

Management of Lettuce Anthracnose

Introduction

There has been a recent sustained increase in the incidence of the foliage disease of lettuce known as Anthracnose (caused by the fungus *Microdochium panattonianum*) resulting in significant crop losses of iceberg, cos and baby leaf lettuce.

Lettuce anthracnose is an intermittent disease in Australia, driven mainly by extended periods of wet weather, particularly mild-cool wet periods. When these conditions occur, crop losses can be severe. The disease mainly affects field-grown crops, and while it can occur under protected cropping it is usually less frequent and less severe.



Anthracnose symptoms on lettuce

Infection and Spread

Anthracnose is caused by a fungus which can infect lettuce plants when the leaves are wet for 8 hours or more at an average temperature of about 15°C. Infections can also occur in leaf bases after less than 8 hours of leaf wetness.



Anthracnose symptoms on lettuce

The disease is spread either by spores or resistant structures called microsclerotia.

- **Spores (conidia):** This is the most common method of infection where spores come from the soil, lettuce crop residues, other infected lettuce plants or weeds. These spores can survive and remain viable in the soil for about 20 weeks.
- **Microsclerotia:** These are small, tough vegetative pieces of fungus that can lie dormant, persist and remain infective for longer than conidia. Research in the US has shown they can persist in soil for up to 4 years, however anthracnose microsclerotia have never been found on plants, soil or crop residues in Australia.

The fungus causing Anthracnose has not been demonstrated to be transmitted by seed. Even after artificially infecting seed with spores, one research study found that the disease was not successfully transmitted to seedlings provided the seed was stored for at least 24 days at 5°-20°C after harvest. All commercially supplied seed in Australia would be stored at least this long. In addition, disease symptoms on seedlings suggests infection comes from soil or other lettuce plants, rather than from seed.

Cultural Controls

1. Field Production

Cultural methods for controlling Anthracnose can be grouped as follows:

- Leaf wetness
- Crop rotation and crop hygiene
- Buffer zones and roguing
- Weed control

Leaf Wetness The single most important way to reduce the risk of infection is to minimise the amount of time the leaf is wet.

The unusually wet and cool conditions during the 2010-2011 winter-spring period in south-eastern Australia made it nearly impossible for growers of outdoor lettuce to avoid severe losses from Anthracnose.

While the most serious epidemics are the result of prolonged wet weather, the following irrigation practices are worth considering as ways to minimise the risk of infection:

- Use trickle irrigation instead of overhead sprinkler irrigation.
- Do not irrigate at night or on cool, still days when the humidity is high.
- Irrigate in the morning as temperatures begin to climb to allow the warmest part of the day to help dry leaves rapidly.
- If possible, irrigate immediately before windy conditions are expected to allow the wind to assist rapid drying of the leaves.

Crop rotation and crop hygiene

To break the disease cycle and allow spores of the disease in the soil or on buried crop residues time to lose viability, you should apply a **minimum break of 20 weeks between lettuce crops**. This break period can be used to grow a crop other than lettuce or left fallow.

Remove or bury any remaining crop residues after harvest. Encourage healthy soils with high microbial activity to speed up the rate of decomposition of any lettuce plant residues.

Buffer zones roguing

Lettuce Anthracnose spores can spread several metres by wind or water splash.

When the conditions favour infection, the disease can spread between plantings and infect a clean crop growing immediately alongside an infected one.

Allow a minimum separation (buffer zone) of about 10 metres (a typical "bay" width) between lettuce plantings to minimise the risk of infections spreading from a diseased crop to a healthy one. This buffer zone can be planted to a non-lettuce alternative crop.

Roguing or removing infected plants at the start of a field outbreak can reduce the chance of the disease spreading from infected plants. If there are already a large numbers of infected plants, this method is not likely to be effective.

Weed Control

The most likely alternative host appears to be prickly lettuce (*Lactuca serriola*), an autumn-spring germinating annual or biennial weed commonly found across much of southern Australia.

Prickly lettuce should be controlled if it occurs within 10 metres of any lettuce production areas. It is also possible other weeds could carry the disease, and good general weed control around crops will provide protection against potential infection via weeds.



Prickly lettuce



2. Nursery Production

Monitoring lettuce seedlings for disease symptoms should be done throughout high-risk periods by daily plant inspections. Any plants showing signs of infection should be removed immediately and disposed of well away from the nursery.

Seedlings should be inspected immediately prior to dispatch and ***plants showing symptoms should not be dispatched.*** Growers should also closely inspect seedlings for any signs of infection on seedlings they receive before planting them out in the field.

During high disease risk periods, consider not growing varieties which may be highly susceptible to the disease or those that have a strong tendency to retain water near the leaf bases. At other times of the year, more susceptible varieties should be grown away from other varieties, in discretely separated areas, where secondary infection from susceptible plants to less susceptible varieties by splashing water is not possible.

Seedling nurseries normally move lettuce seedlings from under shelter to outdoors to harden them off prior to delivery. This normally involves moving seedlings to fully exposed locations where it is possible seedlings could be infected if conditions favour infection and the disease spores are present. While likely to be expensive, systems that allow exposure to the air but provide shelter from direct rain are worth exploring to reduce the chance of infection during the hardening-off stage. Some nurseries have reported success in reducing infections by using overhead fans to blow plants dry after leaves have been wet.

Varietal Control

There are no commercially available lettuce varieties that are truly resistant to lettuce anthracnose, however some varieties show a greater level of susceptibility to this disease than others.

Resistance to lettuce anthracnose has been identified by lettuce breeders. It is considered a lower priority than aphid (*Nasonovia*) and downy mildew resistance and more development and back-crossing is required before the resistance is incorporated into commercial lettuce varieties. Current estimates are about 2016 for commercial release of anthracnose resistant lettuce varieties.

One factor related to varietal susceptibility is plant habit. Varieties which trap water near the leaf bases are more likely to be infected. For this reason cos lettuce are more susceptible than iceberg, because cos types have an open habit and allow water to penetrate to the base of the leaves which encourages infection.

Anthracnose disease outbreaks starting in cos plantings can easily spread to less susceptible iceberg plantings if they have been planted close to each other. To reduce the risk of spread, it is important to separate the plantings of cos and iceberg plantings in the field by at least 10m when conditions favour infection.

Younger leaves are generally more susceptible to infection than older leaves, however in the case of closed-headed varieties such as iceberg types, the disease may be most prevalent on the outer (most mature) leaves. This is because the younger leaves are protected inside the head and the older leaves have been exposed to longer periods of leaf wetness.

The disease is more difficult to see on the red varieties. This means greater effort is required to monitor red varieties for the disease but also that heads with a low level of infection may still be acceptable for market, provided leaf symptoms are relatively minor.

Growers should consult seed companies directly for information about the susceptibility of particular lettuce varieties.



Chemical control

Fungicides

Lettuce Anthracnose is difficult to control and fungicides are not currently providing effective control of anthracnose in lettuce under high disease pressure, mainly because of the difficulty in applying fungicides effectively into leaf bases where the disease usually starts.

Prochloraz (Octave®) is currently the most effective fungicide available for controlling anthracnose in lettuce but can only be used on “closed head” varieties such as iceberg.

A number of protectant fungicides are currently registered on lettuce for the control of Anthracnose, such as mancozeb and copper-based fungicides, however the difficulty of achieving adequate coverage mean they tend to be ineffective when the disease pressure is high.

Most “protectant” fungicides will only protect leaves where spray droplets adhere. Even “systemic” fungicides generally only move from the sprayed point on a leaf upwards and out towards the leaf tips and margins. They generally have a very limited capacity to travel downwards in the plant back toward the leaf petiole and the leaf axil.

Good spray coverage, including leaf bases is important but difficult to achieve, especially in head lettuce.

During periods of high disease risk, shorter spray intervals can greatly improve disease control. Keep spray intervals short to cover new growth and ensure adequate spray volumes are used to maximise canopy penetration. In general, lower label rates at the shortest intervals will give better disease control than highest rates at longest intervals.

In general, fungicides provide much better control if they are applied immediately before an infection event (wet weather), rather than afterwards. Attempts at “timing” curative sprays, immediately after an infection period are not generally as effective as scheduled applications at shorter spray intervals. Attempts to apply curative sprays will be rendered even less effective if protracted rain prevents re-entry for several days, or fungicides are sprayed onto wet, unprotected leaf bases.

Fungicides are an important tool for controlling this disease but should not be relied on as the first means of controlling Anthracnose, rather they should be used in conjunction with cultural control methods. Always refer to product labels and follow the manufacturer's instructions and recommendations before using any fungicide.

Consult the APVMA website for a list of fungicides currently registered or permitted for use by permit for the control of anthracnose on lettuce (www.apvma.gov.au).

Calcium Sprays

There is some evidence that foliar applied calcium products may help reduce disease when applied before infection. Growers should consult product manufacturers for latest recommendations.

Disclaimer: This best practice guide is an output of HAL project VG10123 and has been funded by HAL using the vegetable levy and matched funds from the Australian Government.

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