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Orchard Spray Program for Oregon

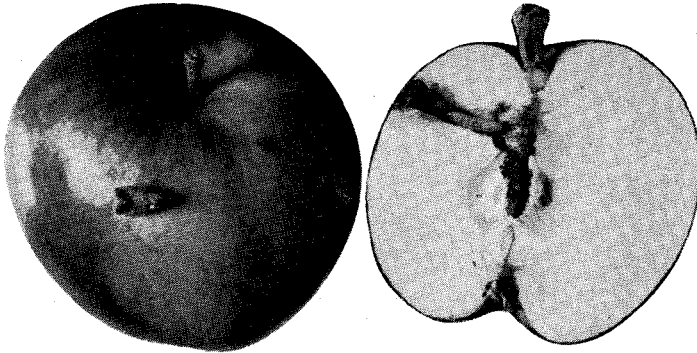
By

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Oregon Agricultural Experiment Station



The codling-moth adult on the fruit and the larva or worm in the apple.

CORVALLIS, OREGON

The bulletins of the Oregon Agricultural College are free to all the residents of Oregon who request them.



Orchard Spray Program for Oregon

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On account of the climatic differences existing between the more humid orchard sections west of the Cascade Mountains and the semi-arid or arid and irrigated regions east of these mountains, the conditions as to pests and diseases are different and require a somewhat different spray program. In general there are a greater number of diseases and pests to be sprayed for in the typical Western Oregon fruit districts than in the drier orchard sections of Eastern and Southern Oregon. Hence the full spray program for most of the state west of the Cascades is presented, followed by paragraphs outlining the program for other sections. First are presented some special notes regarding the control of particular diseases or insect pests, and finally a few paragraphs which deal with spray materials and spray practices.

SPECIAL NOTES ON PARTICULAR PESTS AND DISEASES

GENERAL PESTS

San Jose Scale manifests itself as small, ash-grey or blackish pimple-like scales clustered on the bark. The bark is usually thin and shows a purple stain, the trees becoming bark-bound and devitalized. Infested fruit shows bright red spots. The pest seldom becomes serious in well-sprayed commercial orchards. Where present, the dormant spray of lime-sulfur or oil is advisable. Where there is no other occasion for the dormant spray, application can very acceptably be delayed until the delayed dormant. In such a case the dormant strength of lime-sulfur, 12 to 100, should be used.

Red Spider-mites. Remarks in general as given above concerning prevalence of and control for San Jose scale will apply. More frequently serious on prune and cherry where no spray program is regularly applied.

Aphids or plant lice are particularly a pest of apple and cherry. On these trees the aphid spray of nicotine should usually be applied. Probably seldom required on other fruits, though in some sections the peach aphid requires attention. Ants carry aphids up to reinfest cherry trees. Band the trees with tanglefoot to prevent this.

Pear and Cherry Slug. Occurs as a greenish-brown, slimy, slug-like larva, which skeletonizes the foliage of pear and cherry. Spray with lead arsenate as advised if pest is prevalent.

Bud Moth. This is a chocolate-brown worm one-third inch long found inside a mass of webbed leaves at the tip of the twig. Attacks all fruit trees, but due to arsenate sprays for other pests on apple and pear, bud moth is rarely serious there. Cherries are often seriously attacked and other stone fruits to a varying degree. Lead arsenate in the pre-blossom spray will control. See remarks on lead arsenate on stone fruits.

APPLES AND PEARS

Codling-moth. Codling-moth control is still a vexing problem. Spray programs designed to serve such a wide area are at best only suggestive. Seasonal climatic variations and differences in altitude, humidity, and temperature, have a material influence on the activities of the codling-moth so that no definite rules of procedure for the season are possible. The trained entomologist encounters puzzling variations and must determine each spraying date for the season from a variety of evidence, accumulated from breeding-cage records, temperature data, and careful field observations.

Where available, get the advice of your county horticulturist, agricultural agent, or other specialist to assist in determining spray dates. In the absence of such an agency one may depend with a fair degree of accuracy on the spray dates sent out through the press from the Experiment Station.

Pears are less susceptible to worm injury than are apples. Where worms are particularly bad the calyx application on pears is advised. In fact, because of the serious injury from fruit-worms (see below) in most pear-growing sections the poison spray in the calyx is probably advisable. The late spray may usually be omitted on pears.

An additional cover spray two weeks after the first cover spray is probably advisable in Southern Oregon and in areas subject to high temperatures or where worm control has been unsatisfactory.

Supplement the spray control with a careful collection and destruction of wormy apples at thinning time. Also scrape the scaly bark from the trees during the winter. Before June 1, band the scraped trees with burlap strips of three thicknesses and approximately six inches in width. Visit these bands every two weeks during the summer and destroy the accumulated worms, giving a final treatment after harvest. Increasing the dosage of lead arsenate in the last cover spray to three or even four pounds to the hundred gallons is a fairly common practice and, for bad cases, it is advisable.

Apple Aphids. The degree of success secured in apple-aphis control with our standard aphid spray of lime-sulfur and nicotine in the delayed dormant, has not been in all cases satisfactory. Evidence obtained through studies by the Experiment Station indicates that in many cases the delayed dormant spray is applied too early for best results in aphid control. Where aphids are particularly bad, postpone the delayed dormant spray as late as possible, or if scab control is a minor factor, bring forward the pink spray, adding the nicotine to this solution and applying in early pink as soon as the blossom buds are separated from each other.

Leaf-rollers. Leaf-rollers are probably not sufficiently serious as to require a spray except in our more northern and eastern fruit districts. Miscible oil 8 to 100 in the late dormant is the standard control spray. Rain within four days to a week subsequent to the application may materially decrease the efficiency of this spray. Good results have been secured where the oil spray has been supplemented with a spray of lead arsenate, double strength (4 to 100), in the pink spray or even in the calyx application.

Pear Fruit-worms. Two or more species of caterpillars attack the pear fruit from the time the fruit sets until it is the size of a walnut.

Many fruits drop but others mature as scarred and mal-formed pears; typical examples of fruit-worm injury. These worms appear very early and feed promiscuously over the foliage before the fruit sets. Lead arsenate in the pink spray affords excellent control. The calyx application is not equally successful as it is too late for best results in control.

Pear and Apple Leaf Blister-Mite. Injury by the pear leaf blister-mite has become alarmingly general in spite of the application of the dormant lime-sulfur spray. Every indication is that the growers generally are not achieving the thoroughness of application so essential to successful control. It is very important to cover the terminal twigs and the four feet at the top of the tree, as well as those portions more easily reached with the spray. Lime-sulfur, 12 to 100, applied any time from early February to early March is the ideal application. Oil sprays are not equal to lime-sulfur in blister-mite control. A combination of lime-sulfur, 7 to 100, plus two gallons of miscible oil is an especially effective spray, and probably advisable for aggravated cases. The increasing abundance of blister-mite on apples in some districts is an unfortunate occurrence. The same sprays are advisable as on pears and should be applied. Ordinarily, spraying cannot be delayed as late on apples as on pears. In any case the spray must be applied before the buds begin to show color.

Apple-scab. This is the most serious disease of the apple in Oregon. Carried over as it is on the old leaves of the season before, these leaves ought to be plowed under in the early spring before the winter buds burst if possible. Winter or dormant sprays are of no advantage for this trouble. The early spring sprays are of utmost importance and a clean crop of fruit in Western Oregon is practically impossible unless the "delayed-dormant," "pink," "calyx," and "15-day" sprays are given at the proper time. With highly susceptible varieties like Newtown the "30-day" spray can rarely be omitted with safety in the moister sections of the state.

Pear-scab. Very similar to apple-scab. Early spring sprays are very important. The leaves should be turned under during the winter. Only after several seasons of careful spraying can the full measure of scab control be attained on very susceptible varieties in Western Oregon.

Powdery Mildew. This is serious on certain varieties of apples like the Jonathan, Grimes, and Rome and is suspected of causing much russetting of d'Anjou and some other varieties of pears. The disease winters over in the buds and all mildewed twigs that can be discovered should be pruned out during the dormant season. The most troublesome effects on the fruit arise from the attacks that come early in the season as the fruit buds are developing and opening. The most effective applications are, therefore, the "delayed-dormant" and the "pink." Later sprays will keep the foliage clean and when combined with systematic pruning of the white mildewed twig tips that are bound to appear, there will be a noticeable reduction in the mildew infection the following season. With peaches that are subject to mildew, self-boiled lime-sulfur is advisable at intervals beginning when the shucks fall off the small peaches.

Fire Blight. Successfully controlled only by surgical methods. Send for circular.

Anthraxnose Canker and Fruit Rot. Anthraxnose canker and fruit rot may be successfully prevented by a single thorough summer application

of bordeaux mixture 4-4-50. For the sake of economy this may be put in with the July or August worm spray. A fine misty spray should be used, and if casein spreader is added it should be dissolved first in water before going into the tank. Commercial ready-mixed bordeaux materials are inferior to the properly home-made spray. Fruit will often require wiping after a summer bordeaux spray, and the use of a spreader is apt to make this more difficult. On dark red varieties the color may be somewhat affected by the shading effect of the spray, while in seasons of early fall rains, yellow fruit may display some reddish spotting around the lenticels earlier than unsprayed fruit, but the protection against fall infections on fruit and bark is positive and effective, while spraying after harvest is a gamble.

European Canker. Destructive on certain varieties of pears and occasionally on apples. Cutting out of cankers is necessary and spraying with bordeaux before fall rains set in will materially reduce the number of new infections.

STONE FRUITS

Western Peach and Prune Root Borer. This serious pest of prune trees is not controlled by spray applications, but special treatment must be given. The paradicholobenzene treatment appears the most promising and practical treatment for older trees. This material is inadvisable for trees six years old or younger. For the younger trees the whitewash treatment is advisable, in fact observations by the Experiment Station over a period of years indicate that where the whitewashes are regularly and carefully applied young orchards may be kept practically free of the borer. Write for special article on the peach and prune root borer and its control.

Prune and Peach Twig Miner. This small, pinkish worm works havoc by tunneling into the terminal growth of both bearing and non-bearing trees. In recent years a later brood of worms has attacked the fruit also. Mature peaches and apricots have shown an alarming degree of infestation, and a heavy prune drop has sometimes resulted from the attack of the worms. The pest is almost invariably present in destructive numbers in both young and bearing orchards. Lime-sulfur, 12 to 100, or even 10 to 100, applied any time from late February until early pink will give excellent control if thoroughly applied, and is probably advisable in the majority of the orchards. Oil sprays are not equally effective.

Cherry Fruit Maggot. Occurs as a small white maggot inside the ripe fruit. If the regular lead arsenate sprays are applied for cherry slug control (see calendar) they will usually serve to check the maggot. The standard spray, however, applied in the form of a poison bait for the adult fly, is lead arsenate, one-half pound; sirup or molasses, two quarts; water, eight gallons. Three applications should be given: the first, when the adult flies appear; this will be about the time the Royal Anns show good color, or about June 8 to 20; a second application should follow ten days later, and a third one week after the second. Two applications will probably suffice if carefully timed and no rain interferes. Rains will discount the effect of previous applications and necessitate a repetition of the spray.

The spray should be applied at the rate of about one pint to the tree, applying the solution as fine droplets to the upper surface of the outer

leaves where the adult flies will feed upon it. Seedling trees and adjacent foliage should receive the treatment as well.

Leaf Spot of Cherry and Prune. This trouble is not found in all orchards. It seems to be worse where trees are crowded or the soil thin. Where it is known to be troublesome it should be sprayed for, following directions in the spray calendar.

Blossom Blight of Cherry, Prune, and Apricot. Certain varieties of pears and plums are also subject to this disease, caused by a brown rot fungus. The best control application is a spray of bordeaux, 4-4-50, given just as the first blossoms are beginning to open. Thorough work should be done. Complete control is not likely, but a repetition of this spray over a period of several years should bring gradual reduction of the disease.

Brown Rot. This disease varies so much with the weather that no fixed spray program can be advised. Plowing early and cultivating during the blossoming season will help to reduce early attacks by destroying the cup stage of the disease on the ground. Old mummies should be removed from the trees at pruning time. Rotted fruit on the ground at the close of the season should be cleaned up by hogs if possible. In the case of prunes and peaches the orchard should be watched during the growing season. Rotting fruit clusters should be picked out of the trees with pole hooks and removed. A spray given about a month before picking will reduce considerably the serious harvest attacks.

Peach Blight. This is the most serious disease of peach trees in the state. It causes the blighting of the buds during the fall and winter and results in spotting of the fruit and spots on twigs and leaves during the growing season. The most effective spray for the disease is given just after the fruit is off, using bordeaux 6-6-50. This protects the buds and twigs against fall and winter attacks. Where the disease is bad it may be necessary to spray again in the spring, beginning when the shucks drop off the fruit and using self-boiled lime-sulfur, or other safe form of sulfur spray. Unless this disease is sprayed for at the right time it will quickly ruin an orchard.

Peach Leaf Curl. This destructive disease causes thickening and distortion of the leaves, resulting in their eventual death. It can be controlled easily by applying a bordeaux spray some time during December, January, or early February. Later applications are a gamble. Lime-sulfur sometimes produces good results, but bordeaux has proved by far the most reliable material. Early fall sprays for blight do not control leaf curl, and spring sprays are without effect on the disease.

Bacterial Gummosis of Cherry and Other Stone Fruits cannot be controlled by sprays. Surgical methods are advisable. The most serious effects in cherry orchards are absent where the body and frame-work limbs are of Mazzard seedling stock, which is in general highly resistant to the disease. Send for special circular.

SPRAY

For sections of Oregon west of



Fig. 1. "Delayed-dormant" stage. Winter buds just opening.



Fig. 2. The "Pink" stage. Blossoms just opening.

APPLES AND PEARS

Time of Application	Pest or disease	Spray material and strength
1. Dormant spray. As winter buds swell just before opening.	San Jose scale, blister-mite and spider-mites Apple leaf-roller (see special discussion)	Lime-sulfur 12 to 100 or, for scale only, miscible oil 8 to 100. Miscible oil 8 to 100.
2. Delayed dormant spray. Cluster buds separating just enough to expose blossom buds.	Scab and powdery mildew Aphids on apple*	Lime-sulfur $3\frac{1}{2}$ to 100. Add nicotine sulfate $\frac{3}{4}$ pound to 100 gallons of spray.
3. Pink or pre-blossom spray. Just before blossoms open.	Scab and mildew Fruit worms on pear and bud moth	Lime-sulfur $2\frac{1}{2}$ to 100. Add lead arsenate 2 pounds to 100 gallons of spray.
4. Calyx spray. As last petals fall. Before apple calyx closes on central fruit in cluster.	Scab and mildew Codling-moth on apple Fruit worms on pear	Lime-sulfur $2\frac{1}{2}$ to 100†. Lead arsenate 2 lb. to 100 gal. Lead arsenate 2 lb. to 100 gal.

GRAM I

ades, except Rogue River Valley.



st ready to open.



Fig. 3. The "Calyx" stage. Petals off, calyx lobes open.

5. Fifteen-day spray. About fifteen days after petals fall.	Scab and mildew Pear slug	Lime-sulfur 2 to 100. Lead arsenate 2 lb. to 100 gal.
6. Thirty-day or first cover spray for worms. Three to five weeks after petals fall.	Codling-moth (see special discussion) Scab and mildew	Lead arsenate 2 lb. to 100 gal. Lime-sulfur 2 to 100.
7. July spray. July 10 to 25 depending on locality and season.	Codling-moth, second generation Anthracnose canker	Lead arsenate 2 lb. to 100 gal. (See special discussion.)
3. August spray. August 10 to Sept. 5, depending on season and locality.	Codling-moth (may usually be omitted on pear)	Same as for No. 7.

*Where aphids are very bad, especially with varieties somewhat resistant to scab, omit nicotine from Spray No. 2, adding to it Spray No. 3, which should then be applied just as soon as the blossom buds separate from each other.

†Ordinary lime-sulfur is liable to russet the skin of some varieties of pears like d'Anjou, Comice, and Howell, and may cause burning of apples when hot weather comes on. Under such circumstances substitute self-boiled lime-sulfur 8-8-50 or a reliable "wettable" sulfur or Atomic sulfur 12 pounds to 100 gallons.

PRUNES AND PLUMS

(Program I, continued)

Time of Application	Pest or disease	Material and strength to use
1. Dormant spray. As winter buds are ready to open.	San Jose scale, spider-mite, twig miner.	Lime-sulfur 12 to 100. If scale is absent dilute 8 to 100.
2. Pre-blossom spray. Buds white just before opening.	Brown rot blossom blight Bud moth Aphids	Bordeaux 4-4-50 with spreader or lime-sulfur 3 to 100. Lead arsenate 2 lbs. plus lime 2 pounds to 100 gallons. Nicotine sulfate $\frac{3}{4}$ pounds to 100 gallons.
3. First fruit spray. As soon as shucks fall.	Cylindrosporium leaf spot and brown rot Syneta beetle	Self-boiled lime-sulfur 8-8-50 with spreader or Atomic sulfur 12 lb. to 100 gal. Lead arsenate 2 lb. plus lime 2 lb. to 100 gal.
4 and 5. About June 1, and July 1.	Cylindrosporium or brown rot if troublesome	As under 3.
6. August spray. About a month before harvest.	Brown rot	As under 3.

PEACHES

Time of Application	Pest or disease	Material and strength to use
1. Leaf curl spray. From December to mid-Feb.	Peach leaf curl	Bordeaux mixture 6-6-50.
2. Late dormant spray. Just as first buds are ready to open.	Peach twig miner, San Jose scale, spider-mite. Bud moth	Lime-sulfur 12 to 100. If scale is absent dilute 8 to 100. Lead arsenate 2 lbs. plus lime 2 lb. to 100 gal.
3. First fruit spray. As soon as shucks fall.	Peach blight (fruit spot) or mildew	Self-boiled lime-sulfur 8-8-50 with spreader or Atomic sulfur 12 lb. to 100 gal. If bad repeat once or twice at 2 or 3 week intervals.
4. Late summer spray. About six weeks before harvest.	Brown rot	Same as No. 3 or use dusting sulfur.
5. Early fall spray. As soon as each variety is picked.	Peach blight and die back	Bordeaux 4-4-50.

CHERRIES

San Jose Scale. Same as No. 1 on prune program.

Aphids. Use nicotine sulfate 1 lb. to 100 gal. with pre-blossom spray (same as No. 2 for prune). Use tanglefoot bands on trees to prevent aphid reinfestation by ants.

Cherry Fruit Maggot. Use sweetened poison spray for adult flies. See special discussion under Cherry Pests.

Brown Rot Blossom Blight. Same as No. 2 on prune program.

Cylindrosporium Leaf Spot (Yellow Leaf). Same as Nos. 3, 4, 5, on prune program.



Fig. 4. Illustrating the development of the apple buds at the time for the aphid spray. There is a tendency to put on the delayed-dormant spray a little too soon. Applications earlier than this often fail to give satisfactory aphid control.

Brown Rot on Fruit. Use self-boiled lime-sulfur 8-8-50 with spreader, or Atomic sulfur 12 lb. to 100 gal. or a reliable "wettable" sulfur, one month before picking. Begin earlier if disease shows up sooner and repeat every three weeks till a month before picking.

APRICOTS

Brown Rot Blossom Blight. Same as No. 2 on prune program. Prune out all dead twigs and spurs in winter.

Fruit Spot (Peach Blight Fungus). Same as No. 3 and 5 on peach program.

San Jose Scale and other insects. Same control as for similar insects on peach.

SPRAY PROGRAM II

For all sections east of the Cascade Range and for the Rogue River Valley.

APPLES AND PEARS

Scab. Present and troublesome only in a few localities. Where sufficiently abundant to justify spraying, apply Nos. 3 and 4 in Program I for apples and pears.

Powdery Mildew. Use applications Nos. 3, 4, and 5 in Program I for apples. Continue if necessary.† Use casein spreader first dissolved in water. Supplement by winter and summer pruning out. Pink spray most important to avoid sulfur shock.

Codling-moth. Following the calyx application the first cover spray (30-day) is applied just before first worms hatch. In general this will be earlier (15 days) than for coast area. Follow with second cover spray two weeks after first cover spray; third cover spray four weeks later, and fourth cover spray four weeks after third.

For Southern Oregon an additional late cover spray may be necessary. Double strength lead arsenate in late sprays is advisable. Calyx spray on pears is likewise advisable in Southern Oregon.

For the Grande Ronde Valley follow Program I, although in higher altitudes probably two cover sprays will generally suffice.

Citrus Red Spider. Use Spray No. 1 in Program I, as for red spiders.

Blister-mite. Use Spray No. 1 in Program I. Take care to get application on apple early.

Leaf-rollers, Fruit-worms, San Jose Scale, Aphids. Follow Program I for these insects.

PEACHES

Leaf Curl, Mildew, California Blight, Twig Miner, San Jose Scale, Spider-mite. Follow Program I for these diseases and insects.

CHERRIES

Practically no fungous diseases requiring spray. Insects in general would require no regular program of sprays. For specific pests follow Program I for cherry.

APRICOTS

California Blight. Follow Program I for peach blight. Insect pests and treatment same as for peach in Program I.

PRUNES AND PLUMS

As a rule no fungous diseases requiring spray.

San Jose Scale, Twig Miner, and Spider-mite, are principal insect pests. Where present control with Spray No. 1 in Program I for prunes and plums.

†See foot note on ordinary lime-sulfur under apple and pear spray Program I on page 9.

SPRAY POINTERS

WHAT NOT TO SPRAY FOR

Know what particular pests and diseases are locally troublesome and follow carefully the proper program for these. Do not waste time and spray materials fighting troubles that do not exist in your orchard. If you do not know what pests and diseases you have to fight get your fruit inspector or somebody who does know to instruct you. It does not pay to fight unknown enemies in the dark.

SPRAYING ECONOMY

Harvest results always show that it is poor economy to use a spray outfit of inadequate capacity or power to do the work right and in a reasonably short time. It is also poor economy to save on spray. Thorough covering of every particle of surface on the tree from top to bottom is the secret of 100 percent results.

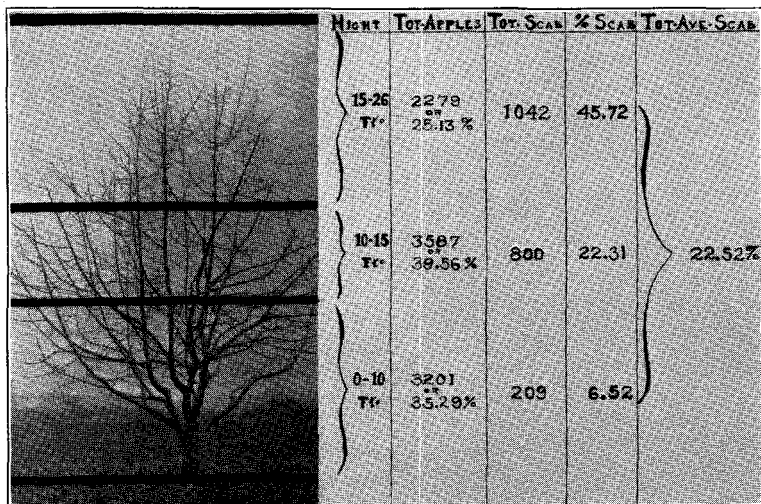


Fig. 5. Illustrating the distribution of scabby apples on an average sprayed tree. Note that the percentage of scab rapidly increases toward the top of the tree. All evidence indicates that the average grower can decrease his percentage of scabby fruit by giving more attention to spraying the top ten feet of the tree.

SPREADERS

Materials used with a fungicide or insecticide spray to increase the spreading and adhesive powers are rapidly coming to the front. Calcium caseinate is excellent for use with lead arsenate alone. Where added in powder form to sprays containing bordeaux, lime-sulfur, or other fungicides it sometimes gums things up badly. In such cases it is suggested that the spreader be completely dissolved in water before adding to the spray tank.

DUSTING

Former experimental work in the Northwest in general has not been very encouraging to the substitution of dusting for spraying, especially in those sections subject to severe attacks of fungous diseases under relatively cool and moist climatic conditions. Improved materials, machinery, and application methods recently developed and now under test may alter the outlook somewhat in the near future.

ARSENATE ON STONE FRUITS

There is a reasonable element of danger of burn in applying ordinary commercial lead arsenate to stone fruits. The neutral or triplumbic lead

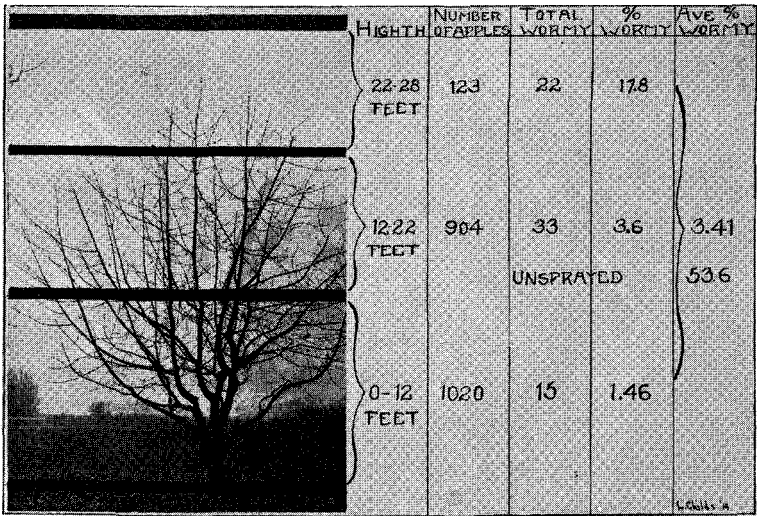


Fig. 6. Illustrating the distribution of wormy apples in an experimental block sprayed with guns on a 3½ h. p. sprayer. Good control was obtained up to a height of 22 feet. Above this point worminess rapidly increased. The average worm control was good, but poor in the tops of the trees. A gun on a low capacity outfit tends to slight the top of the tree.

is preferable, but almost impossible to obtain. Using the lead in combination with lime-sulfur increases the opportunity for injury and is possibly inadvisable on stone fruits. Serious burn on stone fruits from lead arsenate spray is extremely rare, however, and even an appreciable burn is uncommon. Probably in the majority of cases the defoliation by the pest against which arsenate might be applied would prove much more extensive and deleterious if unchecked than the defoliation or leaf burn resulting from the spray application.

"WETTABLE" SULFUR

Within recent years efforts have been made to devise ways by which ordinary sulfur dust can be made "wetable" so that it could be mixed readily with water and used as a spray. Certain types of sulfur pastes have appeared which, like "Atomic sulfur," have given very good results. Among the most promising of wettable sulfurs is a dry mixture made by thoroughly combining 8 pounds of finest ground dusting sulfur, 4 pounds of hydrated lime, and 6 or 8 ounces of powdered calcium ceseinate spreader. This gives enough material for 50 gallons of spray. This material has given remarkably satisfactory results in the 1922 season trials in the Eastern states, having proved to be a very effective fungicide under severe tests and having shown itself to be a safe material for use on any kind of fruit where lime-sulfur is unsafe on account of danger of spray injury. The material appears to be easily handled and applied and to spread and adhere exceptionally well. It can be readily mixed with water and added to the spray tank, and some have even secured good results by dusting the material into the spray tank gradually while the agitator is running. The apparent merits of the material justify trial in the Northwest, but it is inadvisable for any grower to attempt to make up this mixture unless a suitable mechanical mixer is available which will combine the raw materials into a perfectly homogeneous mixture. Furthermore, ordinary grades of sulfur flour will not give results that may be expected of specially prepared dusting sulfur and hence cannot be recommended. This type of dry-mixed wettable sulfur and lime is likely to prove an excellent substitute for the more troublesome self-boiled lime-sulfur wherever the latter is advised in the usual spray program.

SPRAY COMBINATIONS

Any of the materials referred to in this spray program may be successfully combined. In adding lead arsenate to a tank of dilute lime-sulfur it is best to put in the arsenate the last thing before starting to spray.

SULFUR SHOCK

Under certain climatic conditions if lime-sulfur is not used on apple trees in the earlier delayed-dormant or pink applications, a very severe injury with foliage and fruit drop may result when lime-sulfur is applied later on. This is known as sulfur shock and occurs without regard to strength of spray. Immunity against this danger can be secured only by application of the pre-blossom sprays as scheduled. Trees in a run-down condition due to poor care or to the effects of previous drought or poor soil conditions and culture are much more liable to severe spray injury than are healthy trees in fertile, well-cared for soils.

