the many varieties, the fruit being the size of a large shaddock, and weighing over two pounds. This tree loves high, dry, sandy soil, and moderate fertilizing; it grows rapidly and bears at three years old; the fruit, where a market can be quickly reached, finds ready and profitable sale, but will not bear shipping on long or rough journeys unless picked very green.

The Florida mango of the Gulf coast is at present marketed chiefly in Key West and New Orleans. It is not as yet extensively planted, but its area is yearly extending, so far as the limited area possible for its growth will allow; it will not bear frost, and by "frost" we mean here, as elsewhere in this work, a degree of temperature which will produce even a thin film of ice.

THE AVACADO

(Pronounced ah-guah-cahta),

Often, but erroneously, called the alligator pear; it is not a pear at all, and has nothing in common with that fruit except, perhaps, in shape and size; another name frequently given it is "Vegetable Marrow."

The tree, which is a handsome one, attains to the size of an apple tree; the leaves are oblong, the flowers of a yellowish-green color, and the fruit, which sometimes weighs two pounds or more, is regarded as one of the most delicious in the world.

It contains one large seed or kernel; the flavor of the fruit surpasses that of the finest muskmelon, and on account of its rich, marrow-like, vegetable texture, is usually eaten with pepper and salt, or lime juice mixed with sugar.

There are three varieties of the avacado, the red, purple, and green, the latter being most highly esteemed.

This tree is counted among the purely tropical fruits; but this is, in some degree, a mistake. It has been successfully raised, without injury from even severe frosts, as far north as Palatka, and this fact should be more widely known.

As simply a shade tree the avacado is beautiful, but when to this is added the fact of a bountiful yield of fruit, which sells readily at from six to eight cents a pound, or, at the lowest, by the dozen at seventy-five cents, that the tree will easily yield one thousand pounds annually, and that it begins to bear when five years from the seed, it will be seen that this is destined to become one of Florida's favorites, so soon as its high qualities are better known. The fruit ripens from August to October.

Other fruits there are in abundance which will yet become known as "Florida fruits," but at this present writing are not sufficiently established or cultivated to be of any commercial importance, although of no little value to those whose location allows their culture.

The field for experiment is wide, and we hope to see it thoroughly tilled, not only by private enterprise but under the more effectual direction of both our State authorities and the General Government.

CHAPTER XXIV.

GRAPES.

Many varieties of grapes have been tested, and tested satisfactorily, in Florida, but foremost among them all ranks the *Bullace* or *Vitis vulpina* family, native grapes of Southern origin, which, owing to their late blooming and late ripening, will not succeed north of the more southern portions of Virginia.

It is a curious fact that while the several members of this family vary greatly in the quality of their fruit, even in the wild state, this is the only difference that can be detected in them: All the cultivated and all the wild varieties are alike in leaf, bloom, and general habits, the only perceptible difference, apart from the fruit, being that the white sorts have pale green tendrils, and the purple kinds purple tendrils.

The whole habit and manner of growth of the *Vitis vulpina* family is so entirely unlike that of any other grape in cultivation, that the rules generally applied to grape culture are here at fault.

Most grapes root with ease from cuttings, but the *Bullace* varieties do not, their wood being so dense and compact that it is almost impossible to get cuttings to strike; consequently the vines are propagated by layers, and where a large number are desired, certain vines are set apart for this purpose alone. These are kept cut back almost to the stump, only short shoots, with four or five eyes or buds are left; this is done in the fall or in the spring. The shoots, which are very numerous, are allowed to grow until June, by which time they have attained a length of five or six feet; then the leaves are all stripped off from

the lower part, and the shoots gathered up in bunches of six or eight; a hole is made near their junction with the stump; a handful or two of rich compost or thoroughly rotted stable manure, incorporated in the soil to be filled in, then the vines are bent down into the hole, the earth firmly packed in on them, the ends left out turned slightly upward, and the work is done. During the summer the weeds must be kept down, and the ground kept slightly moist, not wet. By November the layers are ready to be lifted and set out, either in their nursery or in their permanent places; they will be found fully supplied with strong, thrifty roots. One good, large stump thus devoted to propagation, will in one season furnish from fifty to a hundred layers. These layers may be set out at any time while dormant, and this, of course, is during the winter and early spring months.

They should not be set closer than twenty-five feet to each other in any direction, and if the land is very rich not closer than thirty feet. This may seem very far apart while the vines are young, but wait awhile and see, and if the holes where they are planted are well manured before setting out you will "see" all the sooner.

Cut back the vines as they are planted, so that no more than three or four eyes or buds are left, and drive down a stout stake alongside of each, so that it stands fully six feet out of the ground.

Watch the young vines carefully and pinch off all of the lateral shoots, a few at a time, so as not to check the growth of the main stem, which is the object of your care. This must be tied to the stake as it grows until, at the end of its first season, it should have reached the top, a single, stout, clean stem.

Before spring comes again a canopy should be prepared; four perpendicular posts, six feet high (out of the ground)

and ten or twelve feet apart with slatted top, will suffice for the second season's growth, and each season, as the vine spreads, the canopy must be spread also to meet its increasing requirements.

It is a fact to be noted and heeded, especially by the Northern settler who thinks he "knows all about grapes," that the *Bullace* family will not do well at all spread out on the perpendicular arbors usual at the North, and indeed every where, for most other varieties of grapes. They must emphatically be kept spread out uniformly on this horizontal canopy, and not permitted to overlap and crowd; if they are, the fruit production is lessened and deteriorated; also the trunk for six feet up must be relentlessly shorn of all lateral branches.

It has often been said that the *Bullace* grapes do not need pruning; and this is quite true in the sense in which other grapes need it. This difference is owing to the fact that in the *Bullace* or *Vitis vulpina* family all the eyes or buds, that in other vines lie dormant, unless forced into activity by pruning, start out of themselves, thus causing a more even, uniform growth over the whole vine; sometimes, when the vine is very vigorous, the branches overlap and crowd, and in these cases the *Bullace* vines need pruning to the extent of cutting out the feebler stems. We have often heard and known of persons "bleeding to death," but it is not often that this happens to a denizen of the vegetable world.

Until very recently all nurserymen and growers held that there was no remedy for preventing *Bullace* grapevines from literally bleeding to death if any considerable limbs were cut or broken during those months when the sap is flowing freely in the spring and summer. Such is the tremendous force of the circulation of the sap, that the wound thus made has no time to heal over like that of

an ordinary plant, but the sap flows out, drop by drop, until the vine dies for want of nutriment. Recently, however, one of those happy accidents, by which so many discoveries are made, revealed a remedy, certain, and easy of application. A strong, thrifty vine having been burned by its frame catching fire, the owner cut it back to about eighteen inches from the ground. The vine at once began to bleed, and its death must have speedily followed had he not bethought him of charring the cut end; a lighted torch was applied, but for a day afterward the sap continued to drip, though slowly; by another charring the cure was completed and the vine saved.

The vine, if it has grown with its usual vigor and thrift, should bear the second year from the layer—that is, the first season on the canopy; of course it does not bear very heavily, it has as yet neither root nor branch enough to make much of a crop, but with each year's growth the yield increases rapidly.

Old vines frequently bear thirty bushels of grapes, and in vineyards of fifteen to twenty years' standing, single vines often yield from fifty to seventy-five bushels.

A bushel of grapes, weighing about sixty pounds, yields three to four gallons of wine, and from the pomace that remains after expressing the juice no inconsiderable amount of vinegar can be made.

The following are the several varieties of the *Bullace* or *Vitis vulpina* grapes.

SCUPPERNONG.

Bunches seldom composed of more than eight or ten grapes; grapes large, round, bronze color when fully ripe; skin thick, flesh pulpy; very vinous, sweet, and of a peculiar musky aroma; exceedingly pleasant and refreshing.

Matures from middle to end of August. Fruit has never been known to decay before maturity. Vine is free

from attacks of insects or disease; gives a certain crop annually; is very prolific, and rapidly becoming popular as a wine grape. Makes an excellent sweet wine, resembling Muscat, and when properly manipulated produces a fine, sparkling wine.

THOMAS.

Bunches of six to eight grapes; grapes oblong, large, light violet color, quite transparent; pulp tender, sweet, of a peculiar vinous flavor; quality superior to any of its type; has but little musky aroma, and makes a superior red wine. Matures middle to end of August.

FLOWERS.

Bunches of from fifteen to twenty-five grapes, which are almost black, and sweet, vinous flavor. Matures end of September to middle of October.

TENDER PULP.

An improved seedling of the Flowers. Grapes large, very sweet; pulp tender. Matures end of September.

PEEDEE.

Resembling the above, except that the grapes are light colored, like the Scuppernong.

These are all of the *Bullace* family. Other grapes that have so far been successful in Florida are:

CONCORD.

Bunches large, berries very large; blue-black, with bloom; skin thin; pulp juicy; a beautiful market variety; rampant grower and good bearer. Ripens middle of July.

DELAWARE.

Bunches medium, red or pink; skin very thin; pulp very slight; juicy, vinous, and most delicate table grape; very prolific bearer. Ripens about middle of July.

CLINTON.

Bunches medium, berries large, black, vinous, and very refreshing; makes a delicious claret wine. Ripens middle of July.

DIANA.

Bunches large, compact, berries large; reddish lilac; little pulp, sweet; very productive.

HARTFORD PROLIFIC.

Bunches large, berries large, blue; flesh pulpy, musky, sweet; prolific bearer and fine grower. Ripens early in June.

GOETHE (ROGER'S NO. 1).

Large; greenish yellow, turning pink at full maturity; very sweet, vinous, and of well-defined aroma; excellent, and is a reliable bearer. Ripens in August.

WILDER (ROGER'S NO. 4).

Very large; blue-black; very fine, and a thoroughly reliable bearer. Ripens in August.

MRS. M'CLURE.

A cross between Peter Wylie and Clinton, foliage and growth resembling the Clinton; very vigorous; bunch and berry medium size; white, and of excellent quality.

PETER WYLIE.

Vine vigorous, short pointed; holds its foliage till fall; bunches alone medium, shouldered, loose; berries medium,

round, white, transparent; golden yellow at maturity; flesh melting, vinous, delicate, Muscat flavor; quality best; best flavored white grape ever grown in the South. Ripens in July.

BERCKMAN'S

Holds foliage till frost; bunches large, berries above medium; reddish pink; first quality. Ripens in July.

These are all native grapes of the foreign varieties. Black Hamburg, Black Prince, and Chasselas Blanc or White Sweet Water have been tried and "not found wanting," especially the former.

In fact, there is no doubt that Florida is destined to be a great grape country, both for raisin-making and for the production of wine. The grape loves a warm, dry, sunny soil, more especially a sandy loam, and this Florida can give almost over her whole surface.

Here, as well as elsewhere, one of the greatest difficulties the grape grower has to contend with is the pilfering of the numerous birds. Covering the several bunches with paper or cheese-cloth bags is a method often resorted to for protection, but this is a very tedious process. Another is to pass strings across the tops of the vines, birds will not alight under them.

Still another, and a very effectual way to save the grapes from the feathered robbers, is so to train the vines on horizontal canopies that the dense mass of foliage on top will shield the fruit below; the birds then can not reach it, for they will never fly up from beneath the canopy.

Yet another and very effective method for protecting, not only grapes, but all fruit, is one invented by a poor East India native, who little expected its fame would ever travel beyond the limits of his humble field.

An empty bottle, a string, a cork, and a nail—these are

all the materials required. The bottom of the bottle is cut off by a heated wire being drawn along a file mark; then the string is passed through the cork in the mouth of the bottle, its lower end, with a nail (or small stone) tied to it, hanging about two thirds of the way down to the lower part of the bottle; this, you will see at once converts the latter into a bell, the nail being the clapper; the bottle must now be hung up on a twig of the plant to be protected, either by a continuation of the clapper string, or, which is much better, by a wire passed around the neck of a bottle. The least breeze causes this novel bell to tinkle, and a number of them, placed here and there in an orchard or vineyard, will effectually frighten away the birds, and preserve the fruit from their ravages.

Another enemy we have to contend against is the leaf-roller, which devours the young leaves, and thus prevents the fruit from maturing. The following is claimed to be about the only effectual method of destroying them:

To ten pounds of flour mix enough petroleum to reduce it to a thin liquid, no lumps; then add one pound of borax and a half pound of sulphate of iron. Apply with a spray fountain pump; a light application will answer the purpose, the lighter the better. A fine, frost-like coating will be left on the leaves, protecting them from other insects as well as the leaf-roller. This emulsion is excellent for the trunks of trees, and, diluted with whale-oil suds, for spraying young trees.

In picking grapes to send to market great care must be taken not to handle the bunch itself, as this will rub off the bloom, which lends so attractive an appearance to the grapes; the stem only should be held in the hand.

Five-pound boxes, not larger than these, are the proper size for packing them in; they are very cheap, and are made either of very thin pieces of wood or of stiff paste-

board. The grapes must be laid in carefully, shaken lightly to make them pack firmly, and filled even with the top. The boxes thus prepared are placed in larger boxes, and are then ready for shipment.

When grapes are properly handled in picking, so that they are not broken or bruised, they may be kept for months by the following simple process:

Nail cleats on the inside of nice, clean boxes, about an inch from the top, and between them, on the inside of the top of the box, nail bars, made of two strips of wood placed one on the other, the lower one the widest, so that there will be a ledge on each side of the narrower center strip.

Let the grapes hang on the vines as late as possible, and then cut the bearing shoot so that the bunch of grapes will lie in the center; cut the shoot to fit so that it will slide in by a tight fit on the bars, one end resting on a ledge of each; this will hang the bunches in their natural position, allowing the air to circulate freely all around them. Put the cover on the box (loose), and place the latter in as cool a place as you can find; remove the cover now and then and examine the bunches, taking off any dried or decaying berries.

CHAPTER XXV.

CHINESE SAND PEARS.

All over the North, wherever pears are grown, there has of late years prevailed a dire disease, mysterious in its cause, mysterious as to its remedies, and plain and certain only in one respect, that of the destruction of pear growing as a profitable market fruit. Whole orchards of thousands and tens of thousands of trees have gone down before the dread disease, and their owners have abandoned the pear-growing business in despair.

For years it seemed as if this delicious fruit must be numbered among the things of the past, but for the advent of that for which our horticulturists had been largely hoping, an entire new race of pears, with all the health and vigor of the wonderful pears of China, and free from the dreaded "blight" and all other diseases so destructive to those which may now be termed our native varieties.

In China the pear trees reckon their lives by as many centuries as ours by decades, and are never attacked by disease. This sturdy race of pears has been acclimated in the United States by half a century of trial, and in all that time not a single Chinese pear has been touched by blight or any other disease.

Happily, it has also been shown that these pears, unlike the majority of the more familiar sorts, are especially adapted to the Southern States, particularly to Georgia and Florida.

As yet there are not many varieties of these pears, all of the sand pears now on the market having sprung from the original Le Conte, but this is a fault that will soon be mended, for all over the land enterprising horticulturists

are experimenting in hybridizing the China sand pears with our old valued varieties; that is, taking the pollen from the blossoms of our best dessert pears, and impregnating with it the blossoms of the healthy, hardy Eastern sorts.

Trees grown from the seeds of pears thus impregnated have retained the same degree of health and vigor and freedom from disease that belonged to the mother tree, while the fruit they bear is as large, handsome, and delicious as that of the home variety which was selected to be the male parent, which is usually the Bartlett. And of such excellent keeping qualities are these newly-created pears that they may be, and have been, shipped to Europe as freely and successfully as apples.

This race of blight-proof pears is one of remarkably rapid growth and intense thrift and vigor. The trees grow readily from cuttings, and, if well cared for, will bear in three years from the date of rooting.

Their value is greatly enhanced by their power of adaptation to circumstances, for they will thrive on sandy soil or in clay, in dry lands or in moister situations, although they should never be planted in places more than moist—wet. They like a rich soil, and respond generously to liberal feeding. As all pear trees need a good supply of water when fruiting, they should be heavily mulched during this period, if set out on lands subject to drought. One point must, however, be borne in mind; these pears, on quince stock, will not do well in Florida.

All the sand pears are naturally symmetrical in shape, and very ornamental, needing little pruning, save the removal of dead branches from time to time.

That the Chinese race of pears is destined to become one of the staple productions of Florida, as it is already of Georgia, we have no doubt. It has only been three or

four years since this fruit first began to attract the attention of Florida fruit growers, and already orchards of five to twenty acres of Le Conte pears are being planted here and there over the State by far-seeing men, whose energy (and means) are equal to their faith.

From all parts of Florida reports are beginning to come in of the successful fruiting of the few trial trees set out, and before long pear orchards will be no uncommon sight. In some localities they will rival the orange in number and importance.

At present the Le Conte is the one Chinese sand pear most generally known, because it was the first to be introduced, and from it the other varieties have originated—some just from the seed, some just as the Le Conte itself originated, from an accidental hybridizing with the Bartlett pear—and of course some years necessarily elapsed before these new sorts could be fruited, or be sufficiently proven to be placed upon the market as distinct varieties. Meantime the Le Conte was winning its way to the front rank and becoming widely known. There are now other pears, however, originating from it, as the mother tree, that are destined to surpass it in public favor as soon as their great merits are generally known. Among these the Kieffer Hybrid, as we shall presently see, stands pre-eminent. The history of these several varieties of the Chinese sand pears is as follows:

THE LE CONTE.

Over forty years ago Major John Le Conte purchased a lot of fruit trees from a New York nurseryman, and among them was one labeled "Chinese Sand Pear." He was told that this tree was of no value, as the fruit would not mature in this country. The Major, however, carried it to Liberty County, Ga., where it "waxed exceeding

strong," grew into a tall, beautiful tree, and soon began to bear a large, fine fruit, excellent for cooking, for preserving, and for dessert.

Major Le Conte had presented this tree to Mrs. Harden, and after its true nature had been thus revealed, a friend of the latter, Major Varnadoe, secured a cutting and started the second Le Conte pear tree in Georgia, but just then came our terrible civil war and the tree was neglected. Peace restored, the Major turned back to his old project again of propagating this grand tree on a large scale, and when he moved to Thomas County, Ga., in 1869, he carried with him a great quantity of these cuttings, and from the young trees that resulted from these was inaugurated what has already proved to be in Georgia, and will soon prove to be in Florida, a veritable "bonanza."

The oldest growers of the Chinese sand pear race have yet to meet with a single case of blight, or other disease, or defective fruit.

The Le Conte pear roots with extreme ease, if kept slightly moist while rooting, and grows off afterward with great rapidity, frequently attaining a height of thirty feet in seven years, with limbs twenty feet long bending to the ground under their weight of delicious fruit, until such a tree, fully fruited, resembles a weeping willow, so far as its branches are concerned. The general shape of the tree is that of a cone, and is very handsome.

It is of unexampled prolificacy, it being no uncommon thing for a tree to bear from four to six bushels of fruit at its first bearing, and at its fourth year to yield twenty bushels of fine, marketable pears.

They ripen about the first to the middle of July, more than a month before the earliest of all other pears, and hence always "skim the cream" of the markets. Major Varnadoe, a year or two ago, received ten dollars a bushel

for his first shipment; the usual net price, however, is from five dollars to six dollars a bushel.

It is a peculiar feature of this pear that it perfects not only one crop in one season, but sometimes partially matures a second before the first is all marketed.

The pears are picked before they are fully ripe, and then spread out on one blanket and covered by another. This ripens them evenly and gives a rich, golden color, which makes them as pleasing to the eye as they are to the palate, for the Le Conte, be it known, is a fine-flavored, juicy, aromatic fruit.

The tree has no "off years," but gives continual crops year after year. The original tree, in Liberty County, Ga., is the greatest bearing pear tree known; has never missed a crop, and has yielded at one picking thirty-nine bushels of large, smooth, marketable pears.

Another thing that extremely enhances the value of this remarkable fruit, in a commercial sense, is its unusual keeping qualities. The Le Conte is one of the best, if not the very best, shipping pear that the world has ever produced, excepting only its own offspring, as we are about to note.

KIEFFER'S HYBRID.

In the year 1868 Peter Kieffer, of Philadelphia, planted a quantity of seeds of a Chinese sand pear in his garden. One of the seedlings thus raised proved to be the bearer of a new variety of pear, and one of exceeding merit in every respect. This seedling commenced bearing in the year 1873, five years from germination of the seed, and has borne full crops every year since, the quantity steadily increasing with the bearing surface of the tree. In the fall of 1877 it yielded four bushels, the next eight, and so up to the present season the yield has gone on steadily increasing.

Wherever the Kieffer Hybrid has been exhibited it has taken the first prize as the best blight-proof hybrid seedling, and in the markets it always commands a higher price than any others. The fruit is large, measuring from ten to twelve inches around; is double turbinate in shape, pointed at both ends; flesh white, and remarkably firm until it ripens, then it is juicy, rich, with a pleasant vinous flavor, and of best quality.

It is a splendid keeper, and can be shipped to markets a month or so distant, arriving in better order than when it started, ripening on the way. It does not rot until very ripe, and remains sound at the core to the very last. The fruit is a rich yellow, tinged with red, and very attractive. The tree is very ornamental, an early bearer, commencing to fruit at two or three years, and is enormously productive as it grows older. It is also a very strong grower; young trees planted in the spring often making a growth during the summer of four to five feet. It grows well in any ordinary soil, whether heavy clay or light sand, but does its best on the latter, hence is peculiarly adapted to Florida. The fruit commences to ripen in July, and continues through November.

At the International Exhibition in Philadelphia, in 1876, the Centennial Commission gave to P. Kieffer a prize medal and certificate of award, for "originating a hybrid pear of remarkable excellence, between the pear of culture and a Chinese sand pear, giving promise of a new race of pears of great excellence."

GARBER'S HYBRID.

This is the best of many seedlings of the Chinese sand pear, raised by Mr. J. B. Garber, of Pennsylvania. The tree is fine, healthy, and vigorous, like all that spring from this hardy source. The fruit is of good size, measuring

nine inches around, and is much flatter and rounder than the Le Conte or Kieffer. Its color is greenish-yellow when ripe, with a red blush on one side; stem is slender, of medium length; flesh firm, coarse-grained, juicy, with a peculiar, pleasant flavor. It ripens well and evenly, and is of excellent quality and a good shipper. Ripens in September.

COCKLIN'S SHA-LEA.

This pear is the best of two thousand Chinese sand pear seedlings, raised by E. H. Cocklin, of Pennsylvania, and is not a "sport," but undoubtedly an accidental hybrid between the above pear and a Bartlett tree, which grew near that from which the seeds were obtained.

The seedling commenced to fruit in 1873, when five years old, and has borne full crops every year since, bearing in 1877 eight bushels of fine, marketable pears. The fruit is remarkably handsome, smooth, high-colored, and beautiful. The skin is yellow with a bright-red blush on one side; medium size, measuring ten inches around and twelve inches lengthwise; stem long, calyx small; shape, double turbinate; flesh white, crisp, firm, and of good quality.

This pear, from its handsome shape, fine color, and other good qualities, has already become a prime favorite in the market, selling readily at six dollars per bushel when pears of the older varieties are selling at one third that price. The fruit begins to ripen in October and continues through November, just when pears are scarce and high.

These three new-comers in the family of Chinese sand pears, Kieffer's Hybrid, Garber's Hybrid, and Cocklin's Sha-Lea, are destined to secure as firm a foothold in our Southern pear orchards as their mother tree, the original China sand or Le Conte pear has already done. Very few

pears grown on any of these trees prove to be unfit for market, but any that should be so could be readily utilized by drying them, just as we have recommended the surplus guavas to be treated.

In handling pears for market it must be borne in mind that they are a delicate fruit, and require tender treatment, a bruise being ruin. They should be picked when fully matured, but before they are ripe, to insure safe carriage. To hasten the ripening process they should be spread on paper or blankets, and covered with the same, in a moist air. To retard the ripening, keep the fruit uncovered in a dry air, and as near 40° temperature as possible. In packing remember that pears absorb odors with great readiness, and therefore always pack them in clean barrels or boxes. Never use "fruit baskets," they are not firm enough; either pack in slat boxes or in barrels with plenty of holes bored in them for ventilation.

Pears are not elastic like apples, therefore must not be packed down so tightly. When the point of destination is very distant, the sides, top, and bottom of box or barrel should be lined with paper, straw, or some other soft, dry material.

Separate the different sizes and qualities, just as with oranges or lemons, and place them always on their blossom ends. Pack just tight enough to keep the fruit from moving about. The French gardeners are justly celebrated for their success in packing pears for distant markets, and this is how they do it:

They pack their pears, carefully picked and handled, in small boxes, covering the sides and bottom with dry moss, or soft, dry paper, as we do oranges, and pack in layers, the largest and primest specimens at the bottom, and fill in the interstices with dry moss or paper. In this way every pear is held firm in its place, and no one pear can press another.

CHAPTER XXVI.

FIGS.

This fruit is destined to become one of the staples of Florida. It is of quick and easy growth, and particularly adapted to both soil and climate; but up to the present time its culture has been carelessly conducted, and but little pains have been taken by the nurserymen of the State to introduce those varieties especially suited for commercial purposes, namely, those that are light-colored, and therefore the best when dried for market, and those that that are superior as table fruit.

Gustav Eisen, of Fresno, California, tells us that the following conditions are highly favorable to fig culture:

"1. Abundance of moisture in the soil before the figs begin to ripen.

"2. Good and perfect drainage at any and all times.

"3. The gradual drying of the soil when the fruit is ripening.

"4. Sufficient heat to insure sweetness in the figs.

"5. Absence of any frost lower than 18° Fahr., though figs can stand 12° if they are tolerably dormant.

"6. Absence of heavy rains during the maturing of the fruit.

"Again, the following conditions are more or less injurious to fig trees, if the object is to procure good fruit for drying or the table:

"1. A wet soil, sour from stagnant water, during the fruiting season.

"2. Cess-pools, sewers, and ditches in so close proximity that the trees can send their roots to them.

"3. Heavy and repeated showers of rain during the

maturing of the fruit. Some figs are not much affected by this; some, however, will spoil, crack, and sour.

"If, with these conditions favorable, a proper site for the orchard is selected, no great difficulty will be encountered in setting out and caring for the trees. In planting, however, great care should be exercised in shading the roots from the sun and wind. Figs are more apt to get hurt from exposure to sun and wind than almost any other fruit tree, and if the roots once have become perfectly dried, it is generally difficult to get the trees started.

"The proper distance apart to set the trees is dependent upon circumstances. Heavy growing varieties should be planted twenty-five to fifty feet apart; if the former, every other tree may be cut out when the trees grow too large. In the meantime a profitable crop has been for years secured from each. If set twenty-five feet away we believe ten years will elapse before any necessary cutting has to be done.

"The head of the fig tree should be started not over two feet from the ground, and at that height the tree should be allowed to branch out freely, thus to form a low, spreading crown. On such low trees the fruit is easy to pick, the stem is kept cool, while the crown of the tree receives the maximum of sun. High-stemmed fruit trees are an abomination and not profitable, if fruit is the object. We do not refer now to fruit trees for shade or for avenues, as such trees may be given any shape desired.

"The pruning of a fig orchard is a very light job, simply because no regular pruning, as practiced and necessary for other fruit trees, is here needed. Here and there a branch may be cut out or a dead limb taken away, but no stopping of branches is required, though it would not prove absolutely detrimental to the tree.

"The sweet but deceptive expectation, that, when an

orchard or vineyard once is planted, the owner may lay in his easy chair and wait for the fruit to ripen without any further trouble or labor, can alone be referred to the fig. We know of no other fruit tree that needs so little care, or, in fact, demands to be left alone as does the fig; even the constant plowing of the soil, so much needed in other fruit plantations, is here even a disadvantage. Figs should be left alone; keep the weeds away and nothing more. One plowing is enough, provided the trees are in the proper soil; two would injure the trees. The fig has any quantity of surface roots, and if these are disturbed the trees will suffer. Figs which are never plowed produce as fine fruit as those cultivated with care. While other trees cry for constant care, the fig trees beg to be left alone; they are fully able to care for themselves."

It is with the fig in its natural state much as it is with guavas, the taste for each must be acquired, but when once attained is very strong. In Europe the people are trained from childhood to like the fresh fig; it is seen on the hotel tables as a dessert fruit whenever it is in season, and fresh or stewed, even more than dried, it forms an important part of the food of the masses.

It is a mild laxative, and hence particularly wholesome for a warm climate, and to this fact the inhabitants of Southern Europe are fully alive. It should be the same in America, and would be if more care were taken to place the best sorts on the markets.

Wherever fresh figs are offered for sale in the United States, the largest and coarsest kinds only are sought for, and it is very amusing to those who know better, to see a customer pass scornfully by a lot of fine, delicate-flavored, but small fruit, and purchase a larger, more showy kind, not one half so palatable or rich.

The people are not yet educated to a proper appreciation

of figs, and it is the fault of the producers that this is the case. The public are always ready to seize upon a good article, when it is made known to them as such. So long as the fruit growers exercise so little care and wisdom as to plant inferior sorts of figs, because they are larger than the more delicate kinds, just so long will the people care little for them in their fresh state, not knowing how excellent a fruit they might have.

Let the fruit growers of Florida and California set out the small, finely flavored varieties of figs, and there will soon be a demand throughout the country for all that they can raise.

It is true, as urged by the former, that the coarser kinds, such as the Brown Turkey, Mission, and Brunswick, are hardier and easier to raise than the others; but there are many localities in both the great fig-growing States, Florida and California—in fact, through all the length and breadth of the former—where the finer and more delicate sorts could be raised without the least danger of loss by frost. Let our growers try it, and they will soon find that the fig is one of the most profitable fruits that can be placed on the general markets, either fresh, preserved, or dried.

Already here and there in Florida a few wide-awake, enterprising men are establishing factories, where limes, figs, oranges, citrons, guavas, and any other fruits that can be obtained, are being prepared for market in the shape of pickles, preserves, dried fruits, jellies, marmalades, and wines. The only trouble is that they can not procure enough material to keep them busy, except in the one item of oranges, the others not yet being raised in sufficiently large quantities.

For instance, this past year, at St. Augustine, Mr. S. B. Valls, during the height of the fig season, preserved about

sixty bushels of that fruit daily; but the supply was soon exhausted, and in the quaint old city the people complained because there were no fresh figs left for them to purchase for home use; thousands of bushels more could have been sold in this one place alone, with great profit to the growers. It was the same with limes and guavas; the factories were compelled to close for want of material to operate on, and yet there are thousands of acres of land suitable for the culture of these valuable fruits still unoccupied.

The fig-tree grows very readily from cuttings, and this is the most satisfactory way to start a fig orchard: plant the cuttings deep just where they are to stay, for the fig is much like the pine-apple with regard to its roots; the latter object so strongly to transplanting, unless very carefully done and kept moist, that they are very likely to die, or at least lie dormant for months or even years, while new roots are forming alongside of them and outstripping them in the race.

We heard not long since of a gentleman who set out several fine young fig trees procured from a nursery; the trees did not die, they lived, but that was all they did do for more than three years, and so disgusted was their owner that he was on the point of digging them up and throwing them away, when, happening to relate his experience to a neighbor, the latter bade him let them be as they were.

"I have often remarked," said he, "that almost invariably a fig tree transplanted will lie comparatively dormant for four years and then start out, grow rapidly, and bear prolifically for years upon years. Wait a few months longer; your four years are nearly up, and then you will see."

So the fig owner waited and he did see. The condemned trees suddenly awoke to life, and put on a vigorous growth. In one season they gained as much bearing surface as could

reasonably have been expected in three seasons, and the following year, and every year thereafter, these awakened trees bore heavy crops of fruit.

A cutting placed in permanent position, with the ground properly prepared and suitable after-treatment given, will outstrip a transplanted fig tree, as a general rule.

Wherever the future tree is to stand—and if there is clay near the surface so much the better—a hole three feet in diameter and two feet deep should be excavated, the top soil thrown to one side, the subsoil to another; then a compost of muck, forest leaves, and stable or hen manure, or some commercial fertilizer, should be thoroughly incorporated with the top soil and the hole filled in and tightly packed with this mixture. If the compost is moist, as it should be, the fig cutting may be thrust down, sloping, in the center of the spot thus prepared, the earth packed firmly around it (in this last lies the secret of successful rooting), a mulch of leaves or grass placed around it, a tall stick or two driven down alongside as a guard, and the work is done. Should there be a long dry spell after planting, then, but not otherwise, the cuttings should be watered.

Before long, buds will develop and the young tree will grow right along, beginning to bear in its second or third year, and continuing to do so for a life-time or more.

The time is not far distant when our people will awake to the true value of the fig, whether sliced with sugar and cream as a table fruit, as a preserve, as a sweet pickle, or as a dried or shipping fruit.

Wherever fresh figs are placed on sale in the Florida cities and towns, they sell readily at from ten to twenty cents a quart, and even if the local price should fall to five cents a quart, there would be still a handsome profit for the grower.

The experiment of shipping fresh figs from Florida to the Northern markets has already been made with eminent success. They were sent in refrigerator cars, carefully packed in quart boxes, and, having been picked just before maturity, they ripened in transit, and arrived in perfect order, bringing the splendid price of forty cents a quart, when even at one half of that amount they would have given a very large profit.

There is no doubt whatever that if good, sweet, ripe figs are thus sent to the Northern cities in quantities, they will soon be sought after as a dessert fruit; they only need to be known to become exceedingly popular, just as they are in Europe.

The true Smyrna fig, the dried fig of commerce, has not yet been introduced into Florida, although several importations of alleged cuttings have been made in California; upon fruiting, however, they were found not to bear the true Smyrna fig. Recently it has been proven that the agents of the importers were deceived in the cuttings; the true Smyrna fig tree or cuttings not being allowed to be sent out of the country. Seeds from the imported figs themselves will, however, germinate, and thence our supply must come.

The principal varieties of the fig now cultivated in Florida are as follows:

ANGELIQUE, OR EARLY LEMON.

Small; greenish yellow; fine flavored; early.

BRUNSWICK, OR MADONNA.

Very large; violet; good, and very productive.

BLACK ISCHIA.

Medium size; bluish-black; very good quality.

BLUE GENOA.

Medium size; bluish black; very fair quality.

CELESTIAL.

Very reliable for orchard culture; class fruit very early, and gives large crops; fruit medium size; pale violet, and very sweet.

BROWN TURKEY.

This variety is also excellent for orchards; fruit medium size; brown; very sweet and delicious.

GREEN ISCHIA.

Fruit medium size; green, with crimson juice; very good and prolific.

LEMON.

Very large; yellow; sweet and prolific.

WHITE GENOA.

Leaves smooth, not deeply lobed; growth medium size, Fig medium size, larger than Ischia; skin very thin; meat finely grained and highly flavored. A fine and very valuable fig for drying.

WHITE SAN PEDRO, OR APPLE FIG.

Leaves not deeply cut, woolly. Tree a strong grower. Fig very large, as large as a medium apple, the largest of all figs; skin rather thin; highly flavored and sweet when grown on drained soil. Very fine for table, but too large to dry well.

WHITE ADRIATIC.

From Sicily, Italy. Enormous grower and bearer. Skin very thin; meat very sweet and highly flavored, and very valuable for drying. As a table fig it is equally fine, but is not as large as San Pedro. Should only be planted on well-drained soil.

CHAPTER XXVII.

PEACHES* AND PLUMS.

Who does not love it, the luscious, juicy, fragrant peach? Why, the very mention of it, when it is not within our reach, is enough to "make the mouth water," and the nostrils expand in the futile hope of recalling the taste and smell of past pleasures connected with that "fruit of the gods."

We have yet to meet with the first person who avows a distaste for a fine, aromatic peach, and, strange to say, we have met with but few more who could tell "whence its name or what's its name."

The botanical designation of the peach, *Amygdalus Persica*, at once reveals its origin and the land of its nativity, for to Persia do we owe this most popular fruit, and yet, strange to say, in this, its native home, it was considered unwholesome, and so was far from being the favorite it now is with the civilized world. In point of fact, it really was unwholesome in those days, just as it is now, where its due care and cultivation are neglected or not understood, for the peach is one of those aristocratic trees that object to "roughing it" through the world, and will not flourish as it might if not intelligently waited upon by its owner.

Hence, in Media, that province of Persia to which we owe our improved peach of to-day, the fruit seldom ripened, the flesh was tough and indigestible, and the flavor bitter, and all because its true character and requirements were unknown. Just exactly as many a human heart has become toughened and embittered from not being understood and rightly treated by those about it.

*Peaches—Originally published in the *Florida Agriculturist.*

Columella tells us that when the peach was first introduced into the Roman Empire from Media, during the reign of the Emperor Claudius, it was possessed of extremely injurious qualities.

Somehow the Chinese, in the "good olden times," even more than in the present, seemed to take hold of every new plant or discovery with a zest that soon carried them beyond the nations of Christendom, so it was with the peach; although a native of Persia, its first visit to foreign lands and the first true appreciation it met with was on Chinese soil, and there we find it flourishing and at home almost as early as it was noted in its native land. Thence it spread to Asiatic Turkey, where the natives regarded it with deep veneration, and even connected various superstitions with the tree and its fruit, at least so Pliny and other classical writers tell us.

That the peach was one of the "trees in the Garden of Eden" there can be no doubt, and surely God could have placed there, for the comfort of our first parents, no more delicious fruit than this; and perhaps it was for this reason that after their fall it was withdrawn from the knowledge of their descendants; for, curiously enough, we find no mention of the peach in the Bible, although its congener, the almond, is mentioned even as far back as in the time of Jacob, for we read that when preparing his gift for the Governor of Egypt, he commanded his sons to take "myrrh, nuts, and almonds," thus showing the high esteem in which these three articles were held. And yet again in the minute directions for making the golden candlestick we find mentioned, among the chief ornaments, the myrtle and almonds; again and again the almond you see, yet never once the peach; hence it is quite safe to infer that to the Israelites the peach was an unknown fruit, although the almond is so nearly identical with it.

We have seen how the peach when first brought to Rome bore unwholesome fruit, yet in a few years thereafter we find it so vastly improved, by proper care and cultivation, as to be highly valued by the Roman patricians, and regarded by them as one of their choicest luxuries, and as such Italians still consider it.

From Italy the peach was carried to England about the middle of the sixteenth century, and it is still cultivated there as an exotic, as it must ever be, for the cool, moist climate prohibits its general culture, and its fruit can only be perfected when trained against sheltering walls or under glass. Hence, in England, the peach is rarely seen except on the tables of the wealthy. Even in France, whose climate is milder than that of England, it can only be occasionally perfected in the extreme South without protection, and hence its cultivation is confined to gardens, and the fruit, as in England, "tickles the palate" only of the rich.

To the honor of the United States, be it said, that it is the only country in the world where, either in ancient or modern times, the peach has been cultivated in such quantities as to be placed in the open market, and brought within the reach of all. Here it is not only the wealthy, as on the continent, but the poor, as well, who may feast, at slight expense, on the most wholesome and delicious of all fruits, and every year its cultivation is becoming more and more extended, and its profusion in the markets greater and greater.

Next to the United States, China raises more peaches than any other one nation, but even there it is only the rich who profit by them. The Chinese as a nation are great gardeners, and originate much that is curious as well as useful in this as well as in other arts.

Years ago, while still the Chinese were shutting them-

selves out from intercourse with other nations, we used to read accounts by venturesome travelers of the wonderful peaches raised in China; peaches of enormous size and strange shapes, notably one that has latterly become familiar to some of us, the flat or Pien-tau peach, and another that is yet a stranger, the crooked peach. We hope that some of our enterprising nurserymen may soon get hold of the latter and introduce it to the residents of Florida, for if it flourishes here as vigorously as its sister, the Pien-tau, we could not in reason ask for any thing better.

Heretofore, Florida, partly because it is a newly-settled country, has not done much in the way of peach raising, but the few who have had enterprise enough to plant and cultivate a few trees have been amply repaid, and the result of such intelligent efforts is sufficient to justify the assertion that when Floridians wake up to the fact that "there's millions in it," then their State will easily step forward into the first ranks as a peach grower; for the peach is a native of a mild climate; severe winters chill its life-blood, and late springs kill its delicate blossoms or young fruit. Florida's mild winters are congenial to it, and if we exercise proper care in the selection of varieties we need have little if any fear of our crops being "nipped in the bud" by Jack Frost.

The peach, to do well, requires care and cultivation; but given these it will accommodate itself to almost any soil, and, while preferring a clayey loam, will flourish in the sand if the clay be three, four, or even five feet below it.

Of course with peaches, as with other fruits, not all varieties are suited to all localities; for each section of country there are certain kinds that do well while others will not grow at all. Hence, it is a point of great importance to ascertain just what kinds are best suited to our own

special localities, and this point, for Florida, has been pretty well worked out in the last few years.

Pre-eminent among those suited for the fruit growers of Florida are the

Pien-tau peach, or China flat peach.

The *Honey peach*, maturing fruit early in May, sometimes even in April.

Early Louise and China Cling are also early peaches, and do well in Middle and South Florida, as also in North and West Florida.

These are all vigorous growers, prolific bearers, and their fruit is of exquisite flavor and fragrance.

Briggs' May and *Wilder* have succeeded excellently in North and West Florida.

These are all "foreign varieties," but there are a few native peaches, obtained from pits planted from Florida-grown fruit, that are worthy of our best attention and care. Among these are

Beach's Periodical, a strong, healthy growing tree, bearing large, fine-flavored fruit from July to September—the very months when other fruits are scarce, and our parched throats crave their refreshing juices.

Goodbread peach, so named after its originator. It is medium in size, and begins to ripen from May 15th to June 1st. A cling of the most exquisite flavor, bearing transportation admirably, it is peculiarly suited to Florida fruit growers.

Another is the May peach, ripening the last of May or first of June; and yet another, called the November, furnishes ripe fruit of best quality in October and November. These kinds are offered by one of our well-known nurserymen, and another introduces to our notice the following, all natives of Florida or Southern Texas:

Pennies' Free, a large, fine-flavored peach, ripening in July.

Bankman's Free, also large and good, perfecting the middle of August.

Onderdonk's Favorite, a large, yellow, juicy, July peach.

Cabler's Indian, a cling-stone of large size, ripening also in July, and with the peculiarity of purple or reddish flesh, whence, we presume, its name of "Indian."

Thus we see that any fruit grower of Florida may, by a judicious selection of varieties, secure a full supply of this delicious fruit during at least seven months in the year, these months, too, covering a period when this fruit brings almost fabulous prices in the cities north of us.

In short, we need here in Florida but to set out peach orchards as we set out orange groves, and give them as much attention, to obtain another source of income just as generous and reliable as the much-vaunted golden fruit, yielding, too, a larger sum per acre; for while one hundred and eight is the largest number of orange trees permissible to an acre, peach growers, placing their trees fifteen by fifteen feet, have space for one hundred and ninety-three trees.

And now let us pass on to that most important consideration, the proper care of the peach tree.

First of all, in setting out the trees let the hole be well spaded, raised in the center, with a hole for the tap-root, and large enough to admit of the roots being spread out as nature intended them to be; do n't crowd them in a bunch on one side or against the stem, that is a slovenly method, and unworthy of an intelligent being; they need to cover all the ground they can to procure food enough for their foster parent; then spread out the roots carefully, and to do this you must "stoop to conquer." Throw the earth carefully upon them until the hole is half filled, then raise a bucket of water as high as you conveniently can, and pour half of it down around the stem; this will pack the

earth around the tender rootlets much better than the hand could do it—you will see this by the way the soil washes down—put on more earth and then pour on the rest of the water, shaking the tree gently as it settles; this done, scatter a handful of salt around the base of the stem to keep the borers away. Throw on more soil, tread it down firmly, then a little more dry soil on top, loosely, and your work is done. Even in dry weather the tree thus planted will need no more care for three weeks at least. It takes time, to be sure, but often time lost is time saved, and so it is here, not only time saved but trees saved.

It is the nature of young peach trees to keep on growing till late in the fall, and it is best, even in Florida, to check this injudicious vigor by pinching off the young shoots and ceasing to stir the soil. Bearing trees, in this respect, should be treated differently; let them grow as late as they will, it will do them no harm in this latitude, for the latent fruit buds will consume all the extra sap caused by cultivation.

In the last word, cultivation (conjointly with pruning), lies the grand secret of success in peach raising; from the moment the buds begin to swell in the spring till the leaves fall in the autumn, keep the soil around the tree so mellow and free from weeds that you can at any time run your hand right down into it and bring it up filled with loose soil.

Cultivate at the beginning, cultivate at the middle, cultivate at the end; this, with due pruning, will secure a fine crop of fine peaches, where, without these two things conjoined, the same trees would produce tough, leathery, unripened fruit. This latter is the usual condition of our native Florida peaches, not because they are inherently poor, but because their owners, like the ancient Medians, do not understand their proper treatment.

Cultivation and pruning—pruning and cultivation; these are imperative elements of success in the peach orchard. A very rich soil is not needed, in fact, it is apt to promote branch growth at the expense of fruit, for every horticulturist knows that great growth and fruit can not be expected the same season.

The best fertilizer for the peach tree is made in the following proportions: Four bushels of leaf mold, or hammock top soil; one bushel of well rotted cow chips; one peck of unleached hard-wood ashes; and a quarter of a peck of salt; these will give splendid results in growth and fruit.

The tree requires yearly pruning, as the fruit is only grown on wood of last season's growth, and a superfluous branch, therefore, only takes so much wood away from the working portions of the tree.

When set out it should be cut back to within two and a half feet of the ground; below this cut young shoots will be produced, from which three should be selected to form the main branches of the tree, all other shoots being pinched off; the second year these three branches are cut back one half their length, one shoot being allowed to grow to continue the branch, and another to form a secondary branch, while a few bearing shoots are left to grow from the older wood; the third season the six leading branches are shortened one half, to obtain more bearing shoots, and so the formation of the "head" goes on for five years, and then, thereafter all that is necessary is annually to shorten in the older branches and trim out where too thick.

As we have demonstrated, it is the want of this selfsame pruning and cultivation that has given the opportunity for so many to declare that "good peaches can not be raised in Florida." Let those who have old peach trees

take our advice and saw and cut and clip now at once, till little is left but the trunk and three short branches at the top; then hoe away the weeds, and next spring give a dressing of the fertilizer we have specified, and our word for it, one or two years hence those old "worn-out" trees will bear profusely, fine, ripe peaches, not leathery ones.

Summer pruning is best for bearing trees; it forces out new shoots for next season's bearing, while spring pruning is better for young trees.

Peach trees, in fact all fruit trees, are a great deal like children; they need care and constant attention to conduct them safely "in the way they should go."

A good many persons, new to the business, appear to think that all one has to do, to have a fine orchard and large yearly crops of fruit, is to plant the trees and then let them alone to struggle along as they best may. But this is an erroneous and fatal idea; fruit trees have their enemies in scores, and as their attacks produce disease, and ultimately death, if not checked in time, it behooves the fruit growers to be ever on the war-path.

The most deadly of the insect enemies of the peach tree is the white worm, familiarly known as the "borer," which, entering the trunk, usually below but sometimes above the collar where the bark is soft, burrows into the very center of the wood, if allowed, and destroys the tree by literally "eating its heart out."

There are several ways of waging war on these burrowers, and here are some of them:

When you observe a tree losing its usual thrifty appearance, its leaves dropping or turning brown, you may be pretty sure that a borer is "at the bottom of it," and if you look closely on the ground, at the root of the tree, you will notice a little pile of reddish sawdust. Seeing this you may know at once that you are on the right trail, and

a look at the stem will disclose the tiny round hole through which the would-be destroyer has entered.

Now, how to get at it is the question. If you have been watching your trees as closely as you should have done, it will not have had time to do more as yet than burrow between the bark and the wood, and then its course is easily traced under the bark by the eye, like the rise in the ground made by a mole. Press with your finger-nail along this furrow until the bark peels from beneath it; this will tell you that the end of the burrow is reached, then cut a slit that will lay open the bark, and the borer will be at your mercy.

When it has entered too deeply into the wood for the knife to reach it, a bit of slender wire thrust into the hole and pushed along the burrow until it will go no further, in other words, has reached the end, will effectually dispose of the intruder.

Sometimes, however, the burrow has gone so far into the tree that the winding tunnel can not be followed by the wire, and then an ingenious device, the invention of a celebrated horticulturist, comes into service and rescues the tree from death. This is nothing more than a little funnel-shaped reservoir with a rubber tube, having a tiny nozzle depending from it. The reservoir is filled with a solution of tobacco or carbolic acid, then hung on a branch and the nozzle inserted in the borer's hole; the fluid flows slowly down, and, following the windings of the tunnel, no matter how long or tortuous, ultimately meets the enemy and destroys it. This result may be known by the fluid ceasing to flow from the reservoir, showing that the tunnel is completely occupied by the rescuing liquid. The fluid does no harm to the tree, and a budding slip wrapped over the hole will enable nature to repair damages very quickly.

And right here we will speak a word in favor of the

much maligned woodpeckers. If the fruit grower only knew how much solid, substantial aid these poor birds gave him in his war on the insects that attack his trees, he would never allow one to be shot on his premises. In the matter of this self-same borer, for instance, they always seem to know just where to find it, and, if above ground, rarely fail to rout it out and end its career of mischief forever.

For one fruit he destroys the woodpecker saves fifty. The borer deposits its eggs on the base of the trunk where the bark is soft; here it is hatched, and from this point usually bores its way into the tree; consequently, wherever traces of borers are found, after routing out such as have already effected a lodgment, it is a good plan to remove the earth from around the collar, hunt for any cocoons that may be hidden there, then fill in with fresh earth, a shovelful of ashes, and a little salt or lime.

Another way to exterminate this pest is, after dislodging those inside the tree, to swab the trunk from the lower limbs to the upper roots with a wash of lime and sulphur, then re-cover the roots with fresh earth and pour over them a bucketful of water with a teaspoonful of carbolic acid dissolved in it.

So much for remedies; now for what is of much more value, preventives—one ounce of which, as the proverb truly tells us, is worth a pound of the former. It has been observed that the peach trees in iron regions are very seldom attacked by borers, they don't like iron, evidently not being in need of a tonic, and so when there is iron present in the soil, there the peach trees flourish in the highest perfection.

All stone fruits, let us mention here, are improved by iron, either by a few nails driven in near the root, or by blacksmith's cinders; and as for the borers, if cinders can

not be had, all one has to do to keep these pests at a distance is to dissolve one pound of copperas in eight gallons of water, and let the earth be well soaked with it close around the stem of the tree: it is life to the tree and death to the borer.

Another preventive is ashes and salt; another, and a very effective one is to scrape away the earth and wrap stiff brown paper around and below the collar, then replace the soil, and the wandering borer, searching for a place whereon to lay its eggs, will pass on in disgust.

Another preventive, and an excellent one, too, is twice each year, in the spring and late summer, to dash a bucketful of scalding water on the base of the trunk, so that the collar will get a liberal bath; it won't hurt the tree in the least, but it will kill the borer and its eggs; the tree don't mind "getting into hot water," but the worm does. Trees treated in this way grow with amazing thrift, and it will pay the peach grower to procure a large iron kettle for the express purpose of heating water in the orchard so that every tree may be scalded thoroughly, especially so if the hot water is made the medium for applying the copperas solution as above; this would be "killing two birds with one stone."

In cases where the borer can not well be routed, or where ants are injuring the tree, a piece of tow, or similar material, dipped in a mixture of hog's lard and chloride of lime, and tied low on the trees, will cause a speedy surrender of the invading forces; they will evacuate the premises without stopping to demand the honors of war.

The "yellows" is another and much-dreaded enemy of the peach, and in many sections of the North it has spread like an epidemic over whole tracts of country, sweeping out of existence thousands of trees in a single season; fortunately, we see but little of this fatal disease in the South, still it is well to be fore-armed.

The question "What is the yellows?" can not yet be answered without a shadow of doubt, but the prevalent belief is that it is a disease caused by a minute fungus growth, and is analogous to the fatal "blight" in pear trees, which is without question caused by a fungus so minute as to require a high-power microscope to detect its presence.

Sulphur and lime are deadly foes of all fungoid growth, and a wash of these two combined will help the tree attacked by yellows.

A most excellent remedy also is to wash the trees with a solution of quassia. One pound of chips, costing about twelve cents, is boiled and reboiled until eight gallons of the solution are obtained; this, poured around the trunk and sprayed with a hand-pump over the foliage will effect a wonderful change in the most forlorn-looking trees. This quassia solution will also banish the green fly and other troublesome insects.

Nearly eighty years ago Dr. Darwin suggested that very solution of copperas or sulphate of iron, which we have already mentioned, as a remedy for the yellows, and for the gummy secretions so common in fruit trees, and in the year 1840 a scientific farmer in France was so highly successful in using this remedy that the Academy awarded him a medal as a public benefactor.

But here, as with the borers, preventives are better than remedies. The yellows is hereditary among peach trees just as surely as insanity and consumption are among men; therefore, be careful that your peach trees come from healthy stock and are budded with healthy buds. One tree affected with the yellows will, if not cut down and burned as soon as the trouble is detected, communicate the disease to the whole orchard; so it behooves the peach grower to be watchful.

A horticulturist who has had many years' experience

with curl-leaf in the peach orchard, asserts that there is but one cause for this malformation of the leaves (a fungoid growth), and that is, that the bark of the tree is too close, and fits so tightly that the sap can not circulate freely, and hence the leaves are not properly nourished. He recommends an up-and-down cut through the bark of the trunk and main branches with a sharp knife, and declares that in a few days after this is done all signs of curl-leaf will disappear from all the younger leaves, and appear no more. If the tree is watched carefully, and the bark split when needed, curl-leaf will be prevented. Another remedy is to wash the trunk and branches with lime.

Standing still, very slow, or very rapid growth are assigned as the cause of tight bark, and consequent curl-leaf.

By observing these simple directions for the care and fertilizing of peach trees, the most veritable novice may have a fine, thrifty, and paying orchard, and we trust that a few years hence Florida will be as celebrated for her early peaches as she is now for her delicious oranges. Here is a sample of what has been, and can be done again, in this line of industry.

In Chambers County, Ala., near the Georgia line, is the largest peach orchard in the world, embracing two hundred and fifty acres of this luscious fruit, of which over eighty thousand dollars worth have already been sold. It is owned and cultivated by Mr. John Parnell, brother of the leader of the Irish Land League. Some twelve years ago he bought an old worn-out cotton plantation, and converted it into one immense peach orchard; his fruit is always the first in the market, bringing almost fabulous prices.

Mr. Parnell is coining an immense fortune out of his peach orchard, and there is no reason why Florida can not do as well as Alabama in the cultivation of this fruit.

As to the budding of the peach tree, which is the only certain way of obtaining sure results, it should be done in the same manner as has already been described in Chapter IV, pages 42 and 43; therefore it is not necessary to repeat them here. Suffice it to say, that when peach buds are inserted in peach stocks, the latter should be yearlings only, although those two years old will often do well; our native varieties of wild, rapid-growing plum trees, however, are by many preferred for stock for peach budding. In Bryan County, Ga., is an orchard containing two hundred trees thus budded as an experiment, and the results have been extremely gratifying, fine crops of superior fruit being gathered yearly from the trees.

In conclusion we would add a word of caution to all intending to set out peach trees, in particular, not to delay beyond the early part of February at the latest, as the trees take but a short period of rest, growing late and starting early, so that there is but brief time during which it is quite safe to transplant them; we have, however, seen trees set out in March do well, but it is a greater risk.

PLUMS.

The plum tree likes plenty of water, hence moist (but not wet) lands are best adapted to its growth. It does well in sandy soil, but better if there be clay near the surface.

For years back the plum, like the pear, has been subject to the attacks of a special enemy that has well-nigh ruined the business of their culture as market fruits; with the pear it was the "blight," with the plum an insect, the *curculio*.

But just as a new race of pears has been found to resist the "blight," so has there been found, for the South, especially, a new race of plums proof against *curculio;* these

are the several varieties of the improved Chickasaw type, as follows:

CUMBERLAND.

Large, yellow, juicy, sweet, and very good. Matures in September.

DE CARADUEC.

Medium, round, yellow, with brown red cheek; juicy, sweet, and of fine flavor; a remarkably fine plum. Ripens early in June.

WILD GOOSE.

Large, somewhat oblong; bright vermilion red; juicy, sweet, good quality; a cling-stone; a very showy and fine market fruit, and a prolific bearer; the most profitable of all the Chickasaw type.

HATTIE.

Medium, round, bright red; very sweet and of good quality. Follows the Wild Goose in maturity.

NEWMAN'S.

Medium, bright red, round; a cling-stone; quality good. Ripens early in July.

All of these plums named above should be picked as soon as they commence to color, and ripened in the house, where, in three days' time, they will acquire a brilliant color. If left on the tree too long the fruit drops, and never attains the quality of that which is house-ripened. This gradual ripening allows these varieties to carry perfectly to distant markets.

PEACH-LEAVED, OR KANAWHA.

Medium, oblong, bright vermilion; juicy, fine-flavored; quality very good. Ripens in September. Although it begins to color in July it is not fit to use until it ripens upon the tree, two months later.

JAPAN MEDLAR, OR JAPAN PLUM.

This valuable fruit is generally known in Florida under the latter title, which is an entire *misnomer*. There is a true Japan plum, but it is not an evergreen as is the Japan medlar.

This tree is not only a very ornamental one, with large, evergreen leaves, but it is destined to become one of the leading fruits of Florida. It has been introduced into California, but rarely fruits there, as the early blossoms are almost invariably nipped by severe frosts.

In Florida the fruit matures without danger of loss, and wherever the orange tree flourishes there the so-called Japan plum flourishes also. It grows slowly at first, but after the first three years increases in size more rapidly, and by its eighth year frequently attains a height of twelve or fourteen feet, and is covered with fruit and bloom; the ultimate height of the Loquat is about twenty feet.

The fruit ripens from January to March, and is of good quality, sub-acid, and a general favorite; excellent preserves are made of it, and as for its jelly, it has no superior among the many jellies offered for sale in the markets.

The fruit, resembling an ordinary plum in size and shape, carries as well, and in fact better than the peach. It has been shipped to the Northern markets in perfect order, selling there from twenty-five to forty cents a quart basket. In the Florida local markets it sells readily at twenty-five to fifty cents a quart.

The tree, if well cared for, commences to bear in its fifth year, and when covered with bloom fills the air with a delicious fragrance.

Another fruit destined to be of great value is

KELSEY'S JAPAN PLUM.

This remarkable plum was imported from Japan in 1871

by the late John Kelsey, of Berkeley, Cal., whose name has been given to the fruit as a just tribute to the memory of one of California's pioneer leaders in horticulture. The following points of excellence are claimed for it:

1. Its wonderful productiveness is unsurpassed by any other plum, either native or foreign.

2. It comes into bearing at the age of two to three years, blossoms appearing frequently on yearling trees.

3. The fruit is of very large size, being from seven to nine inches in circumference, and specimens weighing six and a half ounces each; it has a remarkably small pit.

4. It is very attractive in appearance, being of a rich yellow, nearly overspread with bright red, with a lovely bloom. It is heart-shaped; it ripens from first to last of September.

5. It is of excellent quality, melting, rich, and juicy; its large size renders the paring of the fruit as practicable as the peach, which is quite a novelty, and it excels all other plums for canning.

As a dried fruit it is destined to take the lead, equal to, if not surpassing, the best dried prunes. Experiments resulted in yielding nineteen and a half pounds of dried fruit to the one hundred pounds of fresh fruit. In texture it is firm and meaty, and it possesses superior qualities for shipping to long distances; it remains solid longer than any other variety.

CHAPTER XXVIII.

JAPANESE PERSIMMON, OR DATE PLUM.

Among the fruits quite recently introduced into Florida, and indeed into the United States, is the *Diospyros kaki*, or Japanese persimmon. Wherever it has been tried—and many are now scattered all over the State—it has done well; even the imported trees have given a satisfactory account of themselves, and now that our nurserymen have succeeded in propagating it on seedlings of the wild persimmon stock that grows luxuriantly on pine land and hammock alike, we may look for still better results. Its successful culture and great profit to the grower is fully established, and henceforth the Japanese persimmon will rank as one of Florida's favorite fruits.

In Japan it is considered the choicest and most popular of all the many fruits of that favored country.

There are several varieties, some conical in shape, some round, and they do not at all resemble in any respect the typical "persimmon" of our own land.

The fruit of the finer varieties is of a beautiful yellow or red color, and measures from three to four inches in height, and from eight to nine inches in circumference; of seeds, it has from five to seven, of a small size. The fruit ripens from September to March, and its flavor is so delicious that it is readily understood why it is so great a favorite in Japan, where its different varieties have been so carefully crossed and recrossed that it has become to that country what the apple is to the United States.

The dried fruit is as palatable as the fresh, is fully the equal of the fig, and can be kept a long time; moreover,

the Japanese persimmon, or date plum, as it is often more properly called, is a fine shipping fruit, and will bear transportation safely to great distances.

The tree is highly ornamental; leaves dark, glossy green; shape symmetrical; it is a very prolific bearer, is as hardy as a pear tree, and fruits sooner. The seedling tree bears in about ten years, but is apt to "sport," or not bear fruit at all, and hence is not desirable because not reliable. Budded trees fruit in from one to three years; they prefer a light, sandy soil, are not affected by curculio, grow to a large size, and attain the age of a hundred years while losing none of their vigor.

A number of varieties have been introduced into the United States, and of these there are two principal divisions, one of which is large, round, and shaped like a Greening apple. The flesh of this variety resembles that of the pear or apple, and is eaten in the same way; it is unsurpassed for the table, and considered equal to the peach and pear. Its color is a rich, golden hue, and the flesh "juicy, vinous, and firm." This variety should be inclosed in a tight cask for a few days after picking to render it perfect. The other variety is oblong, like a "Minie ball" in shape; "it is soft, sweet, and custard-like, is eaten with a spoon, and with cream and sugar is one of the most delicious fruits that is known."

The fruit of this variety attains a very large size, and, owing to the large amount of saccharine matter it contains, is the sort usually dried and prepared like figs for market; in this form it is sold as sweetmeats in Japan.

Professor W. E. Griffis, the author of "The Mikado's Empire," tells us:

"As regards the value of the Japanese persimmon there can be but one opinion; the tree itself is one of the handsomest of fruit trees, and in the fall, with its golden-hued

fruit hanging to the branches after the leaves have fallen, forms a beautiful and striking picture in a landscape. As to the fruit itself, it is nutritious, palatable, and to a high degree charged with those chemical ingredients which give most fruits their value in preserving the health and purifying the blood. This fact is insisted on by the Japanese doctors, some of whom I have known to cure their patients by a 'persimmon cure,' like that of the 'grape cure' of Southern Europe."

The following are the best varieties so far introduced into the United States, and for sale by our principal Florida nurserymen:

TANEASHI, OR SEEDLESS.

Very fine, large, oblong; flesh soft; color dark red, with black spots.

IMPERIAL.

Shaped like an acorn or "Minie ball;" very large, with dark stripes on the surface; flesh soft when ripe, sweet and fine.

ROYAL.

Nearly round; pale yellow; large size; early. Ripens on tree; good for drying.

AMONG.

Large, round, a little flattened; orange color.

MINOKAKI.

Very large, oblong, pointed; highly colored; often without seeds.

HYAKAME.

Largest known, and of the very best quality.

MIKADO.

Flat like a tomato; medium sized; bright yellow; flesh solid.

TAIKOU.

Round; pale or greenish yellow; fair size.

NIHON.

Slightly oblong; yellowish red; black spots on the surface and in the flesh; flesh solid. Very early.

DIAMIO.

Slightly oblong; reddish, with dark point; medium size; flesh soft.

DIE-DIE MAWELL.

Large and round, with slight point at apex.

HAYCHUYA.

Large, oblong; rich color; one of the best.

CHAPTER XXIX.

EVAPORATING FRUITS.

Our work on "Florida Fruits" would not be complete without a reference to a comparatively new industry, which is destined to be a revelation of wealth to the fruit and vegetable growers, not alone of Florida and the United States, but of all countries; a revelation of wealth on the principle that a "penny saved is a penny earned."

Wherever fruit or truck is raised for market there is sure to be a waste of unsalable produce, which could be utilized for home use if there was not "too much of a good thing," which, however, there is, and so a great deal spoils and is lost. Another thing, in many places, especially in newly-settled States like Florida, it is very difficult, if not impossible, to get perishable produce to market in good condition, hence, people living in these localities are cautious about raising such products. But modern invention has swept away this heretofore serious drawback. The farmer or fruit grower may now plant what he will, gather as he will, and then quietly place the result of his labor in such shape as shall assure him a large and sure profit, without the possibility of loss, no matter how far he may be from the great markets, nor how slow his means of transportation. Nay, more; he may prepare his produce and pack it away to await the highest market prices, instead of being obliged to place it on sale when the field is already overoccupied. Neither is the produce thus rescued from waste and low prices in poor demand; on the contrary, the supply will scarce be able to keep pace with it. If the article supplied be the best of its sort, a good price and ready sale is always sure. The recent invention

which has brought so great a boon, not only to the producer but to the consumer, is that of the evaporation of fruits and vegetables. To be sure, they were evaporated years ago and placed on the market with a great *furore*, but the principle then employed was totally incorrect, and the result correspondingly disappointing to all concerned. The fruit offered was really cooked and then dried, and not genuinely evaporated at all. The trays were placed one above the other in a box or chamber; the hot vapor or steam from below was augmented by the moisture from the contents of the lower trays, and the result was that the fruit swelled just as though it had been cooked, the delicate membranous cells burst asunder, and the starch they contained, instead of being converted into grape-sugar or glucose, acidified, and thus both the sweetness and the flavor of the fruit, which is an essential oil held prisoner by these same little cells, dissipated, and consequently the whole character of the fruit was changed. The salt had lost its savor, hence, evaporated fruits took no hold on public favor, and those who had invested in expensive driers soon abandoned their use, the universal verdict being that "it did not pay." And yet all felt that there existed a satisfactory solution of the vexed question of perfect evaporation, and within the last few years it has been solved completely by the invention of the "American Fruit Drier," by Dr. Ryder.

He set aside, from the beginning, the erroneous idea upon which the vertical evaporators were constructed, that "evaporated produce should be retained and finished in a humid atmosphere, entering at the point of greatest humidity and finishing at the point of greatest heat." Water in dried fruit means decay, acetous fermentation, and consequent loss of sweetness and flavor. This theory had failed lamentably in practice, so Dr. Ryder adopted the

opposite as the true method, and the result of his patient investigation is what the writer, after careful study and observation, fears not to pronounce the *ne plus ultra* of an evaporator.

No one, even though blindfolded, can taste or smell a slice of fruit or vegetable evaporated by the "American" without at once distinguishing the name of the crude article. So perfectly is the flavor preserved, no mistake can be made about it; and here is just the difference of product between the old vertical method and vapor bath and the "American's" inclined flue and "hot-air cure," a difference that is just as noticeable to the eye in color and handsome appearance as it is to the palate in quality.

So, you see, that there is a right and a wrong way of evaporating fruits and vegetables, and it was the misfortune of the wrong method coming first under notice that for a time threw the whole business of evaporating the products of the soil into the shade.

In the past, as a rule, dried fruits have been literally "flat, stale, and unprofitable;" but now, under Dr. Ryder's common-sense method, evaporated fruits are rapidly coming into public favor, and there they will stay.

In many cases the producer who uses the best evaporator (and we can truly say, having the welfare of our fellow fruit grower at heart, that this is the "American Drier or Pneumatic Evaporator"), will find that it will pay better to convert all his produce into the evaporated article for market than to ship it in its original state. The saving in crates, in hauling, in handling, in freight, and in loss by decay in transit—very important items to the Floridian—would greatly augment the profits of the crop, besides being perfectly safe.

The demand for evaporated fruits and vegetables will, for years to come, fall far short of the supply, where the

supply is of the best quality. People are finding out of late that they are not only very wholesome but that they are cheaper than canned fruits. To prove this one need only buy a can of any sort and its equivalent in cost in the best evaporated fruits, place the latter in water for eight or ten hours (which should always be done previous to stewing slowly), and then try to put it in the empty can; the result will be a revelation most damaging to the canned article.

The truth is that every agricultural family ought to own one of these evaporators; one of the smaller sizes will suffice to save many and many a dollar's worth of good, wholesome food that must otherwise be wasted; and this is particularly so in Florida, where, during the heat of the summer months, fruits and vegetables are apt to be scarce. The farmer who owns one of these improved evaporators —and the number is daily increasing, for there is no farm implement that will pay its cost so quickly or so often in a season—the farmer, we say, who owns one of these can, during the season of plenty, dry all his surplus peas, beans, sweet-corn, tomatoes, potatoes, both sweet and Irish, turnips, beets, cabbages, egg-plant, or onions; it needs only then to tie them up in paper or close muslin bags to "bar out" insects, and when needed for use to soak them for a few hours and cook slowly. It is no light thing, as every householder knows, to have fresh vegetables on hand at all seasons. In this one respect alone, apart from all commercial considerations, we can not over-estimate the value of these money and labor savers.

And the same is true of fruits; in the season of plenty, blackberries, strawberries, mulberries, huckleberries, plums, peaches, pears, pine-apples, guavas, may be preserved for future use with the greatest ease, and without the expense of glass jars, cans, or sugar.

In one season the ordinary farmer, curing for home consumption only, can save double the cost of this busy little worker, which has yet another popular qualification: it is cheap, far cheaper than the vertical machines, which really destroy the fruit rather than preserve it.

There is a No. 6 size that will dry three bushels a day, weighs two hundred pounds, and costs twenty-five dollars; then there is a No. 1 which evaporates six to eight bushels a day, weighs three hundred and fifty pounds, and costs fifty dollars. Three larger sizes are made, designed for more extensive work: No. 2, costing seventy-five dollars, cures from twelve to fifteen bushels a day; No. 3 costs one hundred and seventy-five dollars, and evaporates forty-five bushels; No. 4, which weighs a ton, and swallows one hundred and ten bushels, costs three hundred and fifty dollars; and No. 5, made only to order, costing four hundred and fifty dollars, and eating up one hundred and fifty bushels at a day's meal.

And still further to facilitate matters, these same manufacturers, called, by the way, "The American Manufacturing Company of Waynesborough, Penn.," place on the market a "Parer, Corer, and Slicer," which performs its triple work at one time, and costs only a dollar and a half; and an "Improved Rotary Knife Peach Parer," same price; also a "Peach Peeling Spoon" for twenty cents. Thus is evaporating made easy.

Any one who chooses to send to this company for the catalogue of their fruit drier, will learn a great deal to arouse his attention and interest in a subject that grows in importance as one looks into it; and we will further add, that with every drier full and money-making instructions are sent.

We have elsewhere referred to the great profit of raising the guava, our Florida apple, as it may well be called.

The subject of jelly-making is, as we have seen, one of immense moment; but not every one is able to command the needful labor to place his fruit in this salable form, and so there is a great deal of waste as things are at present, but need be no more, for, with even one of the small evaporators, all the loss may be made gain; besides that, the outlay of work, time and capital are much less than in jelly-making.

We believe that the drying of guavas for home use and the Northern markets will, within a few years, become one of Florida's great industries. Pare and slice the larger specimens, halve the smaller ones and then lay them in the warm embrace of the "American;" then pack them in neat, two-pound paper boxes, such as are made for such uses, and ship them off, forty boxes to the crate.

That there will be a large and increasing demand, once guavas in this shape are put upon the Northern markets, there is no doubt whatever, although, like all new things, its introduction may be slow.

Guava jelly is popular, but its expense puts it beyond the reach of the masses. Let them see guavas evaporated ready at their hand to stew for the table, or to convert it into jelly if they like, and we of Florida will have our hands full to keep up with the demand, for you know Florida alone can supply this fruit, so herein there can be no competition.

The Florida grower, even though far removed from "rapid transit," has a bonanza in this one industry alone, which is light, clean, pleasant, easily learned, can be carried on, nay must be, under shelter, and requires very little capital.

All this applies also to pine-apples, Le Conte and Kieffer pears, peaches, figs, etc.

CHAPTER XXX.

ODDS AND ENDS.

This present chapter may truthfully claim to be, in point of time, the "latest edition of Florida Fruits," being, as the reader will observe, made up of the tangled odds and ends of information, experience, and observation, that have been gathered together from out-of-the-way corners, here and there, during the few months that have elapsed since the main part of the work was sent to press.

After a battle has been fought, a great undertaking accomplished, it is an easy matter to look calmly out over the field and point out how this or that might have been better or more easily done.

It is very much the same with such a work as now lies before us. In gazing backward over what has been accomplished, when the stress and anxiety of the actual labor is over, and the pen almost ready to lie down and rest after its miles of patient travel, we can see here and there points of possible improvement, not so much sins of omission as the opportunity to seize, before it is too late, upon the odds and ends that have come into view since the previous pages were written.

First of all, let us see what lessons have been taught us by

THE FREEZE OF JANUARY, 1886.

The days and nights, inclusive, of the 9th to the 13th of January, 1886, will never be forgotten by any dweller in bonnie Florida at that disastrous time. Little did any one realize what was in store for him when, on the 9th, Friday, the United States Signal Officer at Jacksonville telegraphed all over the State that a "cold wave" was on its

way southward, and that Florida would feel its first breath that night.

The warning was significant enough to set some men to work hauling wood and piling it among their trees, and making ready for cordons of fire around their groves to the north and west, whence came our ordinary cold winds.

All Friday morning it rained a heavy down-pour; this, too, had been predicted by the weather prophets; and early in the night the first cold breath of the coming enemy reached us—and such a breath as it was! All night the bitter northwest wind blew and howled and whistled in every nook and corner, and our people, growing hourly more fully alive to what might possibly be the outcome, were too anxious to rest or to sleep, and yet it was too cold to do aught but to lie still under what, for Florida, was a mountain of coverings, until daylight should come, and with it, perchance, relief. But not so; it came indeed, but brought with it no hope of better things, rather the certainty of worse to come; as yet we had felt but a light touch of the Ice King's hand.

The leaden heavens gave no sign of cheer, and the cold, fierce wind continued to howl and shriek as if in derision of the puny efforts of mortals to snatch their property from its icy grasp. The huge fires kept burning day and night were useless to arrest or change the fiat that had gone forth. This was no "ordinary frost," whose cold hand could be held in check by human devices, but one of those rare, all-powerful strokes of the elements that teach us now and again our own insignificance.

During the afternoon of Saturday, the 10th, the sky partially cleared, and the sun tried to struggle through the clouds and send down his rays to warm his shivering friends; but it was of no use. The clouds gathered again, the gale

howled as fiercely as ever, sifting into every corner of dwellings ill-prepared for visitors from the arctic zones, and, strange to record, now and henceforth to the end, the worst of its work was done with the wind sweeping up from the southwest; and it was such a gale, this that came from our usually warm quarter, so pitiless, so bitter cold, as no Floridian had ever faced before, nor is likely to ever again on his native soil.

Long before sunset ice began to form. In ordinary storms the wind lulls as the sun sinks, but this was no ordinary storm, neither "rule, rhyme, nor reason" dictated its course or actions.

Another night, and what a fearful one it was, in-doors and out! neither hope nor comfort, physical or mental. Out in the groves, here and there, men flitted about large fires, desperately fighting to the last, hopeless now of saving the orange crop remaining on the trees, and feeling that they would be thankful if they could save the trees themselves. In-doors water was freezing, not a thin skim of ice, but strong ice that had to be broken with a hammer.

Not for fifty years had Florida seen the equal of this bitter storm; it was the longest, the saddest night, that of the 10th of January, 1886, that her present population had ever met.

Morning dawned: ice, an inch or more in thickness, covered all shallow, standing water; every thing that could freeze was frozen, in-doors and out of doors—the hearts of Florida's people also! Ah! those were times that tried men's souls, times when they could only stand aside and look on in desperate silence at the wholesale destruction of the property they had toiled for years to accumulate. For, note this fact, when the morning of the 11th dawned, with the thermometer nowhere in the State higher than 20°, and in most sections still lower, all the way down to 15°,

with the oranges on the trees frozen solid, the leaves curled and frozen so stiff that they crumpled in the hand like sheets of ice, the despairing fear, in many cases, belief, went out among the people that the trees also were killed. The one, the crop, was a loss of one year, but the other, the tree, one that many years could not replace.

Add to this depressing fear of total loss and ruin, the fact that the biting wind was pitilessly sifting into the houses, and that all through the day, on that bitter Sunday, water froze solid even within a foot or two of the stoves; that grown persons were blue and shivering, and children crying with the cold, and the pandemonium that had so suddenly swept down upon sunny Florida may be faintly pictured.

Every one knew that all the injury had been already done that was possible, and in dull, despairing apathy settled down to a knowledge of heavy loss; only the older and most experienced growers held fast to the belief that the bearing trees were not injured, the majority were too dazed to be capable of reason or of hope.

Sunday night, Monday, Monday night, came and went, and still the bitter wind howled, and the temperature continued lower than ever before known since 1835, when every bearing tree in the State (not so many by thousands then as now) was killed to the ground. By noon of Tuesday, the 13th, the wind veered around to the eastward, and then every one drew a long breath, for east winds in the winter time, in Florida, always mean milder weather. Before night it was evident that the terrible "dark days of January, 1886," were over, and that now it only remained for people and trees to thaw out and reveal the full extent of the damage done. This could not be done all at once; some of the destruction was self-evident on the instant; that the oranges, lemons, limes, were frozen on the trees,

and that their leaves were stiff, that the lemon and lime trees were, in nearly all cases, killed to the ground, that bananas, pine-apples, guavas were also generally destroyed; all these things showed at once.

Then, as the days and weeks rolled on, and the beautiful Florida climate resumed the even tenor of its way, little by little it began to be realized that the worst that had been feared, the loss of the great staple, the orange trees themselves, was mercifully spared her heavily stricken people.

In many cases even the large bearing trees were seriously injured, a few killed to the ground, but these were exceptional, and due either to unduly exposed locations or to the fact of the trees being in active or very recent growth, a condition which every one knows is always detrimental to a tree at the approach of cold weather.

The freeze extended over the whole State, even the most southern sections feeling its influence. There was ice in Monroe County and beyond it; Key West saw it; even Cuba awoke to the possibility, nay, reality, of a genuine freeze, the first in her history. The wonder is that the orange tree throughout the State was not universally killed, since the temperature was as severe and the cold more protracted than during the famous "freeze of 1835," which did kill them all.

There was a reason for their wonderful escape, however. It is a matter of record that the coldest temperature of the Florida winters occurs between December 20th and January 15th, and the weather for several weeks prior to the Ice King's harvest was emphatically of this description, thus checking the flow of the sap in the trees and putting them to sleep as it were, and in excellent condition to meet the advancing though unsuspected enemy.

Another reason why more damage was not done lay in

the fact that the weather, both during the freeze and for some days after, was cloudy, and the moderation of temperature very gradual instead of sudden.

In many cases not only were the older orange trees uninjured, except to the extent of shedding their leaves, but young trees in grove and nursery escaped damage. The writer even had tender, dormant buds, that were exposed to the full extent of cold and wind, buds set in young nursery (grape fruit) stock, yet they passed through it unharmed, and are now in strong, vigorous growth; but other buds, side by side with these, on lemon and lime stock, were killed, together with their foster parents.

Right here is one of the lessons of the freeze. Another is, to cease cultivating the trees early in the season and check the flow of the sap, so that the leaves may rest, and the sap already in the body of the tree may fulfill its mission and form into the tissues that build it up.

Not, understand, that we at all anticipate another such frosty visitation; that is not likely for fifty or more years to come, but that every tree needs rest, and during every winter there may come "cold snaps" that would injure young, tender growth, while it would not in the least affect a dormant tree.

That the freeze of the past winter will eventually prove to have been a "blessing in disguise" we are well assured. For one thing it has proved, that the orange tree will stand uninjured a much lower temperature than even its best and most familiar friends supposed possible, and the result is that Florida to-day, with her groves full of vigorous growth, and oranges half grown, with her young trees making a thrifty growth also, with energy and hope once more triumphant, Florida is to-day, we repeat, as profitable a field as ever for orange culture, with the added assurance that she did not have before, that the tree is very

hardy, and will withstand a temperature of 15° or even lower, while the fruit continues uninjured unless the temperature falls below 26°, which is an exceedingly rare occurrence. And even if the fruit was frozen once in eight or ten years, we could stand it; but it need not be frozen at all, even with the temperature at 20°, for all we have to do, on the first suspicion of danger, is to gather and bury the fruit in dry sand, and then market it at leisure, as we have already mentioned on page 134.

A few wise men thus saved their crop this present season, and at this present writing are reaping the result in perfectly ripe, sound oranges, that sell readily at from three to five dollars a hundred.

No, there is no ground whatever for discouragement of orange culture; on the contrary, well-located, healthy groves are actually more valuable now than before the great freeze, because their value and hardiness are placed on a surer basis; we *know* what we before only believed, because we could not know.

But the most important lesson of all those that our recent unexpected experience has taught us is this:

Diversify production! To employ a homely but significant phrase, "Do n't put all your eggs in one basket;" then if your basket gets upset before it reaches market there is something else left to fall back upon for support.

Floridians needed a shaking up, and a pushing out of the one groove which was filled up with oranges, nothing but oranges. Our soil and climate are as well adapted to many, very many other fruits as they are to oranges and the citrus family. Then why give our whole attention to the one only?

If our people had paid as much attention in the past as they will do in the future to figs, peaches, pears, plums, grapes, apricots, pecans, walnuts, strawberries, and black-

berries, they would have felt the loss of the orange crop but lightly.

Already this great lesson has gone home, and other Florida fruits than the citrus are being largely set out all over the State. Right! diversify production and prosper.

THE REFUSE OF THE ORANGE CROP.

In every grove, whether large or small, there must necessarily be hundreds or thousands of oranges not fit to ship or to sell in their original shape; some of these are blown from the trees by high winds; others are thorn-pricked or punctured by birds; others drop from drought or overloaded trees.

We have frequently seen the ground actually yellow with fallen fruit, left to lie under the tree, an utter wicked waste of one of the most valuable fruits we have. And what we have seen, others have seen every where over the State, a deliberate throwing away of thousands of dollars, for every one of those dropped oranges could be utilized, and a great industry developed for the good of the people at home and abroad.

We refer to the manufacture of orange wine; we would not advocate the making of any intoxicating beverage—far from it; but certainly pure orange wine does not come under this heading. It is true that such drinks are sometimes disguised with so-called "orange wine," and sold unlawfully as such, but this is not an argument against the manufacture of pure, honest orange wine. The manner of making it is simple; any one can do it and do it well by following the recipes given in this work, and the result will be just so much profit added to the crop; there need not be an orange lost.

And this is not all; the use of surplus oranges for wine would serve to steady the price and value of the fruit. If

there came a glut in the market, and prices fell, they could be kept at home, and the wine made from them would ultimately bring more profit than the oranges would have done if shipped.

As to the value and superiority of sweet (or sour) orange wine, here is what a prominent dealer has to say about it, and he speaks "as one having authority":

"It is the best tonic, medical or otherwise, that can be taken into the human system. It is nourishing, of agreeable flavor, and, what is more, a perfectly pure native wine. Every body knows what recuperative power there is in luscious, ripe oranges, and as no part of the fruit is used in the manufacture of the wine but the pulp of perfectly ripe oranges, and none of the wine bottled from the casks until it is at least three years old, it is easy to see that the wine made from Florida oranges will, at no distant day, outrival any of the imported still wines. In taste it is marvelously palatable, and I am told that it is the cleanest wine in the market to-day, there being but 8.64 per cent of absolute alcohol, and slightly over 5 per cent of sugar. Florida, filled with orange presses, will outrival the famous vineyards of France and Italy in time, for the manufacturers of this splendid wine are pushing ahead with new and improved machinery, are setting out countless orchards of the precious fruit, and investing thousands of dollars in the enterprise which they are satisfied will soon become one of the greatest industries of the country. The supply is now in no wise equal to the demand."

THE ORANGE PEEL.

This is another point that has not yet received the consideration it deserves.

In Europe the orange rinds are carefully gathered up and sold to the marmalade manufacturers, and New York

is now entering upon a steadily increasing import business in orange peels, because the home supply does not even begin to fill the demand. It is not used here as in Europe, for making marmalade, but as a basis for medicinal preparations, tonics, orange bitters, syrups, and confections. The imported peel brings from ten to twelve cents a pound, and has no import duty to pay.

This may seem a small item, but it is such items that make up the sum total of domestic economy; save all the clean orange peels, dry and sell them, and there will be more money in our pockets and less sent out of the country.

Note how the importation is increasing: In 1877, five thousand nine hundred and twenty-seven dollars was sent to Europe to pay for orange peels; in 1881, the latest date we have been able to obtain, the same small item of "waste peel" cost us over twelve thousand dollars. It has doubtless more than doubled now, and Florida might just as well keep this money at home, since it would be all clear gain, requiring no outlay.

SUMMER ORANGES.

There are a few varieties of late oranges (Hart's Tardiff is one) that will hold their fruit well into the summer season, and such fruit is always at a premium, because it comes in when the market is empty of oranges. But there is a method practiced in Mexico by which any ordinary tree may be made to bear summer oranges.

When the trees bloom at the usual season, a brush made of stiff leaves or twigs is used to whip off the blossoms, one and all; none must be left to set fruit. The trees, being strong, healthy, and in vigorous growth, resent this unmerited whipping, and at once set out to repair damages and make good their loss.

The result is, that in June or July the trees are again in full bloom, and this time the fruit is allowed to set; as it ripens in about a year or a little less, a fine crop of summer oranges is produced, worth double or treble the ordinary crop.

Perseverance for three or four years will give the trees thus treated a confirmed habit of blooming at the desired time, and thus summer oranges are secured without further trouble.

PEARS ON QUINCE STOCK.

Beware of these; they are not suited for Florida's soil or climate, for, as a rule, the quince itself is a failure over fully three fourths of the State. Not only so, but the Chinese sand pears, whose hybrids, the Le Conte, Kieffer, and others we have mentioned in our foregoing pages, are a failure upon quince stock.

Mr. William Parry, of the Pomona Nurseries, Parry, N. J., whose experience with these pears is probably greater than that of any other person, is very emphatic in his statement that the quince is poisonous to all and every admixture of the Chinese pears; the *American Agriculturist* also confirms this statement, which is undoubtedly correct, and should be more widely known than it is. It should also be noted as a fact, that if buds be taken from a pear (Chinese) on quince stock and worked on a pear stock, the trees raised therefrom will be stunted and sickly.

Mr. Parry mentions an orchard of five thousand trees, three thousand on pear stock the remainder on quince; at the end of the first year only one in a thousand of those on pear stock needed replanting, while out of the two thousand trees on quince two hundred had to be replaced; the next year as many more, and all that were left were stunted and sickly. The same pears on pear stock, or on their own roots, are strong and thrifty.

The writer's own experience confirms the point in question; four trees of the Le Conte variety on quince stock have almost stood still on our own grounds, while cuttings from other trees on pear stock, although three years younger, have far outstripped the former in size and vigor.

"SUN-SCALD."

Of all the ills that trees are heir to there is none more universal than those which are directly due to a cause that need never exist at all. This is the exposure of the trunks of fruit trees to the scorching effects of the afternoon sun on the south and southwest. If the bark is not actually killed and the sap soured on that side of the tree, it is almost certain to become hide-bound, and to act as a ligature on the delicate sap-cells beneath it.

In cutting across the trunk of an orange tree, for instance, the difference of the rings showing the annual growth of the wood is very perceptible, those that were on the south and southwest sides of the tree being much thinner than the same rings on the opposite side.

We have seen fruit growers set out trees from the nurseries where they have been well shaded all their short lives by low limbs and close planting, trim them bare, and thus leave them out in the open ground, exposed to the full strength of the sun, which beats down all day long on the young, tender bark.

Now, is this good treatment or good judgment? Those who pursue this course are answered, bye and bye, in trees stunted, diseased, or dead, and then they wonder what is the matter, and, if the trees were purchased, blame the seller for the fault that lies at their own door, in full sight, if they would but open their eyes and look. Never set out a tree of any kind and leave it standing with a bare trunk.

Go over young groves or orchards or single trees that are dead or stunted, and in every case almost you will find the bark scalded and peeling off on the south and southwest sides. And where the tree has vitality enough to drag on its weary existence, the presence of this "sunscald" will be found a standing invitation to borers and wood-lice to enter and put in their death-dealing work.

So you see it will pay to protect the delicate stems of your trees. How? It is very easily done, and quickly. The long, gray moss of the hammocks is excellent for wrapping around the trunks; just as good and more convenient for many are newspapers lightly tied. Either of these will last for months, and should be kept in place *all the year around*, until the trunks are well shaded by overhanging limbs.

SPECIALTIES IN BUDDING.

While Chapter IV of this volume deals in thorough detail with the several methods of budding and grafting, yet there are some few trees and plants which require especial care as to the mode and time of propagating by these methods. One of these, which is now attracting great and deserved attention, is the

JAPANESE PERSIMMON.

Since the introduction of this valuable fruit into our country the idea has generally prevailed that its propagation upon our native stock is very difficult and uncertain. Now, the truth is exactly contrary, if one only knows how to set about it.

The trouble was at first, that orange growers especially, being more accustomed to budding than to grafting, naturally tried to apply the same process to the Japan persimmon, forgetting, or being ignorant of an old rule in horticulture, that trees having thick bark should be propagated

by grafting, and that any tree that is prolific in throwing up suckers may be root grafted, and also grown from cuttings.

Consequently, "eye buds" failed, a fact that was rendered extremely aggravating by the abundance of native wild stock, and the value of the Japan persimmon. But now that experience has taught us the needed lesson it is all easy enough.

First of all about the native stocks. Small trees are best, with the stock not more than a quarter to half an inch in diameter at the point of union, and to get good stocks of this size they should be grown from the seed in nursery rows.

The persimmon in its wild state is naturally almost destitute of fine, fibrous roots, and it is a difficult matter to transplant the proper size satisfactorily. The best and quickest way, therefore, to get good strong Japan persimmons is to drop the seed of the native sort in January in shallow drills about three inches apart, the rows being three feet apart. Do not have the soil very rich or cultivate the young seedlings very freely; the native persimmon is a strong, vigorous grower, and your object now is to regulate it, so that by the time it is one year old, and sufficiently matured to graft, the stock will not be larger than that named above, for, if it exceeds half an inch in diameter before being grafted, it is almost worthless, a proper union being well-nigh hopeless. Grafts on one-year-old stock that have not been transplanted will make a growth of from three to six feet the first year.

It is, however, as advantageous to transplant the persimmon twice, that is, once from the seed-bed to another bed, and thence to the orchard, as it is to the orange, and for the same reason, to promote the formation of fibrous roots. Root pruning, by thrusting down a sharp spade

pretty close to the stem, will serve the same purpose, a very important one, for trees that are to be moved.

And now as to the grafting process. First, take notice that the buds of the Japan persimmon begin to swell in February, a week or two sooner than those of the native, and therefore the scions must be cut that much earlier, at the first sign given by the moving sap, and laid away in a cool place, covered with moss or earth, to await the movements of the native stock.

The best method of grafting this fruit is the "whip" graft, as it is the most convenient. (For details of process see page 47.) The earth should be removed from the crown of the stock deep enough to allow the point of union to be entirely covered when it is replaced. The scion should be about three inches long, and only one bud left above the ground; after it is in place wrap strips of waxed cloth tightly around the union of stock and scion, overlapping the folds so as to insure it against the entrance of water.

There is another method of propagating the Japan persimmon, much easier and more simple, though the trees thus obtained are rather longer in bearing fruit than those grafted. This is by cuttings, taken as other cuttings should be, when the tree is in a dormant state, although they can, by extra care, be made to strike root at any time; the cuttings root readily, and it is a curious thing that this simple fact is not generally known.

GRAFTING THE GRAPE.

The grape is one of the easiest plants to graft, and the best time to insert the graft is in the latter part of the winter season, when both stock and scion are dormant. By the following simple process, the common wild Florida grape vine may be employed as stock for any of the finer

varieties, a use for which their vigorous growth especially adapts them:

Cut off the stock just below the surface, then split it with a chisel or knife-blade, and insert a wedge-shaped scion, pushing it down into the cleft as far as possible, not less than one or two inches; be careful that the bark touches on the outside.

Another method is to cut off the stock as before, square and smooth; then with an auger bore a hole about two inches deep, and perpendicular; get a scion that will just fit this hole, and push it down firmly to the bottom; make sure that it goes down all the way, and in order to do this the safest plan is to measure the exact depth on a slender stick, then lay this against the scion, and mark its height. Then proceed as in other grafting; wrap the point of union with prepared strips, and mound up the earth over it.

TO HAVE EARLY ORANGE BUDS.

It is of great advantage to be able to put in orange buds early in the season, but, as a rule, this is impossible until June, because only the current season's growth is available for scions, and none of it is sufficiently matured earlier in the season. By experiments, however, it has been found that buds of the citrus family may be successfully "wintered," just as other buds frequently are.

Select, as late in the season as possible, exactly the same kind of buds as you would if going to use them immediately. Make a trench in a shed, or under some shelter where the ground will not become wet, and line the bottom with leaves—palmetto answers the purpose better than any other—lay the bud sticks on these, not piled thick or on top of each other; then another layer of leaves, more buds, and more leaves; the top layer should be leaves, and earth cover the whole.

In the spring, when the sap begins to move in the stock, all you have to do is to bring out your buds and go to work; they will "take" as readily as if just taken from the tree in May or June, and a clear gain of at least three months is the result.

Another point in propagating oranges not generally known is, that they will root from cuttings and make good trees. It is claimed that they root more readily if the cutting is set with the small end down; and this also of lemons, but we will not vouch for the truth of this claim, although we know that it is true of some others than the citrus family.

SHELLAC COATING.

The coating of shellac, recommended on page 86, for application to cuts or wounds made in trimming trees, is prepared as follows:

Dissolve in one quart of alcohol as much gum shellac as will make a liquid of the consistency of paint; apply with a common painter's brush. Keep it in a wide-mouthed bottle or jar, well corked, and have it always ready for use.

REMEDIES FOR MILDEW, APHIS, AND RED SPIDER.

One quarter of an ounce of sulphide of potassium to one gallon water; apply with a syringe or fountain pump. This substance is cheap and easily applied, and the effect upon the above enemies of the fruit and vegetable grower is almost magical. Grape vines, cucumbers, melons, plum, and peach trees, in short every plant attacked, requires only one to three sprinklings to be completely cleared of its enemies.

ANOTHER REMEDY FOR MILDEW AND GRAPE ROT.

Four pounds of bluestone (copperas) to fifty gallons of water, or, on a smaller scale, one ounce of bluestone to

six gallons of water. Sprinkle the foliage copiously once a week as long as the rainy season continues (these diseases being caused by an excess of moisture on the foliage). If mildew and rot have already developed before this treatment is begun, and threaten loss of leaves or fruit, a ten-per-cent solution of common whitewash applied in the same way will arrest their progress.

DURABLE LABELS FOR FRUIT TREES.

The need of some better and more lasting label than the usual wooden one, with the name penciled or printed, for marking trees in nursery and grove has long been sorely felt by the horticulturist; such labels are far from satisfactory, the name being almost invariably faded or washed out in a few months. A tree label, cheap, easily obtained, and indelible, has been eagerly sought for, and here it is:

Get pieces of sheet zinc, the older and more corroded the better, cut them in strips about an inch wide at one end, tapering to a slender point at the other, and six to eight inches long; then, with a soft, ordinary lead-pencil, write on the wider end the name or number of your tree or bud, with date or any other *data* desired; wind the slender end of the strip around the stem or trunk. It will unwind of itself as the tree grows, hence never cuts into the bark. The older the label is the more distinct the marks will be, the lead acting chemically on the zinc; the lettering, plain enough even at first, soon becomes outlined with a fine flour-like substance, and then turns purple.

This label will last as long as the tree, only needing occasional transfer to a new place, as the stem it clasped at first grows too large for it. The comfort and profit of such a label will be acknowledged by every fruit grower.

New tin, scratched upon with a sharp awl, answers nearly as well as the zinc, but will not last as long.

CHAPTER XXXI.

HOW TO USE FLORIDA FRUITS—ORANGES.

Orange Wine, No. 1. Take perfectly ripe, sweet oranges, the riper the better, as then the saccharine matter is entirely developed; peel and cut into halves across the cells; cut over a tub so as not to lose any juice, and squeeze both halves hard before dropping in the tub. When the tub is full put the whole mass through a wine-press, which must be so close that none of the seeds can escape into the mash, as they would give the wine a bitter taste. To each gallon of juice add one pound of granulated or loaf-sugar, and to each gallon of this mixed juice add one quart of pure water. Put the whole in a barrel, leaving a space of about five gallons for expansion of the wine during fermentation.

Orange wine has to undergo the lower fermentation, as by the upper fermentation all the volatile matter and the aroma would escape. The barrel must be closed air-tight, and a fermenting tube adjusted; the fermentation is very vigorous for the first few days, and the barrel must be closely watched to prevent its bursting. The fermentation subsides gradually after a few days, then the wine has to be racked off and the lees can be filtered; the fermenting tube must be adjusted again to the new barrel, to remain until the fermentation shall have ceased entirely. Rack the wine off again in about six weeks after the latter period, and in a month after this second racking it will be fit for market, as there is no second or "spring" fermentation, as with grape wines.

Orange Wine, No. 2. Ninety sweet oranges, thirty-two pounds of lump sugar; break sugar in small pieces and

put it in a dry, sweet, nine-gallon cask, place the latter where it is to remain. Have ready close to the cask two large pans or small tubs, put the orange peels, pared thin, into one, and into the other the pulp, after the juice has been squeezed from it; strain the juice carefully and put it in the cask, then pour one and a half gallons of water on both peels and pulp; let it stand for twenty-four hours, then strain into the cask; add more water to peels and pulp, next day strain into cask. Repeat this process until the cask is filled, which should take just seven days to accomplish, the water being properly proportioned to this end, and the contents of the cask being stirred each day. On the third day, after the cask is full, it may be securely bunged down.

This is a very simple and easy method, and if directions are followed the wine can not fail to be excellent. It should be bottled in eight months, and will be fit for use twelve months after making.

Orange Wine, No. 3. Juice of sweet oranges and water, equal parts; to every gallon add three pounds of raw Florida sugar; place in tight barrel, filled, with a bent tube from the closed bung-hole to a pail of water. When the gas bubbles cease to show in the water, close the barrel; leave it undisturbed for four months, then bottle and cork tight. This makes a very fine wine that will keep well in wood or glass.

Orange wine is of an amber color, tastes like dry Hock, but always retains a decided aroma of the orange.

Twelve hundred sour, or fifteen hundred sweet oranges, will make forty-five gallons of wine at from three to six dollars per gallon, and ten gallons of vinegar at twenty-five cents per gallon, wholesale.

Orange Vinegar. To the cakes which are left in the presses, after making wine, add molasses and water, ac-

cording to judgment; let it stand until vinegar is formed, then strain and bottle or place in casks.

Orange Marmalade, No. 1. Forty sour oranges; peel and set pulp aside till next day; soak peels in water (rain water preferred) for twenty-four hours, changing the water four times; then boil peels in a porcelain-lined kettle till tender, changing water three times, using boiling water each time, and keeping the last used water for use as follows: Take out the peels, drain and spread out on a flat dish or waiter; put into the kettle the orange pulp, squeezing each piece in the hand; add three pints of the water saved from the peels, and boil for one hour. While this is boiling scrape off all the white from the peels, then shred or chop the yellow portion into fine pieces; next, strain the contents of the kettle several times till it is as clear as amber (there should be about seven and a half pints of juice, if there is not, add enough of the water the peels were boiled in to make up the difference). To this quantity of juice add ten pounds of white sugar; let it come to a boil, then add the shredded peels, about five pints; let it boil all together for about one hour and a quarter, or until it begins to jelly.

Orange Marmalade, No. 2. Of oranges and sugar allow pound for pound. Pare half the oranges and cut the rind into shreds; boil in three waters until tender, and set aside; grate the rind of the remaining oranges, take off and throw away every bit of the white inner skin; quarter all the oranges, and take out the seeds, chop or cut them into small pieces; drain all the juice that will come away without pressing them over the sugar; heat this, stirring until the sugar is dissolved, adding a very little water if the oranges are not very juicy; boil and skim five or six minutes; put in the boiled shreds and cook ten minutes, then the chopped fruit and grated peel, and boil twenty minutes

longer. When cold put into small jars, tied up, with bladder or paper next the fruit, and cloths dipped in wax over all.

Preserved Orange Peel. Weigh the oranges whole, and allow pound for pound; peel the fruit, and cut the rinds into narrow shreds; boil until tender, changing the water twice, and replenishing with hot each time. Squeeze the orange juice through a strainer over the sugar, let this heat to a boil; put in the shreds and boil twenty minutes.

Orange Jelly. One pint of water, two ounces of gelatine, half a pound of loaf-sugar, ten oranges, and one lemon. Put water, gelatine, sugar, rind of one orange, and rind of half a lemon into a sauce-pan together, and stir over the fire until the gelatine is dissolved; remove the scum; then add juice of lemon and oranges sufficient to make one pint; stir together until on the point of boiling, then strain through a jelly bag or fine sieve, and when nearly cold place in a mold previously wetted.

Preserved Oranges. Take small oranges, and rather more than their weight in white sugar; slightly grate the fruit, and score round and round with a knife, but not very deep; put the oranges in cold water for three days, changing the water two or three times a day; tie them up in a cloth, boil them till they are soft enough for the head of a pin to penetrate the skin. While they are boiling place the sugar on the fire, with rather more than half a pint of sugar to each pound; let it boil for a minute or two, then strain it through muslin; do not put the oranges into the syrup until it jellies and is of a yellow color; try the syrup by putting some to cool, it must not be too stiff; the syrup need not cover the oranges, but they must be turned so that each part is thoroughly done.

Orange Cream. One and a half ounces of gelatine, one lemon, six large oranges, sugar to taste, half a pint of

good cream; squeeze juice from oranges and lemon, strain and put in sauce-pan with gelatine, and enough water to make juice up to one and a half pints; rub the sugar on the orange and lemon rind, add to it the other materials, and boil for about ten minutes; then strain through jelly bag, and, when cold, beat up with it half a pint of thick cream, then pour into wet mold.

Orange Tincture. Peel off the yellow part of the rind very thin, and cover it with alcohol in a tightly-corked bottle; when the tincture is bright yellow pour off into another bottle for use in flavoring puddings, custards, cakes, etc.

How Orange Wine is made in Sicily. Boil the peels of forty oranges in ten quarts of water until the water tastes strongly of the peels; add twelve quarts of orange juice and thirty-six quarts of sugar. When cold pour into a barrel; leave the bung out during the fermentation, which lasts forty days, and keep the barrel bung full, then close the barrel and let the wine settle for two months. Two days before bottling add a small handful of orange flowers to give fragrance to the wine. Orange wine improves with age, and acquires the taste of the Malvaria of the Madeira. It bears transportation well; it competes with curacoa and other alcoholic, aromatic beverages of Southern France and Italy.

Sour Orange Wine. To five gallons of water add one half gallon of juice and fifteen pounds brown sugar; put the sugar and water together, let it come to a boil, when cool add the juice. Let it stand open till fermentation ceases, then stop tight. It may be bottled after it has remained in barrel about six months. This makes an excellent wine, and if the receipt is followed it will be a success.

Sour Orange Wine, No. 2. To one gallon of juice add

three gallons of water, and to every gallon of the mixture add three pounds of sugar; put into a barrel and let it stand until fermentation ceases, which will be from six weeks to two months; keep the bung covered with a thin cloth. After fermentation ceases it is better to draw off the wine into other barrels, then stop up the bung tight and keep it in a cool place.

Sweet orange wine is made in the same way, except that you use equal parts of juice and water with three pounds of sugar to every gallon of mixture. Of course the juice must be well strained before the sugar is added.

Orange Champagne. The following is the recipe: One gallon sour orange juice, three gallons rain-water, seven pounds white sugar. Put into a keg, and each day add a little fresh juice until effervescence ceases. After standing about eight days, or when it becomes perfectly clear, bottle and cork tightly; secure the corks with string or wire and set aside for use.

Sour Orange Preserves. Either grate or pare off the outside rind of the fruit, cut in half and take out the seed; sprinkle liberally with salt and let it stand twenty-four hours; wash off the salt thoroughly and boil in soda-water, allowing a good handful of soda to two gallons of water. Then scald in clear water until the rind can be pierced with a straw. Allow one pound of sugar to every pound of fruit, and a pint of water to every pound of sugar. Boil the syrup until it begins to thicken, then add the fruit and boil until clear. When the fruit is cooked enough, if the syrup is not thick enough, continue to boil after the fruit has been removed. Change the clear water two or three times after boiling in the soda-water, before putting the fruit into the syrup.

Sweet Orange Preserves. Grate off the outside rind, cut in half and take out the seed; after this put the fruit in a

weak brine and let it stay for twelve hours, then rinse it in cold water; put it into a kettle, cover it with cold water and let it come to a boil; repeat this several times until the bitter taste is destroyed. Just as soon as the water begins to boil change it for other water. Allow one pound of sugar to a pound of fruit, and one pint of water to every pound of sugar. Boil the fruit until it is clear, and after it is taken up, if the syrup is not thick enough, continue to boil.

Orange-Flower Candy as made in Sicily. Soak one pound of orange-flower leaves in water twenty-four hours; pour off this water, and, adding fresh water, boil to a good consistency; sprinkle well with cold water; spread on cloth, and sift over the mass two pounds of powdered sugar. Spread out on dishes and place in the shade for a week that the sugar may be thoroughly absorbed. Dry the candy in the sun or fruit drier and serve on sheets of white paper.

Orange Blossoms Utilized. Place sheets or any suitable article under the trees at night to catch the falling blossoms; in the morning before the dew is off gather up all that have fallen and put in a three-cornered bag—flannel that has been washed is best. As soon as possible pour over these boiling syrup, made of the best sugar, but rather thin; hang up the bag to drain and leave it out all day; take out the scalded flowers and save them. Repeat the process of fresh flowers for three mornings, using the same syrup; then bottle for use as a delightful beverage, with water added. The flowers that have been scalded can be used by placing them in thin muslin bags between layers of butter; the butter can be used in cakes, sauces, or any way that flavored butter may be wanted.

LEMONS.

Lemon Tincture is made exactly the same as orange tincture, given above.

Pickled Lemons. Cut the lemons in quarters, not entirely apart, and put a teaspoonful of salt in each one; put them where they will dry either in the hot sun or by the stove; when they are dried so that they are black and look good for nothing, prepare the vinegar with cloves, cinnamon, nutmeg, ginger-root, onion, and a little mustard seed, and pour it boiling hot over the lemons; keep a year before using. They are quite equal to the West India limes. They require more vinegar than other pickles, as the lemons will swell out to their natural size.

Lemon Jelly, for Layer Cake. Two cups of sugar, yolks of three eggs, juice of two lemons. Cook till thickened by setting in boiling water, and then add the well-beaten whites of three eggs; spread between layers of cake.

Lemon Cream. One pint of cream or new milk, yolks of two eggs, four ounces of white sugar, one large or two small lemons, and one ounce of gelatine. Put the cream into a sauce-pan with the sugar, lemon peel, and gelatine, and simmer over a gentle fire for ten minutes, stirring all the time; then strain into a jug, add the well-beaten yolks of two eggs, and put the jug into a pot of boiling water; stir the mixture one way until it thickens, but do not allow it to boil; take off and stir till nearly cold; strain the lemon juice and stir in gradually till well mixed, then pour into a well-oiled mold.

Preserved Lemon Peel is made according to recipe given for orange peel, or as follows: Make a thick syrup of white sugar, chop thick lemon peels very fine, and boil in the syrup ten minutes; put in glass tumblers and paste paper over; a teaspoonful of this conserve gives a delicious flavor to cakes, puddings, etc.

Lemon Syrup. Squeeze lemons, and strain juice carefully; then place in a broad, open dish, and add all the granulated sugar it will dissolve; let it stand for several days, and stir and add sugar occasionally till it will take up no more; then bottle and seal closely; keep in a dark place and cool as possible. A tablespoonful to a tumbler of water makes a refreshing summer drink.

Nourishing Lemonade. Pint and a half of boiling water, juice of four lemons, rinds of two, and half pint of sherry, four eggs, and six ounces of white sugar. Pare the lemon rinds thinly, put it in a jug with the sugar, and pour on the boiling water; let it cool, then strain it, add the wine, lemon juice, and well-beaten eggs, also strained, and the beverage will be ready for use. If desired, the sherry and water may be omitted and milk put in their place.

Lemon Butter. One and a half cups of white sugar, whites of three eggs, yolk of one, grated rind, and juice of one and a half or two small lemons; boil gently twenty minutes, stirring all the time. Nice for tarts or to be eaten as preserves.

Lemons for Malaria. An Italian physician gives the following directions for preparing a remedy for malaria, which may be worth trying, as it is said to have proved efficacious when quinine has given no relief: Cut up a lemon, peel and pulp, in thin slices, and boil it in a pint and a half of water until it is reduced to half a pint; strain through a linen cloth, squeezing the remains of the boiled lemon, and set it aside until cold. The entire liquid is taken fasting.

LIMES.

Limes for Pickling, for Shipping to distant Markets. They should be a bright yellow when picked, which should be done carefully. Place in tight barrels or casks the same day they are picked, and cover at once with a

brine as salt only as sea-water; then head up tight, and change water two or three times. Limes prepared in this way are ready for use at any time, either as pickles or preserves, by first freshening in clear water and then following other recipes.

Pickled Limes are prepared exactly according to recipe given for pickled lemons, and are equally good.

Preserved Limes. If the limes have been previously kept in brine, freshen by soaking in several waters; then proceed as follows, same as if just picked: Take out the seeds and place in cold water for twenty-four hours, changing the water several times; boil until tender, in water to which a little soda has been added; soak again in water for twenty-four hours, changing water as before; the limes are now ready to preserve. To each pound of fruit take two pounds of white sugar and three pints of water; make a syrup first, drop the fruit into it, and cook long enough to become thoroughly heated through; place limes in jars set in hot water, boil the syrup down a little and turn over them. Seal up the same as any other preserves.

CITRONS.

To Dry for Home or Market. Pick the fruit when green, just as it comes to maturity; cut into four or six pieces; soak in clear water twenty-four hours, changing it several times, boil half an hour in water containing a little alum, and a few handfuls of green grass (Guinea preferred), or the leaves of the citron tree; pour this off, and boil half an hour in thin syrup; then weigh the citron and add an equal weight of white sugar to the syrup; dip the citron into the latter two or three times, dry in the sun one day, the second day fill the cavities of the citron with the syrup, and continue to expose to the sun until thoroughly dry. This makes an excellent article for commerce, being of

superior quality to that sold usually in the stores. If you have a fruit drier so much the better.

Preserved Citron. Never use ripe citron in any shape, it will not dry nor make a good preserve. Take green citron, full grown but young and tender, cut into four pieces, and take out pulp and seeds; lay the citron in salt and water for twenty-four hours, take it out and scald it two or three times until the bitter is extracted; then make a moderately thick syrup, and boil the citron in it gently until clear and translucent; then flavor syrup with lemon juice, all-spice berries, stick cinnamon, and root ginger.

Grape Fruit, or Pomola. This fruit is used only in its original state, eaten as an orange, or prepared for the table by carefully removing all the inner membranous skin and seeds, and then sugaring the fruit an hour or two before sending to table. The inner skins part readily from the pulp, which is very juicy, and great care should be taken not to leave any of the former clinging to the pulp, as it is very bitter; properly prepared there it no fruit more refreshing than the pomola. The juice also makes a very pleasant drink, prepared the same as lemon- or lime-ade.

TO PREPARE CITRONS FOR SHIPMENT.

There are two methods of preparing the citrons when it is desired to ship them to a factory for purposes of preserving or evaporation.

No. 1. Gather the fruit carefully, cutting the stem as you would an orange or lemon; place it in a basket lined with moss, paper, or some other soft material, as it is important not to bruise the skin. See that all possible blemishes, as of insects or dust, are cleaned off with a brush or a sponge dipped in cold water; spread them out for several days.

Sort the citrons into two classes; those that are large,

plump, and free from blemish are to be marked "first class;" inferior ones are "second class." Wrap the citrons in paper, and pack carefully in boxes, strongly made but smooth inside, between two and three hundred in a box.

No. 2. Cut the fruit into halves or quarters, then pack it in casks with a sprinkling of salt; then fill the casks with sea-water or its artificial counterpart. In twenty days open the casks, take out the fruit, and remove the pulp with a spoon; repack, and fill up again with sea-water, to which a little salt has been added. Lay the cask on its side with the bung open, that the gas may escape, and keep it thus until ready to ship.

Commercial Candied Citron. Cut the fruit into halves or quarters, according to its size, put it in a tub or cask of brine, having first cleaned out the pulp, and leave it for a month; then renew the salt water, and let the citron lie in it for four or five months, or as much longer as you choose; this long process is necessary to eliminate the bitter principle from the rind, which it is otherwise impossible to remove entirely.

Next, boil the fruit in fresh water until a fork will easily pass through it; it usually takes about an hour and a half to reach this point. Then put it in cold, fresh water, to remain there for at least twenty-four hours, when it will have turned to that light green color which we have learned to associate with candied citron.

The next step is to drain the fruit, place it in earthen jars, and pour over it hot syrup of white sugar at twenty degrees sacchrometer; cover it entirely, and let it stand for three weeks, but the syrup must be poured off twice a week, boiled, skimmed, and more sugar added each time until the syrup is a little thicker than it was at the first boiling; turn it back over the fruit at boiling point. The three weeks elapsed, put the citron in a vessel containing the

syrup, with all the sugar it can dissolve; let it boil for ten minutes; and then for twenty-four hours keep it near the boiling point without letting it reach it, then boil it again until no more sugar can be taken up.

The proportion of sugar absorbed in this process is about eighty pounds to one hundred of the citron rinds. The boiling completed, the rinds are spread on wire netting and dried, either in the sun, or, which is a far superior method, in an evaporator. The writer's experience proves the American Fruit Drier to be especially adapted to this process.

PINE-APPLES.

Pine-apple and Tapioca Pudding. Soak a teacupful of tapioca in a pint of water for two or three hours; then add one quart of milk, two beaten eggs, two thirds of a cup of sugar, a little salt, and a tablespoonful of butter; bake in a buttered dish, stirring occasionally at first; when done it must be quite stiff; turn on to a platter and pour over a pint of canned pine-apple, or uncooked pine-apple, previously cut into little dice; sprinkle with sugar, and cover tightly for an hour or two before using. Serve cold.

Pine-apple Champagne, or "Chichi." The latter is the proper title of this delicious and favorite drink of tropical countries; it is a Spanish name, and pronounced as if spelled *chee-chee*. Over the peelings of two small pine-apples pour one quart of boiling water; allow it to steep until cold, then sweeten to taste, strain and bottle, corking tight; tie down the cork and place the bottle on its side; if placed in a warm place it will be ripe in twenty-four hours. A small piece of ginger placed in each bottle will improve the flavor. The whole pine-apple, chopped, can be used if desired.

Pine-appleade. Boil the pine-apple or skins; allow

liquid to cool, then strain; add lemon or lime juice, and sweeten to taste.

Recipes for making a preserve or for candying pine-apples being found in all cook-books, we will not repeat them here.

GUAVAS.

Guava Jelly. This is a jelly that has a world-wide reputation, although the Havana article, so familiar to the public, is really no jelly at all, but the fruit stewed down to a smooth mass—a marmalade, in fact. True guava jelly, as made by the following recipe, is as clear and beautiful as crab-apple or quince jelly, and varies in color from a pale amber to a light claret, according to the varieties of the fruit:

Either the parings or the whole fruit (ripe, but not too ripe) cut up, may be used. It is a good plan, when paring guavas for the table (like peaches eaten with sugar and cream), to put the skins into a small kettle, with also the centers of the fruit containing a majority of the seeds, and make jelly of them, a few glasses at a time, as the guava jellies best in small quantities. Put just enough water in the kettle to keep the fruit from burning before the juices are extracted. Let it boil for an hour or more, until well cooked, then strain through a rather coarse bag; do not squeeze it at all, or if you do, strain it again through a fine cloth; measure the juice, let it boil a few moments, then add granulated sugar, one and a half measures to each one of the juice, also the juice of one or two lemons; skim carefully, watch closely, and the moment it ropes, or falls in large drops, remove and place in glasses.

Guava Paste. Take twelve pounds of guavas, not peeled, to eight pounds of white sugar; reduce the sugar with water to a syrup clear and ready to sugar. Boil the guavas until they are thoroughly softened, then pass them

through a sieve and boil again until they are at the right point to harden, when the hot syrup is added. Test the mixture by dropping it in cold water; if it solidifies it is ready for the boxes or cups.

Spiced Guavas—Canned Guavas are prepared according to usual recipes for spiced and canned fruits.

BANANAS.

Fried Bananas. Peel and slice the fruit, sprinkle with salt, dip them in thin batter and fry in butter. Serve immediately.

Frozen Banana Pudding. Make an ice-cream of two quarts of cream, one of milk, and one pound of white sugar; stir this well together and freeze hard enough to put into a mold; line the top of the mold with slices of banana about an inch apart, then a layer of ice-cream, then another layer of bananas and a little pounded sweet almonds, then ice-cream, and so on until the mold is full; cover it with a cloth, put on the tin cover tightly, and pack it in salt and ice for three or four hours.

Bananas sliced across make a pleasant addition to a dish of grape fruit.

STRAWBERRIES.

Strawberry Syrup and Strawberry Preserves. One gallon of capped strawberries will weigh six pounds when gathered fresh, and allowed to lie lightly without being mashed. For this quantity take one pound of best white sugar, either granulated or crushed loaf. In a china bowl put a layer of strawberries and a layer of sugar alternately, until all the sugar has been put in. Let them remain so for three or four hours to extract all the juice; then with a skimmer dip up all the berries, and lay them on a colander to drain, without mashing them. When all the juice is drained from them strain it through a coarse linen

towel or piece of flannel; then to every pint of juice put one pound of best white sugar. Put the juice and sugar into a stone jar, set the jar into an iron pot of cold water. Set the pot over the fire; let it boil, stirring it occasionally to dissolve the sugar; skim the froth off. When all the sugar is dissolved and the froth ceases to rise, take it off, let it cool, put it into bottles, cork tightly, and set them in a cool place. This syrup makes a delightful flavoring for ice-cream, and with the addition of a little lemon juice or vinegar and water makes an agreeable summer beverage. After all the juice has been drained from the strawberries they will weigh two pounds less than they did at first. Take then their reduced weight in crushed loaf sugar, and put a layer of the berries and a layer of sugar; put them in a stone jar, set the jar in a pot of cold water, set the pot over a brisk fire, and let the fruit boil until perfectly tender and transparent. Stir gently at first so as to dissolve the sugar without breaking the berries. The preserves require more cooking than the syrup. Strawberries preserved by this recipe keep much longer than when prepared in the usual way. If you wish the color of the strawberries to be bright, do not let pewter or tin come near them during the process of preserving, for either turns the color dull directly.

OLIVES.

Methods of Preparing Olives. In Italy the olives are prepared for the table in three ways. First, pickled green; second, pickled ripe; and third, dried when ripe. The green olives are picked before they commence to change from the green color, and placed in a strong solution of lime to take out the oily substance, and are then conserved in water saturated with salt. The oil is taken from ripe olives by the use of salt instead of lime. The olives for

drying are fully ripe, dried in the sun, or in an evaporator, packed tight in a jar with aromatic herbs to flavor the fruit. Oil is then turned over the fruit to exclude the air, but none is allowed to sink to the bottom of the jar, as it might become rancid.

Pickled Olives. In Spain the green fruits for pickles are allowed to reach full size, but yet be green and hard, and are handled by a slow and a quick process. By the slow process the freshly picked olives are placed in fresh water, which must be changed daily for a fortnight; the water must be drawn off and promptly replaced, leaving the fruit exposed to the air no more than possible. At first the water will be very bitter, but the bitter will decrease daily. The taste must determine the time required. When sufficiently soaked the olive must be placed in a pickle containing one volume of salt to fourteen of water. They may be kept in clean, well-soaked tubs without any repugnant flavoring, a layer of olive twigs and leaves being placed at the bottom to prevent injury from pressure, and another on the top, weighted down and covered with the pickle. They will be ready for bottling in four months.

By the quick process a solution of two volumes of caustic soda and fourteen volumes of water is prepared and turned over the fruit. After remaining in soak an hour the olives must be sampled by cutting a few open to ascertain how far the solution has penetrated. The depth may be noticed by the color, and should not exceed one half the thickness of the pulp; when the proper depth is reached, the solution must be immediately drawn off and replaced quickly by fresh water, changing it three or four times, and leaving the last water on twenty-four hours. Brine, as for the slow process, is prepared, and the olives placed in it; by this process the olives will be ready for use in thirty days.

Preserved in Oil. Ripe olives are preserved in oil by steeping them in oil, without other preparation, and seasoned with fennel, coriander, salt, and pepper.

GRAPES.

Wild Grape Wine. The small wild grape, that grows wild in such luxuriance in the Florida hammocks, makes an excellent wine, as follows: Mash the grapes in a large tub or bowl, and let them stand until there are signs of fermentation setting in, then strain the juice by dripping through a flannel bag. To three quarts of juice add one quart of water and three pounds of light brown sugar. Put it away in a demijohn in a moderately warm place, and tie up the mouth of the demijohn closely with a piece of thin muslin. Do not cork until fermentation is complete.

Domestic Grape Wine. Put twenty pounds of ripe grapes in a stone jar, and pour on them six quarts of boiling water; as soon as the water is cool enough squeeze the grapes with the hand; cover the jar with a cloth and let it stand for three days, then press out the juice and add ten pounds of crushed sugar. After it has stood for a week skim, strain, and bottle it, corking loosely; when the fermentation is complete strain it again and bottle it, corking tightly. Lay the bottles on their side in a cool place.

How to Keep Grapes. Take full bunches, ripe and perfect; cut the stem off smooth and seal by dipping it in hot sealing-wax; let them lie one day to make sure they are perfectly sealed, if not, they will shrivel. If they are all right, pack them in a box in layers, with dry saw-dust or sand; make the box as air-tight as possible. By this method they will keep for months in perfect condition.

FIGS.

To Dry Figs. Gather the figs when the skins begin to crack (which is a sign of maturity, and that the fruit contains the largest amount of saccharine matter); make a strong lye of oak ashes or common cooking soda dissolved in hot water; quickly dip the figs (in a wire basket) into the hot liquid, and remove immediately; expose to the air for a minute or two and repeat the dipping. If the lye is hot and strong enough the color of the fig will immediately change, the dark varieties to a bright green, and the pale colored to a pale green. Place the figs upon trays made of wooden slabs, and expose to the sun, taking care not to allow the dew to fall upon them. After a few days they are ready to be put away in small wooden boxes, first putting a layer of spice, laurel, or bay leaves at the bottom, and another at the top; put the lid on tight to keep insects out. Figs placed in a dry room will keep a long time. An evaporator, either purchased or such a one as is described in the chapter on guavas, will greatly facilitate the drying process; but great care must be taken not to give too much heat. So soon as the figs show signs of secreting syrup, too much heat has been applied, and they will make only an inferior article. The fruit should be turned frequently in drying, and it is advisable to lightly press the fruit with the hand in order to flatten it. The light colored varieties are preferred for drying, although some of the dark-skinned, especially the Brown Turkey, make a very good article.

Pickled Figs. Pick the fruit with the stems left on, it must be matured but not very soft; place it in a jar, sprinkle the layers with salt, in the proportion of a half pound to a peck of figs; pour on boiling water to cover, and let it stand twelve hours; then put the fruit in a col-

ander, and rinse with clear, cold water. Fill jars with the figs; take strong vinegar, add a quarter of a pound of sugar to each quart; boil, and pour the hot vinegar over the fruit. In filling the jars with the fruit, cinnamon bark, cloves, and any other spices desired should be scattered through it.

Fig Pie. A delicate dessert. For each pie chop half a pound of figs (dried or fresh) very fine, and cook them up with a cup of cold water, or part cider or brandy and part water; when the figs are soft and smooth, let cool, and add the yolk of an egg, put in crust and bake; make a meringue of the white of the eggs beaten stiff, with two tablespoonfuls of powdered sugar beaten in it; flavor with vanilla. As soon as the crust is done draw the pie to the oven door (don't take it out), spread this on top, and let it set for a minute or two, not longer.

Fig Pudding. Three quarters pound of grated bread, half pound figs, six ounces suet, six ounces brown sugar, one teacupful of milk, and grate a little nutmeg; chop figs and suet together, then mix in the bread, sugar, and milk, and lastly, one egg well beaten. Boil in a mold four hours; serve hot with sweet sauce.

Fig Candy. One pound sugar, three quarters of a pint of water, and set over a slow fire; when done, add a few drops of vinegar and a lump of sugar, and pour into jars in which slices of dried figs have been laid.

Fig Jam. Peel when entirely ripe, and boil a few moments until quite soft; strain through a colander or coarse sieve; add one half their weight in white sugar, and boil to the desired consistency. Flavor with lemon, pine-apple, or any thing preferred. This is a very delicate and delicious sweetmeat, and could be made a profitable article of commerce.

Fig Jelly. Take fully ripe figs, peel carefully, put into

a porcelain or preserving kettle, and add water enough to cover the fruit. Boil about twenty minutes, then strain, add sugar, say half a pound to each pint of fig juice, and boil again, from ten to twenty minutes, until it jellies.

Cakes of Figs, similar to those mentioned in the Bible, are made by slowly stewing peeled ripe figs to a smooth pulp in a porcelain kettle, adding a little sugar and flavoring matter, and stirring the mass constantly while cooking. When thoroughly done, and reduced to a smooth, thick pulp, free from lumps, pour into shallow pans or fancifully shaped molds, and dry slowly in stove or evaporator. When fully dry wrap each cake in paper, and store away in a dry place. These cakes may be broken up and stewed for the dessert, or eaten from the hand like dried figs or dates.

The fresh fig, as gathered from the tree, is a favorite dish, cut and sugared, and eaten with cream. It is also much used as an ordinary stewed fruit.

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