

apple and sometimes on the quince. The rusts have a peculiar life history. In the rust it takes two plants to complete the disease. There are several instances of this principle in the animal kingdom. It takes two animals to produce tapeworm, hog and man, or a cat and a mouse. A mouse develops it so far and when the cat eats the mouse, the tapeworm is developed in the cat. The same is true in the case of trichina, the hog develops it so far and man completes the development.

Now we find the same thing in plant life; wheat rust can go so far on your wheat, but the life history of the plant is completed on another plant; in some cases on the barberry. The apple rust cannot be developed on the apple alone. The spores get to the red cedar and there they develop what we call cedar apples. In the spring of the year you will observe on these apples peculiar structures like this (*Ill.*) and these develop something like you see here (*Ill.*) so that before you can have rust on the apple, you must have red cedars. It is therefore wise to destroy the red cedars.

We next consider the smuts. I do not think any of the smuts trouble the fruit grower, but they do the farmer. Here are some forms, (*Ill.*)

But as they are of more interest to farmers than fruit growers I pass on to the last group of the fungi.

Mushrooms. This is a comparatively harmless family. I am inclined to think there is likely to be a field opened up for enterprise in the cultivation of mushrooms. People are not only collecting them from meadows, but are beginning to grow them for profit. This group is one of the largest among the fungi. Now if you examine the soil in which mushrooms grow you will find it is full of thread-like structures, the vegetative part of the fungus, from this arises the so-called mushroom, which is really the fruit bearing part of the fungus; These thin gills beneath are covered with spore-bearing stalks. These spores as soon as matured fall into the ground where the mushrooms grow. The ground is full of them. We have now directed your attention to several groups of the fungi, viz: slimes, microbes, moulds, mildews, rusts, smuts and mushrooms, some of which are very injurious to the fruit grower.

Remedies. We have learned something about the nature of these fungi. What shall we do to destroy them? Thousands of dollars have been lost every year from the attack of fungi, but we are now learning how this may be diminished. From a study of the habits of the fungi we have learned we must depend upon prevention rather than cure. Many are located in the cells of the plants and beyond our reach, so that we must deal with them at an earlier stage. We should always, as far as possible, destroy all affected material. Some of you may have had your plums affected with plum rot. Affected plums left hanging on the tree have on them millions of spores, to be carried over to the next season. As soon as the warm weather arrives, these spores may be wafted about and thus cause any amount of plum rot. These should be destroyed. Examine the rot that attacks apples, you will see affected apples covered with spores which cause the disease. How important that they should be destroyed when seen!

Another principle that I would advocate in the prevention of fungi, is cultivation, so far as it aids in increasing the vigor of the tree. It is a very important thing to keep the plant in a healthy condition.

The third principle is the application of fungicides or fungi killers. This principle has been most emphatically demonstrated by many experimenters with fungicides. This is a list of the most common: copper sulphate and Bordeaux mixture (the same thing except that the latter has lime mixed with it); eau celeste (sulphate of copper, washing soda, with a little ammonia); carbonate of copper and potassium sulphide. But we have cut the list down until we have about one remedy for all, *Bordeaux*, so that we have now, I believe, a fungicide which covers nearly every case. There is one that is being largely used for the mildew of the gooseberry, Potassium sulphide, but the Bordeaux is the panacea for all; and every one should know what it is. It is simple sulphate of copper, lime and water. Some differ a little regarding the proportions, but a very excellent one is: five pounds sulphate of copper, four pounds fresh lime, and forty gallons water.

I believe the proportion, four, four, forty will prove equally successful, and is easily remembered, as one pound sulphate copper, one pound of lime, ten gallons of water.