

has reached a considerable size, and often blights the prospects of Canadian growers for a large proportion of No. 1 apples. It was found that in some years spraying for the second brood was more effective than in others. Paris green alone, with water, or even Paris green with lime and water, is not recommended, as both of these mixtures were found to injure the foliage and cause the fruit to drop, by injuring the fruit stems. Mixed with Bordeaux mixture, Paris green did not cause this injury. Spraying should be commenced before the larvæ have eaten far into the apple, as, if sprayed before they have gone far in, the poison will kill them, and the fruit, though somewhat marred, will keep well. While a large percentage of the larvæ of the second brood enter the fruit at the side, experiments showed that a large percentage entered at the end: In 1902, 44.90 per cent.; in 1903, 73.07 per cent.; in 1904, 47.65 per cent.; and in 1906, 68.19 per cent. As a large proportion enters every year at the calyx, it is very important, in controlling the second brood, to spray thoroughly early in the season, as late sprayings have little effect on larvæ which enter at the calyx. Several applications of poisoned Bordeaux are necessary, as the larvæ may continue to appear for four or five weeks. Paris green, used in combination with Bordeaux mixture, at the rate of one-quarter pound to 50 gallons of water (wine measure), and arsenate of lead made from 25 ounces of lead acetate, and 10 ounces of soda arsenate to 50 gallons, are about equally efficient in late spraying for the control of the second brood of codling moth.

In addition to spraying, the results of which are uncertain for the second brood, Dr. James Fletcher, Entomologist, of the Dominion Experimental Farms, recommends banding with burlap, which has been found quite effective in controlling the codling moth.

#### POWDERY MILDEW OF THE GRAPE.

Useful information for Ontario grape-growers is contained in Bulletin 186 of the California Agricultural Experiment Station, Berkeley, Cal., by F. T. Bioletti. This bulletin gives an account of the life-history of the disease, the results of experiments to control it, and methods recommended.

The Powdery Mildew is native to America, but in the past caused much injury to grapes in Europe. It has also done considerable injury in the United States, and is more or less troublesome in Ontario vineyards. The powdery mildew attacks all parts of the vine, including the leaves, canes, flowers and fruit. The first indications of its presence are the small, whitish patches on either the upper or lower surface of the leaves in spring. The disease spreads and the small patches unite, until finally a large part of the leaf may be covered with a greyish-white mildew, when the leaf curls up and its usefulness to the plant ceases. As growth goes on, the shoots become affected, usually near the base. It may occur on the shoots in patches, or they may be covered with the mildew. When they are attacked this way early in the season they are weakened, and do not make good wood. The blossoms and the fruit are affected later. If the former are diseased, the fruit does not set, and if the latter is affected when small the grapes will drop off. When the fruit is not affected until it is nearly full-grown, it is misshapen, the diseased parts becoming hard, and sometimes the grapes crack. The powdery mildew feeds upon the outer surface of the shoots and fruit, the white mildew being the mycelium or vegetative part of the fungus, hence the disease is easy to get at. Suckers are sent down from this white mass into the outer cells of the part affected, and the nourishment for the disease is obtained at the expense of the parts attacked. As the disease or mildew spreads, spores are given off which infect other parts of the vine. In the autumn provision is made for the disease to be carried over winter. Small black bodies are formed among the white mass. These contain spores, and remain on some part of the vine or in the soil until spring, and the spores are released when the weather becomes warm; and when they reach a growing part of the vine they germinate, and the vine is reinfected. The winter spores may remain in the ground for two years without losing their germinating power. The powdery mildew affects some varieties more than others. It develops most rapidly in sheltered, shady positions, hence a good circulation of air in the vineyard is important. This disease spreads under comparatively dry conditions, when some other diseases would not be troublesome, but moisture favors its rapid development, hence vines in low places are affected when those higher up escape. Rain or fog in spring or early summer is very favorable to the development of the powdery mildew, especially if the weather be warm.

This disease can be controlled to some degree by cultural methods, such as choosing light ground, planting the vines wide enough apart so that they will get abundant sunlight and a good circulation of air, and will dry off early in the morning. To get the most favorable conditions, the rows should run north and south. Thorough

pruning and training, to prevent massing of foliage, is advantageous. Good culture is not sufficient to control this disease entirely, and an application of a fungicide is necessary where the disease is very troublesome. Of all the fungicides which have been tried, dry sulphur has given the best results. When the temperature is sufficiently high, fumes are given off the sulphur, which are the agent in controlling the disease. These fumes dry up the mycelium and summer spores, though they do not affect the winter spores. The fumes are supposed by some authorities to consist of sulphurous acid gas. Others believe the active agency to be hydrogen sulphide, while others, again, believe that the fumes are simply vapors of pure sulphur volatilized by high temperatures. Not until the temperature reaches 75 degrees F. are the fumes given off, and the higher the temperature, the more rapidly they are given off. If the highest temperature in the shade is from 75 to 80 degrees F., it will require from seven to eight days to destroy all the mycelium, while, if the temperature is higher, less time is sufficient. In order to obtain the best results, the sulphur must be applied to every part of the vine, as the nearer a spore or mycelium is to a particle of sulphur, the more quickly it will be killed. As the air is hottest near the soil, the sulphur which falls to the ground will give off the most fumes.

Sulphur is not injurious to the grapevines unless the temperature exceeds 110 degrees F., which it is not likely to do in Canada. Usually an

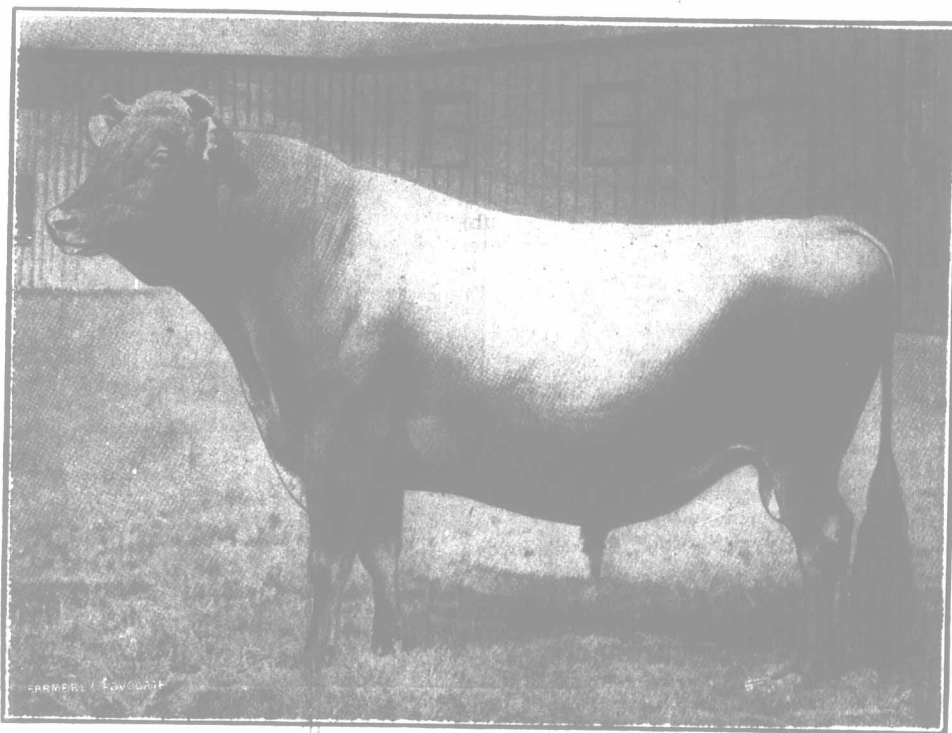
ineffective. Throwing the sulphur by hand is very laborious, and wasteful of the material. Distribution from perforated cans is also very wasteful. A sack is somewhat better, but not as good as a blower. Hand blowers are satisfactory in distributing the sulphur, but are very tiring. Knapsack bellows or dust sprayers are an improvement on the hand bellows, but are somewhat wasteful of material. One of the European make was found to be the best of these. The estimated cost of sulphuring 500 mature vines three times varied from \$1.16 with the European machine, to \$4.14 by hand. A power or traction engine, while not tested, is thought by the author not to give as satisfactory results as a hand machine, as it would be more wasteful of material, especially on small vines, and it would be more difficult to reach the interior of the vines than with a hand machine.

The Powdery Mildew is one of the easiest diseases to destroy, hence, where troublesome in Canada, it should not be neglected.

#### CO-OPERATIVE FRUIT-GROWERS' ASSOCIATIONS.

The fact that last season thirteen local co-operative fruit-growers' associations in Ontario joined the Provincial Association, while this year some twenty-one have signified their intention of so doing, indicates the growth of this movement.

This season the general fee remains the same, \$5 for each local association, which entitles them to receive the weekly crop report, prices asked, sales made, or offers by buyers to associations. In addition to this, at the recent annual meeting in Toronto, it was decided to make a further charge of 1 cent per barrel on the pack of the association, entitling the local organizations to use the central association brand, and also to have the services of a representative in Ontario and the West to help dispose of their apples. The conclusion was also reached that it would be better to have buyers from the Old Country come over to a central point and buy the apples, than to send a representative over there. The Dominion Minister of Agr. will be asked to arrange for another Dominion Fruit Conference, to be held early in the winter of 1908. The Secretary of the Association, A. B. Cutting, Toronto, was authorized to obtain the names of firms from whom the local associations can obtain supplies at wholesale rates.



Stockwell (imp.) 75264.

Jersey bull. Sold for \$11,500 at Cooper & Son's sale, Coopersburg, Pa., May 30th, 1907.

improvement in the health and vigor of the vine is noticed. There is also a favorable effect upon the setting of the fruit when the sulphur is applied when the grapes are in bloom. The fruit on vines which are free from mildew ripens from seven to ten days earlier than that affected by mildew. The sulphur may be applied when the leaves are either dry or wet, but it is not so effective when the leaves are wet, as the sulphur is not distributed so well, and it will run together in the wet places. If there is rain or heavy wind within four days of sulphuring, it should be repeated. If, however, the temperature is 90 degrees F. or over, two days will be sufficient to get good results from the sulphur. It is very necessary to sulphur the vines several times to get best results, but the most effective application is when the blossoms are opening. This application is desirable even where mildew is not very troublesome, as even where there is no mildew it has been observed that the fruit will set better if the vines are sulphured. It is thought that the sulphur either stimulates the flowers or destroys fungi which are not known, or that the blowers used in the distribution of sulphur aid in distributing the pollen.

A second sulphuring should be given when there are the first signs of the disease, and a third may be necessary just before the grapes begin to color, if the disease has not been already destroyed. In some situations, where mildew is very bad, it may be necessary to begin spraying before blossoming time.

As the thorough distribution of the sulphur is important, many methods of applying it have been tried in California to discover which is the best. Some of the methods tried were: Throwing the sulphur on the vines with the hand, distributing by perforated cans of various forms, shaking through the tissue of a cloth sack, various forms of hand bellows, and various forms of knapsack bellows. All of these methods are ef-

#### HOW THE PEACH TREES WERE INJURED.

Editor "The Farmer's Advocate":

In reply to your recent inquiry, would say I did not see the peach orchard you refer to (that of J. Spencer, Kingsville, Ont.), but have no doubt but it was injured by the severe frost that occurred early in October, 1906, which killed 90 per cent. of all the peach and Japan plum trees in the extensive fruit belt of Western Michigan, as well as about 40 per cent. of the peach trees in this district. The great loss of peach trees by root-freezing in this district, which occurred in Feb., 1899, and again in Feb., 1903, I think could have been prevented if the trees had been protected by a wood veneer at the base and a liberal mulch of straw or other litter beneath the trees, such as I have been using ever since the latter date.

Essex Co., Ont.

J. L. HILBORN.

#### FRUIT AND HONEY.

Editor "The Farmer's Advocate":

I am a specialist in the beekeeping line, and, although "The Farmer's Advocate" is not a bee journal, I like to read its fine articles on other things. Every apple tree that bloomed well in Ontario this year will be loaded down this fall with fruit, because the blossoms were full of honey; and this being so, the bees kept at the blossoms day after day, and the work done on the blossoms will result in large apple crops.

Wentworth Co., Ont.

WM. McEVOY.