

Some Fungous and Bacterial Diseases of the Potato

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THE potato crop of the past few years has been very unsatisfactory in Canada. The mischief caused by certain fungi and bacterial diseases seems to have increased, supplementing the already extensive ravages of the Colorado potato beetle. In Ontario during the season of 1906, the losses caused by diseases of this kind were so marked, that it was impossible, in certain districts, to supply even the local markets, and potatoes had to be imported.

It may be useful to describe briefly some of the pathological aspects of these sources of injury to the potato, as the gravity of the evil sufficiently warrants every rational effort to mitigate it. We subjoin some notes on the early blight, the late blight, the potato scab, and the fungous and bacterial wet rots.

THE EARLY BLIGHT

The Potato Leaf Blight or Early Blight, *Alternaria solani*, was especially widespread and destructive. The disease attacked the leaves and green shoots of the plant, spreading rapidly and checking the growth of the tubers. The first indication of the disease was the appearance of brownish spots on the leaves about the time of blossoming, resulting in the characteristic curling and withering of these parts, in the destruction of the stem, and later, of the young tubers themselves.

It will be readily appreciated that an early destruction of the leaves must of necessity result in greatly diminishing the size of the tubers, for in the absence of leaves the highly elaborated plant food so essential to growth cannot be obtained.

Although the early blight is most frequently observed about the time of blossoming, it may also attack plants at an earlier stage, and not uncommonly has been observed on plants scarcely six inches high.

The common flea-beetle is believed to distribute this fungus extensively. It establishes excellent places for infection, by burrowing holes in the leaves, and may even carry the spores along with it from diseased plants. The remedial measures are the same as suggested for late blight.

THE LATE BLIGHT

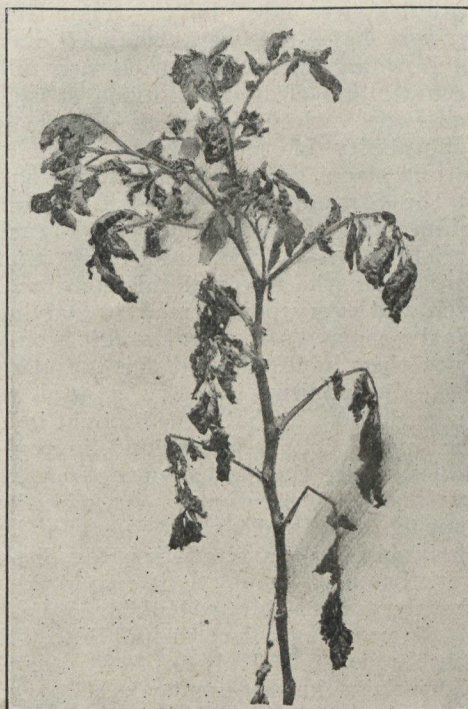
The Late Blight or Fungus Rot, *Phytophthora infestans*, has caused even greater loss than the early blight. Moist warm weather is especially favorable to its development, and under such conditions it spreads with singular rapidity. During the warmer, humid weather of July, 1906, which prevailed in many sections, the disease spread so suddenly that fields, appearing healthy and green

one day, became withered and blackened the next.

The infected areas show, in the early stages, a well-defined limiting line, but during such weather as just described, these soon extend over the whole leaf, becoming soft and emitting a very unpleasant odor.

GENERAL MORPHOLOGY

If we examine the brownish spots originating on the under side of the leaves with a hand-lens, we find them composed of many delicate white branching threads, which protude through the stomata or breathing pores, and produce (conidia) spores. These spores are



Late Blight—Final Stage

Note the scorched-like appearance. (From the New York Experiment Station, Geneva, Bulletin 241.)

somewhat egg-shaped, colorless, and are blown about by the wind and washed by the rain, until they fall on neighboring leaves or are washed through the soil to the tubers. After falling on a moist leaf or being washed by rain to a young tuber, the spore gives rise to a number of minute swimming spores (zoospores), which move actively about. These eventually settle down and emit slender germ-tubes, which may enter the leaf through a stoma or directly penetrate the epidermis. Once within the plant, the fungus develops rapidly and sends its branching root-threads (mycelium) in every direction.

AN EXPERIMENT DESCRIBED

Many experiments are to-day being carried on by plant pathologists in the endeavor to obtain accurate data as to

the life-cycle of the late blight, so that remedial measures may be taken when they are most applicable and effective. Prof. George Massee describes one of special economic interest which was conducted at Kew. In this experiment three potatoes showing the brownish stains so characteristic of the late blight, were cut in half and planted in pots. Three of the pots were placed in a hot-house at a temperature of about 70° F., where the humidity occasionally reached saturation point, and the remaining three put in a room having no artificial heat and where the air was kept as dry as possible. Equal quantities of water were supplied in each case. The results were, in brief, as follows:

DISCUSSION OF RESULTS

The plants grown under the warm, moist conditions developed rapidly, but the fungus also developed, appearing when the plants were six weeks old, and by the end of the succeeding two weeks the three plants were completely blackened and killed. On the other hand, those grown under dry conditions did not develop as rapidly as the others, but were apparently free from the fungus; when, however, they were removed to the warm, moist surroundings the dormant mycelium developed so exceptionally, that within a fortnight these also were killed.

CONCLUSIONS

From this experiment we may conclude that epidemics of potato blight are influenced largely by weather conditions, and the potato grower is advised to take as much care in selecting his seed potatoes, by obtaining them from districts free from blight, as he now commonly does in selecting his peas to insure freedom from the much dreaded pea-weevil. It should also be remembered that infection by the early and late blights is due, not only to the hibernating mycelium, but also to the spores produced on the leaves.

(To be continued in next issue.)

Black Rot of the Tomato

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This disease did much damage to tomatoes in some parts of Canada in 1906, a large percentage of the fruit being rendered useless in some plantations. When the disease begins to spread on the fruit, small, roundish spots may be seen usually towards the blossom end. These rapidly increase in size, and the tomato becomes discolored and rotten at the parts affected. The spores are given off from dark mould-like masses on the surface of the fruit, and these being scattered re-infect the