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## KENTUCKY FRUIT NOTES

Articles for "Kentucky Fruit Notes" are assembled under the direction of W. D. Armstrong, Horticulturist, at the Western Kentucky Substation, Princeton, Kentucky.

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Kentucky Agricultural Experiment Station

Lexington, Kentucky

# NEW MATERIALS FOR CONTROL OF THE STRAWBERRY CROWN BORER

## Tylocladia fragariae (Riley)

P. O. Ritcher<sup>1</sup>

Widespread injury by the strawberry crown borer during the late summer of 1948 in the Jackson Purchase, the Bowling Green-Franklin, and the Jefferson County berry growing areas of Kentucky has prompted further studies on control measures. Since growers have made little use of methyl bromide fumigation or poison baits, the control methods recommended in Ky. Agr. Expt. Sta. Bul. 468, attention has been turned to newer insecticides.

Laboratory test. In April 1949, several hundred over-wintering adult crown borers were collected by W. D. Armstrong and the writer from a borer-ruined strawberry patch near Sharpe, Kentucky. From 2 to 13 adults were found on or about each plant. These adults were taken to Lexington, where laboratory tests were made with a number of the newer organic insecticides. Each material was dusted evenly over 4 potted strawberry plants, using a hand duster. Ten crown borer adults were placed at the base of each plant and confined by means of a cylindrical, 16 mesh, galvanized wire cage placed over the plant.

Results are summarized in Table 1. Of the materials tested, 1 and 2 percent Parathion, 5 percent Chlordane, and 20 percent Toxaphene dust gave excellent control. Poor results were obtained when benzene hexachloride (odorless) dusts were used.

They contained 1 1/2 percent and 3 percent of the gamma isomer, each with 5 percent DDT dust. Fair results were obtained with DDT spray (1 lb actual) and a dust containing 2 1/2 percent compound 118.

Parathion was the quickest acting of the materials tested, killing most of the crown borer adults in 3 days. Where Chlordane and Toxaphene were used, many affected beetles continued to move their appendages for 5 or 6 days but none recovered. Beetles affected by benzene hexachloride, however, often recovered and proceeded to feed normally.

Field test. On April 20 a newly set strawberry patch was located in Jefferson county which was being invaded by crown borer adults from adjacent old patches, one of which had been plowed under several months previously. Two plots each 140 feet long and 4 rows wide were dusted, one with 5 percent Chlordane dust and one with 20 percent Toxaphene dust, using a knapsack, continuous duster. The rest of the patch was left untreated.

Five days later, dead or dying crown borer adults were fairly common about treated plants, especially on the side of the new patch closest to the old patches. Some beetles were lying beneath the leaves near the crowns of the plants; others were in depressions in the soil surface, in some cases out in the open a foot or more away from plants. Many live beetles were still present in the untreated area.

Discussion. These tests indicate that several of the newer insecticides can be used to kill adult crown borers. Since new patches usually become infested by adults crawling from nearby old patches, the best method of control appears to be one thorough

<sup>1</sup> Since Aug. 1, 1949 with North Carolina State College, Raleigh, N.C.

treatment of all old patches early in the spring, followed by treatments of new patches, at least on the borders closest to an old patch or other sources of infestation such as cinquefoil (five-finger). Treatment of new patches would require the use of very little material, since only a puff of dust is needed per plant.

Table I

1949 Laboratory Tests of Organic Insecticides for Control of Strawberry Crown Borer Adults. (Counts made 3 to 5 days after treatments.)

Treatment	Percent Dead		
	April 9	April 14	April 27
2% Parathion - - - - -	100	100	None used
1 1/2% gamma BHC (odorless) - - - - -	65.5	10.3	None used
20% Toxaphene - - - - -	96.9	100	None used
5% Chlordane - - - - -	100	100	None used
Check			
No Treatment - - - - -	2.6	0	4.3
DDT 1 lb. Actual			
per 100 gallons - - - - -	None used	65.8	None used
5% DDT - - - - -	None used	32.4	None used
1% Parathion - - - - -	None used	None used	100
2 1/2% Compound 118 -	None used	None used	76.3
3% gamma BHC (odorless) - - - - -	None used	None used	30.6

Summary. One and 2 percent Parathion dust, 5 percent Chlordane dust, and 20 percent Toxaphene dust all gave excellent control of strawberry crown borer adults in laboratory tests. Five percent Chlordane and 20 percent Toxaphene were tried in the field and gave similar results. Early spring treatment of old strawberry patches and repeated treatment of border rows in newly set patches are suggested as means of controlling crown borer by killing adults before egg-laying occurs.

## CONTROL OF PEACH BORERS

J. G. Rodriguez

The most important enemies of the peach tree are the peach tree borer and the lesser peach tree borer. The former is the most common and the most destructive, causing heavy losses in Kentucky orchards. These species are closely related and, except for habit, are difficult to distinguish.

Injury. Borers may be identified by the fact that the peach borer attacks the base of the trunk, from 2 or 3 inches below the surface to about a foot above the surface while the lesser peach tree borer attacks the upper part of the tree trunk, the crotches, or any wounds in the bark. Jelly-like gum, including sawdust-like frass, exudes from the borings of either borer and this is an indication of infestation.

Life History. Both borers overwinter as small worms in bark crevices or in portions of the trunk in which they feed; they resume burrowing and feeding in early spring. The more advanced of the peach tree borer larvae attain full growth, about 1 inch, by the middle of May. They then spin silken, dirt and gum-covered cocoons on the surface of their burrows or in the soil, and change to the pupal stage. The first moths emerge in late June and continue emerging through September. They are clear-winged, blue and orange moths resembling wasps. The moths of the lesser peach tree borer may also be mistaken for wasps but they may emerge somewhat earlier.

Control. The summer treatment is the same for the control of both species. Use 4 lb of 50 percent wettable DDT per 100 gallons of water and spray only the trunks, including the crotches. Apply July 1, August 1, and September 1. If the lesser peach tree borer is also present, it may be advisable to begin the treatments about June 24. If a heavy infestation of either exists, spray at 3-week intervals. Care should be taken to assure thorough coverage of the trunks; remove all trash, weeds, or grasses from around the tree trunks.

The fall treatment of paradichlorobenzene (PDB) applied at soil level is effective only on the peach tree borer. Apply PDB crystals about October 1, when the soil is dry. Clear trash from the base of the tree trunk, remove gum if present and place a band of crystals around the trunk, taking care to allow at least 2 inches between the band and the trunk. One ounce of PDB is advised for treating a full grown tree and from 1/2 to 3/4 oz on trees from 3 to 5 years old, depending upon the size of the tree. Do not use more than 1 1/2 oz on any tree. Cover the crystals with about 3 inches of fine soil, piling it towards the trunk, and compact the mound with the back of the shovel. Remove the soil after four weeks from trees less than four years of age; on older trees the mounds may be removed in the spring.

For lesser peach tree borer control, paint the wounds with a mixture of PDB dissolved in crude cottonseed or linseed oil. Warm 2 qt of oil, dissolve 1 lb of the PDB crystals and apply with a paint brush. Make this treatment about October 1 and apply only to the area of the wound. It is not necessary to remove gum, frass, or loose bark from the infested area.

The above DDT trunk sprays have been giving good borer control where used in Kentucky the past two seasons. Where these sprays are well-applied, no other control method has been needed for the peach tree borer. However, regular inspections should be made following the sprays and if for any reason good control is not had, the regular PDB treatment can still be applied at the proper time.

#### THE 400 CRATE PER ACRE CLUB

J. Homer Miller, County Agent  
Marshall County

Hats off to Charles Cone of Benton, Marshall county, for his high yield of Tennessee Beauty strawberries that won for him the 1949 sweepstakes in the Kentucky "400 Crate Per Acre Club." He harvested 420 crates of Tennessee Beauties from a measured acre. Of the 420 harvested, 370 were shipped through the McCracken County Strawberry Growers Association. It was estimated that at least 50 crates were picked after the shipping season closed. Forty-eight crates were harvested from the plot on the last day of the shipping season. For this high yield, Mr. Cone was crowned "State Strawberry King" by the Kentucky Horticulture Society during its annual convention in Louisville December 5 and 6, 1949.

The berries were grown on level Clarks River "second bottom" land that does not overflow. The land was in dark fired tobacco in 1946-47 and was set to berries in the spring of 1948. It had been heavily fertilized with barnyard manure, phosphate, and complete fertilizer. Set about the first of March, the inspected plants were kept clean and well-cultivated. They were mulched with 1 1/2 tons of straw per acre about December 1 and were top-dressed with 250 lb of 46 percent phosphate about March 1. Insects had caused considerable damage in surrounding fields, so a mixture of 5 percent Chlordane and 5 percent DDT was used at the rate of 20 lb per acre when about one-fourth of the plants were in bloom. Mr. Cone estimated that dusting increased the yield of berries at least 60 crates per acre.

A 2-acre field of Aroma berries, planted at the same time, were grown beside the Tennessee Beauties and were given the same cultivation, mulching, and spraying. This variety yielded only 220 crates per acre.

#### PEACH VARIETIES

W. D. Armstrong

A great many new peach varieties are now being offered for sale and most of them are being tested in experimental plantings at Lexington or Princeton or with variety cooperators in the state. Most of the varieties are being developed by the fruit breeding programs of the various state experiment stations or by the U. S. Department of Agriculture. A few have been originated by individuals or nurserymen. Since the Experiment Station is well informed on new varieties, it is strongly urged that growers contact the Station before ordering a large number of any new variety. While some of these are adapted to Kentucky, many of them are not and often time and money can be saved by consulting the University, not only about peaches but on all types of fruit to be planted in the state. **Some established varieties are discussed on the following page**, followed by a list of promising newer sorts.

The Elberta, the large yellow, freestone peach ripening in Kentucky about August 1 in the southern part of the state to August 15 in the northern part, continues to be the leading variety.

Of other older varieties, Georgia Belle is still an excellent white freestone peach 1/2 week ahead of Elberta. However, it is soft and hard to handle, is often small and seems to be a favorite of peach insects. For these reasons and because it ripens so close to Elberta, it is losing popularity.

Hale is not being planted in Kentucky because, in general, its tree is weak and non-vigorous and it is extremely difficult to protect its fruit from insect and disease attacks, chiefly brown rot.

Some strains of Shippers Late Red are doing well in Kentucky. However, this variety has been badly mixed up by nurserymen and the Station does not recommend planting it unless definite assurance can be had that the trees are all of the same type and that they are not Hales. The American Pomological Society is trying to straighten out this and other varieties that have different types being sold under the same name.

Halehaven (yellow free) ripening 2 weeks ahead of Elberta is the second most popular variety in Kentucky. It is usually hardier than Elberta and sets a heavy crop each year, but it needs to be thinned heavily and often needs extra sprays against brown rot.

July Elberta (yellow free) ripens with Halehaven. It is a very fine peach and some prefer it to Halehaven. July Elberta is doing fine in western Kentucky near Paducah.

July Heath (also called Othelle) is a white clingstone that also ripens with Halehaven. This peach is fairly hardy, bearing good crops of medium to large peaches, and is quite a favorite over Kentucky as a local sale and home canning variety. Several orchardists who feature orchard sales consider this one of their best money makers.

Golden Jubilee (yellow free) ripening 3 1/2 weeks ahead of Elberta, is now well established. It is a bit hardier than Elberta, usually needs a little or no hand thinning, and is also fairly resistant to brown rot. The variety softens rapidly, however, and drops badly upon ripening. It is a poor shipper which needs to be handled quickly and with extra care.

Red Bird Cling (also called Early Wheeler) which ripens 5 1/2 weeks ahead of Elberta, is of such poor quality and is so susceptible to brown rot that it should not be planted any more. The variety is especially subject to brown rot in the blossom blight stage. This stage of the disease carries over to the green fruit, usually spoiling most of the crop. When this variety is set among later kinds, the brown rot that starts on Red Bird usually spreads to the surrounding trees, often causing a serious loss of fruit. The diseased fruits that fall to the ground (most of which are never picked up) remain to carry the disease over winter, causing more trouble the next season. Most growers who have had this variety have either taken out the trees or are planning to do so. They would be money ahead if they cut down every Red Bird tree and never planted another. The same is true for individuals who have only one or two trees.

Mayflower (white semi-cling) is the earliest established variety, ripening 8 weeks ahead of Elberta. However, it is soft and watery, of poor quality and hard to handle. It has been steadily declining in popularity and usually a few trees are enough.

Below is a list of some of the newer peach varieties that are showing promise in Kentucky, starting with the earliest:

Name	Type	Weeks ahead of Elberta in ripening
Dixired - - - - -	yellow cling	6
Erly Red Fre - - - - -	white semi-cling	5
Jerseyland - - - - -	yellow free	5
Dixigem - - - - -	yellow free	4 1/2
Raritan Rose - - - - -	white free	4
Redhaven - - - - -	yellow free	4
Cumberland - - - - -	white free	3 1/2
Fair Beauty - - - - -	yellow semi-cling	3
Triogem - - - - -	yellow free	3
Fairhaven - - - - -	yellow free	3
Sunhigh - - - - -	yellow free	2
Ambergem - - - - -	yellow cling	2
Goldeneast - - - - -	yellow free	1 1/2
Veteran - - - - -	yellow semi-cling	1 1/2
Sullivan Early Elberta -	yellow free	1
Summercrest - - - - -	yellow free	1
Redskin - - - - -	yellow free	with Elberta
Afterglow - - - - -	yellow free	1 week after

The above list contains new varieties for any season, both white and yellow, and both freestone and clingstones and all are doing well in Kentucky. If a few of these are selected according to the preferred season and color there is reasonable assurance of a crop if good care is given, the weather cooperating.

Many others are being tried and other names will be added to the list as they prove worthy.

#### NEW APPLE AND PEACH PEST, THE RED-BANDED LEAF ROLLER

W. D. Armstrong

The red-banded leaf roller showed up in Kentucky in small numbers in 1947 or 1948, but it was not until 1949 that it was present in numbers large enough to cause a heavy loss to orchards and to present a serious orchard problem for both peaches and apples. When the 1949 peach harvest survey was made covering 17 peach orchards located near Mayfield, Paducah, Princeton, Madisonville, Henderson, Louisville, and Bedford, 12 of these had leaf roller injury to the fruit, ranging from 1 to 44 percent. Only 4 orchards had no leaf roller damage. It also caused heavy damage in a number of apple orchards. While most damage was observed in western Kentucky, there was evidence of slight damage in central and northern Kentucky and much injury probably occurred in areas not covered in this survey.

The pest passes the winter in the pupa stage and the moths emerge in early spring. They lay their eggs on the foliage. The young, active, greenish-yellow worms feed on the leaves, webbing several together where they overlap. Later in the season they attack the fruits, eating out grooves and trenches in the surface of the fruit, often near the stem, at the suture, where fruits touch each other, or where leaves come in contact with the fruit.

Several materials will control the pest. One of these is lead arsenate. It is thought that the use of less lead arsenate and more DDT during the last several seasons has caused the build-up of the red-banded leaf roller.

In apples, it is suggested that where a heavy carry-over is known to exist, 2 lb of lead arsenate and 2 lb of lime be added to the regular pink bud spray. Also, since lead arsenate is recommended in the calyx and first and second cover sprays, this will, in turn, aid against the leaf roller.

Where the pest makes a sudden appearance on either apples or peaches and must be checked at once, this can be done by spraying with 2 lb of 50 percent Rhothane (also known as TDE) wettable powder to each 100 gal or 1 qt of the 25 percent Rhothane emulsion per 100 gal. This is more effective than lead arsenate and can be used at times when it is not desirable to use lead arsenate. Parathion at the rate of 3/4 lb of 15 percent Rhothane emulsion per 100 gal will also control the leaf roller, when Rhothane is not available.

While this pest can be very serious, it need cause no great concern for it can also be controlled fairly easily. The important thing is to watch the orchard closely for this and all other pests so that control measures can be applied before serious damage is done.

#### 1949 STRAWBERRY INSECT CONTROL WORK

W. D. Armstrong

Strawberry insect pests have caused heavy losses to the crop in Kentucky the past few years but recent tests offer great promise of effective control. The strawberry crown borer, an old pest, was more active and damaging in 1948 and 1949 than in a number of years. The strawberry weevil, often referred to as the "clipper," has caused serious crop reductions in the Bowling Green and Benton sections of southern and western Kentucky, but is not reported in damaging numbers elsewhere. It has long been a major pest in Tennessee. The tarnished plant bug causes many cat-faced, hardnosed, or "button" berries. This pest was serious in 1948 in several parts of the state but was less serious in 1949. It goes and comes and is more widely distributed than either the crown borer or the weevil. It was definitely established in 1948 that the tarnished plant bug caused a type of cat-facing that had often been mistakenly credited to frost injury or malnutrition.

In 1949 it was established also that the small millipede or "thousand legger" caused serious injury to berries in the Experiment Station plots and in many commercial fields. Injury was caused when this small pest ate into the berries, chiefly on the lower side or where they touched the ground. "Thousand leggers" were often found curled up in the cavities they had dug into the berries. In an untreated plot, 30 percent of the berries at one picking were injured by millipedes.

It was also observed in 1949 that extensive strawberry leaf injury was caused late in the summer (chiefly in old patches) in central and northern Kentucky by the adult of the strawberry root worm, a small shiny black beetle.



Control of strawberry Insect pests in general. It has been established by work done in Kentucky and elsewhere that all of the above insects can be controlled effectively by either of the following materials listed in their order of effectiveness: (1) 5 percent Chlordane - 5 percent DDT dust; (2) 5 percent Chlordane dust; (3) 20 percent Toxaphene dust. While the 5 percent Chlordane or the 5 percent Toxaphene are very effective against several of the pests, it is thought that the combination of 5 percent Chlordane and 5 percent DDT will give better all-around control than either of the other materials singly.

#### Suggested Strawberry Dust Schedule

Use commercially blended dust at rate of 20-30 lb per acre.

Dust and Timing	Materials	Pests Controlled
1. Prebloom: Early March, or when crown borers first leave hibernation	Dust containing 5% Chlordane or 20% Toxaphene or 5% Chlordane plus 5% DDT	Crown borer adults
2. Early bloom: When blooming is well underway	5% Chlordane plus 5% DDT or 5% Chlordane or 20% Toxaphene	Crown borers, weevil, tarnished plant bugs, millipedes, root worm adults, ants and root aphids.

Important: Last dust application should go on not later than 3 weeks ahead of harvest to avoid residues on fruit.

New Patches. Where needed, for crown borer protection, start dusts just after a setting in spring and make 4 treatments at 10-15 day intervals.

#### PARATHION

Parathion has proved to be a highly effective insecticide in the control of many important insects in Kentucky. The material, however, is extremely toxic to humans and for this reason it is not recommended.

Parathion is effective in controlling curculio, mites, leaf roller and scale crawlers on both peaches and apples. It is also effective against oriental fruit moth on peaches, codling moth and aphids on apples, and crown borer on strawberries. Nonetheless, it should be used only as an emergency measure in cases where safer materials have failed to give satisfactory control.

Each package offered for sale carries a detailed list of precautions to be followed; no fruit grower should use or permit the use of parathion unless he knows and enforces all precautions completely.

Suggestions for control of various pests with parathion, as well as a list of precautions and other information pertinent to parathion usage, can be obtained upon request from the College of Agriculture and Home Economics, University of Kentucky, Lexington.

### HINTS AND OBSERVATIONS

W. W. Magill

#### Think It Over

In the years when peaches and apples sold at \$3.50 and up per bushel, orchard run, we all considered doubling our orchard acreage. With 1949 prices, we considered hiring a bulldozer. Lucky is the orchardist who "thinks" before he "acts"!

#### Good Wages For Children

Most farm children like to earn a few dollars for themselves and have their own money. Parents, how about creating a home set-up so that John or Mary can have a strawberry patch of 500 plants (1/8 acre)? When crabgrass gets bad, help them for a day. Local retail sales will furnish a good market.

#### The 400 Crate Per Acre Club

Charles Cone, Marshall county strawberry grower, carried a big smile when he was presented the big purple ribbon for having the champion yield per acre for 1949, 422 crates of the Tennessee Beauty variety. He thinks his dust application as the berries began to bloom added at least 60 crates to his yield.

#### Cold Storage Berry Plants

Every grower I know of who has set cold storage strawberry plants likes them better than fresh dug plants.

#### Home Luxury

No Kentucky farm is too small or large to furnish board and room for a half dozen apple trees and an equal number of peach trees.

#### Save Hand Labor

Pasturing geese in the strawberry patch the first season after planting is a 25-year-old Kentucky commercial practice. They will eat crabgrass and most all weeds that grow in strawberries but do not bother the berry plant.