



PHYTOPHTHORA BLIGHT OF PEPPER

Phytophthora blight, caused by *Phytophthora capsici*, is a devastating disease on both bell and non-bell peppers. *P. capsici* was first described by Leonin in 1922 on chili pepper 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 (Fig. 1). *P. capsici* has a broad host range, among which cucurbits, eggplants, and tomatoes are severely affected in Illinois.

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 (Fig. 3). A lesion 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 axils of pepper branches, resulting in wilting of leaves and branches (Fig. 2). The affected plants gradually die (Fig. 4). It is not uncommon for an entire field to exhibit plant blight. 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. 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. Affected fruit wither, but remain attached to the plant.



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



Figure 2. Blight of pepper, caused by *Phytophthora capsici*, in low area of the field.

For further information contact Mohammad Babadoost, Extension Specialist in Fruit and Vegetable Pathology, Department of Crop Sciences, University of Illinois at Urbana-Champaign. (Phone: 217-333-1523; email: babadoos@uiuc.edu)

DISEASE CYCLE

Phytophthora capsici is a soilborne pathogen. The pathogen produces several types of spores which enable it to spread throughout the field, and to persist in the field between crops. *P. capsici* survives between crops as oospores or mycelium in infected tissue. An oospore is a 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 the host plant for many years. Once pepper plants are transplanted into a field, and the environmental conditions are favorable, oospores germinate and produce sporangia and zoospores (asexual spores). Rainfall, soil saturation, and temperatures between 75° to 85°F (24°-29°C) are necessary for development of Phytophthora blight. Zoospores, released in water, swim, and upon contact with host tissue, initiate infection. Following infection, a girdling lesion is formed at the base of the plant near the soil line. Sporangia are produced on the lesion surface and spread by splashing rain. Upon landing on a pepper plant, sporangia release zoospores which initiate infection. Production and spread of sporangia are repeated throughout the season. Plants eventually die and oospores formed within the lesions are released into the soil as the plant decomposes. Oospores will persist in the soil until another susceptible crop is planted.



Figure 3. Root and crown rot of pepper, caused by *Phytophthora capsici* (courtesy N.C. State Univ.)

DISEASE MANAGEMENT

No single strategy should be used to control Phytophthora blight of pepper. A combination of methods is needed to effectively control this disease. Strategies recommended for management of Phytophthora blight of pepper include preventing the pathogen from being moved to the field, reduction of soil moisture, reduction of Phytophthora spores in the soil, utilization of resistant varieties, and applying 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 peppers, cucurbits, eggplants, or tomatoes for at least 3 years. No rotation period has been established for effective management of Phytophthora blight in pepper fields in Illinois.
3. Select fields that are well isolated from infested fields with *P. capsici*.
4. Select well-drained fields. Do not plant the crop in the low areas or the areas which do not drain well.



Figure 4. Stem infection of pepper, caused by *Phytophthora capsici*.

5. Clean farm equipment of soil between fields.
6. Plant peppers on raised beds (a minimum of 9 inches high). Beds should be prepared prior to transplanting—do not transplant on flat culture and make the beds by cultivation. The beds must be made with a central crown in order for water to run-off during rainfall. Equipment must be adjusted properly to avoid making beds with depression. In fields where low areas exist, beds should be broken and drainage areas established. Maintain dome-shaped status of beds throughout the season.
7. Do not leave a depression around the base of transplant. Fill soil depression around the plants.
8. Avoid excessive irrigation.
9. Do not irrigate from a pond that contains water drained from an infested field.
10. Scout the field for the Phytophthora symptoms, especially after major rainfall, and particularly in low areas. As Phytophthora symptoms become obvious, remove infected plants to reduce the amount of spores produced.
11. Do not save seed from a field where Phytophthora blight occurred.
12. Plant resistant varieties, whenever it is possible. ‘Emerald Isle’, ‘Paladin’, and ‘Rainger’ have moderate to high resistance against *P. capsici* isolates of Illinois. Also ‘Arda’ has been reported to be resistant to *P. capsici*. When growing resistant pepper varieties, implement the cultural practices recommended above.
13. Fungicides may be used to reduce Phytophthora infection in pepper fields. Chemical control strategies should be integrated with cultural practices to manage Phytophthora blight. Chemical control measures commonly involve soil drenches early in the season, and foliar applications during the season. For the up-to-date recommendation on chemical use for control of Phytophthora blight of peppers, refer to the current edition of publication number C1373, “Midwest Vegetable Production Guide for Commercial Growers.” This publication is available from ITCS, University of Illinois P345, 1917 S. Wright St., Champaign, IL 61820 or call 1-800-345-6087.