

KENTUCKY FRUIT NOTES

W. D. Armstrong, Horticulturist, Editor

FINAL ISSUE

The January issue of Kentucky Fruit Notes carried a statement to the effect that the Special Horticultural work would end June 30 unless additional funds were made available by the legislature. Instead of \$10,000.00 which was made available each year from 1938 to 1940, \$4,000.00 per year was appropriated for 1940 to 1942. This reduction of \$6,000.00 a year in the funds for operating the special horticultural project will naturally result in a serious restriction and limitation of the amount of work that can be done. Very little traveling can be done and a large part of the field-contact work will be discontinued. Funds will not be available for publishing Kentucky Fruit Notes and this is the final issue.

The spray service work will be continued. While many curtailments will be necessary, this part of the work will be made as effective as possible. The strawberry work also will have to be limited; however, here as in the other phases of the work every effort will be made to render as much service as possible with the funds available.

1940 STRAWBERRY MULCH EXPERIMENTS

W. D. ARMSTRONG

Preliminary results only are available at this time in the 1940 Strawberry mulch Project; however these look very promising so far. Here are some of the results that are showing up and can be determined before final harvesting is completed:

(1) The winter of 1939-40 was a test winter in regard to winter injury

among trees, shrubs and berry plants.

(2) Strawberry plants that were not covered with snow or mulch during the extreme cold weather of January were, in most cases, injured in various degrees. This injury was worse in the new plantings set in 1939 than in the older fields. The thicker stand of plants, more litter, and deeper rooting seemed to aid in protecting the older patches.

(3) Most of the injury was caused during the week of January 15 to 22 when there was no snow on the ground over the southern tip of Western Kentucky, or in Jackson purchase as a whole. The temperature during that week went below zero on two nights and on one of these went down to 12 below zero. Plots that were mulched early showed much less of this injury.

(4) The injury showed up as dark discolorations in the pith of the crown, of the plants, chiefly in the region where the roots join the crown, and in the upper parts of the roots. This injury is still visible and many roots are now dead.

(5) Plots and fields that had any mulch at all seem to have suffered less injury than unmulched fields. Applications of two and three tons per acre gave more protection than lighter mulches.

(6) In general, there are less non-bearing plants (locally called "he" plants in fields and parts of fields that were mulched before Christmas. A number of field counts made in the experimental plots show that the plots receiving 2 or 3 tons mulch per acre in early winter had 68% of the plants bearing fruit, while plots not

mulched until spring had only 28% of the plants bearing fruit.

(7) Yields so far show an increase of about 50% in favor of the early mulching.

(8) A complete report on the 1940 results will be given after the records for the year are complete.

(9) Growers are urged to make observations in their own fields.

BITTER ROT REMINDERS

The bitter rot disease of apples was a serious factor in 1939 in practically every orchard in Kentucky that contained susceptible varieties. The individual losses varied from only a few bushels to as many as 15,000 bushels in one Jefferson county orchard. In this last case the disease destroyed practically the whole crop regardless of variety. In this case Delicious and Stayman were as badly affected as other varieties which is unusual. Generally the varieties that suffered most in 1939 were King David, Golden Delicious, Jonathan, Ben Davis, Polly Eades, Rome and Grimes. Many orchardists, who had never been seriously bothered with bitter rot previous to 1939, were threatened with the loss of the major part of their crop. We are glad to report that many of these growers were able to check this disease by using methods recommended by the Experiment Station for a number of years.

Serious bitter rot damage is not expected each year, nor was the serious 1939 injury, the worst in several years, particularly expected. This disease overwinters in old mummied fruits which hang on the trees or in some cases which fall to the ground, on infected fruit stems which remain in the tree, in some cases in cankers on the tree or from some unknown sources outside of the orchard. In general, warm, rainy, humid weather is suited for development and spread of the disease. In Kentucky, the disease generally starts about mid June and from that time on

through July, August and September is considered the bitter rot season, depending on the weather. It was puzzling to many that 1939 should have been a serious bitter rot year when it was one of the driest in several years. A partial explanation is that in some sections of the state the extremely dry weather did not set in until August and even at Princeton where the drouth started June 15 there was sufficient showery and cloudy weather and moist nights after that time to be favorable for spreading the diseases. There was not enough rain however until late fall to effectively wet the soil. The worst out-break seen in 1939 was in a rank growing orchard in rich Ohio river valley soil, partially surrounded by hills. The trees were unpruned and were so close together in the rows that the branches of adjoining trees interlocked. There was also a rank growth of vegetation on the ground and all of this contributed to poor air circulation and also made effective spraying impossible.

Much thought, study and correspondence have been given to the bitter rot problem since 1939 and at present the suggestions gathered from various sources seem to be about as follows:

In orchards and varieties subject to bitter rot injury, but which were free from bitter rot in 1939, a Bordeaux spray of 6-8-100 strength should be given about the last week in June in western Kentucky and about July 4 in other parts of the state. If bitter rot has been a serious problem it is not safe to delay this spray until after the first bitter rot spots are visible. By that time the disease has often secured such a foothold in some of the trees that it is rather difficult to control, especially if unfavorable weather conditions prevail. Many growers have found that it is very valuable insurance and a good precautionary measure to include this first bitter rot spray in their regular

spray program. Coming at the time it does it coincides with the first spray for summer brood codling moths and is often combined with this spray. In orchards where bitter rot losses have been severe this first Bordeaux spray should be applied about June 15 and be of 4-6-100 strength followed at two-week intervals with three more Bordeaux sprays of 4-6-100 strength. "The grower should be alert to observe the first appearance of the disease. It usually occurs first on one certain tree each year. Hand-pick and destroy all bitter rot spotted fruits and search for overwintering places, such as old fruit stems, mummied fruit, cankers and dead wood. The source will usually be found directly above the first rotted fruits and should be removed. With the first appearance of bitter rot, remove spotted fruit and spray affected trees and neighboring trees immediately."

Recent tests carried out by Dr. Kadow in Deleware show that Bordeaux mixture is still the most effective spray material to use in the bitter rot sprays. In this work it was shown that many of the newer insoluble copper sprays had very poor spreading and sticking qualities and that very little actual copper was deposited on the fruit and leaf surfaces. Bordeaux mixture also helps to correct arsenate of lead injury to the foliage. Sulfur sprays are not effective against bitter rot.

Do a good job—it pays big dividends in bitter rot control.

WANTED—100 STRAWBERRY GROWERS—TO RAISE 100 ACRES OF MULCH MATERIAL.

Half of the Strawberry farms of Southwestern Kentucky will have no wheat, rye or barley straw available for mulching their berry fields this fall. This means that many fields will pass through the winter bare unless

mulching material is purchased. Experimental results thru the berry season just past demonstrate that a failure to mulch last December cut the yield 50 to 80 crates per acre or a loss of \$100 to \$150 per acre.

SUDAN GRASS FOR MULCH

Sudan grass, planted thick and cut before the seed forms is the best known substitute for wheat straw as a berry mulch. It can be planted from June 15 to July 15. Sow the seed on as good land as is available, 30 to 35 pounds per acre. (The seed usually sells at about 5c per pound.) Sow on well prepared land, and cover with a spike harrow. Just before the seed begins to form cut with a mower. Soon as it is well cured, rake with a hay rake and shock like you would hay. Let the shocks stand in the field until December and then mulch the berry field using two tons per acre. If the season has plenty of rain you may be able to cut the field twice. At any rate you can expect from 2 to 4 tons per acre. Some farmers have been able to double their yield by applying 100 pounds nitrate of soda per acre when the grass is 2 to 6 inches in height. This should be applied during a rainy day to prevent burning the tender grass.

A NEW CROWN BORER CONTROL STUDY

Based on the work Dr. P. O. Ritcher has done with crown borer in western Kentucky it has been established that crown borer-free plantings can be established by (1) digging young plants before March 1, cleaning and washing them thoroughly and heeling them in in clean ground, (2) using certified plants, (3) locating new plantings at least 300 yards from old plantings, and (4) avoiding locations where cinquefoil (five finger), a native host of crown borer is growing.

It is often rather difficult to be certain that plants are dug from

crown borer-free plantings or that all plants are dug before egg laying starts. For this reason other means of controlling this pest are needed and Dr. Ritcher is working on this problem.

Experiments are being carried out by Dr. Ritcher using methyl bromide which is a new chemical widely used by nurseries for fumigating nursery stock to control insects such as the Japanese beetle. Shipments of strawberry plants known to be infested with crown borer eggs and larvae have been sent to Dr. Ritcher for fumigation trials. If it is found that the eggs and young borers in these plants are killed without injury to the plants should be of great importance to the strawberry industry. Should this work prove practical it would be a comparatively simple step to establish fumigation stations in the strawberry sections where growers could have their plants fumigated in order to have assurance that only crown borer-free plants are being set.

The development of this work is being watched with a great deal of interest and with high hopes by a number of strawberry growers.

CROWN BORER—FREE BERRY PLANTS

By P. O. RITCHER and W. D. ARMSTRONG

In work carried on at Paducah and Princeton in 1937 it was shown that growers could free strawberry plants of crown borer by digging and cleaning plants before egg laying began. In general, the dead line for digging plants in western Kentucky was set as about March 1, but the date varies from year to year depending upon the season. Each year the time has been rechecked and growers advised by letter, radio and newspaper of the proper time to stop digging plants.

Since it is impossible to find the first egg laid, a way was worked out that would give circumstantial

evidence on the beginning of egg laying. This is by the dissection of female crown borers under a microscope. If on a given date in February or March no females contain fully developed eggs, it is good proof that no eggs have been laid. On the other hand, if one or more crown borers contain full sized eggs then egg laying can be expected whenever the temperature is about 70 degrees F.

Using this system, the writer in 1937 found the first eggs laid at Princeton about March 8. In 1938, there was danger of eggs being laid after March 10. Beginning last year, Mr. Armstrong collected crown borers at intervals in western Kentucky patches and sent them iced to the writer in Lexington for dissection. Last year (1939) there was danger of egg laying after March 7.

This year, Mr. Armstrong and his helpers began collecting crown borer adults early in March. The first collection made at Princeton on March 4 showed only slight egg development. A second collection made March 19 and 20 included females from both Benton and Princeton patches, but none contained fully-developed eggs. March 22, Mr. Armstrong gathered 42 crown borers at Princeton. The first female containing fully developed eggs was found in this shipment. Shipments of over 200 crown borers from the Magruder farm near Kevil made on March 27 and April 1 and a shipment from Princeton on April 1 all contained females with fully-developed eggs.

From the above evidence, it was concluded that crown borer egg laying was delayed in 1940, beginning about the third week in March at Princeton and Paducah. It was not safe to dig strawberry plants in western Kentucky after March 21 since there was a good possibility that some plants would contain crown borer eggs.

On the basis of the 1940 findings, letters were sent by Mr. Armstrong

to fifteen county agents in the main strawberry sections, including the Purchase, Marion, Bowling Green, Greenville and Louisville, advising them as to the stage of egg development and danger of egg laying. Mr. Armstrong also sent letters to growers who passed the station inspection for crown borer and the results were used in newspaper and radio announcements.

REGIONAL STRAWBERRY AND RASPBERRY CONFERENCE

W. D. ARMSTRONG

On April 26-27 there was a regional small fruit conference at the Coastal Plains Experiment Station, Willard, North Carolina. The meeting was sponsored by the North Carolina Department of Agriculture, North Carolina Experiment Station and the U. S. Department of Agriculture jointly; as the three are cooperating in the work under way at the station. Small fruit workers of seventeen states from California to Maine were present.

The purpose of this conference was to inspect and study the results and progress of the strawberry, raspberry and blueberry breeding program; study cultural experiments under way; to observe commercial plantings in the vicinity; to exchange ideas with other workers present and to learn of the scope of work going on in other states.

Many new strawberry selections and seedlings were seen that will no doubt play a big part in the strawberry industry in the future. This breeding program of the U. S. Department of Agriculture in cooperation with the North Carolina Station has already produced such outstanding strawberry varieties as the Blakemore, Fairfax, Dorsett, Southland, Bellmar and more recently the Fairmore, Daybreak, North Star, Eleanor Roosevelt and others.

Many of the new seedlings and selections contain the blood of, and

are attempted improvements on, some of the above mentioned varieties and other outstanding varieties of the United States and foreign countries.

Other workers present told of the small fruit breeding program under way in their several states. Of particular importance to Kentucky and this section of the United States is the fine strawberry breeding work being done by the Tennessee Experiment Station with the work centered at the West Tennessee Experiment Station at Jackson, Tennessee. It is suggested by Dr. Darrow that the Tennessee breeding work is likely to be of more importance to the central United States section than is the breeding work being carried on further east.

On the Station grounds were also located several tests that were showing decided increases in Blakemore yields from the spacing of the new runner plants and the restriction of the number of runner plants rooting. These cultural tests on Blakemore which usually sets too many runner plants should be of great importance in Blakemore producing sections. A spacing system known as triple-row spacing is being used widely there with the Blakemore variety. In 1939 the triple-row spaced plants produced a yield of 292 crates (24 quarts) per acre in comparison to 243 crates for the regular matted rows. It was also found that the spaced plants had more leaves per plant in the fall and that this resulted in more fruit per plant the next spring.

Another cultural experiment on the care of the second year patch was being started. In this, one plot was reworked just after harvest, one plot was not reworked and no new runners were to be allowed to root. These two plots were compared with a new planting, which would represent a patch that would be fruited only one season. This and other treatments of the second year patch are big problems in strawberry production.

The raspberry work seen consisted of a number of new crosses and seedlings from which the workers are attempting to develop new varieties better adapted to southern conditions.

WINTER INJURY NOTES

Strawberries:

In the Paducah section and western Kentucky in general where there was no snow on the ground during the sub zero weather of January 19, there was considerable injury to the crowns and roots in practically all of the unmulched strawberry fields. This was particularly true of the new patches. When growth started in the spring however it was very rapid; causing many to think the injury had grown out or that there had been no injury. In addition to the discoloration in the roots and crowns, which is still visible by the way, many of the plants particularly the younger ones were heaved out of the ground and were injured so badly that they are producing very few berries and many have been killed.

When blossoming started, it was noted generally that an unusual number of plants were producing no blossom clusters, particularly in the unmulched fields. Some counts were made in the Experimental mulch plots which showed that 68% of the plants were fruiting in two plots heavily mulched in December while only 28% of the plants in spring mulched plots were bearing fruit. Harvest records and other observations are being made to compare the amount of injury in the early and late mulched fields. From present indications it seems almost certain that early winter mulching will have paid big dividends in the 1940 western Kentucky strawberry harvest.

There was less injury in the remainder of the state chiefly because a protective blanket of snow covered the plants during the sub zero weather.

Apples:

Little injury in general is reported to apple trees by the cold winter which ranged from 10 to 18 below zero in all parts of the state at one time or another during January 1940. In some apple and peaches plantings, a number of limbs died during the winter. In some cases these limb losses were ascribed to a combination of over-bearing in the fall of 1939, of drouth injury and winter injury after going into the winter in a weakened condition. Such a loss of limbs is reported in the Exall Orchards at Paducah in a block of Paducah trees that bore heavily in 1939. Tip killing of terminal twigs is also observed in some Yellow Transparent plantings.

At the Western Ky. Experiment Substation at Princeton in a planting of 4 year old Jonathan apples, twelve were killed, eight severely injured, three slightly injured and only two uninjured. Of 28 double worked Grimes of the same age, inter-planted with the above Jonathans, not a one was injured. All of these trees as well as the older apples and peaches on the Station ground received their dormant spray of 3% oil emulsion in December. The most severely injured trees appeared to have an oil soaked appearance early this spring and died soon after leafing out.

Mr. S. C. Chandler of the Illinois Natural History Survey of Carbondale, Illinois reports that he has observed several orchards, both peaches and apples that were sprayed for scale last fall and are showing injury but that in no case has he seen that type of injury in plantings having been sprayed in the spring.

It seems likely that fall spraying was likely tied up with some winter injury in the case of the extremely hard winter just past.

Peaches:

Over most of the state the first buds were killed by the January weather. The Purchase region is

fortunate however in that the temperature was a degree or so higher and their fruit buds escaped. This section also escaped the spring frosts and practically every orchard is now producing a full crop of fruit. The discoloration to the cambium in that section has also cleared up.

At Henderson the trees are recovering from the -16° weather with a comparatively few dying. A number of growers there and at Louisville pruned their trees back considerably after growth started to take advantage of this non-fruiting year to lower the fruiting wood in their trees.

Trees that were headed back, should by all means have their new growth thinned out by late June or early July to prevent this thick new growth from shading out the low growth in trees. If this crowded thick condition is not relieved it will cause the trees to grow back tall and spindly and the purpose of lowering the head will be defeated.

At the Western Ky. Experiment Substation at Princeton an interesting condition has developed as a result of the fall and winter. A block of trees was cut back considerably after the loss of the crop from a spring frost in 1938, and another block along side was left uncut. In 1939 the uncut portion set much the heavier crop and had to be thinned heavily while the portion cut back in 1938 set a smaller crop and needed very little thinning of fruit.

Due to the severe summer drouth, however, the heavy laden large trees failed to size their fruit and most of it was $1\frac{3}{4}$ " fruit. The fruit on the cut back trees was larger, poorer colored and a day or so later. This spring, however, serious injury has showed up in the larger uncut trees that over bore in 1939. This is thought to be due to a combination of the overbearing coupled with drouth, which caused the trees to go into the winter in a weakened condition and

were in this way more subject to winter injury.

STRAWBERRY FIELD MEETING

W. W. MAGILL

One of the best Extension Demonstration field meetings I have held during the past 20 years was that on the farm of Lester Harris in McCracken County, Heath Community, May 20, on the Experimental Strawberry Plots conducted by W. D. Armstrong, Horticulturist of the Western Kentucky Substation.

Commercial Strawberry growers of the Paducah district have always had a wide difference of opinion as to the most desirable season to apply the mulch and the proper amount to apply. Many growers do not consider it worth while to apply a mulch, in fact a high per cent of the berry fields do not get any mulch before March or early April.

During January of 1940 the temperature reached zero several nights and on January 19 the temperature dropped to 12 below zero—with no snow on the ground in the Paducah district.

This abnormal temperature evidently killed the fruit buds on about $\frac{1}{3}$ of the strawberry plants and injured the roots on an additional $\frac{1}{3}$ of the plants where no mulch had been applied before Christmas.

Growers attending this meeting were very much surprised at the contrast shown in the berry plots from the use of straw applied in December as compared to the March application. The dead roots and large per cent of non-fruiting plants in the March mulched plots was outstanding. More details of this mulch experiment will be found on page 1 of this issue. I estimate the 2 ton of mulch in December increased the yield this year over 50 crates per acre.

Growers attending the Demonstration were also very favorably impressed with the appearance of the

small planting of the Tennessee strain of Yellows Free Blakemore which Mr. Armstrong had planted in the spring of 1939 on Mr. Harris farm for an experimental test. A number of prominent growers commenting said, "They show more vigor, berries are slightly larger and the plants show no trace of yellows". All considered them an improvement over the local strain of Blakemore being grown in the district.

GRAPE LEAFHOPPER CONTROL

By P. O. RITCHER

Department of Entomology and
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Leafhoppers are very small, triangular-shaped insects which pierce the tissue of grape leaves and suck the sap from the underside. The first signs of injury are small whitish or yellowish spots on the leaves. When hoppers are abundant, leaves are injured to such an extent that they become yellowish or brown and many may fall. Leaf injury causes grapes to ripen irregularly, makes the grapes sour by reducing the sugar content and produces loose bunches of odd sized grapes. When hoppers are abundant they fly in swarms if the vines are disturbed.

The standard control measure for grape leafhoppers is nicotine sulfate, one pint to 100 gallons of spray material (1-800). Some spreader such as liquid soap or soap flakes should be included in this spray. If the nicotine sulfate is combined with Bordeaux mixture, the spreader may be omitted.

Other spray materials which are known to be effective against leafhoppers are rotenone, pyrethrum, and rotenone and pyrethrum combination sprays. These should be used as recommended by the manufacturer. Attention is called to the fact that some of these are said to be compatible with Bordeaux mixture while others are not.

In general, manufacturers recom-

mend dosages of from 1-400 to 1-800 when using pyrethrum or rotenone sprays. This is the equivalent of one quart or one pint to the 100 gallons. Aside from the known compatibility of nicotine sulfate with Bordeaux, nicotine sulfate also kills leafhopper eggs. The pyrethrum and rotenone sprays have the advantage of being much more pleasant to use.

None of the spray materials for grape leafhopper will kill adult leafhoppers. Therefore, spraying should be timed to kill as many nymphs (young leafhoppers) as possible. Spraying is most effective if done just before the oldest nymphs of the first brood develop wings. This time in central and eastern Kentucky is about June 22 to 25. In western Kentucky, the date is several days earlier. In case the June spray was not effective or omitted, a spray late in July may be necessary.

1940 KENTUCKY PEACH CROP

Only two areas in Kentucky are favored with a peach crop in 1940. A large portion of the fruit buds in the area around Paintsville and Pikeville survived the sub-zero weather in January; the same was true in the sections near Paducah and Mayfield and in the Purchase section as a whole.

In eastern Kentucky Mr. Fred Van Hoose from Paintsville reports that after surviving the January sub-zero weather the freezes of April 13 and 14, during blossoming, reduced all varieties and all but eliminated Elberta. At that time temperatures went to 26 degrees and 28 degrees. At this writing he reports a good crop of Champion, Carman and Belle of Georgia; the varieties eastern Kentucky growers depend on.

In the Purchase section, which includes all of Kentucky west of the Tennessee river, there is a full crop of fruit on most varieties and most growers are now (June 3) busy thinning the heavily set trees.

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