



Halo blight of beans

Pseudomonas savastanoi pv. *phaseolicola*



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Early leaf spots with yellow halo.



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Water soaked lesions on pods (A) showing internal decay (B).

SUMMARY: There are two serious bacterial diseases of bean: common blight, caused by *Xanthomonas* and halo blight, caused by *Pseudomonas*. Both diseases are spread in similar ways: in seeds, rain splash and by physical contact. Bean halo blight has a distinct yellowing around the initial leaf spot, which spreads outwards, though the symptoms of common blight are similar. Bean cultivars vary widely in their resistance to the two bacterial blights, and laboratory testing may be necessary to distinguish them. The use of clean seed is critical for both bacterial blights.

KEY SIGNS

Symptoms of halo blight of beans are most clearly seen on leaves. The first symptoms are water-soaked spots, little bigger than a pin-prick, scattered on the leaf blade. The bacteria produce a toxic chemical which results in a yellow area (the 'halo') spreading outwards from the spots, which then go red and dry up. The yellow areas from adjacent spots often join up. Water-soaked areas or lesions also develop on pods, stems and leaf stalks, and sometimes produce a whitish ooze which contains bacteria.

Seedlings that develop from diseased seed are systemically infected and lesions develop around the stem. The nodes rot and plants are stunted and distorted, with an overall lime-green colour.

Common blight has similar symptoms to halo blight. If in doubt, send samples to a laboratory to confirm which pathogen is present. Other fungal diseases which attack the leaves produce different shaped spots which are not water-soaked and lack the characteristic halo associated with halo blight.

MANAGEMENT

Prevention – what to do before signs are seen

Cultural approaches: The most important measure is to use certified seed. An alternative is to sow seed saved from plants which are healthy and occur in areas free from halo blight.

Some varieties of common bean are resistant to halo blight and they should always be used in areas of high rainfall, where the risk of halo blight is greatest. Choosing the right variety to plant can be difficult because there are always trade-offs: in Kenya GLPX92 (*Mwitmania*) is resistant to halo blight but susceptible to bean common mosaic virus; GLP 1004 (*Mwezi moja*) is susceptible to halo blight but less so to other major problems. Check with seed suppliers on the characteristics of available varieties in order to recommend the most suitable ones for farmers.

Other steps to take include deep-ploughing or removal of the remains of bean plants after harvest. This may be impractical for smallholders because of labour and cost constraints.

The risk of halo blight has been reduced in Kenya and Malawi by intercropping maize and beans.

Chemical approaches: There are no preventive chemical options.

Control – what to do after signs are seen

Cultural approaches: Hand removal of infected plants, particularly at the early stage of disease development, will limit spread of the disease.

Chemical approaches: Chemical treatment with copper-containing pesticides, applied at the first signs of the disease, can reduce the rate of spread of halo blight. This is, however, costly for smallholders to apply and gives only marginal gains. It is not effective against common blight.

CAUSE

Halo blight is a bacterial disease of *Phaseolus vulgaris*, the common bean, caused by the bacterium *Pseudomonas savastanoi* pv. *phaseolicola*. Previous names include *Pseudomonas syringae* pv. *Phaseolicola* and *P. phaseolicola*, but these are no longer accepted.

Halo blight affects the leaves and pods and can severely reduce yields. The main means of transmission is in seeds. Some infected seeds are wrinkled and discoloured but the majority show no symptoms.

The bacterium is also found on other hosts but there is little evidence that these are a common source of new infections on common bean. Although the pathovar (pv.) name suggests that this only attacks the common bean, other hosts are affected: in Tanzania, for example, these include *Phaseolus coccineus* (runner bean), soybean and certain weeds.

The disease spreads rapidly during rainfall when cooler temperatures, water splash and wind help transfer the bacteria to other plants. Bacteria may also be transferred as people walk through fields.

Several races or types of the bacterium have been characterised. Some occur only in certain countries or are associated with different alternative hosts; others are more aggressive. Scientists are studying these different races to develop resistant bean varieties which are acceptable to farmers.

IMPACT

The risk of infection and disease losses are greatest in cool, humid regions. Halo blight can spread rapidly in a crop and cause big losses. Examples include up to 43% yield losses in the UK and the US, where mechanisation and large-scale production of common beans may favour rapid disease spread, for example in irrigated fields. However, major losses due to halo blight have also been observed in Lesotho, Rwanda and Zimbabwe.

DISTRIBUTION

In eastern and central Africa, the disease occurs in Burundi, DR Congo, Ethiopia, Kenya, Rwanda, Tanzania and Uganda. In southern Africa, halo blight is found in Malawi, Mozambique, South Africa, Zambia and Zimbabwe. The disease has not been recorded from West Africa and is unlikely to occur there because growing conditions are less favourable to bean halo blight.

FURTHER READING

Crop Protection Compendium (www.cabi.org/cpc)

Plantwise Knowledge Bank (www.plantwise.org)

There are two useful fact sheets which compare different bacterial diseases on bean, including halo blight and common blight. Note that the recommendations and other advice relate to growing beans on a commercial scale in the western United States. The first fact sheet is:

Bacterial diseases of Beans. Fact sheet 2913. Colorado State University (www.ext.colostate.edu/pubs/crops/02913.pdf)

Common Bacterial Blight and Halo Blight. Two Bacterial Diseases of Phytosanitary Significance for Bean Crops in Washington State. Washington State University extension fact sheet • FS038E. (http://mtvernon.wsu.edu/path_team/FS038E-CommonBacterialBlightAndHaloBlight.pdf)

Another useful article from the US looks at common blight, halo blight and other bacterial diseases of beans in the most important area for bean production. Waveson RM, Schwart HF (2007). Bacterial diseases of dry edible beans in the Central High Plains. (www.plantmanagementnetwork.org/pub/php/diagnosticguide/2007/beans/)