CFAES

PLPATH-SOY-F06-18

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Downy Mildew of Soybean

Dana Martin, Research Associate, Department of Plant Pathology, The Ohio State University.
Anne E. Dorrance, Professor, Department of Plant Pathology, The Ohio State University.

Downy mildew has been present in the U.S. since 1923 and has become one of the most common foliar diseases of soybean. The disease rarely causes severe damage to a crop, but there are some reports that it has reduced seed size and quality if present early in the season and at high levels. This disease occurs annually in Ohio, most often appearing after flowering. There are differences in the level of susceptibility among varieties.

Causal Organism

The causal organism of downy mildew is the oomycete *Peronospora manshurica*. Hyphae are aseptate, or without walls, and can be seen on the underside of the leaf as well as throughout leaf tissue. Sporangiophores, or the structures that bare sporangia, are present on the underside of the leaf. These sporangia are infective and will not produce zoospores. There have been thirty-five races of *P. manshurica* identified in the United States.

Figure 1. *Light green to yellow spots that, in some areas, have coalesced into larger lesions on the upper leaf surface (top left). Seeds can also be affected, giving a dusty appearance to the seed surface (top right). The underside of the leaf will have fuzzy gray-light purple areas where the pathogen is producing inoculum on the leaf surface (bottom).*

Symptoms and Signs

The best way to distinguish downy mildew from other foliar diseases is looking at the underside of the leaf. *P. manshurica* will produce gray to pale purple spore mats that will be fuzzy in appearance. These are the sporangia, which are saclike, infective structures of the organism. Sporangia are most commonly visible under moist weather conditions. On the upper surface, leaves will have pale green to light yellow spots that may enlarge to lesions (Figure 1).

Pod infection can also occur. Infected seeds may be smaller or lighter than healthy seeds. Seeds may be cracked or encrusted with oospores, giving the seed a dull white appearance. Symptoms on the outside of the pod usually do not occur.

Disease Cycle

This oomycete overwinters as oospores in leaves as crop debris or on seeds. Infected seeds can produced systemically infected seedlings, leading to infection in the hypocotyl and in the first leaf pairs. Once a plant is infected, sporangia will be produced on the underside of leaves under moist weather conditions. Sporangia are disseminated by wind and rain. These sporangia can germinate within 12 hours in times of high moisture. As leaves mature, they become resistant to infection and sporangia formation.

Disease Management

Overall, downy mildew of soybean is considered a minor disease and in most situations no action is needed for management. Be sure to note when high levels of disease are observed and remove that variety from future plantings.

Cultural practices: Rotating soybean crops with a non-host for 1 or more years will help reduce inoculum in the field. Tillage can also help by burying crop debris that carries infective oospores. Using pathogen-free seed will help reduce chances of downy mildew.

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES