CABBAGE DISEASES IN INDIANA.

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The earliest available records of cabbage yellows in Indiana come from Indianapolis in 1897 when the disease appeared in the market garden of Percy Trost. It seems probable that the disease was brought in with manure obtained in the city. It is possible that the rubbish from commission houses which included leaves from infected heads may have been the source. It has been shown too that plants shipped in from other places have also been responsible for the introduction of the disease at other places in the state.

Following the introduction of the disease in 1897, it spread rather quickly to the adjacent gardens. In 1900, it was reported at three other places within a radius of one mile from Trost's farm. Since that time it has spread to practically every garden about Indianapolis and has become one of the limiting factors in cabbage production. There is no evidence that the yellows has spread throughout Indiana from Indianapolis, in fact it is probable that this is not true. However, there is no more widespread and destructive disease in the state than cabbage yellows.

The first tests of the yellows resistant varieties were made by the Horticultural Department in 1917, using the Wisconsin Brunswick and the Wisconsin Hollander. These tests were made at four widely separated places in the state and proved the resistant qualities and value of these varieties. In 1919, demonstrations of Wisconsin Hollander, Wisconsin All-Seasons and Wisconsin Succession were conducted. These varieties all proved to be resistant and valuable, so much that the use of these resistant varieties has spread throughout the state. Over 2,000 farmers and gardeners in 52 counties are using these varieties regularly.

At Indianapolis, Jacob Goepper has developed a strain of the Louisville Drumhead variety which is very resistant to the yellows. His land has been infested with the disease for 15 years but by constant, though unconscious, selection of the resistant plants, he has produced a strain of cabbage that has proved to be most acceptable to the gardeners of the state. It has been tried in 30 places in Indiana and in each case it proved its resistance to the disease and its value as a producer of marketable heads. The Indiana cabbage is a meritorious addition to the yellows resistant varieties.

Another serious disease that has caused heavy losses at times is the black leg. In one case at Indianapolis an entire field of cabbage was completely destroyed by this disease. In Goepper's fields from 25 to 40 per cent of the plants have been destroyed each year. Before distributing the seed of the Indiana cabbage to be tested, it was decided that it must be treated to kill the spores of the black leg fungus, *Phoma lingam*. Ac-

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cording to Walker[1] the corrosive sublimate treatment is not fully effective against the black rot and black leg disease. He has devised a method of hot water treatment which he claims is much more effective. We treated ten pounds of Goepper's Indiana resistant cabbage by the hot water method.

The seed was placed in a cloth bag and thoroughly soaked in water for a short time to facilitate the subsequent treatment in the hot water, though Walker states that this pre-soaking is not necessary. A large vessel of water is heated to the temperature of 125° F. and when the cold seed was placed in this hot water, the temperature quickly dropped to about 122° F. By the addition of small amounts of boiling water this temperature was easily maintained throughout the 30 minutes of treatment. Immediately after the expiration of this time, the seed was immersed in cold water and spread out in a thin layer on screens to dry. After the seed had become thoroughly dried it was resacked in new clean bags for storage.

This treatment was a complete success both as to its effects on the seed germination and as to the control of the black leg. Following Walker's suggestion, a small amount of the seed was treated in the laboratory to determine if injury would result from the treatment. Germination tests showed very little injury to the seed, the untreated seed gave from 90 to 92 per cent germination and the treated seed about 85 per cent. Goepper used this cabbage on land that was not infested with the black leg and also on land where the disease occurred in 1923. On the uninfested land there were no signs of black leg, showing that the disease had been effectively destroyed on the seed. The plants in the infested land developed about 25 per cent of the disease, demonstrating that the fungus had remained alive in the soil. In no case has there been any report of this disease from other gardeners who used this seed.

A difficulty that has been experienced by Goepper in raising his cabbage seed has been the rotting of the seed stalks during the spring and summer. At times this has been so serious that he has secured only about an ounce of seed from 200 cabbages that were set out the previous autumn. All but one or two stalks having been rotted off before the seed could be matured. An examination of these rotting stalks indicated that the organisms entered through the leaf scars or possibly through injuries to the stem or leaves. Before the seed heads were transplanted in 1923, 28 of them were placed head down so that the stem and leaves could be thoroughly sprayed with 4-4-50 Bordeaux. There were 69 heads that were not sprayed. In May 1924, it was found that in the unsprayed plants 36 were growing vigorously and were apparently healthy and 33 were dead or dying as a result of the rotting of the stalk. Among the sprayed plants 25 were sound and three were dying or missing. On July 11, another examination showed that practically all the unsprayed plants were dead, whereas the sprayed plants were still healthy and were producing a good crop of seed. Further tests of this treatment were started in 1924.

[1] J. C. Walker. The hot water treatment of cabbage seed. Phytopath, 13:251-253, 1923.