THE CONTROL OF ONION AND CABBAGE DISEASES

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(From Reporter's Transcript.)

To a group of horticulturists the mention of plant disease control at once suggests the idea of spraying with Bordeaux mixture or lime sulphur. If any of you have ever tried to spray onions or cabbages, you will understand that in the case of these crops we are up against an entirely different problem. It is simply like pouring water on a duck's back. Of course, we can make it stick by the use of fish oil soap or other combinations, but for different reasons we do not in general use sprays for the control of plant diseases in these two crops. In the onion, the most serious field diseases we have in this state is the smut. This is caused by an oil-infesting organism; that is, the germ which causes the disease gains entrance into the soil, spreads rather slowly but surely, and when once it is in the field, it is there to stay—just as long as onions are grown. The most serious diseases of cabbage are also what is known as "soil diseases." When they get into the fields, we have what is known as "sick soil." Crop rotation as a general thing will check such diseases, but in this section there are a good many fields where onions and cabbages are the most profitable crops, and the farmers quite naturally do not like the idea of a long crop rotation to hold up their fields; so we have to develop other means.

As I said, the smut is the most serious field disease of onions in this state. The organism causing this disease has a very fortunate characteristic, however, of being able to attack a plant only in the very early stages of its development. That is, if an onion is grown to four or five inches in height, say, and then planted into sick soil, it can grow into a perfectly healthy plant. This calls, of course, for a temporary protection of some kind during that early period, and this has been provided in the form of formaldehyde drip treatment. This is applied by an attachment on the seed planter, from which the solution of formalde-

hyde is dripped into the furrow right behind the seeds, just before the packing wheel covers them. In that way the formaldehyde is included with the seeds, and spreading through the soil holds the disease in check. So the seeds germinate and the plan to grow to several inches in height, before the formaldehyde has evaporated from the soil. In a few weeks, of course, it will escape, and the onion smut may develop; but by that time it is too late to injure the crop. The other diseases of the onion are pretty much of a late season or storage nature, and are controlled effectively by proper methods in storing and handling. These include some of the methods that Dr. Fracker suggested with reference to the control of insects; I specifically refer to cleaning up rubbish. That helps in all such diseases. You cannot throw rubbish from a smutted crop of onions on a new field, thinking you are going to get fertilizer from it, without getting some of the smut that goes along, and spreading it throughout the field.

On cabbage, the most serious disease we have here is what is known as the cabbage yellows. This is also a soil disease, and has occurred for many years on a large number of farms in the neighborhood south of here where cabbage has been one of the most important crops. A large number of fields had to be abandoned for cabbage growing ten or more years ago, because they were so sick that they could not produce a profitable crop. Unlike the onion smut, this disease will develop at any time in the season, especially during the warm weather. Therefore, no temporary treatment will control it. In this case we have had one of the most interesting and effective means of control that has been devised in recent years. Ten or more years ago, when the fields I spoke of were failing to produce crops because of this destructive disease, Dr. Jones, head of the department of plant pathology in this state, was called to look at them and advise treatment. As he went through them he noticed that of the plants that remained alive there were a few which showed no signs whatever of the disease, so he assumed that there must be something in those plants which caused them to be able to resist the attack, when all the others around them were dead. To test out whether that "something" could be carried over into the next generation, he selected the best of those plants and had them grown for seed. The next year the plants from that seed were grown in a sick field and they produced a comparatively healthy crop. Then with

the aid of Mr. W. J. Hansche, who knows cabbage growing from A to Z, there have been developed a number of strains of yellows-resistant cabbages. These are now producing large crops on soil that had a few years ago been given up as hopeless for cabbage culture. Tomorrow you will see some of the resistant strains which we have on a sick field; growing side by side with the ordinary commercial strains. You will see the commercial strains badly injured by yellows, and the selected ones practically untouched. A large number of the formerly abandoned fields have been replanted to cabbage now, and they are producing crops just as good as ever.

Another disease of cabbage is the blackleg. This is being attributed very largely to seed infection; that is, the organism is carried over in or on the seed. One seed will have the disease and produce a diseased seedling in the seedbed. It will then be washed over on to other seedlings which will be transplanted out into the field before they show any signs of the disease. Later it will develop and cause the plants to wilt and finally die; sometimes destroying a large per cent of the crop. Since it is carried over on the seed, the best treatment naturally is to get seed that is known to be clean. That is easier said than done. So we treat it with formaldehyde or corrosive sublimate solution, which gives very effective control.

A disease not so common in this state as it is in the East is the clubroot. This is a disease that lives over in the soil, and produces large swellings on the roots which naturally prevent the cabbage from forming a head. It is usually recommended that soil affected with clubroot be given heavy applications of lime—although this treatment is known to be of little benefit in certain special cases.

Another disease is the black rot. This requires a moist, warm summer to develop, so we have had very little of it here this year, and I could not find any specimens to bring with me. It causes a wilting and yellowing of the leaves, and a distinct blackening of the veins, spreading through the cabbage and leading to a complete rot. This is not under control so far. We are beginning to trace it, however, to the seed and later we may have some better methods of control to suggest. It is something that occurs one year, and not in another, being apparently closely dependent on weather conditions for its development and spread.

These are the principal diseases. There are some minor ones, of course, which I will not take time to go into unless some one has specific questions to ask about them. The principal ones we have under practically complete control. The others we hope to have under control before long.

TRUCK CROP INSECTS OF 1920

DR. S. B. FRACKER

I had intended to begin this little talk on truck crop insects with Dr. Marlatt's estimate about ten years ago, that insect pests caused an injury to truck crops of about $68,000,000 per year, including the costs of insecticides applied to the crops. That $68,000,000 now seems so small in comparison with the yields of small fruit, such as we have heard described this afternoon, that I hesitate to mention it.

Truck crop insects attack the plant at so many different places that the subject is very hard to outline. Some of them feed on the leaves, and when the leaves are the valuable part of the crop, the crop may be a total loss, as in the case of cabbage. Or when the leaf is not the part that we eat, as in the case of beets, the crop may be seriously reduced owing to the lack of vigor of the plant. The insects may devour the root, and if the root is the economic part of the crop, as in the case of radishes, the presence of worms or insects in the roots may be a very serious factor. They may tunnel the stems, resulting in the death of the entire top of the plant. They may burrow in the seeds and the fruit, as in the case of tomatoes, and make the fruit practically worthless. Possibly a good deal of nourishment remains, but the fruit is certainly not marketable. Or, on the other hand, they may simply reduce the vitality by sucking the plant juices. In addition to that, they may carry plant diseases, as in the case of the cucumber wilt, the sugar beet curly leaf, and the potato hopperburn.

As an introduction to the discussion of the individual insects, it might be well to outline the three great principles of pest control.

The first is that of clean cultivation, clean fence rows, and the cleaning up of the ground after the crop is harvested. This is