Downy Mildew Damage in Lettuce Stems and Roots

Robert B. Marlatt

Downy mildew in lettuce leaves causes irregular areas to become yellow and eventually brown. A white mold can sometimes be found growing from these infected spots, usually on the underside of the leaf. The illustrations show these symptoms.

In the Phoenix area four years ago a lettuce grower complained about a brown discoloration in the stems, or butts, of many lettuce heads that were harvested. They were brought to the university's Plant Pathology Department laboratory in Mesa for microscopic examination.

Now Appears on Stems

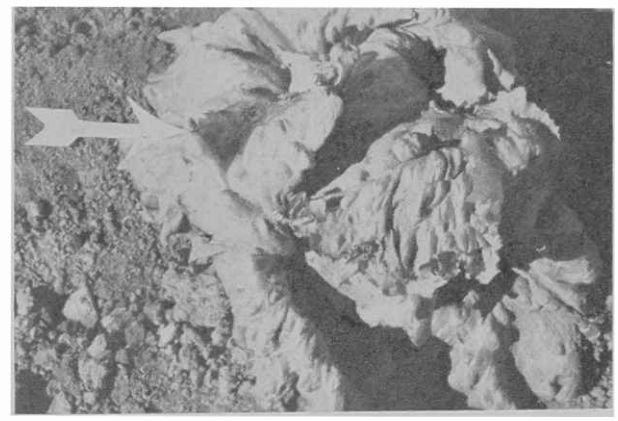
Since it was discovered in 1843, lettuce downy mildew was considered to be a disease of the leaves only. Yet, the plants brought to the Mesa laboratory appeared to have the mildew fungus growing throughout their stems. In order to see if the mildew fungus could grow from a leaf into the stem, an experiment was performed.

Lettuce was grown in the laboratory and at a very young stage it was inoculated with mildew. Every six hours, day and night, some of the infected plants were taken from the soil and were chemically treated in such a way that they became transparent. Then another treatment caused the mildew fungus inside the plants to become bright red.

Under the microscope the fungus could then be traced from the place where it first infected the leaf to wherever it was inclined to grow. It was surprising to find that the mildew fungus could not only grow into the stem of the plant but actually invaded the whole root system.

Spurt to More Research

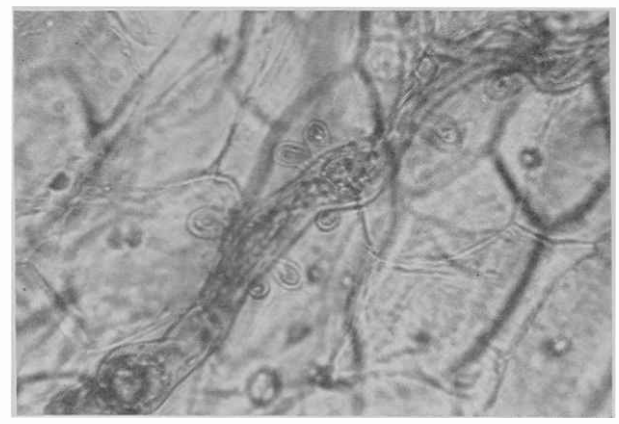
With this new knowledge about lettuce downy mildew, a whole series of experiments are now being planned in an attempt to answer the questions that have arisen. Why is downy mildew sometimes limited to the leaves and at other times able to invade the whole plant? Will this discovery help explain where the mildew fungus hides during our hot, dry summers? Perhaps these and other questions can eventually be answered. We are seeking for those answers now.



ABOVE, the arrow points to areas on lettuce leaves which are killed by downy mildew.

BELOW, arrow points to white mold on close-up view of lettuce leaf.

BELOW, microphotograph showing the downy mildew fungus winding its way through a lettuce leaf. The knobs on the fungus take food from lettuce cells.



The author is an Associate Plant Pathologist at the Mesa Branch Station.

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seed company. This seed had been produced in Yuma, where no measures could be employed to reduce incidence of common mosaic. Hence the seed of each company received probably contained a maximum amount of mosaic infection. Since the seed companies were asked to produce "low mosaic" stocks for grower use, the increase program was, necessarily, difficult and costly.

In most cases the original seed was grown in a greenhouse and all mosaic-infected individuals were removed. Clean plants were kept in the insect-free greenhouse under rigid controls for their entire life, and a small quantity of clean increase seed was produced. In some cases a second greenhouse crop was grown similar to the first. In others, small field plots were planted in strict isolation with stringent measures taken to keep the crop free of virus.

Now larger increase fields are in production in virtually mosaic-free areas of Mexico and in well isolated, well hidden (and probably well guarded), spots in California. As a result, four major seed companies will have sufficient seed to supply some growers. Two other prominent companies have a production program well under way.

A Product of Cooperation

The entire program of providing a superior variety for lettuce growers represents excellent cooperation among many individuals and groups. After the stock was developed in The University of Arizona's vegetable breeding program, the Agricultural Extension Service in Arizona, and later in California, supervised extensive field trials. In this work vegetable growers in each area were helpful.

At harvest time the cooling plants donated their services so that packed test cartons could be transported to Mesa for post-harvest evaluations by Dr. Paul M. Bessey of the Horticulture Department. When the new strain was ready for release, seed companies assisted, as described above, so growers can add to their list of favorite varieties the new and valuable Arizona Sunbright lettuce.

Grandes Diferencias

En ganado vacuno de carne casi todas las pruebas de comportamiento han sido hechas sobre aumento de peso. Existen grandes diferencias individuales entre los animales en su habilidad para aumentar de peso. Animales de la misma raza, de las mismas características, con una misma alimentación difieren en su aumento de peso. Unos podrán aumentar ¾ kilo por día mientras otros harán 1.5 kilo. Muy a menudo en estas pruebas se encuentran reses que llegan a aumentar hasta 3 veces más que las demás. Estas diferencias se deben en especial a la herencia.

—TIERRA