

Gardeners' Advice

What is potato and tomato blight?

Potato and tomato blight is a disease caused by the fungus-like organism *Phytophthora infestans* which spreads rapidly in the foliage of potatoes and tomatoes causing collapse and decay. The disease spreads most readily during periods of warm and humid weather with rain. *P. infestans* can also infect potato tubers causing a rapid tuber rot. It is the most important disease of potatoes, and caused the Irish potato famine of the 1840s. It has therefore been around for a long time, and over the years has adapted with more aggressive strains making it harder to control.

It is a serious disease for outdoor tomatoes, but not as common on tomatoes grown in greenhouses as the greenhouse reduces access by the air-borne spores when vents are shut. Also, water on the leaf surface is required for infection. If however an infection does take hold, the humid conditions within a greenhouse mean that the spread can be fast with devastating results.

Blight is specific to potatoes and tomatoes, and some ornamental relatives of these two crops are also susceptible. Cases have been recorded on some ornamental *Solanum* species such as *S. laciniatum*, and also on *Petunia*.

Symptoms

You may see the following symptoms:

- The initial symptoms of blight on potato plants are small, dark spots or lesions on leaflets, usually on the margins, which enlarge with new ones possibly developing. The brown lesion is surrounded by a halo of light green tissue. During humid conditions, a fine white downy growth may be seen around the edge of the lesion on the underside of the leaflets. This downy growth can release thousands of spores (sporangia) each day. Eventually the leaflet shrivels and dies.
- Brown lesions may also develop on the stems, mainly at the leaf axils.
- The spores of the pathogen will be washed down from the leaves or stems onto the soil surface, and can reach the tubers. Infected tubers have a brown or purple discolouration on the surface, and reddish-brown granular markings in the tuber flesh. The tubers may remain firm but can develop bacterial soft rot if the tissues are invaded by weak secondary bacteria that cause tissue breakdown. Early attacks of blight may not be visible on tubers, but any infected tubers will usually rot during storage.
- See photographs at the end of the fact sheet.

Biology

The blight pathogen is a microscopic, fungus-like organism whose spores (sporangia) easily break away from infected foliage and may be wind-blown for long distances during dull, humid weather. There are two types of *P. infestans* spore that commonly infect: sporangia that are air-borne and are generally responsible for infection at higher temperatures and zoospores that are water-borne and generally infect at lower temperatures. After infection, the pathogen spreads rapidly, killing the plant cells. Under humid conditions, stalks bearing sporangia grow from the infected plant tissue and the disease can spread rapidly through the crop.

Potato blight will defoliate a potato crop, but if the disease arrives after the tubers are a good size and they are harvested before they become infected, little is lost. However early attacks can be a problem, as the tubers may be under threat of infection for a long time, especially as they are developing.

Sources of infection

The pathogen over winters in infected seed potatoes, outgrade potatoes left by the sides of fields, or in groundkeepers, which grow from tubers left in the ground the previous season. This is why it is important to remove all tubers, or parts of tubers from the soil. If these are left and germinate in the following year, they will not produce a worthwhile crop, but will still need to be checked for blight and be a potential source of blight infection. However, the great majority of infections in gardens arise from wind-blown sporangia originating in other gardens, allotments and commercial crops, which can originate from miles away. In the UK, outbreaks may occur from June onwards, usually earliest in the South West.

New blight strains

The genetic population of the pathogen is ever changing but until the 1970s in Britain there was only one mating type. New findings have shown that a new dominant strain, called blue 13, is more aggressive and fitter than most other strains. Potato Council is conducting new research to identify the differences between strains and the possibility of these strains mating to give oospores, which are a third type of *P. infestans* spore. These are thick-walled spores that can survive in soils over long periods.

Variety choice

There are varietal differences in resistance to blight infection. Those varieties that have a high degree of resistance to blight may not show blight symptoms at all, or under high blight pressure, will only delay the onset and reduce the severity, so vigilance is still key. Varieties can have some resistance to foliage blight, but are susceptible to tuber blight and vice versa. All varieties were given a resistance rating for foliar blight, but because of the recent emergence of strain blue 13, there will need to be considerable re-testing of varieties, which is research Potato Council is currently working on. This of course doesn't help to give any guidance on which varieties might be the most resistant. Most early varieties are very susceptible, but as they are often harvested before blight starts (usually in July), this disease is rarely a problem. Similarly, early maincrop varieties are more likely to produce a reasonable crop before blight appears.

Maincrop varieties which have shown resistance to the older, less aggressive strains of blight include Cara, Lady Balfour, Remarka, Verity, Valor and Romano. Claimed to be the most blight resistant varieties available are Sárpo Mira and Sárpo Axona. A point to bear in mind with Sárpo Mira is that it can suffer from nutritional deficiencies which show as many small

brown spots on the leaves. This isn't blight, and won't have the white halo on the underside of the leaves.

Non-chemical control

The most effective control for the spread of infection is warm, dry and sunny weather. Because infection is so dependent on specific combinations of temperature, humidity, leaf wetness and time, the periods of high risk (blight infection periods or Smith Periods) can be predicted accurately. Watering your crop can increase the humid microclimate around the haulm (tops) which can help the spread of the disease. If the potato crop is to be watered, it is best to water the soil around the base of the stems rather than wetting the entire plant. Take care not to wash away soil. A good depth of soil cover over the potato tubers or mulching provides some protection to tubers. Early-harvested potatoes, which are generally more susceptible, are more likely to escape infection as they tend to be harvested before the weather is warm and humid enough for the extensive spread of blight. If you are growing more than one variety, there is evidence that growing alternate rows of different varieties can help to reduce the spread of blight if disease pressure is not too high.

Chemical control

All of the non-chemical control measures should be adopted. If, as a gardener you want to use chemicals, you must rely on a very restricted range of protectant fungicides containing copper (Bordeaux Mixture or Murphy Traditional Copper Fungicide), since the more modern and more effective products are not approved for amateur use. These protectants are best applied prior to any infections, and applications should be repeated on a regular basis every 10 days, but the interval should be adjusted based on Smith Periods. If the canopy is rapidly growing, any new growth since the last chemical application will not be protected. It is therefore critical to get a good coverage to all parts of the foliage, as any stems or leaves not treated won't be protected. It is important to realise that these fungicides will not kill an infection, but will only slow down the spread of the disease, by offering some protection to the healthy plant tissue. Remember to include outdoor tomatoes, as these are as susceptible to blight as potatoes.

What if an infection occurs?

First of all, all is not lost. Infected material should be cut off as quickly as possible and binned, buried or burned rather than composted, as composting may leave the haulm exposed, which will allow blight spores to spread until the green material dies. If composting is the only option, the infected material should be placed under the top layer in the compost to help reduce the movement of spores in the wind. Keep a close eye on the crop, if leaflets or compound leaves or even stems have been removed, there is a strong possibility that other lesions will show shortly afterwards, as it can take a few days for signs of the disease to show. Treat these in the same way by cutting them off and discarding. Remember bin it, bury it, burn it. If the infection is early and the tubers haven't developed to a usable size, the strategy of removing parts of the plant as infections are seen is worth a try. If it's late on in the season and the tubers are at a usable size, it may be worth removing all foliage to protect the tubers.

A crop that is to be stored will be more at risk if there has been blight in the tops. When the tops have been dead for three weeks the risk of tuber infection at harvest is reduced because most sporangia in the soil will have died. Also, the skins will have set on the tubers, which will give the best protection to the tubers as well as being necessary for storage. Remember to remove all tubers.

There are no problems using the soil for next year for other crops, but the potatoes should be moved to another part of the allotment or garden. This is just part of good practice for crop rotation.

Blight websites

The Potato Council has linked with another provider to give commercial growers combined warnings on which they can base their fungicide spray programmes. Leisure growers are able to access this service free of charge by registering with Potato Council on its website. The websites show blight in the area as reported by blight scouts, and weather conditions that are ideal for the spread of the disease, which is described earlier as Smith Periods. You can log onto Potato Council's website at www.potato.org.uk/blight. When you register for the blight outbreak information on the site, you can receive email and/or text messages that warn you of both the presence of blight (Potato Council site) and Smith Periods (Blightwatch) for up to five postal districts.

Blight photographs

As examples of blight, below are photographs of blight infections on the leaves, stem, and tuber. Blight can look different on different varieties, and can also be confused with other diseases, such as Botrytis or even wind damage. To be safe remember, if it looks like blight, bin it, bury it or burn it!

Blight on a leaflet



Fine, white downy growth on underside of leaflet



Blight on a compound leaf

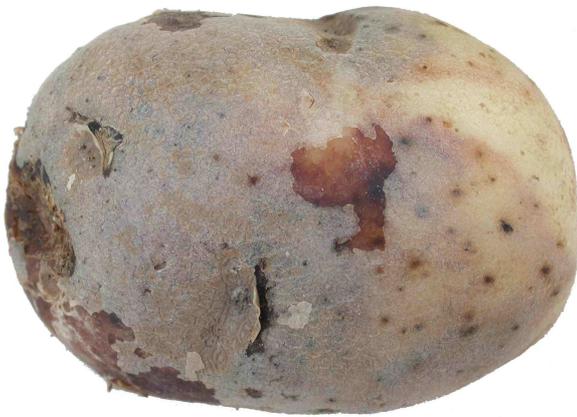


Stem blight

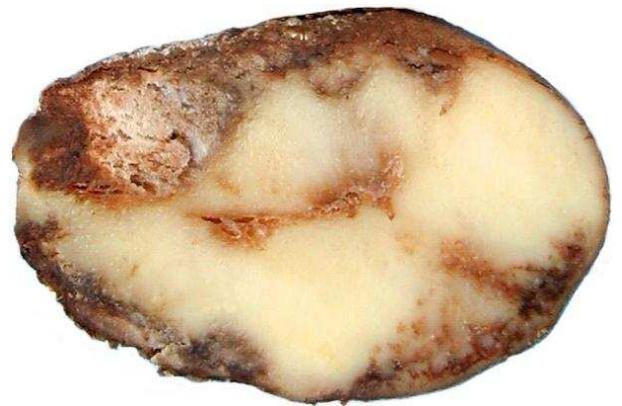


A plant with blight amongst healthy plants

Variety
resistance
to blight



Tuber
blight



If you would like some great recipe ideas for your home-grown potatoes, try the website www.britishpotatoes.co.uk

Thanks go to the following organisations that have helped with guidance and photographs for this fact sheet.

**Garden Organic
National Society of Allotment and Leisure Gardeners
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Scottish Agricultural College
Sárvári Research Trust
Soil Association
Sutton Bridge Experimental Unit
WCF Phoenix**

Potato Council is part of the Agriculture and Horticulture Development Board www.ahdb.org.uk working on behalf of British potato growers and purchasers to promote potatoes. Potato Council is funded through a statutory levy on 3,000 potato growers and potato trade purchasers and aims to support the British potato industry