When does citrus canker disease outbreak occur?

Major citrus canker outbreaks generally occur when new shoots are emerging or when fruits are in the early stages of development, especially if a major rainfall event occurs during this critical time. Frequent rainfall in warm weather, especially storms, contributes to disease development. Citrus canker is mostly a cosmetic disease, but when conditions are highly favorable for infection, it causes defoliation, shoot die-back and fruit drop. Leaf susceptibility is complicated by leafminer. The galleries caused by leafminer larvae do not heal quickly and increase leaf susceptibility. This results in leaves with highly susceptible wounds for long periods of time through which the bacterium can infect the leaf. The number and individual lesion sizes are greatly increased leading to increased inoculum pressure in an orchard compared to citrus canker in the absence of leafminer.

What you should do to manage citrus canker and other foliar diseases of citrus (e.g. Alternaria brown spot)

Citrus canker like all other bacterial diseases is difficult to control once established. The best way to manage the disease is to get rid of the inoculum source within the orchard. In the face of high incoculum pressure in the zone, citrus growers should regularly inspect their trees. In case of infection, the following actions should be taken depending on the level of infection.



Figure 5; Citrus tree heavily infected with citrus canker before buck horning



Figure 6; Clean citrus tree after buck horning.

A. Selective pruning or buck horning in a situation where citrus canker infection is localized and limited to a small number of trees within the orchard.

If canker is detected in an orchard previously free of the disease, selective buck horning (pruning) of infected trees on site will prevent the establishment of the disease. For the selective buck horning to be effective, canker has to be localized and limited to a small number of trees. Selective buck horning is not likely to be effective if canker is already established in the neighborhood as it can spread with the wind and rain. Before the selective buck horning is attempted as a control measure, blocks should be thoroughly inspected to be sure that canker is not more widespread than initially thought. All infected trees as well as some apparently healthy trees surrounding the infested area should be buck horned. Buck horning must be followed by monthly inspections and

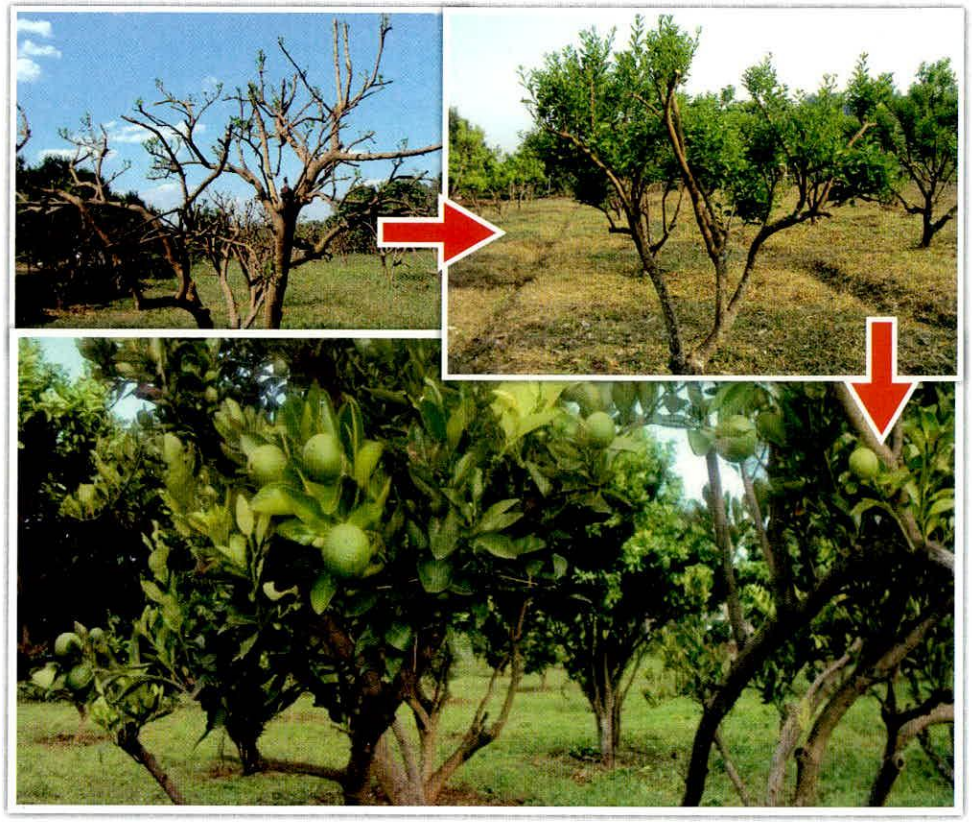

Figure 7; Recovery of a citrus orchard following complete severe pruning (buck horning)

further buck horning of any further trees found positive for the disease.
The buck horning is to be done with a hand saw.

B. Severe pruning or buck horning of the entire orchard for heavily infected orchards .

In heavily infected orchards, removal of leaves of all the trees in the orchard is recommended. Strict sanitation procedures must be followed in the removal and disposal of the infected plant materials. Pruning should only be attempted during dry times of the year and in conjunction with regular inspection. Removal of canker-infected leaves (tissues) is not likely to completely eliminate the disease as strong flushes of highly susceptible leaves will follow and is likely to become infected from residual inoculum in the tree or nearby infested groves. Following severe buck horning, the new growth flush should be treated with copper-based pesticides (fungicides) once the growth is half expanded to protect it from new infections.



Figure 8; Tangerine timely treated with insecticide (IMAXI) after severe pruning (buck horning)

• Twigs and stem infections resemble those on fruits. The lesions are raised with a corky appearance and can support long-term survival of the bacterium. Older lesions may darken when they become colonized by saprophytic fungi such as *Colletotrichum spp.*



Figure 2; Heavily infected citrus tree in a farmer`s orchard in Ngetta Sub-County, Lira District.

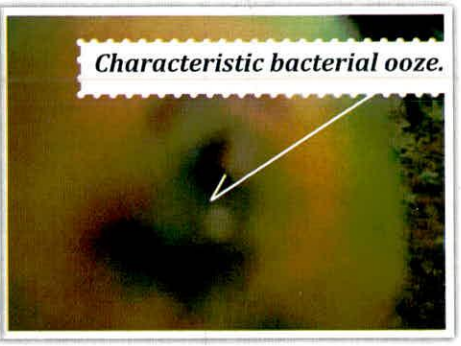

Figure 3; An infected fruit with characteristic bacterial ooze.



Figure 4; Fruit dropping due to heavy infection of citrus canker

Citrus Canker Management Guide

Kumakech Alfred and Acipa Alexandrina.

What is CITRUS CANKER?

Citrus canker is a foliar disease of citrus caused by the bacterium *Xanthomonas* citri subsp. citri. It is a leaf, fruit, and stem blemishing disease that affects most citrus. Citrus Canker causes premature leaf and fruit drop. It is a highly contagious disease that is easily spread by:

- Wind borne rain.
- People carrying the infection on their hands, clothing or equipment.
- Moving infected or exposed plants or plant parts.

How to recognize Citrus Canker Disease

- Symptoms of citrus canker disease appear on fruits, leaves and twigs. The disease causes necrotic lesions.
- On leaves, brown small round blister like lesions occur on both leaf surfaces.



Figure 1; Symptoms of citrus canker disease on leaves

The lesions have water soaked margins and surrounded by a yellow halo. Heavy or severe infection causes defoliation.

- On fruits, the lesions are brown and create a water soaked margin with yellow halo. During rainy seasons and early in the morning hours, bacterial exudate can be seen to be oozing from some lesions. Some of the affected fruits drop. Fruit lesions vary in size because the rind is susceptible for a longer period of time and more than one infection cycle can occur on fruits.



Figure 9; Washington Navel timely treated with insecticide (IMAXI) after severe pruning (buck Horning).

C. Control leaf miner on new growth flush (new leaves)

The new leaves that emerge after pruning or buck horning are highly susceptible to leaf miner damage. The fresh leaves should be sprayed with insecticide (IMAXI, PYRINEX or AMBUSH) once a month for a period of at least 4 months. Applications of insecticides should be properly timed to reduce damage by leaf miner. The concentration of insecticide should be half the concentration recommended by the manufacturer for a mature tree.

What should be done to halt the spread of citrus canker disease within the zone:

(i) Nursery operators should select scions for grafting from citrus orchards without history of citrus canker.

(ii) Citrus seedlings should be distributed to farmers only when the health status has been approved by trained plant pathologists/agriculturalists.

(iii) Farmers should be encouraged to buy citrus seedlings from nurseries with good pest and disease management practices.



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CITRUS CANKER MANAGEMENT GUIDE



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