



PHYTOPHTHORA BLIGHT OF PEPPER

Phytophthora blight, caused by *Phytophthora capsici*, is one of the most serious threats to production of peppers in Illinois, as well as other pepper growing areas in the world. *P. capsici* was first described by Leonian in 1922 in New Mexico. The disease was subsequently reported in many pepper growing areas in the world. Phytophthora blight causes yield losses up to 100% in pepper fields in Illinois (Figure. 1). *P. capsici* has a broad host range, among which peppers, cucurbits, and eggplant are severely affected in Illinois.



Figure 1. Phytophthora blight of pepper, caused by *Phytophthora capsici*. Entire field was affected

SYMPTOMS

Phytophthora capsici infects roots, crowns, stems, leaves, and fruit, causing seedling damping-off, stem lesion, stem blight, leaf spot, and fruit rot. The first symptom on pepper in the field is commonly crown rot (Figures. 2 & 3). A lesion



Figure 2. Pepper seedlings infected by *Phytophthora capsici* in a greenhouse.

girdling the base of the stem causes rapid collapse and death of the plant. This phase of the disease usually occurs in low-lying areas of the field. Following rainstorms, black, girdling lesions form on the stem and in the exiles of pepper branches, resulting in wilting of leaves and branches. The affected plants gradually die (Figures 4 & 5). It is not uncommon for an entire field to exhibit plant blight (Figure 1). Leaf symptoms are less common. When leaves are infected, half-moon shaped, tan lesions form at the margin.

Infected fruit develop dark, water-soaked lesions, which are commonly covered with white mold (Figure 6). The water-soaked lesion may not be immediately obvious; however, the soft, infected tissues may slip off, or can be easily punched when touched during picking.

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Affected fruit wither, but remain attached to the plant.

DISEASE CYCLE

Phytophthora capsici is a soilborn pathogen that can survive in the field for several years. The pathogen survives between crops as oospores (Figure 7) or mycelium in infected tissue. An oospore is thick-walled sexual spore and is formed when mycelia of two opposite mating types (similar to male and female) grow together. Oospores are resistant to desiccation, cold temperatures, and other extreme environmental conditions, and can survive in the soil, in the absence of a host plant, for four years. Oospores germinate and produce sporangia and zoospores (asexual spores) (Figure 7). Zoospores are released in water and dispersed by irrigation or surface water. Zoospores are able to swim for several hours and infect plant tissues. Abundant sporangia are produced on infected tissues and dispersed by water or through the air. Sporangia either germinate and infect host tissues, or several zoospores form inside of each sporangium are released in water. If the environmental conditions are conducive, the disease develops rapidly.

Soil moisture conditions are important for disease development. Sporangia form when soil is at field capacity and they release zoospores when soil is saturated. The disease is usually associated with heavy rainfall, excessive-irrigation, or poorly drained soil. Frequent irrigation increases the incidence of the disease.

DISEASE MANAGEMENT

Strategies for management of Phytophthora blight of peppers include preventing the pathogen from being moved to the field, reduction of soil moisture, four years of crop rotation with non-host plant and with effective weed control, utilization of resistant cultivars, and application of fungicides. The following practices can help to manage Phytophthora blight in pepper fields.

1. Select fields with no history of Phytophthora blight, if possible.
2. Select fields that did not have pepper, cucurbit, or eggplant for at least 3 years.



Figure 3. Crown infection of pepper plants in fields, caused by *Phytophthora capsici*.



Figure 4. Bell pepper blight, caused by *Phytophthora capsici*.



Figure 5. Chili pepper blight, caused by *Phytophthora capsici*.

3. Select fields that are well isolated from infested fields with *P. capsici*.
4. Crop rotation for 4 years with non-host plants, effective weed control and avoiding contaminated irrigation water with *P. capsici*, will minimize the losses of pepper crops to Phytophthora blight.

5. Select well-drained fields. Do not plant the crop in the areas of the field which do not drain well.

6. Clean farm equipment of soil between fields.

7. Plant peppers on raised beds (a minimum of 9 inches high). In order for water to run-off during rainfall, make beds dome-shaped, and maintain dome-shaped status of beds throughout the season. In fields where low areas exist, beds should be broken and drainage areas established.

8. Plant resistant cultivars. As of 2013, the following bell pepper cultivars have been identified resistant to Illinois isolates of *P. capsici*: Alliance, Aristotle, Emerald Isle, Enza, Intruder, Paladin, Reinger, and Revolution. When growing resistant pepper cultivars, implement the cultural practices recommended to minimize development of the disease.



Figure 6. Fruit rot of bell pepper, caused by *Phytophthora capsici*.

9. Avoid excessive irrigation.

10. Do not irrigate plants from a pond that contains water drained from an infested field with *P. capsici*.

11. Do not work in wet fields.

12. Scout the field for the Phytophthora symptoms, especially after major rainfalls, and particularly in low areas. As Phytophthora symptoms become obvious, remove infected plants to reduce the amount of spores produced.

13. Do not save seed from a field where Phytophthora blight occurred.

14. Fungicides can be used to reduce Phytophthora infection in pepper fields. Fungicide application should be integrated with cultural practices. Fungicide control measures commonly involve soil drenches early in the season, and foliar applications during the season. For the up-to-date recommendation on fungicide use for control of Phytophthora blight of peppers, refer to the current edition of publication number C1373, "Midwest Vegetable Production Guide for Commercial Growers"

(www.btny.purdue.edu/pubs/id/id-56/). This publication is available from ITCS, University of Illinois, 1917 S. Wright St., Champaign, IL 61820; or call 1-800-345-6087.



Figure 7. *Phytophthora capsici*: A, colonies; B, sporangia and zoospore; C, a sporangium releasing zoospores; and D & E, oospores.