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SPRAYING PRUNES AND PLUMS

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INTRODUCTION.

The object of this bulletin is to give the fruit grower, in condensed form, such information as will assist him to combat the pests and diseases in his orchard with the right materials, at the right time, and in the right way. The recommendations are based upon the most recent available results of experiments and studies carried out in Oregon or of those conducted by reliable workers elsewhere and adapted to Oregon conditions.

The purpose of spraying is not to cure a tree from the effects of a disease or pest by which it has already been attacked, but instead to kill the pest or parasite by hitting it with the proper solution at a stage when it is unprotected or to coat all the susceptible parts of the tree or fruit with a fungicide or insecticide so that the fungus or insect cannot make its attack at any spot that is not already protected with a layer of fatally poisonous material.

It is evident that spraying cannot be effective unless adapted to the life-habits of the parasite and the conditions of the tree and fruit. Yet many growers apply sprays uselessly at times when the parasite cannot be destroyed or when protection is of no value, while at the critical periods of active infection or attack, spraying is omitted. Other growers fail to do the work thoroughly enough to reach all insects or coat all susceptible parts of the tree. Still others use wrong materials.

Not all orchard troubles are amenable to sprays. There are plant diseases and insect pests which must be combated in other ways. There are also orchard troubles for which no definite control is yet known.

GENERAL HINTS.

Care of the Young Orchard. If free from disease and insect pests when planted, young orchards seldom require any regular schedule of sprays. Thorough inspections should be made, however, at frequent intervals. All kinds of fruits should be watched for the presence of San Jose scale or other scale insects, aphids, borers, bud weevils, fruit caterpillars and Armillaria root rot. In apple orchards look also for mildew, anthracnose, fire blight, and woolly aphis; in pears, for fire blight, slug, and blister mite; in peaches, for leaf curl, mildew, blight, and twig miner; in prunes and plums, for leaf spot; in cherries, for bacterial gummosis, leaf spot, slug, and shot-hole borer. When any of the troubles

are found, follow out the recommendations outlined for them in the regular spray schedule.

Pruning. Pruning should be conducted in such a way as to let light and air into the interior of the tree. This favors rapid evaporation of moisture from leaf and fruit, and thus tends materially to hinder fungus infections. While pruning, inspect the trees for San Jose scale, woolly aphid, and other pests and diseases. In fire blight districts, orchardists should be most careful to sterilize pruning instruments when passing from one tree to the next in apple and pear orchards.

SPRAY PROGRAM FOR PRUNES AND PLUMS.

Application.	Time Applied.	Pest or disease and materials to use.
1. Dormant Spray.	Just as the winter buds are opening.	For San Jose Scale, Red Spider Mites and Twig Miner: Use lime-sulfur, 1-8.
2. Pre-blossom Spray.	When the blossom buds are showing white just before opening.	For Brown Rot* Blossom Blight: Use Bordeaux, 4-4-50 or lime-sulfur, 1-30. For Bud Moth: Add lead arsenate, 4-100. For Aphids: Add nicotine, 1-1200.
3. Calyx Spray.	Just as soon as the petals fall.	For Brown Rot: Use Bordeaux, 4-4-50 or self-boiled lime-sulfur, 8-8-50, with resin-soap spreader.
4. First Fruit Spray.	As soon as the "shucks" or calyx parts are off the fruit.	For Brown Rot and Leaf Spot*: Use Bordeaux, 4-4-50 or self-boiled lime-sulfur, 8-8-50, with resin-soap spreader. For Syneta: Add neutral or triplumbic lead arsenate, 7-100.
5. June Spray.	About June first.	For Leaf Spot (Beneficial for brown rot also): Use Bordeaux, 4-4-50 or self-boiled lime-sulfur, 8-8-50 with spreader.
6. July Spray.	About July first.	For Leaf Spot (Beneficial for brown rot also): Use same materials as in preceding.
7. August Spray.	About one month before picking time.	For Brown Rot*: Use Bordeaux, 4-4-50 or self-boiled lime-sulfur, 8-8-50. Add resin-soap spreader.

*See special discussion on this particular pest or disease.

POINTERS ON SPRAY MATERIALS.

There are a great variety of commercial spray materials on the market, some of them for general use, many of them for special purposes. Most of these materials are very good when properly used; some are of questionable value when price and purpose are considered, and a few are really dangerous. As a rule the commercial preparations of the various spray materials recommended in this bulletin are standardized, are more convenient to use, and often as cheap as the home-made sprays when the labor and equipment necessary for home preparation are considered. It is important that the material, if a commercial pro-

duct, be pure and fresh. It should be in the original unopened container and should not have been allowed to dry out or to freeze.

Arsenate of Lead is prepared in the paste form and as a powder. Both are equally effective in the control of insects. The proportions recommended in this bulletin are figured on a basis of the paste form. For example, "lead arsenate 4-100" means lead arsenate paste, four pounds to 100 gallons of the dilute spray solution. In case the powdered arsenate is employed, use only one-half as much as recommended.

Two types of lead arsenate occur, known respectively as the basic lead arsenate, (neutral arsenate) or triplumbic and lead hydrogen arsenate, (acid arsenate) or diplumbic. The neutral or triplumbic arsenate of lead is a more stable compound and is safer to use on tender foliage or in combination sprays where there is a tendency to burn. It is recommended for use when combined with lime-sulfur for application on stone fruits after blossoming time. The diplumbic material has much to render it superior for most poison spray work and is considered safe in combination with lime-sulfur on apple and pear. Commercial lead arsenates are generally the acid or diplumbic unless otherwise branded.

Nicotine as recommended in this bulletin refers to the concentrated nicotine sulphate, 40 percent solution. A strength of 1-1200, which is equal to one pint in 150 gallons, is sufficiently strong for most troubles; frequently higher dilutions are possible. Soap or lime-sulfur improves the spreading and killing powers of the nicotine solution.

IMPORTANT POINTS ON PARTICULAR PESTS AND DISEASES.

NOTE: Do not waste poison by spraying for pests or diseases not present in your orchard.

Brown Rot. The most serious effects of this disease are usually in the early spring when blossom blight is produced and in the fall when the rot attacks the maturing fruit. Dormant spraying is of no effect. Spraying during the growing season should be supplemented by other control methods. The whole subject is discussed in our circular letter on Brown Rot. Send for it. In districts where the disease has ever been troublesome, the August spray should never be omitted. Every fruit must be covered with spray or the results will be only partly successful. The addition of resin-oil-soap spreader assists the spray greatly in covering the surface.

Leaf Spot or Yellow-Leaf Disease. Caused by a fungus known in its summer stage as *Cylindrosporium*. Results in dropping of leaves; this, if severe, brings about poor fruit development, retarded growth and reduced or weakened fruit buds. Experiments conducted by the Experiment Station at Salem in 1916 proved that spraying about May 1, June 1, and July 1, practically eliminated the disease. Bordeaux gave best results, but Atomic Sulfur was also effective. Self-boiled lime-sulfur, although not tried in our experiments, will doubtless prove entirely effective. Send for circular.

Leaf Roll and Internal Browning. These two troubles are exceedingly common in seasons of long-continued warm and dry weather. Neither appears to be caused by any parasitic disease or pest. Consequently, spraying can be of no direct value. Shallow rooting, dry soils, and dry weather combine to produce the worst effects. The internal

browning or breaking down of the fruit begins at the pit and may extend outward till it involves the whole flesh. This has been confused with the fungous brown rot. It is often associated with the leaf roll. Both are probably physiological disorders.

San Jose Scale. Small ash-gray or blackish, pimple-like scales clustered on the bark. Removing the scale discloses the flattened, oily, lemon-yellow insect beneath. The tree becomes bark bound, devitalized, the cambium layer thin and stained with purple; frequently the bark cracks and excessive gumming occurs. Terminal twigs die and retain their foliage in the fall.

Use Spray No. 1. Application advisable only when reasonably sure of presence of pest. Thoroughness essential; drive spray under buds. Oil emulsions just as effective as lime-sulfur, probably advisable to substitute occasionally for beneficial effect on trees. Send for circular.

Red Spider Mite. Use Spray No. 1. Application advisable only when reasonably sure that pest is present.

Twig Miner. Chocolate brown worm $\frac{1}{4}$ inch in length, found in tunnels at base of wilted tip or fruit spur. Summer applications ineffective. Use Spray No. 1. Applications generally advisable, as pest is usually present. Send for circular.

Aphids or Plant Lice. The addition of nicotine sulfate, 40 percent, to Spray No. 2 at the rate of two-thirds pint to 100 gallons of the dilute spray is the standard treatment for plant lice. Application generally advisable only where pest has been serious previous season.

Fruit Tree Leaf Syneta. Small elongate, active, creamy-white beetles. Feed on buds, unfolding leaves, blossom petals, and developing fruit, eating out unsightly holes. Standard lead arsenates may burn severely on stone fruits when in combination with lime-sulfur. Use the neutral or triplumbic arsenate of lead, 7-100 in Spray No. 4.

Bud Moth. Add lead arsenate, 4-100, to Spray No. 2. Application advisable only where pest has done injury past season. Send for circular.

Borers. Never attack perfectly healthy trees. Not controlled by sprays, but require special treatment. Send for circular.

Resin-Oil-Soap Spreader. This inexpensive material greatly increases the covering power of Bordeaux and self-boiled lime-sulfur. Send for directions for making.

Unsafe Combinations. The combinations recommended in this bulletin are safe under ordinary conditions. Regarding combinations not referred to here, consult the Oregon Agricultural College.

Ordinary Lime-Sulfur Solution, when used in warm weather, even as dilute as 1 to 45, has caused severe injury to the foliage of prunes and sometimes to fruit. Its use is not advised.

NOTICE.

More Complete Information on particular pests and diseases and also directions for making any particular spray material may be secured by writing to the Oregon Agricultural College at Corvallis. If information is desired regarding the identity of any insect or disease, send a complete description accompanied, if possible, with specimens of insect or disease and of the affected plants. Wrap the material in a container which will not be crushed in the mails. Put your name and address somewhere on the package.