



## Septoria leaf spot (*Septoria* spp.)

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### Introduction

Septoria leaf spot is an important disease of parsley and occasionally occurs on other herbs such as coriander and lemon balm. The fungus can be seed-borne (on parsley and coriander) and may also survive in plant debris and on volunteer plants. Under favourable environmental conditions, the disease can spread rapidly, affecting both yield and quality. Because of its seed-borne nature, the disease can potentially develop on crops under any production system, although those that are overhead watered are more at risk. Septoria species cause disease on other crops of the Apiaceae family (e.g. celery) but the host range for each species is limited. For example, *Septoria petroselinii* only infects parsley and *S. apiicola* only infects celery.

### Symptoms

Typical early symptoms on parsley and coriander are brown sunken leaf spots sometimes with yellow haloes, on leaves and cotyledons. As the leaf spots age, the centres turn tan or light grey and tiny black fungal spore cases (pycnidia) are often visible, which is a useful diagnostic feature for this disease. When infection is severe, leaves may die and drop off, and lesions may develop on petioles.

On lemon balm, septoria leaf spots are dark brown/black, up to 3 mm diameter and angular in shape (being constricted between leaf veins). Spore cases are sometimes visible within leaf spots on the underside of the leaf.

[Click here to view photos of Septoria leaf spot](#)

### Disease sources and spread

The fungus is seed-borne (at least for parsley and coriander) and transmission from seed to growing plants has been demonstrated experimentally for parsley. Spore cases are sometimes visible on the seed surface but infection may also be more deep-seated within seeds. The seed coat attached to the cotyledon can act as a source of infection during propagation so that the fungus infects seedling leaves and roots.

Septoria from parsley can survive on crop debris for at least three years and also on volunteer or overwintered plants. There is also a risk of cross-infection between neighbouring crops (e.g. with sequential planting).

### Conditions for infection

Crops are most at risk after long periods of leaf wetness, particularly at warm temperatures and high relative humidity. Disease development is highly dependent on the presence of water for the spore cases to swell and release spores, for splash dispersal of spores between plants and for leaf infection to occur. Spores are readily spread by irrigation and also by people (e.g. on wet boots) and machinery. Under optimum conditions (25°C, 100% RH), symptoms can develop on parsley after only 9 days. Experiments on celery septoria demonstrated that at cooler temperatures (less than 10°C), infection can occur, but moderate to severe symptoms only develop following leaf wetness durations in excess of 24 h (HDC project FV 237).

## Disease management (protected herbs)

### Cultural control

As the fungi can be seed-borne, use of clean seed is important for disease avoidance. Thiram fungicide can be used as a warm water soak for parsley seed (but not coriander) to reduce septoria infection to acceptable levels. However, under EC regulations this is no longer permitted for organic production. In addition, thiram use on conventionally produced crops may soon be limited by retailer quality assurance schemes. There is potential for controlling septoria on seed using hot water treatment but the temperature and soak duration are critical. For example, *S. apiicola* on celery seed can be controlled using hot water treatment (48°C, 30 min) without loss of seed viability (HDC project FV 237a).

Growers can confirm the health of seed samples by testing at NIAB (NIAB, Huntingdon Road, Cambs. CB3 0LE or [www.niab.com](http://www.niab.com)).

The viability of septoria on parsley and coriander seed may decline over time during storage but this is not a reliable control method.

The risk of septoria development can be reduced by using the following measures:

- As septoria can survive in plant debris, plant trays/pots should be new, or washed and disinfected before re-use in propagation or pot production.
- New parsley crops for cut herb production should be planted in soil where parsley has not been grown for at least 3 years.
- In all production systems, irrigation and ventilation should be carefully regulated since overhead watering can result in splash dispersal of the fungus between plants, while poor air movement can lead to extended periods of leaf wetness that are conducive for disease development.
- If overhead watering is necessary, avoid watering late in the day when leaf wetness duration will be prolonged.
- Inspect plants regularly for symptoms and rogue out infected plants.
- Remove crop debris and volunteer plants, and dispose of them carefully.
- Isolate new plantings to avoid splash dispersal from currently or recently affected crops.
- Wider plant spacing may help to improve air circulation in the canopy, thus reducing leaf wetness duration and associated disease risk.
- In cut herbs, mowing alone is unlikely to eliminate the disease as the fungi can survive on crop debris. Flaming, as practised by some cut herb growers, could be more effective.
- Restrict entry into the crop
- Use clean footwear
- Clean planting and harvesting equipment
- Remove surplus or reject plants from the cropped area and dispose of carefully.

Although there are significant varietal differences in the susceptibility of parsley to *S. petroselini* there are no resistant varieties available.

## Chemical control (protected herbs)

For protected herb production systems where fungicides are used, Amistar (azoxystrobin) and Signum (boscalid + pyraclostrobin) are likely to be highly effective against septoria. Amistar efficacy for control of parsley septoria was tested on both field and protected parsley but because of very low levels of infection, fungicide efficacy could not be properly evaluated (HDC project FV/ PC/HNS 245). However, in work on celery septoria, Amistar gave excellent control when applied as a protectant fungicide (up to ten days before an infection event) although it did not provide any curative activity (HDC project FV 237).

Signum is a fungicide with protectant and systemic activity. In HDC-funded research on celery septoria, Signum (trialled as an experimental product) provided excellent control of *S. apiicola* showing both protectant and curative activity (HDC project FV 237).

An example programme to manage septoria leaf spot would involve an early application of Amistar as a protectant, followed by an application of Signum immediately after high risk environmental conditions (e.g. high temperatures, long leaf wetness duration) or if early symptoms of the disease were observed.

Growers using Amistar or Signum should be aware of the need to use strategies to minimise the risk of selecting resistant strains; see the FRAG-UK Technical Leaflet: Fungicide Resistance ([www.pesticides.gov.uk](http://www.pesticides.gov.uk)).

## Relevant references

Cole R. 2003. Herbs: an independent field and crop evaluation of pesticides to fill identified gaps. Project FV PC HNS 245 Final Report. East Malling. Horticultural Development Council. 26 pp.

Green KR. 2003. Celery: Evaluation of alternative seed treatments for the control of *Septoria apiicola* (celery leaf spot). Project FV 237a Final Report. East Malling: Horticultural Development Council. 40 pp.

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