

Hand Pollination Of Cherimoya Practical Method For Improving Fruit Set For Better Yields

C. A. Schroeder

The cherimoya, said to be among the world's finest fruits is well adapted to many sections of southern California.

One of the limiting factors of commercial production of the cherimoya in California has been irregular and light yields together with the formation of poorly shaped fruits.

Investigations carried on by the Division of Horticulture at Los Angeles have shown the cause of poor quality fruit and irregular production to be the result of inadequate pollination.

It is evident from experiments and many observations that the cherimoya is not extensively pollinated by insects in California. Hand pol-

lination will result in fruit set. When hand pollination is done on a large scale, the pollen of many pollen-shedding flowers is first gathered into a small glass vial and is used to pollinate other freshly opened flowers.

Pollination can be done at any time during the day, except when the air is extremely hot and dry. Hand pollination has been practiced by several growers on a commercial basis and has been found to be feasible and economical. There appear to be no varietal pollination problems such as self-sterility or cross-sterility in the varieties now growing in California.

Timing of Pollination
The cherimoya sheds its old leaves in spring just before the new leaves and flowers appear. Hand pollination is done during the months of June, July and August when the flowers are fully developed and after the new leaves have expanded and have attained good size. On many occasions flowers may appear before the leaves have developed and poor fruit sets results from these early blooms, even if hand pollination is practiced.

The Cherimoya Tree
The cherimoya is a tender semi-deciduous, subtropical plant restricted to those areas which are relatively frostfree and where strong winds and very dry atmosphere are not prevalent.

The Fruit
The delicious and interesting fruits—sometimes erroneously referred to as custard-apples, as are a half dozen other fruits—mature from November to June, depending upon the locality and the variety grown.

The fruit is short conical to spherical in shape and attains a weight of tree fourths to one and one half pounds. The surface is marked by spirally arranged tubercles or depressed segments. The skin is moderately delicate, light to yellow-green in color and sometimes has a faint peachlike down.

Enclosed within the skin is a mass of creamy white flesh of custard-like consistency, in which are embedded numerous brown-black seeds the size of coffee beans. The flavor of the fruit suggests to most people, a blend of pineapple and banana. It is primarily a dessert fruit of high quality when grown under the proper conditions.

Hand Pollination
The cherimoya flower contains both male (stamens) and female (pistils) parts, but under ordinary conditions these two parts frequently do not mature at the same time in any given flower. Therefore cross-pollination of flowers on the same tree or of flowers on different trees is necessary to induce fruit set. This pollination can be done easily by hand.

The process of hand pollination is accomplished as follows: When the rather large, inconspicuous, fleshy

flower first opens, the central pistil mass which eventually gives rise to the fruit is receptive, sticky and cream colored. The pollen of the flower is not shed at this time.

After a period of eight to twenty-four or more hours, depending on weather conditions, the petals open wider, while the pistil mass becomes brown and dry and is no longer receptive; hence here is illustrated a lack of overlapping of the maturity of the sex parts, a condition which the botanists refer to as dichogamy.

If the pollen is taken by means of a soft brush from a flower which is in the pollen-shedding stage and placed on the pistil mass of a flower which has just opened and is re-

Sulfaguanidine As Control Against Cecal Coccidiosis

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ens to develop resistance to the disease. Although the disease may be arrested promptly by a larger dose of sulfaguanidine, a second outbreak may occur a short time later.

When the amount of the drug used is too small, the quantity which finds its way into the ceca is insufficient to destroy the large numbers of coccidial forms. These parasites will continue to multiply with consequent severe damage to the cecal wall, causing hemorrhage and possibly death to the chicken.

Effectiveness of Sulfaguanidine
In a controlled laboratory experiment, groups of chickens were given large doses of coccidia and fed mashes containing sulfaguanidine.

When treatment with a regular mash containing 1 per cent sulfaguanidine was started one day before, on the same day or one day after the birds were inoculated, the sulfaguanidine mash was very effective in combatting the heavy infection.

The effectiveness of the drug was demonstrated by the decreased severity of symptoms, by the lowered mortality and by the increased weight gains.

Some protection was evident when the treatment was delayed until the second and third days after the birds were inoculated, but the drug became much less effective as the time between inoculation and treatment was increased from four to six days after inoculation.

All treated groups fared better than the non-treated inoculated birds.

The results of this experiment show the importance of starting treatment at the first sign of the disease, to protect the majority of the flock before the parasites develop beyond the time when the sulfaguanidine may be most effective.

Timing Treatment
In an outbreak of coccidiosis in the field it can be assumed that all chickens in the flock do not become infected at the same time with the same number of coccidia.

A schedule of treatment which is to be used should benefit the mildly-infected chickens already showing symptoms; it should stop the further development of the parasites in those chickens which are infected but do not yet show symptoms; and it should not be harmful to the sick birds or to the susceptible chickens which have not picked up the coccidia.

Treatment, to be of greatest benefit, must be 1) started in the initial stages of an outbreak, 2) discontinued long enough to enable the still non-infected chicks to pick up enough parasites and 3) repeated for the benefit of those not infected when the first treatment was given.

Theory and experience indicate that at least two and possibly three treatments with the medicated mash at three or four day intervals should be given.

A moderate to severe form of the disease should be treated with a mash containing 1 per cent of the drug.

Mild outbreaks of coccidiosis can be treated successfully with mashes containing ½ per cent of the drug.

At the first sign of the disease the medicated mash should be substituted for the regular feed. The initial period of medication will depend on the severity of the outbreak. Twenty-four to forty-eight hours of feeding is usually sufficient.

If the disease is unusually severe and little benefit from treatment is noted on the second day, a third day of medication should be applied. After the first medication period, the sulfaguanidine mash is removed and the birds are placed on the regular mash for four days.

In some cases a marked improvement will be noted. However, the medicated mash is set before them again for a twenty-four or forty-eight hour period, the decision being based on how well the flock responds to treatment. This second period of treatment is followed by a four day period on the regular mash.

In milder forms of the disease a third period of medication is not al-

Chemical Trench Barrier And Soil Fumigation For Control Of Armillaria Rot In Citrus

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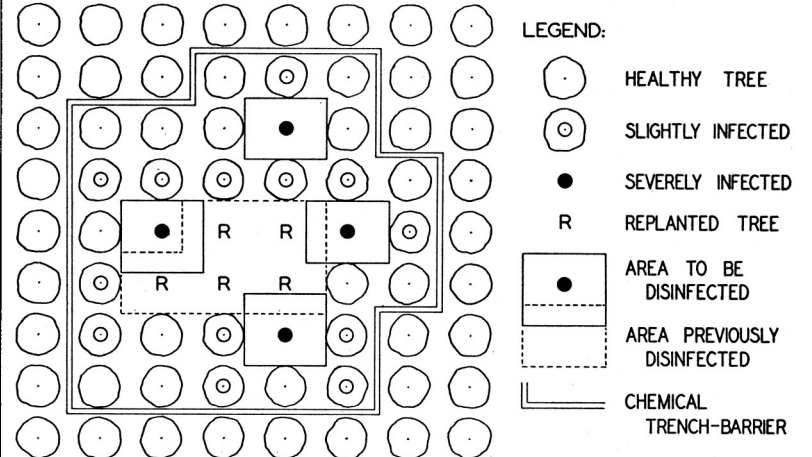
The toadstools of armillaria appear on the most severely affected trees in late fall after the first storms of the rainy season.

If the disease is suspected, examination of the root crown should be made by removing the topsoil. A tree

the disease, but even a single infected tree can form a center of infestation.

The problem of obtaining clean soil is more serious. An infestation may have developed from previous orchards or native trees.

No citrus rootstocks are known to



Map of surveyed citrus orchard, illustrating a method of controlling armillaria root rot. A chemical trench barrier encloses the infested area. Severely infected trees removed and the soil fumigated. Treated areas replanted with healthy trees.

showing distress from armillaria will usually have one or more dead roots.

Prevention
Where citrus orchards are being planted, the use of healthy nursery stock in noninfested soil is perhaps the most important and most practical way to control armillaria.

Nursery stock is usually free from ways necessary but if the disease was severe a final twenty-four hour feeding of the medicated mash should be given.

If the factors discussed above are observed, a reasonable degree of success can be expected.

Other Sulfa Drugs for Coccidiosis
Recently, several new drugs have been introduced, including sulfamerazine and sulfamethazine.

Some workers claim that these two drugs are superior to sulfaguanidine for the treatment of cecal coccidiosis. Since the toxicity of these drugs is still being studied and adequate field trials demonstrating their effectiveness are lacking, it probably would not be advisable to substitute them for sulfaguanidine at this time.

The newest sulfa drug to show promise in the control of coccidiosis is sulfapyrazine but this too, is still in the experimental stage.

Whereas sanitation limits the number of parasites that the chicken can pick up from its environment, sulfaguanidine limits the number of parasites which can multiply in the ceca.

Sulfaguanidine is not a substitute for sanitation but it can be advantageously used as an additional control measure.

Before sulfaguanidine is used, it is important to know that the disease being treated is cecal coccidiosis and that the course of treatment is appropriate for this outbreak.

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Clarification

To clarify the meaning of a sentence which appeared in the June issue of *California Agriculture*, it is reprinted in the original and in a rewritten form.

On page 4 of *California Agriculture* for June 1947, was printed the article, "Family Selection and Progeny Testing of Poultry Worthwhile for Higher Egg Production."

In the body of the article, under the subhead of "The Progeny Test" was this sentence:

"The progeny test increases by a considerable amount, the ability of the offspring to inherit the characteristics of the selected parents."

The idea which that sentence was intended to express may be stated more clearly, perhaps, as:

"The progeny test increases the accuracy with which the hereditary constitution of a breeding bird can be identified."

be immune or very desistant to the strains of armillaria root in southern California.

To keep armillaria away from the healthy trees of an infected citrus orchard usually is more important than to treat the diseased trees.

Chemical Trench Barrier
Spread from an infested area may be prevented by a chemical trench barrier designed to maintain a root-free zone about the infested area by means of charges of carbon disulfide.

The rhizomorphs of armillaria remain closely associated with the diseased roots from which they grow and the carbon disulfide will prevent roots from crossing the trench barrier. It will prevent also the development of rhizomorphs and the infection of healthy roots beyond the barrier.

Physical barriers made of concrete, galvanized iron, roofing paper and the like, are not recommended.

Treatment
Since armillaria is very sensitive to drying, a pit may be dug about the root crown and left open indefinitely. The growth of the fungus is arrested by exposure to the air, especially where it is moving inward along the roots toward the trunk.

Surgery is most effective in the early stages of the disease because then only a small part of the root system is involved, and the loss of a few roots is not serious.

Eradication in Infested Soil
The destruction of armillaria in infested soil may be accomplished by removing the diseased citrus tree and fumigating the soil with carbon disulfide. All trace of the chemical disappears from the soil within 4 to 8 weeks, and another tree can be planted.

Carbon disulfide has been used effectively against armillaria root rot in southern California for nearly 30 years. This soil fumigant is a readily volatile inflammable liquid, but it may be used safely if one takes the same precautions as with gasoline.

Questions concerning identification and control of armillaria will be answered by local Farm Advisors.

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