



African greening management

in SA's citrus orchards

Managing greening disease caused by the bacterium "Candidatus Liberibacter africanus" (CLaf) in orchards, is a challenge. And to combat it successfully requires a fully integrated management approach, as well as an area/regional approach.

By MC Pretorius and James Warrington



Mathys Pretorius (aka MC)



James Warrington

Historically, for more than 40 years greening disease has been successfully managed in Nelspruit's Karino area in the Mpumalanga Lowveld. At a height of between 600 - 850m above sea level, a sub-tropical climate, mild winters and warm to very hot summers, the incidence of greening disease in this area is generally very high.

All citrus cultivars planted in the Nelspruit area are susceptible to greening. The biggest challenge occurs when lemons are grown in a greening-endemic area due to their characteristic year-round flush. Therefore, an area-wide decision was made by growers to refrain from planting lemons. Multiple flushes hamper effective vector control, resulting in the continuous spread of the bacterium, and creating additional inoculum sources that pose a threat to the region as a whole. Populations of the

vector (*Trioza erytreae*) commonly known as psyllids, are endemic and occur in high numbers in orchards every season. If not managed well, this disease can eradicate citrus production as seen in the White River area, where citrus production was discontinued in the 1970s due to the incidence of greening.

Karino: case study of a successful area approach

Area-wide, the Karino region just north-east of Nelspruit started controlling the bacterium and the vector as part of an integrated management approach. This approach proved successful and citrus is still being planted and grown economically in this area, despite the presence of greening and an adverse climate. Extension personnel at Citrus Research International, private consultants, and chemical and technical personnel from chemical companies carried out grower awareness on a regular basis.

All role players need to be on board to make this approach a success, e.g. the Department of Agriculture, Land Reform and Rural Development (DALRRD) for movement of plant material from infected areas to disease-free areas; agricultural unions and support companies; and citrus nurseries, retail nurseries and research institutions.

Additionally, public and grower awareness of the threat of illegal importation of plants is also needed, since this can have devastating consequences. Only legal regulatory processes should be followed to import plant material.

The success of the Karina area and others that would like to follow a similar approach, hinges on the cooperation of all stakeholders, and ensuring that the area remains economically viable for citrus production.

Management approach adopted to enable an area to successfully grow citrus where greening and the vector is present

Establishing/replanting new orchards (0 - 5 years)

1



2



3a



3b



1: Valencia fruit symptom: lopsided fruit, colour inversion 2: Sectorial infections in older trees 3a and b: Iron (FE) and Zinc (ZN) Deficiency symptoms (LD tools) 4: Mottled leaves

4



- Growers are advised to only order new trees from the Citrus Improvement Scheme's accredited nurseries who have obtained all their disease-free budwood and seed from the Citrus Foundation Block (CFB)
- Soil preparation and irrigation should be completed before trees arrive on the farm, to allow the trees to be planted as soon as possible after arrival
- If possible, tree plantings should face north or south in order to create unfavourable conditions for the vector to establish itself (Van Den Berg et al., 1991)
- Two weeks after planting, young trees should be treated with soil applications of a systemic insecticide – preferably a product with a long residual effect (3 - 6 months)
- Stem applications of systemic insecticides should be applied when soil temperatures are still cold, otherwise poor absorption and spread of soil-applied products throughout the tree will occur
- Young (non-bearing) trees should be protected throughout the season with multiple systemic insecticide treatments
- Scouting should be done monthly throughout the year, especially when trees are flushing and when psyllid populations tend to be present in higher numbers (psyllid eggs, nymphs, and adults)
- Flush control is essential and should be well managed to prevent out-of-cycle flush, especially during winter months. New flush will attract psyllids and higher vector populations are then present during the main tree flush in spring. Proper irrigation management will assist to synchronise the flush cycles. No fertilisation should be administered no later than March, to prevent out-of-cycle flush.
- If disease symptoms (greening-affected trees or branches with mottled leaves) are visible, it is recommended to remove these infected trees up to year 5. These trees should be removed as soon as symptoms appear, and replaced with new trees.

Established orchards (> 5 yrs)

Scouting needs to be done throughout the year (psyllid eggs, nymphs and adults).

Flush control

It is essential to manage irrigation schedules and to manage and synchronise flush peaks in order to prevent unnecessary psyllid attraction, especially during the winter months. It is essential to prevent any leaf flushes during winter to ensure that no upsurge in psyllid populations occur, thereby eradicating higher numbers during the spring period. Irrigation and

Area-wide, the Karino region just north-east of Nelspruit started controlling the bacterium and the vector as part of an integrated management approach.

fertiliser consultants differ from this practice. However, the importance of disease control overrides any individual recommendations.

The most important flush peak, with the highest attraction of psyllids, is during the spring flush where soil-applied systemic insecticides proved to be the most effective (3 - 6 month protection; sandy soils have a better absorption compared to clay soils). Stem applications of systemic insecticides (3 - 4 week protection) could be applied as well as foliar insecticides (7 - 10 day protection) need to be applied to protect each flush period. The autumn flush is also a challenge due to restricted registered insecticides available close to harvest.

Fertilisation should not be applied later than December and definitely not later than March,

as currently recommended by fertilisation consultants, in order to prevent any stimulus of new growth during the winter months.

Disease reduction

Pruning: summer and autumn pruning needs to be restricted to the removal of new growth, as the removal of hard wood would stimulate new growth that would attract psyllid populations.

All symptomatic branches should be marked with paint and removed during the winter months, as symptom expression is much clearer/more visible during the cooler months of the year. Fruit and leaf identification of the disease is more effective during this time of the year.

Treat all pruning wounds to prevent new growth that will also attract psyllids.

The standard practice in greening-infected areas is to reduce inoculum by removing infected branches at the point of origin on the main stem.

When trees are infected with the bacterium it is normally only a sectorial infection – a branch – but in severe cases a bigger part of a tree could express symptoms (>2 sectors/branches in the tree).

Trees expressing >3 branches per tree should be removed immediately.

General

- Adhere to DALRRD restrictions on movement of plant material (R110)
- Only utilise official importation regulations to import plant material into the country
- An area-wide approach by all role-players will ensure success.

References

Van Den Berg, M.A., V. Deacon, and P. Steenekamp. 1991. "Dispersal within and between citrus orchards and native hosts, nymphal mortality of citrus psylla." *Trioza erytreae*. (Hemitera: Triozidae). *Agricultural, Ecosystems and Environment*. 35 (1991) 297-309. 