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Fungous Diseases of Ontario Orchards*

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I AM called upon to discuss two very common and destructive diseases of the orchard,—peach yellows, the most dangerous and deadly disease of the peach tree; and pear blight, the contagious and destructive disease of pomaceous fruits. Neither of these diseases is preventable by spraying. I will precede this discussion with a short account of the treatment of some of the prevailing fungous diseases in this section and will tell something of sulphur as a fungicide, particularly the new self-boiled lime-sulphur mixture.

SULPHUR VS. COPPER AS A FUNGICIDE

Although both sulphur and copper have been known to possess the property of killing fungi for many years, sulphur antedates copper as a practical fungicide. It was, in fact, in use long before the year 1885 (?) when the word "fungicide" was coined. The discovery, widely published in 1885, by Millarde of Bordeaux, France, of the remarkable fungicidal properties of the copper-lime mixture, put copper far in the lead as a useful fungicide. Since that time it has been brought out that the practicability of this mixture depends not alone on the copper. It is the peculiar combination of copper and lime and its resulting properties that gives it its value. Since that time much experimenting has been done with other compounds, mainly of copper, yet to this day no compound of copper has been found approaching it in value. The peculiar properties of Bordeaux mixture are that it is harmless or nearly harmless to most plants when sprayed on them during active growth, it sticks tightly for weeks and even months on the plant after it is applied, it is nearly insoluble and yet will dissolve just enough in rain water to give this sufficient copper to kill most fungi. There is no trouble in finding poisons and chemicals that will kill the fungi; the problem is to find poisons sufficiently insoluble so as not to hurt the plant and yet continually to give off just enough of the fungicidal material to do the work when needed.

*A portion of a paper read at the Toronto convention of the Ontario Fruit Growers' Association, held last month. Pear blight and peach yellows will be dealt with in the next issue.

With sulphur that we have had available for use, either the extremely soluble compound, like the boiled lime-sulphur wash, which scorches or burns living plants, the liver of sulphur, which has to be used extremely dilute when applied to the foliage and which is readily soluble so that it washes off with rain, or else the comparatively insoluble flowers of sulphur. The latter substance is not sufficiently active as a fungicide to be used alone.

SELF-BOILED LIME-SULPHUR WASH

Recently, through the investigations of Mr. W. M. Scott, of the United States Department of Agriculture, the peculiar

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value and desirable properties of the self-boiled lime-sulphur wash have been discovered. This mixture is very simply made by adding the flour or flowers of sulphur to the lime before slaking. No heat is used except the heat produced by the slaking lime. The value of the preparation was discovered by Mr. Scott in seeking a remedy for brown rot of the peach. He found not only that this mixture was an excellent fungicide, preventing the brown rot and black spot of the peach, but when properly made with a small quantity of soluble sulphides, it could be applied to peach foliage with perfect safety. For the first time, then, we have a practicable fungicide, with fairly good sticking qualities, slowly soluble and not injurious to peach foliage. It may also be sprayed on the sensitive Japanese plums. This important discov-

ery was made in the season of 1907 and very satisfactory results were obtained. In the season of 1908 they were repeated by Mr. Scott and his assistants, and by some other investigators and great success was attained in the prevention of several of our leading diseases. This gives us practically a new fungicide which is in many ways a rival of Bordeaux mixture. It does some of the things that Bordeaux mixture will not do; on the other hand, it does not quite equal Bordeaux mixture as a fungicide, and unless a better form is discovered than we have available now, this mixture should not displace the standard Bordeaux, except where the latter is injurious.

The important point has been gained that in the treatment of peach diseases where the use of Bordeaux mixture or any other copper compound had to be abandoned we still have a most excellent and thoroughly practical fungicide. From the results obtained from recent experiments, it is quite probable that on the Ben Davis and possibly even on the Baldwin apple, where russetting by Bordeaux is a serious matter, we can still spray our fruit with a fungicide that will give satisfactory results.

Furthermore, attention should be called to the fact that this sulphur spray, while slightly inferior to Bordeaux mixture, is a most excellent insecticide, especially for certain types of insects. It is the deadly enemy of mites and scale insects. The self-boiled lime-sulphur mixture was tried as a scalecide on dormant trees and put in the background by the more active form of sulphur in the boiled lime-sulphur wash, but it looks as though we had here an excellent scalecide, thoroughly satisfactory for use when the trees are in foliage, in addition to its other merits as a fungicide. It is expected that the entomologists will work out the exact status of this spray as an insecticide. However, at the present time they do not advise its use as a dormant spray.

FACTORY-BOILED LIME-SULPHUR

Recently several of the chemical manufacturing firms have put on the market stock solutions of the boiled lime-sulphur wash. These are more perfectly pre-