



Fig. 1. (a) Lemon-shaped sporangium of *Phytophthora capsici* at x240 magnification (b) Amphigynous oospore of *P. capsici* at x180 magnification; (c) Root rot and wilting in chilli due to *P. capsici* infection and (d) *P. capsici* isolate W1025 stained with Calcofluor White showing characteristic torulose mycelia using an Olympus BX51 microscope with UV fluorescence. (a) and (b) isolates collected from infected chilli plants in Bhutan in 2018.

Common Name: *Phytophthora capsici*

Disease: Chilli blight or *Phytophthora* blight

Classification: K: Chromista P: Oomycota C: Oomycetes O: Peronosporales F: Peronosporaceae

Phytophthora capsici is a soilborne oomycete pathogen which infects *Capsicum* spp. and various other vegetable crops around the world. In Bhutan, chilli blight was first reported in 1995 from Lobesa and now it is found throughout the country where chilli is grown.

Biology and Ecology:

The heterothallic species reproduces asexually via sporangia production and the release of motile zoospores or sexually via mating between A1 and A2 types to form oospores. Overwintering oospores germinate forming sporangia on diseased plants. Growth temperature ranges from 10 to 35°C. Dispersal of caducous sporangia and motile zoospores occurs in water, hence rain and running water contribute to the spread of disease in the field. *P. capsici* is the most notorious disease of chilli and all developmental stages and plant parts of chilli are vulnerable to it. In seedlings, it results in damping-off disease with rotting roots and collars. In older plants, it causes root, crown and fruit rots, as well as stem and leaf blights, depending on the prevailing environmental conditions and point of infection. These symptoms are collectively called chilli blight or *Phytophthora* blight.

Impact:

Globally, the value of annual losses of crops due to *P. capsici* is more than \$100 million. The main species of chilli cultivated in Bhutan is *Capsicum annum* but *C. frutescens* and *C. chinense* are susceptible to *P. capsici*. In 2016, more than 5000 acres were used to cultivate chilli yielding 1789 kg per acre. In 2017, it was grown on a total area of 7,571 acres with the annual production of 13,606 metric tonnes.

In Bhutan, the yield loss of chilli due to this disease is estimated at 35 to 40%.

Distribution:

It has a worldwide distribution.

Host Range:

It has a wide host range including *Capsicum* sp., cucumber, squash, melons, pumpkin, tomato, eggplant, okra, snap and lima beans. In Bhutan, *P. capsici* is currently known to infect only *Capsicum* sp.

Management options:

Favourable conditions for root infection by *P. capsici* are saturated soil for extended periods and warm soil temperatures. In Bhutan, all the cultivars of chilli are currently susceptible to *P. capsici* and no resistant variety is available. So the current management practices are only cultural and chemical. Seedlings are either raised inside protected structures, or in raised beds with at least 30 cm spacing for better drainage and to reduce the chances of water accumulation. In the fields, healthy seedlings are planted on sloped lands or in raised beds with proper drainage. Whenever the incidence of chilli blight appears in the fields, plants are sprayed with either metalaxyl or copper oxychloride to the control the disease.

Further Reading: Barchenger et al. (2018) *Front Plant Sci.* 9: 628. doi: 10.3389/fpls.2018.00628; Lamour et al. (2012) *Mol. Plant Pathol.* 13 (4): 329-337; Majid et al (2016) *Zemdirbyste-Agriculture* 103 (4): 419-430; Dept of Agriculture MoAF, Thimphu (2th Sept 2017) *Agricultural statistics 2016 and 2017*; Patho, Leaflet 5 :Chilli blight by NPPC, Semtoka, Bhutan <http://www.nppc.gov.bt/wp-content/uploads/2016/09/5.-Chilli-blight.pdf>

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