

ALTERNARIA BROWN SPOT

Alternaria alternata (Fr.:Fr.) Keissl.

1 PATHOLOGICAL PROFILE

1.1 Distribution and status

Alternaria brown spot occurs in all citrus production areas of southern Africa. The disease is most prevalent on Minneola tangelos in the humid, low-lying areas, especially following periods of high humidity or rainfall. In the drier inland production areas, such as Tshipise, the disease is not of economic significance.

1.2 Description

Two distinct pathotypes of *A. alternata* are known to cause brown spot disease on young leaves and fruits of certain citrus cultivars. The so-called tangerine pathotype, was first reported and described in 1903 on Emperor mandarin in Australia; its name being derived from the characteristic brown lesions produced on the fruit of this cultivar. This strain is pathogenic to only mandarins and does not affect rough lemon. The other strain, called the rough lemon pathotype, was described in 1929 in South Africa. This pathotype is pathogenic to rough lemon only, and not to mandarins.

The microscopic and diagnostic features of *Alternaria* brown spot include:

The spores, called conidia, are produced solitarily in chains, ranging in shape from ellipsoidal to obclavate and are dark blackish-brown in colour. Transverse and longitudinal septa range in numbers from one to six and one to three, respectively.

Conidia are beakless when ellipsoidal, or with a cylindrical beak, 3 to 4 µm in diameter and up to 13 µm long.

The optimal temperature range for the growth of this fungus is 25 to 28 °C. Spores are released in a diurnal rhythm from 12:00 to 18:00.

1.3 Symptoms

Alternaria brown spot spores which accumulate in droplets of free water, excrete a host-specific

toxin which then kills host tissue on contact. This results in a necrotic reaction appearing on leaves and fruit as small, lightly depressed red/brown/black spots within two days.

1.3.1 Leaves

Alternaria damage to young vegetative shoots varies from small circular leaf spots to large necrotic blighted lesions that cover a major portion of the leaf. Lesions tend to extend out along the veins. Damage to vegetative growth often results in severe leaf drop. Twig infection and the defoliation that commonly follows infection of the leaf blade, causes die-back of the shoot apices. Infected twigs provide the most continuous source of infection of lower hanging fruit.

Leaves become resistant to further attack once they are fully expanded.

1.3.2 Fruit

When young fruitlets become infected, they usually drop. Older fruit which become infected may be retained, as they form secondary tissues in a series of radial tissue layers called a periderm, which isolates the disease and gives rise to corky protrusions on the rind. These can easily be dislodged, leaving pockmarks. The healing reaction of the outer cell layers can be enough to completely inactivate the disease. However, some pustules, though apparently completely healed, may become active again and give rise to slowly expanding necrotic brown spots approximately 5 mm in diameter.

1.4 Transmission

Spread of the disease from one tree or orchard to another is by air-borne spores produced on leaf, stem and fruit lesions.

1.5 Seasonal occurrence

Although the pathogen is present throughout the year, symptoms only occur on susceptible host tissue following wet conditions. This occurs during the emergence of growth flushes and on fruit until harvest.

2 MANAGEMENT ASPECTS

2.2.2 Plant Protection products

2.1 Disease assessment

In areas where the disease occurs annually, a preventive approach should be adopted. Treatments should commence as soon as the first spring flush emerges and should be continued until harvest.

In areas where the disease occurs infrequently, or has not yet occurred, young vegetative flush and fruit should be inspected after rainy periods for the presence of lesions.

The approach towards disease assessment of bearing and non-bearing trees is similar, except that in the case of non-bearing trees it is only necessary to monitor young, vegetative growth flush. Any fruit on non-bearing trees should be stripped to reduce the level of inoculum.

Since young vegetative shoots and fruit of all ages are highly susceptible to attack by the fungus, these must be protected during periods when conditions favourable for infection occur.

Due to differences in rainfall patterns between the northern and southern areas, spray programmes must be adjusted accordingly.

All sprays must be applied at medium cover, film wet spray intensity, ensuring that all fruit surfaces and leaves are thoroughly wetted. For more details on spraying requirements consult the part on the application of plant protection products in Chapter 2 of this volume.

2.2 Control options

Control measures are aimed principally at Minneolas since this is the only commercial export cultivar which at present requires protection.

2.2.1 Cultural

The disease is more severe on trees which flush continuously since this results in a build-up of inoculum on young shoots, resulting in subsequent leaf drop and infection of fruit. Cultural practices, including fertilisation, irrigation and pruning should therefore be aimed at manipulating the occurrence of growth flushes to a period during which the application of crop protection products is in any event necessary to protect fruit.

Overhead irrigation should not be practised, since this creates a humid environment conducive to infection by the pathogen. Repeated wetting of the canopy also causes leaching of fungicides and can reduce their residual effect.

Planting at high density will reduce air movement and light penetration and result in more humid conditions, which could favour the disease. The increased need for pruning in these situations should also be borne in mind.

Table 6.1. Spray programme for *Alternaria* brown spot

Growth Stage	Export fruit		Local Market	
	Product	Dosage	Product	Dosage
At first flush (Aug/Sept)	Rovral or Sumisclex + Dithane	200 g + 200 g/hl	Copper oxychloride	200 g/hl
At 100% petal fall	Folicur / Score + Dithane	80 ml + 200 g/hl	Folicur / Score + Dithane	80 ml + 200 g/hl
4 weeks later (Oct/ Nov)	* Dithane ^x	200 g/hl	Rovral/ Sumisclex + Dithane	200 ml + 200 g/hl
At second growth flush (Dec)	* Dithane ^x	200 g/hl	Rovral/ Sumisclex + Dithane	200 ml + 200 g/hl
4 weeks later (Jan/Feb)	* Dithane ^x	200 g/hl	* Dithane ^x	200 g/hl
At third growth flush (Feb/Mar)	* Dithane ^x	200 g/hl	* Dithane ^x	200 g/hl
Ripe fruit	* Dithane ^x	200 g/hl	* Dithane ^x	200 g/hl

* During very wet years spray intervals should be reduced to 3 weeks.

x If mixed with 0.5% or less narrow range mineral oil, the Dithane dosage may be reduced to 150 g.