UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXTENSION SERVICE

CIRCULAR 716 COLUMBIA, MISSOURI FEBRUARY, 1960

SUGGESTED PEACH SPRAY PROGRAMS

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DORMANT SPRAYS*

Scale—Where scale infestation is not heavy and parathion is to be used as the summer insecticide, a dormant spray for scale control may be omitted.

If parathion or other organic phosphate insecticide is not to be applied during the summer a dormant spray for scale control is advisable.

*This program is also satisfactory for spraying plums. However, the curl spray as suggested for peaches may be omitted on plums; that is, the dormant application of liquid lime sulfur, or bordeaux, or ferbam or dichlone.

Use: (For scale only) One of the regular dormant spray oils preferably of the miscible (tight emulsion) type at 3% actual oil or a "superior" type dormant oil at 2% actual oil. Apply in early spring or late winter after the time for very low temperatures is past. Do *not* use DN-289 or Krenite or Elgetol 318 on peaches.

Leaf Curl—In general it is advisable to apply a dormant spray for the control of leaf curl every year. The absence or near absence of curl one year is no assurance that a heavy infestation may not occur the following year.

Under ordinary conditions there is only one infection period for curl; but with prolonged almost continuously wet weather in the spring, secondary infections may occur. Occasionally, such secondary infections can continue until a severe case of curl develops.

Use: (For curl only) (1) ferbam at 2 lbs.-100 gals., or (2) dichlone (Phygon) at 1 lb.-100 gals. or (3) liquid lime sulfur at 5 gals.-100 gals, or (4) Bordeaux 5-5-100. Apply anytime the trees are in a dormant condition.

Note: For the control of both scale and curl in one application use 5-5-100 bordeaux plus 3 gallons of miscible oil or 2 gallons of "Superior" oil or their equivalents. For the oil-bordeaux combination, first prepare the bordeaux as the tank fills, then add the oil, preferably thinned with a little water before pouring into the tank.

Ferbam also may be used with most brands of spray oil. Apply in late winter or before buds swell. ***Do not use oil with lime sulfur.***

BLOOM SPRAYS

These are important brown rot sprays to control the blossom blight form of the disease. A few affected blossoms can make difficult if not impossible the satisfactory control of brown rot of the fruit later in the season.

Where brown rot has been especially troublesome, apply a spray when one-fourth to one-third of the blossoms are open. If the blooming season is prolonged by cool weather, make another application a little after full bloom.

Where brown rot has been severe, begin spraying as soon as a few blossoms are open and continue spraying as nearly as possible every four days through the blooming period.

Use: Microfine wettable sulfur at 6 lbs.-100 gals. or microfine sulfur pastes at manufacturers' recommendation.

PEACH SCAB

The shift from lead arsenate for insect control to the synthetic organic insecticides such as parathion, EPN and methoxychlor has increased the hazard of peach scab. Lead arsenate is quite effective in suppressing the development of scab, but the newer insecticides give little or no protection. It is suggested, therefore, that at least four pounds of microfine wettable sulfur or its equivalent in sulfur paste, or captan at 2 lbs.-100 gals. be included in all sprays in order to guard against the development of scab.

INSECTICIDE PROGRAMS

Several insecticides are available for spraying peaches. Each has its advantages and disadvantages. The following are suggested:

Parathion continues to give better control of insects attacking peaches than any other insecticide so far tested. It will control all the common twig and fruit insects such as plum curculios, the cat-facing bugs, Oriental fruit moths, leaf rollers, mites, aphids and scales as well as peach tree borers. Since its period of protection is comparatively short, sprays must be applied at shorter intervals than with EPN or methoxychlor, and a few more sprays will be required during the season. It is more hazardous to the operator than EPN and considerably more so than methoxychlor.

EPN is related to parathion and will control most of the same insects. It is considered less toxic to man and will remain effective longer than parathion. However, it is not as efficient in the control of scale insects. This material is one of the best for curculio control.

Methoxychlor is effective against curculio, the cat-facing insects and the Oriental fruit moth. But where a methoxychlor program is followed, leaf roller, mite, aphid and scale infestations usually develop making it necessary to use special materials for their control. Although this is the least hazardous of the three programs to the operator, it is also the most expensive and least effective from the over-all standpoint.

The control of insects is essential to the control of brown rot. Insect punctures favor brown rot infections and make satisfactory control of brown rot almost impossible. This is especially true for fruit infested with oriental fruit moth.

Due to differences in the timing of sprays, the parathion, the EPN and the methoxychlor programs are given separately.

The Parathion Program

All quantities are for 100 gallons of diluted spray.

Petal-Fall Spray—When most of the petals have fallen.

Use: 2 lbs. of 15% wettable parathion with 6 lbs. of microfine wettable sulfur or its equivalent in paste. (But see also Dieldrin, p. 6).

First Cover Spray—About 7 to 8 days after petal fall spray.

Use: 2 lbs. of 15% wettable parathion with 6 lbs. microfine wettable sulfur or its equivalent in paste.

Second, Third and Fourth Cover Sprays—Make three more applications in addition to the petal fall and first cover sprays using 1½ lbs. of 15% parathion and 5 lbs. of sulfur at 7 to 8-day intervals.

Summer Sprays—To be timed according to the appearance of curculios. The usual time is the middle of June (more definite information on the timing of these sprays will be given in the "Weekly Report to Fruit Growers.")

For both curculio and Oriental fruit moth control the first application should be made about the middle of June and repeated at weekly intervals until four sprays have been applied.

Use: 1½ lbs. of 15% wettable parathion with either 2 lbs. of captan or 4 lbs. of microfine wettable sulfur. Captan is preferred as it is safer than sulfur from the standpoint of fruit finish under high summer temperatures. Do not use parathion within 10 days of harvest.

Preharvest Sprays—About three weeks before harvest apply 2 lbs. of captan or 4 lbs. of microfine wettable sulfur. Captan is preferred since it is safer than sulfur from the standpoint of fruit finish with high summer temperatures.

With wet weather and especially where brown rot has been a problem, it is advisable to apply another spray about 10 days before anticipated picking time using, preferably, captan at 2 lbs.-100 gals. Another application of captan on the day before or the day of harvesting is of value in checking the post harvest development of certain diseases.

The EPN Program

All quantities are for 100 gallons of diluted spray.

Petal-Fall Spray—When most of the petals have fallen.

Use: 1½ lbs. of 25% wettable EPN with 6 lbs. microfine wettable sulfur or its equivalent in paste. (But see also Dieldrin, p. 6).

First Cover Spray—About 8 to 10 days after the petal-fall spray.

(Use the shorter interval where curculios are a particularly serious problem.)

Use: 1½ lbs. EPN with 6 lbs. microfine wettable sulfur or its equivalent.

Second Cover Spray—About 10 days after the first cover. Use same spray as in first cover.

Third Cover Spray—About two weeks after second cover. Use same spray as in first cover.

Summer Sprays—To be timed according to the appearance of curculios. The usual time is the middle of June (more definite information on the timing of these sprays will be given in the "Weekly Report to Fruit Growers.")

For both curculio and Oriental fruit moth control the first application should be made about the middle of June followed by two more sprays at about 10-day intervals.

Use: 1½ lbs. of EPN with either 2 lbs. of captan or 4 lbs. of microfine wettable sulfur. The captan is preferred as it is safer than sulfur from the standpoint of fruit finish with high summer temperatures. Do *not* use EPN within 21 days of harvest.

Preharvest Sprays—About three weeks before harvest apply 2 lbs. of captan or 4 lbs. of microfine wettable sulfur. Captan is preferred.

With wet weather and especially where brown rot has been a problem, it is advisable to apply another spray about 10 days before anticipated picking time, preferably captan at 2 lbs.-100 gals. Another application of captan the day before or the day of harvesting is of value in checking post harvest development of certain diseases.

The Methoxychlor Program

All quantities are for 100 gallons of diluted spray.

Petal-Fall Spray—When most of the petals have fallen.

Use: 2 lbs. of 50% wettable methoxychlor with 6 lbs. microfine wettable sulfur or its equivalent in paste. (But see also Dieldrin, p. 6).

First Cover Spray—About 7 to 10 days after petal-fall spray. (Use the shorter interval where curculios are a particularly serious problem.)

Use: 2 lbs. of 50% wettable methoxychlor with 6 lbs. microfine wettable sulfur or its equivalent.

Second Cover Spray—About 10 days after first cover, use same spray as in first cover.

Third Cover Spray—About two weeks after second cover, use same spray as in first cover.

Summer Sprays—To be timed according to the appearance of curculios. The usual time is the middle of June (more definite information will be given in the "Weekly Report to Fruit Growers.")

For both curculio and Oriental fruit moth control the first application should be made about the middle of June followed by two more sprays at about 10-day intervals.

Use: 2 lbs. of 50% wettable methoxychlor with either 2 lbs. of captan or 4 lbs. of microfine wettable sulfur. Captan is preferred as it is safer from the standpoint of fruit finish under high summer temperatures.

Note: In this program it is usually necessary to add special materials for spidermite, leaf-roller and scale insect control. A dormant spray for scale and mite control is essential. For materials to use, see special pest discussions which follow.

Do ***not*** use methoxychlor within 14 days of harvest.

Preharvest Sprays—About three weeks before harvest apply 2 lbs. of captan or 4 lbs. of microfine wettable sulfur. Captan is preferred.

With wet weather and especially where brown rot has been a problem it is advisable to apply another spray about 10 days before anticipated picking time using, preferably, captan at 2 lbs.-100 gals. Another application of captan the day before or the day of harvesting is of value in checking the post harvest development of certain diseases.

DIELDRIN IN THE SPRAY PROGRAM

Dieldrin may be used in the petal-fall, first and second cover sprays instead of the insecticide suggested in any of the above programs. It should be used in combination with sulfur as in the regular schedule and can be used on a ten-day schedule. Where curculio is an extremely serious problem, some growers may want to substitute 1 lb. of 25% wettable dieldrin or its equivalent for either parathion, EPN or methoxychlor. A change should be made to one of the other insecticides after the second cover. Dieldrin should ***not*** be used ***after the second cover*** spray at this dosage nor at any dosage within 45 days of harvest.

MALATHION IN THE SPRAY PROGRAM

In limited tests at the Missouri Station, the use of malathion prior to the "Summer Sprays" has resulted in marked injury to peach foliage. Also it has not been as effective in the control of some insects as parathion

and EPN except in extremely high concentrations. It is useful, however, for middle to late season mite and scale control. It should ***not*** be used within 7 days of harvest on peaches.

SPECIAL INSECT TREATMENTS

Peach Tree Borer—With hand application of sprays, the parathion, EPN and methoxychlor programs usually will give control of the peach tree borer without supplementary treatment if some effort is made to spray the trunks and scaffold branches as the regular sprays are being applied. Mist blower applications are usually inadequate.

However, in years of crop failure, or if for any reason satisfactory control of peach tree borer is not obtained, three sprays annually of 4 lbs. of 50% wettable DDT should be applied to the scaffold branches, trunks and soil around the bases of the trees. Make applications the last week of June, last week of July and last week of August.

Although our tests are inconclusive, work at other stations has shown that a single massive application of dieldrin at 6 lbs. of actual (12 lbs. 50% wettable powder) per 100 gals. applied during the last week of June gives protection for the entire season. ***Do not allow this spray to get on the fruit—and, in any case, do not use within 45 days of harvest.***

Mites—If a mite (red spider) problem develops, use 2 lbs. of Kelthane wettable powder per 100 gals. No mite problem has appeared yet under the parathion and EPN programs, but is often encountered in the methoxychlor program. Do ***not*** use Kelthane within 14 days of harvest. Malathion may be used as a miticide up to 7 days before harvest, parathion up to 10 days and TEPP up to 3 days before harvest.

Red-Banded Leaf Roller—Should a leaf roller infestation develop, special sprays should be applied using 2 lbs. of 50% wettable TDE. Do ***not*** use TDE within 30 days of harvest. Parathion (2 lbs. 15W) is also effective.

Aphids—For aphids, wettable BHC (3 lbs. of 6% gamma per 100 gallons) may be used, but early in the season only—(not later than five weeks after petals fall.) Where parathion or EPN is being used, BHC will not be necessary.

Scale—For Forbes scale and Terrapin scale control, the dormant sprays are not always adequate, hence special sprays of parathion or malathion may be needed in mid-season. Further information on scale control will be given in the "Weekly Report to Fruit Growers."

SPECIAL INFORMATION ON BROWN ROT

Leaves, flowers and stems as well as the fruit are subject to attack by the brown rot fungus.

The fungus overwinters principally in the rotted fruits which become dry shriveled mummies. Much of the fruit falls to the ground after it has rotted or later in the fall or winter, but some mummies may hang through the winter and into the next summer. These are capable of producing the numerous spores which serve as "seed" to spread the disease after every rain during the spring and summer as long as the mummies remain hanging in the trees.

Fallen mummies that are partly buried give rise to a special type of fruiting structure in which are produced a different kind of spore from that produced by the mummies that hang on the trees. These spores are shot into the air and scattered by wind currents to the susceptible parts of the trees, principally the flowers.

Fallen mummies not in contact with moist soil do not reproduce. Completely buried mummies may produce fruiting structures, but they are probably not functional, or at least are of little importance in spore production. For normal spore production, a portion of the mummy must be in contact with moist soil and a part of it exposed. Clouds of spores may be produced by the fruiting structures at intervals for as long as seven days. The period of spore production coincides closely with the bloom period of the peach.

Buried mummies decay rapidly although fragments may persist for several years and when partly exposed produce fruiting structures and spores. Fruiting structures develop on fallen mummies most freely the succeeding year, but fragments under suitable conditions are known to produce spores for as long as ten years.

The infection of blossoms is the first attack of the season by the brown rot fungus. This infection comes from the mummies on the ground but also may come from mummies hanging in the trees if any are present. Affected flowers soon become a shriveled mass and in a few days millions of spores are produced. Spores continue to be produced after every rainy period throughout the summer.

The development of brown rot cankers may follow blossom blight but the mechanism by which infection occurs is not certain.

A few dozen blighted flowers or a few cankers in a tree can make almost impossible the control of fruit rot during the preharvest period if weather conditions become favorable for development of the disease.

Brown rot of the fruit is primarily a disease of maturing fruit. Soft, overripe and watery fruits such as are produced in rainy seasons are more likely to be infected than solid ones. Insect punctures greatly increase the chances of fruit infection.

Sanitation

1. Remove all mummies hanging on the trees. This should be done as soon as possible after harvest. Affected fruits of the current year's crop may be removed by a special crew ahead of picking to lessen the spread of spores by pickers. Under no circumstances should pickers of sound fruit handle infected fruit.

2. Mummies on the ground should be plowed under or otherwise disposed of before the blossoms open. Covering mummies hastens decay but remember that turning the soil the next year may expose some undecayed fragments which are capable of producing spores during the blooming period. Disturbing mummies at the pink-bud stage by cultivation or otherwise will prevent their forming fruiting structures.

Spraying

In recent studies, bloom sprays have been found to be highly effective in reducing blossom blight and, indirectly, the development of cankers. The more complete the control of blossom blight, the less infectious material there is for the later spread of the disease to the fruit.

Formerly, control of fruit rot depended largely upon protection during the ripening period, but with a re-evaluation of control methods it now appears that "eradication" at the time of bloom is more effective than protection later. A comparatively few centers of infection from brown rot blighted blossoms or twig cankers make it difficult, if not impossible, to satisfactorily control fruit rot with preharvest protective sprays in seasons favorable for the development of the disease.

The control of curculios, Oriental fruit moths and other insects is essential in the control of brown rot of the fruit. It has been found that under orchard conditions, as much as 90% of brown rot infection of fruit may take place through insect punctures.

RESIDUE TOLERANCES

The statutes of Public Law 518, 83rd Congress, commonly known as the Miller Amendment to the Federal Food, Drug and Cosmetic Act,

provide for tolerances on the amount of chemical residue that may be on fruit at harvest. Furthermore, where such tolerances are set, they are only for chemicals that have been applied prior to harvest. It is the duty of the Food and Drug Administration to see that the tolerances are not exceeded and to bring civil action where evidence of violation is strong enough to warrant it. It is the responsibility of the grower to use chemicals in such a way that excessive residues will not be on the crop at harvest time.

In an effort to help the grower discharge this responsibility, a chart of tolerances for chemicals commonly used on peaches is given with a listing of suggested intervals of time between the last application of each chemical and harvest. In any case where the suggested intervals are less than those given by the manufacturer on the label of the pesticide container, the manufacturer's label must be followed. ***Always read the "Directions for Use" on the manufacturer's label before using the material.***

A chemical marked "exempt" means that if used as usually recommended there will be no residue problem. A tolerance of "zero" means that there must be no detectable residue at all. Tolerances are expressed in parts per million (ppm).

Compound	Tolerance	Suggested Interval
BHC	5 ppm	60 days
Bordeaux	exempt	14 days
Captan	100 ppm	none
DDT	7 ppm	60 days
Dieldrin	0.1 ppm	45 days
Dormant oils	exempt	dormant only
EPN	3 ppm	21 days
Ferbam	7 ppm	14 days
Kelthane	10 ppm	14 days
Lime-sulfur	exempt	dormant only
Malathion	8 ppm	7 days
Methoxychlor	14 ppm	14 days
Parathion	1 ppm	10 days
Sulfur	exempt	- - - -
TDE	7 ppm	30 days
TEPP	zero	3 days

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Distributed in furtherance of the Acts of Congress of May 8, and June 30, 1914

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Local identifier	EC716-1960

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Content type	Text with images
Source ID	
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Scanner model	fi-7460
Scanning system software	ScandAll Pro v. 2.1.5 Premium
Optical resolution	600 dpi
Color settings	8 bit grayscale
File types	tiff
Notes	

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