

Mango Scab and its Control

B. D. Conde, R. N. Pitkethley*, Diagnostic Services, E. S. C. Smith, Biosecurity and Product Integrity, V. J. Kulkarni*, Crops, Forestry and Horticulture, Darwin
* Formerly DPIFM

WORLD DISTRIBUTION

Mango scab was first described in 1943 from specimens from Cuba and Florida. Now it is found in most of the mango growing areas around the world, including South East Asia. It is considered a very minor disease in the USA and the Philippines.

It was first identified in Australia in January 1997, near Darwin. It appears to have been in the Northern Territory and Queensland since at least the early 1990s but was thought to be a form of flowering anthracnose.

THE CAUSE OF MANGO SCAB

The cause of the disease is a fungus, *Elsinoë mangiferae*, also called *Denticularia mangiferae*. This fungus will only survive on living plant tissue. There are no reports of it affecting other plants apart from mangoes.



Figure 1. Leaves showing small spots with haloes and distortion of the margin

WHERE DOES MANGO SCAB APPEAR?

Mango scab appears in swampy low-lying areas or on the lower parts of a sloping farm or in areas where fogs settle. In drier areas, prolonged rain at flowering and early fruit-set can lead to its appearance. It is also seen in mango nurseries where lush young tissue, combined with generous irrigation, provides the right combination of factors for the appearance of the disease. Small young trees in a moist environment in an orchard may develop the disease.

WHAT DAMAGE DOES IT DO?

Newly set fruit develops small black spots. When affected by several black lesions, the fruit drops off. Affected fruit remaining on the tree develops scar tissue which renders it unmarketable or causes it to be downgraded. In contrast to anthracnose, the scab lesions do not expand after harvest, nor develop into a rot. However, severely scarred fruit will show post-harvest anthracnose rot earlier than non-scarred fruit.

Scab infections in mango nurseries can be very severe and the presence of numerous lesions can cause new shoots to defoliate.

THE SYMPTOMS OF MANGO SCAB

The symptoms vary depending on such factors as plant part affected, mango cultivar, age of tissue at infection, and water and mineral nutrition (expressed as plant vigour and lushness). Only young tissue is susceptible to infection and fruit is no longer susceptible after it reaches about half size. Occurrence of all symptoms depends on the availability of free water when the tissue is at the susceptible stage.

Some of the symptoms can be confused with physical or insect injury or infection by other diseases.

Fruit

The most noticeable symptoms are on the fruit. Small black lesions form on newly-set fruit and heavily affected fruit falls off. Lesions on Kensington Pride cultivar fruit which remains on the tree develop into light brown scabs or scar tissue, either as small scabs or as large irregular scars when lesions join up. As individual scabs develop they consist of scar tissue with a central scab which in some cases can be lifted off. A more diverse array of lesions occurs on the Irwin cultivar. These range from small black spots which could be mistaken for spray injury to small and large scarred areas. The large areas are accompanied by a depressed distortion as the fruit grows. Of the two cultivars investigated in some detail in the Darwin area, Irwin has been found to suffer greater damage than Kensington Pride

Early lesions can be easily confused with spray injury or the black lesions of anthracnose but anthracnose does not produce the later scar with a central scab. Unlike anthracnose, mango scab lesions do not develop into a soft rot as the fruit matures. If only a few fruits are affected, scarring can be confused with abrasion injury. The scarred areas in both cultivars can be mistaken for insect damage but mango scab shows no indication of any chewing of the fruit and significant numbers of known potentially damaging insects will not be found. A scab or scar tissue is formed after *Amblypelta* or *Helopeltis* bug injury. In contrast to mango scab, bug damage injury appears as a much deeper depression in the fruit skin.

Stem, flower and fruit stalk

The most common symptom on stem tissue is the occurrence of numerous slightly raised grey oval to elliptical lesions, 1 to 2 mm in diameter. If the environment is somewhat dry, the lesions will be black in colour and smaller in size. These lesions may appear similar to those of anthracnose but closer or microscopic examination will show them to be raised structures in contrast to the non-raised lesions of anthracnose. Another symptom observed on stems is large light tan corky areas which resemble scar tissue from insect injury.

Leaves

Common symptoms are brown spots with haloes, edge lesions, corky lesions on the lower surfaces of leaves and elongated dark lesions along main veins under the leaves. In wet weather, numerous small brown lesions or shot holes may form on young leaves leading to their defoliation. Other symptoms seen on leaves include lesions with centre scabs and numerous small lesions about 0.1 mm in diameter along secondary veins. Leaves often appear distorted due to the effects of marginal or edge lesions.

Elongated lesions along main veins can also be caused by *Amblypelta* or *Helopeltis* activity and infection by the algal leaf spot, *Cephaleuros virescens*.

NURSERY

Shot holes, numerous small dark lesions and distortions occur on the leaves of seedling nursery plants, particularly on young growth. In severe infections, defoliation is common. Small black or elongated grey scab lesions are also found on young stem tissue.

CONFIRMATION OF DIAGNOSIS

Confirmation of the presence of mango scab requires microscopic examination of material from fruit, stems or leaves, and culture of the organism. Culture will only be successful from lesions on young plant material. This can only be done by a qualified plant pathologist.

SPREAD OF THE INFECTION

E. mangiferae produces two types of spores, ascospores (the sexual stage) and conidia (the asexual stage). The ascospore state is rarely found and the asexual conidia are responsible for most infections.

Conidia of *Elsinoë* can only infect young tissue of leaves, stems, flowers, fruit stalks and young fruit. Mango scab, in common with the anthracnose fungus, is spread by rain splash and needs periods of free water both to produce conidia and for the conidia to germinate and produce new infections. Under extremely wet and gusty conditions, but in a sheltered situation, the disease was observed to spread to 4.25 m. In unsheltered situations we would expect spread over longer distances, such as between trees or rows of trees. This rain-blown method of dispersal is in contrast to the dry wind-borne diseases such as powdery mildews and rusts, the spores of which can travel with the wind for many kilometres.

CONTROL

Since mango scab is a recently identified disease in Australia, control measures are being developed and specific recommendations may change with time as we gain more experience in the practical applications in both nurseries and orchards. It may be possible to achieve high levels of control or even eradication of scab within individual properties with strategic spraying. For orchards, it is recommended that protective copper sprays be applied as soon as the flower panicles emerge and continue at two to three weekly intervals up till the fruit has grown to half size. Weekly sprays of copper fungicides may be required in mango nurseries to prevent defoliation, especially in wet weather.

For detailed control recommendations, please request the separate sheet on "Latest control recommendations for mango scab" from the Plant Pathology Branch or the Technical Publications Unit, DPIFM.



Figure 2.



Figure 3.



Figure 4.



Figure 5.

Figure 2. Mango fruit with small spots, small and large scabs and distortion due to mango scab

Figure 3. Young bronze leaves showing small spots with haloes and distortion of the margin

Figure 4. Twig showing small raised grey mango scab lesions

Figure 5. Two old leaves showing dark elongated lesions on the mid rib and splitting from a marginal lesion

INTEGRATED CONTROL RECOMMENDATIONS FOR MANGO SCAB AND ANTHRACNOSE

Current control recommendations for Mango Scab and Anthracnose

ORCHARD

Work published elsewhere indicates that copper fungicides (copper hydroxide and copper oxychloride) are the most effective agents against mango scab. However, copper fungicides have a reputation for damaging or burning very young tissue, such as flowers and flower branches. Because of the possible risk of damaging flowers and causing a severe loss of mangoes, DPIFM is advocating caution in the use of copper fungicides. The Plant Pathology Branch and the Crops, Forestry and Horticulture Division tested copper fungicides on mango flowers and flower branches and found no adverse effects. However, copper phyto-toxicity can occur due to the interaction with other sprays such as zinc fertilisers.

Knowledge of the life cycle of the anthracnose fungus enables growers to modify practices to reduce this disease. The mango anthracnose fungus grows saprophytically on dead tissue producing spores during moist weather, so pruning dead inflorescences, dead branches and mummified fruit will reduce the number of spores which could be spread by rain splash to the fruit. By contrast, mango scab is a biotroph and so does not grow saprophytically on dead tissue but is maintained as lesions on leaves, petioles, and stems and on gnarled bark.

DPIFM has formulated a combined program for controlling both anthracnose and mango scab. The recommendation is for copper sprays, preferably of copper hydroxide or higher grades of copper oxychloride at recommended label rates. The copper spray should be applied thoroughly in dry weather at intervals of four weeks and through the wet, foggy or dewy weather at intervals of two weeks from the time of flower panicle emergence until the fruit is ready for harvest. Because of the danger of copper phyto-toxicity through interaction with other sprays on mango flowers and flower stalks, it is recommended that growers do not spray with copper at this time but rather spray with mancozeb at recommended label rates at intervals of one week from the time flower shoots appear until fruit size is about a 20 cent piece.

MANGO NURSERY

As the young mango tissue of mango seedlings is succulent in very moist environments, copper fungicides need to be applied at weekly intervals during wet weather to achieve good control of mango scab and prevent defoliation.

Please visit us at our website:

www.nt.gov.au/dpifm

Department of Primary Industry, Fisheries and Mines

© Northern Territory Government, 2007

ISSN 0157-8243

Serial No. 709

Agdex No. 633

Disclaimer: While all care has been taken to ensure that information contained in this Agnote is true and correct at the time of publication, the Northern Territory of Australia gives no warranty or assurance, and makes no representation as to the accuracy of any information or advice contained in this publication, or that it is suitable for your intended use. No serious, business or investment decisions should be made in reliance on this information without obtaining independent/or professional advice in relation to your particular situation.