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ORCHARD NOTES.

By

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ORCHARD NOTES.

The feature of the year from the point of view of the orchardist was the unprecedented cold of the middle of February. Following as it did weather sufficiently warm to start vegetation and bring the earliest blooming fruit trees into flower, the destruction was much greater than it would have been had the cold occurred earlier in the season. On the morning of February 14th the thermometer was below zero in all parts of Alabama. At Auburn it registered six and one-half degrees below, which was ten degrees lower than at any time in the thirty years during which records have been kept here. In North Alabama the temperature was several degrees lower, while at Mobile and other points on the coast it was only some four or five degrees warmer, and here naturally the destruction was greatest. Tender shrubs and trees of all kinds were killed to the ground, the long moss (Tillandsia) on the trees was killed, and the thickets of saw Palmetto were scorched, as if by fire. The live oaks and magnolias lost their leaves, and even some of the pines were injured. Throughout the state the peach crop, and with few exceptions, the plum crop, was an entire failure.

The effects of the freeze will be considered more in detail in the following pages in discussing the different fruits.

APPLES.

As apples start growth rather late in the spring the buds were not swollen and they were entirely uninjured by the February cold. So far as observed in different parts of the state the crop was an uneven one, quite a number of kinds failing to bear. At the Station, however, the old orchard set the best crop that it has in a number of years. This was due to heavy pruning two years ago, and to good cultivation so that the trees were in a vigorous condition. Nearly all the trees set a full crop, and yet except on one or two

early varieties, very few perfect fruits ripened. For various reasons this orchard was not sprayed this year, and consequently the Codlin moth and the summer rot destroyed what promised to be a fine crop. This serves to emphasize the necessity for fighting these pests with all the means at our command if we hope to grow satisfactory crops of apples.

In the young orchard the trees as a whole made a satisfactory growth, though some of them were considerably injured by the green aphis.

Apple Varieties.—As the result of the seasons observations it is advised to add Yellow Transparent for summer, and Kinnards Choice for late fall and winter to the provisional list recommended in Bulletion 98, p. 265. Some of the most experienced growers in North Alabama place these two kinds first in their lists for market planting.

Green Aphis of the Apple--During the winter the minute black shining eggs of this aphis were noticed abundantly on the twigs of many of the trees. On February 6th it was noted that a few of these eggs were beginning to hatch. On February 9th all young trees were sprayed with the mechanical mixture of kerosene and water, using a strength of 33 per cent. kerosene in the hope of killing the eggs. This treatment seemed to have been quite effective, for when spring opened very few lice could be found. These few, however, multiplied very rapidly, and soon on many of the trees, the young growth was literally encased by the crowded green aphids. Various lines of treatment were tried for destroying this pest. Certain trees were sprayed at frequent intervals with various strengths of tobacco decoction. It was used as strong as one pound of dried tobacco leaves and stems to the gallon of water. At this strength a few of the lice were killed but not enough of them to do any appreciable amount of good. This spray did no injury to the foliage.

Other trees were sprayed with the rosin mixture recommended as a vehicle for applying Paris green to cabbages. The formula used was resin, 5 lbs.; concentrated lye, 1 lb.;

fish oil or animal oil, 1 pt.; water, 5 gal. This stock solution was used up to one-half strength both with and without lime. When applied with the Bovee & Caapenter attomizer it did no harm to the foliage, but like the tobacco decoction, it killed very few lice.

A considerable number of experiments were tried with solutions of whale oil soap. A strength of one-fourth pound to the gallon of water when applied with an ordinary bucket pump and a Bordeaux nozzle was found to injure the young tender leaves slightly when the spray collected in large drops. It was much more effective than either of the foregoing sprays, but not over two-thirds or three-fourths of the aphids were killed, and the remainder re-stocked the twig so quickly that in a week or two the lice were as thick as ever. Repeated applications of this strength with the coarse spray from the Bordeaux nozzle injured the foliage quite seriously without ridding the trees of the lice. Where the very fine spray from the Bovee & Carpenter attomizer was used a strength of one-half pound to the gallon of water when carefully applied, did no harm to the foliage, and a strength of one pound to the gallon injured the foliage less than the one-fourth pound solution applied as a coarse spray. This very strong whale oil soap solution was quite effective, seeming to kill all the lice with which it came in contact, even though applied as an almost impalpable mist.

In previous seasons a 10 per cent. mechanical mixture of kerosene and water applied with an ordinary nozzle and knapsack pump was found to injure the foliage severely without ridding the trees of the lice. The success of the attomizer sprayer in applying the strong solution of whale oil soap suggested trying it for applying a strong kerosene emulsion. A 25 per cent. emulsion was made by dissolving one-fourth pound of whale oil soap in one quart of boiling water, and emulsifying with two quarts of kerosene, afterwards diluting to two gallons. As applied by the attomizer, this proved so satisfactory that it was adopted as the treatment for all the infested trees in the young orchard. A single application did no appreciable damage to the foliage

except where enough was used so that it began to collect in little crops. Of course so strong an emulsion applied in the ordinary way would have badly burned the leaves. At this strength the slightest touch of the spray was deadly to the lice, but owing to the shelter furnished by the crumpled leaves it was often impossible to reach them all even by taking the greatest care in walking around the tree to direct the spray against the infested twigs from every quarter. In four or five days these protected aphids would be found to have left their shelter and be collected on fresher feeding grounds near the young point of the advancing twig. A second spraying within a week of the first would thus kill most of these, and in many instances the two sprayings entirely cleared the tree. In other cases, a few lice kept re-appearing so that weekly sprayings were necessary for five or six weeks. Even then the lice were not entirely conquered till some heavy rains in August, when they suddenly disappeared. By September 1st the trees were almost entirely clear of them even in those parts of the orchard where no spraying had been done. The trees that it was found necessary to treat so often were finally a good deal injured by the frequent caustic applications. The leaves were thick and crumpled, and seemed somewhat seared. The bark of the young twigs, too, was effected in much the same way, being hard and thick. In these cases it was hard to decide which had done the more damage, the lice or the treatment. While this use of 25 per cent. kerosene emulsion applied as an impalpable mist was not fully satisfactory, it was much better than anything else that was tried, and it must be recommended for the want of something better. It must be applied with great care and only during the middle of bright, warm days when the kerosene evaporates quickly, or great harm may be done. The Bovee & Carpenter sprayer used in these experiments is a hand implement used somewhat like the ordinary garden syringe. The spray being so fine it can only be thrown a short distance. It is only useful for young trees and could not be used successfully where they were more than seven or eight feet high. It

is probable that for large trees a Vermorel nozzle with an exceedingly fine apperture might answer an equally good purpose. This will be tested another season, as many of the trees in the bearing orchard suffered severely from the lice.

It was noted that certain varieties were exempt from this scourge while others in the same blocks suffered severely. This was probably in part at least accidental, but as it seemed that many of those varieties with heavy hairy twigs and foliage were exempt while those with nearly glabrous twigs often suffered badly, it is deemed advisable to place on record the following notes on varietal resistance for this season.

Entirely free from aphis:—Aiken, Arkansas Black, Babbit, Battyani, Black Ben Davis, Bradford, Carolina Greening, Cillagos, Coopers Early, Hames, Haywood, Horse, Hyari-Piros, Kismet, Limber Twig, Magyur, Maidens Blush, Malalyfi, Mamma, Metel, Ponyike, Red Astrachan, Red June, Selymos, Shockley, Texas Red, Thorntons Seedling, Tull, Winesap, Yakor, Yates, Yellow English, Yellow Transparent, York Imperial.

Attacked by aphis but not serious injured:—Apple of Commerce, Benoni, Bledsoe, Buda Summer, Buncomb, Cannon Pearmain, Carters Blue, Champion, Chattahooche, Coopers Red, Dam, Duchess, Early Harvest, Eper, Equinettelee, Fall Pippin, Family, Fanny, Gravenstine, Grimes Golden, Hews Crab, Holiday, Jeffries, Jennings, Jonathan, Julian, Kinnards Choice, Mammouth Black Twig, Mangum, Moultries, Nickajack, Pasman, Pear (or Palmer), Rawls Janeton, Red Astrahan, Red Beitigheimer, Red Limbertwig, Rhodes Orange, Rome Beauty, Sabadka, Saxon, Priest, Sekula, Senator, Shackelford, Summer King, Summer Queen, Taunton, Tuscaloosa.

Badly injured by aphis:—American Summer, Early Red Margaret, Elgin Pippin, Mavarack Sweet, Noble Savor, Oszi-vaj, Santa, Shockley, Summer Cheese, Summer Queen, Summer Wafer, Sweet Bough, Wealthy, Yellow English, Yellow Horse, Yopps Favorite.

That part of this difference is purely accidental, is shown

by the fact that the same variety in several cases appears in more than one of these lists when growing in different parts of the orchard. Several years observation are necssary to determine if any of the kinds are truly resistant to the aphis.

Apple Leaf Rust:—The yellow leaf rust of the apple (*Roestelia pirata Thax.*) which is the Accidial stage of the fungus *Gymnosporangium macropus* causing the galls on red cedars known as "cedar apples," often causes serious damage to the apple foliage in this state. Some varieties are very susceptible to this disease while others are entirely exempt. I know of no plant disease where different varieties of the host have such different powers of resistance. As the red cedar is abundant in most parts of the state where apples are grown, at least as a door-yard tree, it becomes a matter of some moment to select rust resisting varieties for planting. Of the lists enumerated above of the varieties growing on the Station grounds only, the following developed rust during this season. It will be noticed that none of the Russian or Hungarian varieties are included in this list. So far as I know they have always proved to be "rust proof."

List of Varieties Showing Leaf Rust in 1899:—American Summer, Carters Blue, Family, Jonathan, Mamma, Moultries, Nicajack, Rhodes Orange, Rome Beauty, Santa, Senator, Shockley, Wealthy.

Of the above Family, Jonathan, Nickajack, Rhodes Orange, Santa, Shockley and Wealthy were very badly affected. The others while showing the disease were but little injured by it.

The leaf spot (*Phyllosticta*) appeared on many of the trees and caused some of the leaves to fall prematurely. It is interesting to note that the following kinds were entirely free from aphis, rust and leaf spot, making a good growth and holding their leaves green and fresh to the end of the Fall:—Aiken, Arkansas Black, Babbitt, Carolina Greening, Duchess, Fanny, Hames, Haywood, Hyari Piros, Magyur, Maidens Blush, Metel, Milalyfi, Ponyike, Thorntons Seedling and York Imperial.

The Adaptability of Apple Trees to Changed Environment:—In Bulletin No. 98 the fact was noted that apple trees brought from the North and planted here during the Winter, started into growth in the Spring a number of days earlier than similar trees from Southern nurseries. This Spring these different lots of trees were watched closely to see if the Northern grown ones still felt the effect of their early environment. Apparently not; during their one season's growth at the South they seemed to have completely adapted themselves to the changed conditions, for this Spring all lots started alike, not the slightest difference could be seen between them.

Cherries.

Cherries are very little grown in the South, but evidence is accumulating that some of the sour kinds at least can be safely planted as far south as Northern and Central Alabama, That they will fail on the coast is almost certain. Of twelve kinds planted at the Station in 1898 the following are now in good condition and give promise of fruiting next year:—Montmorency, Wragg, Dyehouse, Early Richmond, Suda, Ostheimer. The Wragg trees bore a few fruits this season. In north Alabama English Morello is proving very satisfactory, and it is recommended for planting in that region. Cherries were not injured by the February cold.

Figs.

The freeze killed every fig tree in the state to the ground. This is not unusual in North and Central Alabama. The trees are killed to the ground by every exceptionally hard winter, but the recuperative power of this wonderful tree is so great that only one crop is lost. Sprouts spring up from the roots and grow with great rapidity and bear freely the following year. Under these circumstances the fig is a great bush rather than a tree. On the coast well established fig trees are seldom seriously injured by the cold, but this freeze killed many noble old trees with trunks a foot or more in diameter.

On the Station grounds the figs were all killed down during the winter of 1894-5. They sprouted and grew freely during the summer of 1895, and have since born three successive heavy crops. Of course they were killed to the ground again in February, but most of them have sprouted and made a good growth during the Summer and some kinds have even set a little fruit that ripened late during September and October. The following kinds have ripened some fruit this year, and they are among the best for general planting:—Celeste or Celestial (the "Sugar Fig" of Central Alabama), White Ischia, Brown Turkey, Brunswick and White Smyrna. Of these the Celeste is the one that is most widely planted. It is hardy and vigorous and a most abundant bearer. Though small it is of the best quality. It usually ripens in July. Green Ischia seems to be a very promising kind, and should be planted much more widely since it ripens late in August and in September thus serving to greatly lengthen the season for this most delicious and healthful fruit. It is larger than Celeste, dull green when ripe with a thin skin that often cracks slightly. The seeds and pulp are dark red which makes it very attractive when cut up on the table. Its flavor is rich and agreeable though perhaps hardly as sweet as the Celeste. Figs are so easily grown and yield so regularly and abundantly and furnish so healthful an article of diet they should be planted much more widely for family use. No garden or lot is too small to afford room for one or more fig trees, and no family can afford to be without them.

Grapes.

Grapes were still dormant at the time of the freeze and none of the varieties of bunch grapes on the Station grounds were injured. Many of the *rotundifolia* varieties however, suffered severely. The Scuppernong, which is more widely planted than any of the others, was killed to the ground in many parts of the state. Here it was severely injured but not entirely killed. Of the kinds growing at the Station, Memory proved much the hardiest. In fact it was not at all injured. This is a very vigorous grower and it is one of the

best of the black varieties. It ripens with the Scuppernong, Flowers proved unexpectedly tender. A number of the largest vines were entirely killed, not even sprouting from the root. The others were very badly injured and have made only a few weak new canes. Thomas, Jeter, Tenderpulp and Mish were all somewhat injured but not seriously enough to prevent their bearing nearly a full crop this season. Mish is the most valuable of these kinds The berry is rather small but it has a peculiarly rich, sweet flavor and it ripens late after Scuppernong, Memory and Thomas are nearly gone. Flowers is still later but this season has proved it tender and the quality of the fruit is poor. The Station has no vines of these kinds for sale or distribution.

Kaki, or Japanese Persimmon.

This fruit suffered severely from the freeze the trees being killed almost or quite to the ground. For a time it seemed that all were dead, but finally some of them sprouted from the crown and will be in condition to bear some fruit another year. The present condition of the different varieties is as follows:—Hyakume, dead; Imperial, small sprout on one tree; Tane Nashe, killed to the snow line, sprouted freely and has made good growth; Hachiya, one dead, one very feeble; Yeddo Ichi, killed to the snow line, has made a good growth; Tabors No. 23, killed to the snow line, has made good growth; Tabors No. 72, killed to the snow line, has made good growth; Tabors No. 129, the only kind not killed to the ground. This put out sprouts from the trunk and larger branches, and made a strong growth; Zingi, nearly killed; Tsuru, nearly killed; O kame, one dead, one sprouted freely; Yemon, killed to the ground but made a good growth; Costata, dead.

Peaches.

The freeze killed the peach crop of nearly the entire South. In some sections the trees were much injured, but here those that were well cultivated and thrifty were not hurt, though some feeble neglected trees were killed.

On February 5th preceding the freeze notes were taken on the condition of the varieties in the orchard planted in 1898 as a co-operative experiment for testing the successful geographical limits for the different races of peaches. Duplicate orchards of three trees each of three varieties representing each of the five races of peaches that are cultivated in this country were planted by a number of the Experiment Stations. On the Chinese Cling, Elberta and Mamie Ross representing the North China type, the buds were still nearly dorment. On the Honey, Tabor and Pallas, representing the South China type, the buds were much swollen, but were hardly showing the pink. The Peento was in nearly full bloom and Angel and Waldow of the Peento type were beginning to bloom. Mountain Rose, Alexander and Old Mixon Free of the Persian type, were nearly dorment. Onderdonk, Coblers Indian and Imperial of the Spanish type had buds much swollen, a few showing pink. Older trees of the North China and Persian types were somewhat more advanced, the buds being conspicuously swollen and by the date of the freeze some were even showing the pink. While all the fruit buds were killed on all of the varieties, the wood was practically uninjured except in the trees of the Peento type that were so much more advanced than the others. Peento itself was killed to the ground two of the trees sprouted from near the ground and have made a feeble growth. Angel and Waldow had all the twigs and small brances killed, but the trunks were not injured and they have made new, vigorous tops.

For Central Alabama it is doubtful if we are safe in planting varieties of other than the Persian and North China types.

Pears.

The flower buds of Kieffer and LeConte on the Station grounds were swollen enough to begin to separate at the time of the freeze. Of course, they were all killed. Bartletts and other varieties of the European type were entirely dorment and they escaped injury. The older LeConte and

Keiffer trees suffered but little except in loss of crop, but the trees in the young orchard (planted in 1896) were many of them, seriously injured. The bark of the trunk for a few inches above the ground, or rather the snow line, was blackened on fully half of the trees, and from one-fourth to one-third were killed outright. Some trees that looked all right and started to grow in the spring died from time to time during the summer.

One of the most striking results of the complete destruction of the flowers was the almost entire suppression of the blight. A few of the old Kieffers finally made a light second blooming in April or May, and a few of these culsters contracted blight, but these were the only cases that developed in the entire orchard.

It is a curious fact often noted that fruit trees of all kinds bloom later on the coast than they do one or two hundred miles farther North in the interior. This season the Kieffer flower buds on the coast were so much less advanced that quite a portion of them escaped the freeze and bore fruit.

Plums.

On February 4th the following notes were taken on the condition of the different varieties of plums in the orchard: Kelsey, showing first blooms; Berckmans, buds separating. Blood No. 3, full bloom. Blood No. 4, first blooms. Chabot, buds separating. Excelsior, buds separating. Baileys Japan, buds separating. Botan, buds separating. Gold, buds separating. Orient, buds separating. Yellow Japan, buds separating. Satsuma, first blooms. Lone Star, buds separating. Emerson, buds white. Transpaaent, buds separating. Hattankio, buds separating.

All the other varieties in the orchard (see list in Bull. 98, p. 273.) were still nearly or quite dormant. During the week of open weather preceding the freeze after these notes were taken the general condition had advanced considerably. The injury done was almost exactly in proportion to the state of advancement. Blood No. 3 was killed outright. Blood No. 4, Kelsey, Satsuma and Wickson lost consider-

able portion of their tops, and a number of the other Japanese kinds showed some injured twigs. During the summer trees died of Kelsey, Chabot, Long Fruited, Burbank, Excelsior and Satsuma. Whether this was in all cases due to the freeze is uncertain.

The flowers seemed to open normally on all later blooming kinds but the usual sequence of blossoming was disarranged, all blooming more nearly together. Only the five following kinds bore full crops:—Milton, Whitaker, Wooten, Wayland and Golden Beauty. None of the Japs had more than a few scattering fruits. Again, as with the pears the Southern part of the state fared better as the buds were more nearly dormant, and some good crops of Abundance, and other of the later blooming Japs, were reported from that section.

It is worthy of note that this makes the fourth consecutive full crop for the Golden Beauty on these grounds. Wayland was planted later or its record would be equally good and it is a handsomer and rather better flavored plum.

This Wayland group of plums is evidently well adapted to our conditions and they should be more widely planted. It is true they are small and not of the first quality, but they ripen late, July or August, after other plums are gone and they are very serviceable for canning and preserving. A considerable quantity of them could be sold in the Southern markets at fair prices. They would hardly pay for Northern shipment as they would come in competition with better kinds grown nearer home.

San Jose Scale.

During the Summer of 1897 it was discovered that a number of trees in the old plum orchard were infested with the San Jose Scale. As this orchard was otherwise in poor condition and of but little value, no attempt was made to treat it, but it was promptly dug up and burned. The scale had spread somewhat to the adjoining apple orchard. As there are no large orchard interests in the neighborhood to be endangered, it was deemed permissible to keep these trees

for experimental purposes. All were pruned back heavily. A few were reserved for experiment with the scale insect fungus, *Sphœrostilbe coccophila*, which had been reported as destroying the San Jose Scale in Florida.

The remaining trees were sprayed during the Winter with kerosene. On some it was applied full strength, on others a 50 per cent., and on still others a 35 per cent. mechanical mixture was used. In some cases the full strength did some injury causing a dying and shelling of the outer bark. Other trees were not at all hurt. Whether this was due to the variety or the particular condition of the individual tree could not be determined. The treatment was quite effective. No spraying was done last Winter and the trees are still practically free from scale though it is planned to treat them all again this coming Winter.

Sphœrostilbe coccophila is a common fungus here, growing abundantly on the water oak scale, *Aspidioius obscurus*. Bark from the water oak bearing the fungus, was tied in some of the infested apple trees during the winter of 1897-8. The fungus spread slowly to the San Jose Scale and has been growing on it ever since, but it works so slowly that it is evident that in this dry climate at least, it will not prove an efficient remedy.

Two trees in the new plum orchard (planted in 1896) were also found to be infested. These were allowed to remain untreated to watch the normal rate of spread of the insect. This has been less rapid than was expected, During the Summer of 1898, it only found its way to four additional trees. The foliage at this writing still prevents a careful inspection, but the spread during 1899, has certainly been very little more rapid. The two trees first infested are now getting pretty well coated with the scales, but as yet they show very little signs of exhaustion from the presence of the insect. On one of the trees a natural infection of the scale with the *Sphœrostilbe* took place. Only a few of the red pustules have developed and it seems to be entirely inefficient. This entire orchard will be sprayed with the me-

chanical mixture of kerosene, this Winter, and a determined effort will be made to stamp out the scale by this means.

The facts of the slow spread of the insect and the practicability of controlling it with kerosene are certainly encouraging for those who have been unfortunate enough to get it on their premises. It is unfortunately now quite widely scattered in different parts of the state, and since we have no law to prevent the sale of infested nursery stock it is likely to be still more widely scattered in the future. Parties finding it on their places are strongly urged to treat it at once, this Winter, using 35% strength of kerosene on apple and 25% on peach and plum. It can be applied either as an emulsion, or with the special pump for making a mechanical mixture. In either case, the important thing is to apply it as a fine spray and with some force, and to make certain that the spray reaches all parts of the trunk and limbs. Kerosene should always be applied during sunshine so that it will evaporate quickly in order to avoid injury to the trees. It must be remembered that though this scale works slowly it will surely kill in time every tree on which it gains a lodgment, unless held in check by vigorous and careful treatment. Planters cannot be too careful in buying nursery stock to insist on getting only that that is known to be free from scale.

The extensive nursery interests at Huntsville are to be congratulated that so far their neighborhood has remained free from this pest.