

# Citrus

## Diseases

### Foot Rot or Gummosis (*Phytophthora* spp.)



The symptoms appear as yellowing of leaves, followed by cracking of bark and profuse gumming on the surface. The main source of infection is infected planting material. As a result of severe gumming, the bark becomes completely rotten and the tree dries owing to girdling effect. Prior to death, the plant usually blossoms heavily and dies before the fruits mature. In such cases, the disease is called foot rot or collar-rot.

**Control :** Preventive measures like selection of proper site with adequate drainage, use of resistant rootstocks and avoiding contact of water with the tree trunk by adopting ring method of irrigation are effective.

Alternatively the disease portions are scraped-out with a sharp knife and the cut surface is disinfected with Mercuric chloride (0.1%) or Potassium permanganate solution (1%) using a swab of cotton. Painting 1 m of the stem above the ground level with Bordeaux helps in controlling the disease. Also spraying and drenching with Ridomil MZ 72@ 2.75 g/l or Aliette (2.5 g/l) is effective in controlling the disease.

### Ganoderma Root-Rot (*Ganoderma lucidum*)

The disease appears in the soil in one or more of the lateral roots. Whitish strands of fungus spread along the surface of the bark of the roots, which later turn dark. Gradually, the fungus spreads to the bottom of the main trunk. The affected tissues become very light, swollen and spongy due to water accumulation. During rainy season bracket-like fungal fructifications appears at the base of the trunk.

**Control :** Removal of dead or decaying old stumps from the orchard, treating the basal portion of the stakes with a fungicide and periodical collection and destruction of brackets near the collar controls the disease.

Isolation of infected trees by digging a trench all-round the tree to prevent the diseased roots from having contact with the healthy roots and mixing. 0.5 to 1 kg of powdered Sulphur with the soil in the trench helps in controlling the disease.

Application of Aureofungin solution (1.5 g in 5 litres of water) and Vitavax (500 ppm) in plant basin is effective

### Dry Root Rot (*Macrophomina phaseoli*, *Fusarium* spp. and *Diplodia natalensis*)

It is characterized by moist decay of the bark in the early stages and a dry shredded condition of the bark with hard, dead wood underneath in later stages. The affected roots emit bad odour. Affected tree defoliates, and produces heavy crop of small-sized fruits.

**Control :** If the taproot and crown are still in good condition and only one or two roots are affected, the diseased roots should be cut off and destroyed. The cut surface should be painted with Bordeaux paste.

### **Pink Disease** (*Pellicularia salmonicolour*)

Usually the disease appears during or just after monsoon rains. In the early stages branches and leaves wilt and die. The affected branches are covered with a fine silvery-white film of mycelium. From the characteristic pink colour produced by the fungus on the branches, the disease is aptly called the pink disease. When the bark is severely infected it gets shredded, and the wood is exposed. Longitudinal cracking and gumming of the branches may also take place.

**Control** : All the diseased portions should be trimmed and the cut ends painted with Bordeaux paste. Spraying of Bordeaux mixture (5-5-50) mixed with crude oil emulsion destroys the mycelium in the crotches.

### **Leaf Fall and Fruit-Rot** (*Phytophthora palmivora*)

Shedding of leaves starts from the lower branches of the tree. The affected leaves show water-soaked patches. By the time these lesions extend to the whole leaf, the affected leaves drop off. The fruits in different stages of development are also infected. In the beginning, water-soaked patches develop on the rind and later these fruits drop off and rot.

**Control** : Spraying Bordeaux mixture (1%) can effectively control the disease. Two sprays, one before the onset of monsoon in June and the second one at the end of monsoon in August or September are effective.

### **Scab** (*Elsinoe fawcetti*)

The lesions in early stages appear on the underside of the leaves as small semi-translucent dots, which finally become sharply defined pustular elevations. In later stages, leaves often become distorted, wrinkled, stunted and deformed. On the fruit, lesions consist of corky projections, which often break into scabs. The opposite surface corresponding to the warty growth shows a circular depression with a pink to red center.

**Control** : The diseased leaves, twigs and fruits should be collected and destroyed. Spraying of Bordeaux mixture or Blitox (0.3%) is quite effective

### **Powdery Mildew** (*Acrosporium tingitaninum*)

Whitish powdery mass develops on the young leaves and twigs. Affected leaves get distorted. When the disease is severe the affected leaves drop off and the twigs show dieback symptoms. Surface of the young fruits is also covered by fungus, and they drop off prematurely. Consequently reducing the yield.

**Control** : Powdery mildew can be controlled easily by spraying Wettable Sulphur (1.5kg/200 litres of water). Sulphur dusting (20kg/hectare) in the morning hours controls the disease effectively. Systemic fungicides like Bayleton (1g/litre of water) or Calaxin (3-4 ml/10 litres of water) or Benomyl (5g/10 litres of water) offer better and prolonged control of the disease.

### **Anthracnose or Wither Tip (*Colletotrichum gloesporioides* and *Gloeosporium* spp.):**

The fungus often attacks leaves young shoots and tender fruits. Affected leaves show necrotic patches with distortions. Dead parts of the twig assume silvery grey appearance. Flower buds, when affected fail to set into fruits. Infection on fruits results in fruit drop.



**Control :** The orchard should be kept in healthy state by adequate irrigation, manuring and pruning the diseased twigs. Spraying Bordeaux mixture (1%) or Blitox (2.5g/litre of water) or Mancozeb (2g/litre of water) is effective in controlling the disease.

### **Twig Blight (*Diplodia natalensis* and *Fusarium* spp.)**

In the case of *Fusarium* twig blight, leaves dry up and shed. Small twigs die back from tips and show gummy secretion at the base of the dead twigs.

In the case of *Diplodia* twig blight, the affected twigs show the pycnidial fructifications of fungus. Malnutrition and unfavourable environmental conditions are believed to be cause of the disease.

**Control :** Pruning of the dead twigs and spraying with Benomyl (2.5g/ litre of water) is effective in controlling the disease.

### **Sooty Mould (*Capnodium citri*)**

The disease is common in the orchards where mealy bug and scale insects are not controlled efficiently. Black velvety coating on the leaves, twigs and fruits is the characteristic of disease. The coating is superficial and can be pulled off easily from leaf. Under dry conditions the affected leaves curl and shrivel up.

**Control :** Disease can be controlled by pruning the affected branches and destroying them. Insects causing the disease can be controlled by spraying of Wettasulf (0.2%)+ Metacid (0.1%)+ gum acacia (0.3%) in the month of May. Once the insects are eliminated, sooty mould automatically disappears for lack of suitable medium to propagate.

### **Storage Rots**

#### **Green Mold ( *Penicillium digitatum* ) :**

The fungus penetrates the fruit rind through wounds. Symptoms begin as water-soaked area at the fruit surface followed by growth of colorless mycelium and sporulation (green color).

#### **Blue Mold (*Penicillium italicum*) :**

The fungus penetrates through the uninjured peel and can spread from one fruit to adjacent fruit. Symptoms are similar to green mold except that the spores are blue.

#### **Altenaria Rot (*Alternaria citri*) :**

Fungus enters the fruit through their buttons. Preharvest treatment with gibberellic acid or postharvest treatment with 2,4 D delay senescence of the buttons and subsequent decay by *Alternaria*.

**Control :** Storage rots can be avoided by careful handling during harvesting to minimize cuts, scratches, and bruises. Treatment of fruits with Bavistin (1000 ppm), maintenance of optimum temperature range and relative humidity and exclusion of ethylene during transport can reduce post harvest losses.

### **Citrus Canker (*Xanthomonas citri*)**

It is the most serious bacterial disease of sour lime during rainy season. The disease symptoms appear on leaves, branches and fruit stalks. Canker lesions appear as yellowish spots, which gradually enlarge and appear as raised, rough brownish pustules. These pustules are surrounded by a characteristic yellow halo. Canker lesions on the fruits are confined to the rind only and do not penetrate into the flesh of the fruit. The market value of the canker-affected fruits is very much reduced.

**Control :** Pruning and burning all the canker-infected twigs before monsoon and disinfecting the cuts with Bordeaux paint can prevent the further spread of disease.

Three sprays of Streptocycline 100 ppm (10 g of Streptocycline + 5 g Copper Sulphate in 100 litres water) or Blitox (0.3%) or neem cake suspension (1 kg in 20 litres water) during February, October and December can control the disease.

### **Tristeza Virus Disease**

The aphid (*Toxoptera citricida*) transmits Tristeza virus disease. The symptoms begin with the dieback of small branches and twigs, yellowing of leaves and heavy bearing of small fruits. As the disease advances the symptoms, intensify resulting in severe chlorosis and mottling. The feeder roots of the affected plants die, the bark of the larger roots is distorted and brittle, and dry rot symptoms are observed in case of lateral roots. After 7-8 years the branches of the affected plant dry up completely and the plants wilts completely.

Few trees show wilting symptoms overnight and completely dry up in 2 or 3 days. Hence, *Tristeza* is also called a quick decline disease.

**Control :** Good cultural practices, increasing the fertility levels of the soil and good drainage are useful in reducing the decline disease. The best method to check this disease is to control the aphid population by application of insecticides in the nursery and also in plantations.

### **Greening**

This disease is spread through grafting and citrus psylla (*Diaphorina citri*). Affected trees are stunted with pronounced leaf and fruit drop. Some branches on affected tree exhibit severe twig dieback symptoms whereas the others are apparently normal.

The fruits of affected trees remain mostly green even on maturity and the fruits, which are directly exposed to sun show a conspicuous yellow patch on the rind surface. Disease fruits are valueless owing to small size, distortion, low juice and insipid taste.

**Control :** As the disease is transmitted through grafting, the budwood used from the parent tree should be free from greening.

Controlling the vector population can effectively check this disease in the field. Spraying Phosphamidon (0.025%) or Parathion (0.025%) controls nymphs and adults. Soil application of Dimethoate 10% granules around the plant basin gives effective control of citrus psyllids.

### **Citrus Exocortis**

Exocortis is characterized by drying narrow strips of outer bark, which tend to separate from the inner live-bark. The outer bark slowly peels off as it withers. The affected trees show lack of vigour resulting in dwarfing.

**Control :** The disease can be prevented by the use of virus-free budwood. Grafting tools should be disinfected after pruning branches from diseased trees.