

hoppers. It is made as follows: $\frac{1}{2}$ lb. of common laundry-soap is dissolved in 1 gallon of hot water. While still hot 2 gallons of kerosene is added, and the mixture churned for five or ten minutes until a creamy liquid results. If properly made, this emulsion will not separate out and may be kept as a stock solution. If used on plants in leaf, dilute the emulsion with ten to twelve times the volume of cold water. If used on dormant plants, to kill insects on the bark only, five or six times the volume of cold water is used.

Some sucking-insects attach themselves to the bark of twigs or stems and secrete a protective, scale-like covering. These are the so-called "scale-insects." The San Jose is very common in orchards, as is also the oyster-shell scale or bark-louse. When the young insects swarm out from beneath the shell covering of the parent insect they are easily killed by painting the trunk and limbs with linseed-oil or spraying with soap solution or kerosene emulsion. The lime and sulphur spray is also used and is more powerful, but somewhat harder to prepare. It is being sold, however, already prepared for dilution.

Tree-borers are harder to discover, and, fortunately, are not quite so common as the other insects referred to. A careful examination of the ground at the base of the tree may reveal small quantities of borings of bark and wood, which will reveal the whereabouts of the borer. Once located, the only remedy is to dig them out with a knife and paint over the wounds. Scraping the bark makes it easier to locate the borings exuded upon the surface. In some cases the placing of tar bands around the tree prevents the wingless female insect from crawling up the tree to deposit eggs. This is true of the canker-worms.

Fungous diseases are caused by low forms of plant-life which are parasitical upon other plants which are called "hosts." These low forms, which are known as "fungi," have branching root-like parts (mycelia) that penetrate or "digest" their way into the tissues of leaf or stem, thereby weakening it, frequently causing deformity in those parts affected, and resulting in loss of function of the parts of the host-plant which suffers the attack. Familiar examples of these fungous plants are the mildew on the leaves of lilacs and roses, the rusts and blight that attack the leaves of fruit and shade trees, the smut of grain, etc. Fungi are propagated by spores, which are such minute particles that they are carried long distances by the wind. These spores germinate and grow rapidly in warm, moist weather.

The only direct method of preventing or arresting these fungous diseases is spraying with solutions which destroy the germinating spores or external parts of the fungous plants. It is, of course, impossible to reach the mycelial threads which have penetrated into the tissues of the host-plant. Copper sulphate or blue vitriol has long been known as a powerful fungicide. Unfortunately, it is also injurious to the leaves of plants unless used in very dilute solution. One part blue vitriol to 1,500 to 2,000 parts water is as strong as can be used; 4 oz. of blue vitriol would require 50 gallons of water. By combining unslaked lime with the copper-sulphate solution, however, it can be used much more effectively. This mixture is known as Bordeaux mixture and is made as follows (if 50 gallons of the