Pythium Root Rot of Lettuce

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*Pythium* species are well known plant pathogens that affect dozens of crops and cause a diverse range of diseases such as seed decay, seedling damping-off (both before and after seedling emergence from soil), rot of feeder roots of established plants, bottom rot of leaves in contact with soil, and rot of fruit in contact with soil. *Pythium* species are soil inhabitants and exist and thrive in most agricultural soils for extended periods of time. In any particular field, many different species may be present, with some of these species being non-pathogenic to crops. *Pythium* is favored by wet soil conditions and ample soil water levels. Taxonomically, *Pythium* belongs in the Oomycete group of organisms. While they may look and behave like fungi, evolutionarily Oomycetes are more closely related to algae.

Prior to 2011, lettuce grown in coastal California counties was not known to be subject to diseases caused by *Pythium* species. In particular, damping-off diseases of young lettuce seedlings, to date, are not seen. However, in 2011 mature romaine plants in the Salinas Valley were observed to be affected by a root rot disease. Examination of plants, testing for pathogens, and subsequent investigation found this lettuce to be infected with *Pythium* root rot caused by *Pythium uncinulatum*.

Symptoms of this disease became most apparent after thinning when plants were at the rosette stage. Affected plants were smaller and stunted. As disease progressed, outer leaves became yellow and eventually wilted. By harvest time, diseased plants were noticeably smaller and most outer leaves were yellow with some brown necrotic spots. The feeder roots of the plants were rotted and brown to gray in color. The taproot could also have some brown discoloration on the surface but did not have internal, central discoloration as seen in vascular wilt diseases. Affected plants could not be harvested.

*Pythium uncinulatum*, like most *Pythium* species, produces swimming spores (zoospores) that are released and move within the water film in the soil. Water flow from irrigation, flooding, and movement of soil via tractors and equipment can spread this pathogen. In addition to zoospores, the pathogen also produces a sexual spore (oospore) that is encased within a spiny outer covering (oogonium). It is the oospore that allows the pathogen to survive in the soil in the absence of susceptible plants.

In the Salinas Valley this disease does not appear to be widespread and is currently of minimal importance; only two fields in this valley have been confirmed to have this problem. However, notify the UC Cooperative Extension lab in Salinas if you see possible cases of this disease. *Pythium uncinulatum* on lettuce has also been reported in California’s Coachella Valley, Yuma Arizona, The Netherlands, and Japan.
Photos 1A and B. Lettuce infected with *Pythium uncinulatum* can be stunted with yellowed lower leaves.
Photos 2A and B. *Pythium uncinulatum* infects the feeder roots of lettuce.
Photo 3. *Pythium uncinulatum* forms spiny structures called oospores that survive in the soil.