



Late blight of Irish potato

Phytophthora infestans



Illustration: Margaret Senior, NSW Department of Primary Industries, <http://bit.ly/11MAEdo>

Composite of early lesions on leaves and further development of larger, dark brown patches as foliage withers. Note darkening of stem and rotting of tuber.



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The disease develops rapidly once spores infect leaves and late blight takes hold, eventually killing the whole plant.

SUMMARY: Late blight of potato, caused by a fungus-like organism, is a constant threat wherever potatoes are grown. Whole fields can be wiped out in a short time. Selection of clean, healthy and preferably certified tubers is essential, as is removing left-over tubers from previous potato crops. It is difficult to avoid the use of fungicides given the risk of losing whole crops. Most fungicides are used as protectants: some act systemically and others on contact with foliage, with the common aim of preventing disease establishment. Resistant varieties are an important part of an integrated disease management strategy but the risk of disease outbreaks is too high to rely only on this approach.

KEY SIGNS

Symptoms are usually first seen on leaves before spreading to all other parts, including the tubers, and killing the plant. If infected tubers are planted then symptoms appear low down on the main stems.

Diagnosis of early symptoms can be tricky. The leaf symptoms vary according to growing conditions and potato variety. They begin usually as irregularly shaped small leaf spots, pale to dark green, which spread rapidly, unrestricted by the leaf veins. Look out for characteristic browning of veins on the lower leaf surface on young lesions. Leaves dry up and go brown. Pale green to yellow halos develop around the dying (necrotic) areas but note the rapidity with which plants are killed. Black or brown lesions occur on stems and leaf stalks. Infected tubers go brown outside and rot inside. Other fungi and bacteria spread the rot in stored tubers.

Under humid conditions a white, furry growth may occur at the edge of dying leaf areas, indicating spore production. Potato powdery mildew also produces a similar growth but without the rapid death of leaves and decline of the plant. Other leaf diseases produce similar symptoms though generally lack the rapid progress and blackening of the whole plant. If unsure about the presence of late blight, put leaves in a plastic bag overnight and look for fluffy growth (sporulation) the next day.

If a small patch of blight appears, remove and destroy plants by burying in the ground where they are planted. Remove soil and wash tools used before drying off. Great care should be taken to avoid moving spores to new areas.

MANAGEMENT

Prevention – what to do before signs are seen

Cultural approaches: Late blight resistant varieties are available such as Asante and Tigoni in Kenya, Meru, Tengeru 97 and Shengena in Tanzania and Cruza in Rwanda. Check on new resistant varieties and which ones are available in the local area. New cultivars regularly appear.

Always use certified seed potato. Before planting, examine tubers for brown patches, though these are difficult to see in

darker varieties of potato. If uncertain about the health of seed potatoes, test a small batch by letting them sprout for 10 to 15 days at 15 to 20°C. Diseased tubers will rot.

Mound the potatoes in fields and keep the tubers covered to limit infection by spores washed down from leaves. In some countries, farmers grow potatoes during periods of low rainfall to avoid late blight, but yields are much lower.

Phytosanitation and the use of healthy and resistant material is important but late blight can still develop and cause major damage. Stay alert for cool, moist conditions favourable to disease development and any announcements on radio or through extension officers about the risk of late blight.

Chemical approaches: Late blight is a devastating disease, one which takes advantage of any opportunity to infect and invade plants quickly and spread to new areas. The choice and use of fungicides is complex and controversial because the pathogen and fungicide options are constantly changing.

Some active ingredients used against late blight are systemic though the majority work on contact with plant surfaces, preventing air-borne spores that land on leaves from growing. Some are translaminar – these penetrate the leaf but not the leaf stalk and stems. A popular recommendation is to use commercial products which contain two active ingredients with different properties, usually either systemic + contact, or contact + translaminar.

Cymoxanil and dimethomorph are systemic and have curative properties. They are often combined with mancozeb, a commonly used contact fungicide. But the curative effect only works one or two days after infection. The spraying schedule for fungicides must be rigorously observed since any gaps allow the late blight pathogen to enter the crop. Metalaxyl, a systemic fungicide is still widely used but should be avoided because of pathogen resistance. Fungicides with cymoxanil, which kills spores ('stop effect'), should be applied at 5-7 day intervals. Other fungicides are more commonly sprayed at 7-10 intervals.

The maximum number of applications varies from four (cymoxanil by itself) to ten (zoxamide and mancozeb) according to recommendations in the UK. Alternate fungicides containing active ingredients from different chemical groups to avoid inducing resistance. Further information on fungicides is available from various sources listed below.

Control – what to do after signs are seen

Cultural approaches: Remove infected tubers and piles of potatoes rejected after harvest to minimise carryover of the pathogen to the next crop.

CAUSE

Late blight is caused by *Phytophthora infestans*, an oomycete. It is not a true fungus, even if it is still referred to as one; a better term is fungus-like or water mould.

Late blight also attacks tomato and other members of the Solanaceae (potato family), but the strains of *P. infestans* are different and do not cross-infect. There are many *Phytophthora* species which attack many different types of plants, including trees. Many species cause huge damage.

The disease is spread by wind-borne spores and by water splash. Spores are washed into the soil where they can infect tubers. Potato plants are most at risk from late blight under cool and moist conditions.

IMPACT

Late blight of potato is a devastating disease and a major threat to potato production. Once it takes hold it is difficult to control. Whole fields are affected, with total loss of production. The threat and risk from the disease is highest in damp and cool conditions, most often found at higher altitudes in tropical countries.

DISTRIBUTION

Present in all potato growing countries in sub-Saharan Africa.

FURTHER READING

Plantwise (www.plantwise.org)

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

Infonet-Biovision has details of Irish potato varieties available in Kenya (www.infonet-biovision.org).

CIP (www.cip.org) and the Roots, Tubers and Bananas research programme (www.rtb.cgjar.org).

There are many sources of extension literature on potato blight, particularly from North America and Europe. Be cautious in applying knowledge to Africa since growing conditions, cultivars etc will vary. See: University of Massachusetts (<http://extension.umass.edu/vegetable/diseases/late-blight>) and Potato Council (www.potato.org.uk/knowledge-hub/publications/late-blight-publications-and-research-reports)