

EXTENSION BRIEFS • AUGUST & SEPTEMBER 2012

H.F. LE ROUX & J.J. BESTER

Citrus Research International



INTEGRATED PEST MANAGEMENT

CITRUS THRIPS T.G. GROUT

Suppressing citrus thrips populations on the spring growth flush will assist in lowering populations experienced at petal fall. On younger trees a methamidophos stem treatment is a useful option for this. An alternative may be an organophosphate that cannot be sprayed after petal fall. If mealybug requires control, the organophosphate could be sprayed at full cover. These treatments will also reduce low populations of citrus psylla. Avoid using abamectin at this time because it will be needed for citrus thrips control in summer.

FALSE CODLING MOTH S.D. MOORE

It may be very tempting to neglect orchard sanitation in winter, as FCM levels are usually low and Valencias being harvested at this time are generally less susceptible to FCM than some of the earlier season cultivars. However, this would be a big mistake. It has been shown that Valencias can fulfil an overbridging role for FCM from one season to the next. The most effective way in which to ensure the lowest FCM inoculum possible at the start of a season, is to diligently continue sanitising orchards until the previous season is truly over. Most importantly, growers must ensure that no fruit whatsoever remains on trees or on the orchard floor after harvesting is completed.

BOLLWORM S.D. MOORE

Depending on the region of the country, which influences temperature and blossom phenology, bollworm may begin invading orchards as early as September or even August. Growers should therefore begin weekly blossom inspections for bollworm eggs and larvae no later than early September. Particularly if a biological product, such as DiPel or HELICOVIR, is going to be used, sprays should be applied as soon as eggs begin to hatch. This can only be determined by vigilant and regular scouting.

CROP AND FRUIT QUALITY MANAGEMENT

P.J.R. CRONJE

Maturity indexing on late cultivars in late areas should commence. Maturity indexing is done to predict the rate of change in fruit maturity in order to harvest fruit at a maturity that would maintain acceptable commercial shelf life. The aim is to define changes or rate of change in acids and sugars and to build up a database over a number of years for comparison. Random sampling of fruit every week from each of ten representative trees should start 4 to 6 weeks before the expected harvest date. Titratable acidity is determined by titration with sodium hydroxide, sugar content (Brix) is determined using a refractometer, the sugar:acid ratio calculated and fruit colour should be read

from a colour chart. All the parameters mentioned above should be plotted on a graph over time. Once plotted, trends will become apparent, harvest dates can be estimated and problem areas in internal and external quality parameters can be identified and manipulated.

Degreening and post harvest rind disorders. The two publications "Common Defects Associated with Degreening of Citrus" by Andy Krajewski and Tim Pittaway and "Postharvest Rind Disorders of Citrus Fruit" by Paul J.R. Cronje are a must for any grower. Both are available from CRI. Contact Bella Thulare at 013 759 8000 or bella@cri.co.za.

Pruning of early and late cultivars should be done as soon as possible after harvest. Prune more heavily after a light crop if a heavy crop is expected and when the orchard has a history of alternate bearing. Pruning in the winter and not later than September improves the light distribution inside the tree and improves the quality of the bearing wood inside the tree. Pruning can also be used as a thinning technique. Light levels of 30% of full sunlight are necessary for optimal photosynthesis and light also improves colour development. In very dense trees and especially older trees light levels drop to below 30% inside the tree and adversely affect fruit size.

One or two **pre-bloom foliar urea** applications (low biuret urea at 1%) should be applied for uniform flowering and fruit set, especially when leaf N levels are low and a light blossom is expected.

Fruit set treatments according to cultivar requirements need to be applied. Specific treatments include the application of gibberellic acid (GA) and girdling, especially for parthenocarpic cultivars that have a poor set. Girdling during full bloom improves set. A general guideline cannot be given as fruit set treatments differ by cultivar and, in many cases, by orchard depending on the previous crop load. Moisture stress should be avoided during full bloom, fruit set and early fruit growth.

GEÏNTEGREERDE BEMESTING

J.T. VAHRMEIJER

STIKSTOFBEMESTING VAN SITRUS

Aan die einde van die groeiseisoen

1. Blaar en grondmonsters moes aan die einde van die groeiseisoen geneem gewees het (Februarie tot Mei).
2. Resultate van die blaar- en grondontledings tesame met boordinsigting (ouderdom van bome, onderstam, kultivar, verwagte opbrengs, ens.) word gebruik vir bemestingsaanbevelings.

Waar mikro-spuite of enige ander stelsel behalwe druppers gebruik word:

3. Begin met stikstoftoedienings in Julie met die uitsondering

van die Wes-Kaap en Hartswater wat in Augustus begin. Afhangende van die klei-inhoud van die grond word die stikstof tussen 1 en 4 toedienings verdeel.

Waar druppers gebruik word.

4. Begin met die stikstoftoedienings in Julie met die uitsondering van die Wes-Kaap en Hartswater wat in Augustus begin.
5. Verdeel die volumes wat per maand aanbeveel is in ten minste weeklikse toedienings.
6. Stikstoftoediening geskied volgens die fenologiese stadium van die boord. As breë riglyn kan die volgende gebruik word:

Periode	Phenologie	N (dpm)
Einde van oes tot knopbreek	Seldifferensiasie en akkumulering van koolhidrate	25
Knopbreek tot eerste blom	Knopbreek, blom en vrugset	45
Blom tot vrugval einde November	Vrugset en selgroei	30
Vrugval to einde Januarie/Februarie	Vrug-groei	90
Tot aan einde van oes	Rypwording en oes	0

Blaarbespuitings:

7. Dien ureum toe as 'n blaarbespuiting in Julie om vrugset te bevorder of na Oktober vir stikstof-aanvulling.
8. Die kritiese vereistes vir suksesvolle blaarvoeding is die kontaktyd wat die blare nat bly, en die konsentrasie van die voedingselement in die spuit-oplossing.

Om die loging van stikstof te beperk kan die volgende gedo word:

9. Dien stikstof in die middel van of aan die einde van die bproeiingsiklus toe.
10. Voorkom 'n oormaat van stikstof in die grondoplossing. Stikstofkonsentrasies wat hoër is as 150-200 mg l-1 het geen adisionele voordeel nie. Oormaat stikstof lei tot moontlike logi van die stikstof en moontlike probleme met vrugkwaliteit.
11. Stikstoftoediening moet verkieslik aan die einde van (groeiseisoen gestaak word sodat die stikstofinhoud in die gro

gedurende die wintermaan kan afneem.

12. Die regte hoeveelheid wa moet toegedien word tydens sproeiing. Dit is onvermyde dat 'n sekere hoeveelheid stiks geloog word tydens besproeiing maar oor-besproeiings vers die proses en 'n groot hoeve

heid stikstof kan verby die wortelsone geloog word. Reën moet ook in ag geneem word tydens besproeiingskedulering.

NITROGEN FERTILISATION OF CITRUS

At the end of the growing season:



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1. Leaf and soil samples should have been taken between February and May).

2. Results from the soil and leaf analyses with additional information such as tree age, tree vigour, expected yield rootstock, etc. are used to compile a fertiliser programme.

When micro-jets or any other system except drippers are used

3. Start with nitrogen fertilisation in July with the exception of the Western Cape and Hartswater which should start in August.

4. Split the nitrogen application in one to four portions, depending on the clay content of the soil.

When drip irrigation is used:

5. Start with nitrogen fertilisation in July with the exception of the Western Cape and Hartswater which should start in August.

6. Split the volumes recommended per month into at least weekly applications. Even better, into daily applications. Ensure that the water and fertilisers do not penetrate deeper than the upper root zone (30-40 cm).

Period	Phenology	N (ppm)
End of harvest until bud break	Cell differentiation and accumulation of carbohydrates	25
Bud break to first open flowers	Bud break, flowering and fruit set	45
Blossom to fruit drop in November	Fruit set and cell growth	30
Fruit drop to end January/February	Fruit growth	90
Till end of harvest	Ripening and harvest	0

Foliar spray of nitrogen:

7. Spray the urea in July to improve fruit set and after October to supplement nitrogen.

8. The critical requirements for successful foliar sprays are contact time and concentration of the nutrient element in the spray solution.

Four measures can be used to prevent or minimise the downward movement of nitrate:

9. Inject nitrate in the middle of, or late, in an irrigation event.

10. Avoid excessive concentrations of nitrate in the soil solution. Nitrate concentrations greater than 150-200 mg/L don't provide any additional benefit, and supplying more N fertiliser simply increases the risk of leaching by successive irrigation or rainfall events. Oversupplying N can also lead to fruit quality issues.

11. Complete the N supply programme by the end of the growing season to allow depletion of nitrate in the soil by winter.

12. Ensure that only the right amount of water is applied. Some movement of nitrate may be inevitable with each irrigation cycle, but overwatering is likely to speed up that process and move nitrate beyond the root zone. Allowing for expected rainfall when calculating the depth of water to apply will also help reduce the likelihood of leaching.

GRONDGEDRAAGDE SIEKTES M.C. PRETORIUS

Aalwurms

Grond- en wortelmonsters kan in die lente getrek word en na die Diagnostiese Sentrum in Nelspruit gestuur word vir ontleding sodat die aalwurmpopulasie in die wortels bepaal kan word. Die resultaat sal dien as 'n bestuurshulpmiddel om 'n koste doeltref-

fende aalwurmbeheerstrategie daar te stel.

Die gebruik van chemiese aalwurmdoders vir die beheer van die sitrusaalwurm word nie aanbeveel alvorens ten minste 30 mm reën geval het nie (Oktober). Elke aalwurmdodertoediening behoort met 'n behoorlike besproeiing opgevolg te word om te verseker dat die middels deeglik deur die grondprofiel gewas word. *Toedienings behoort slegs volgens etiketaanbevelings toegedien te word. Afwykings van die geregistreerde dosisse, om kostes te bespaar, lei tot oneffektiwiteit. Dit is belangrik om 'n program te volg, een aalwurmdodertoediening per seisoen is 'n mors van geld!*

Phytophthora

Phytophthora wortelvrot die gebruik van fosfonaatprodukte is 'n uiters effektiewe en bekostigbare beheermaatreël wat suksesvol deur produsente gebruik word. Dit is van uiterste belang dat die etiket deeglik bestudeer word asook die waarskuwings voordat die produk gebruik word om effektiwiteit te verseker

en fitotoksiteit te voorkom. Indien kraagvrotletsels voorkom kan 'n stamverf/blaarbespuiting aangewend word, drie aanwendings per seisoen met 6-8 weke intervalle. Vir wortelvrotbeheer word drie blaarbespuitings, met 6-8 weke intervalle aanbeveel.

FRUIT AND FOLIAR DISEASES G.C. SCHUTTE

Alternaria core rot

Alternaria core rot, also known as navel-end rot and black rot, occurs in all areas of southern Africa. The disease is most prevalent on those citrus cultivars such as navels and Clementines characterised by the presence of a secondary fruit called the fruit-navel, which varies in size and develops at the stylar end of the primary or main fruit. These fruitlets are extremely sensitive to environmental stress conditions during early stages of development and are therefore also prone to diseases such as navel-end rot and physiological disorders.

Alternaria core rot is linked to large fruit-navels or to the abnormal growth of the secondary fruit into primary-fruit locules which lead to the formation of points of entry through which fungi can penetrate to form infections which remain quiescent until favourable conditions stimulate further fungal growth.

The style and stigma of navel blossoms are milky white at first and then turn light brown in colour and abscise cleanly. This happens one week after petals have dropped and young fruit are ± 8 mm in size. The two sets of stylar tissue present in the primary and secondary fruit locules can be injured during the blossom period if harsh weather conditions prevail for one or more days (hot days $>25^{\circ}\text{C}$), and low relative humidity ($<20\%$) followed by heavy dew during the evenings. This causes the outer or primary style to turn brown and dry out, while the inner or secondary style remains unaffected inside the outer style and continues to develop and swell in size to result in longitudinal cracks in the outer tissue. The longitudinal cracks enlarge as the orange increases in size. The inner ovary projects even more as the orange

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approaches maturity. This results in a large, irregular-shaped navel-end and creates an ideal site for *Alternaria* infections.

Score (50 ml/100 l water) and Folicur (80 ml/100 l water) are registered for control of the disease.

POST HARVEST PATHOLOGY – WASTE PREVENTION

K.H. LESAR, A. ERASMUS & P.H. FOURIE

Packing and harvest schedules should be extreme at this stage of the season, but basic practices should not be neglected now. Below are a few factors that should be focused on.

Precautions and Recommendations

- Minimise injuries to fruit during picking, handling and transport to the packhouse.
- Monitor the incidence of insect activity in the orchards and institute appropriate measures to reduce their populations. Especially fruit fly numbers which could increase with the hotter weather.
- Insect damage to fruit contributes to injuries and possible infection by the wound pathogens.
- Make use of the indigo carmine mixture to monitor the incidence of injuries to the fruit during picking.
- Handle the fruit as a perishable product, because it is a perishable product.
- Ongoing removal of dead wood from trees.
- Ongoing orchard sanitation is a non negotiable requirement.
- Minimise the delay between picking and treatment. The longer the delay the higher the risk for high decay.
- The first fungicide application must be applied within 24 hours from harvest.
- Packed fruit must be cooled down as soon as possible.
- Fruit destined for juice factories should be removed from the packhouse premises on a daily basis.

Checklist for chemical application

- Chlorine application
 - Solution pH: 6 - 7
 - Chlorine concentration: 75 – 150 ppm
- Fungicide dip tank
 - Imazalil concentration: 500 ppm
 - Solution pH: not higher than 6
 - Exposure time: 1 – 3 minutes in a solution at pH3 or not longer than 45 seconds in a solution at pH6
 - Maintain the concentration by following the advised imazalil top-up protocol
- Wax application
 - Fruit should be dry when they reach the wax applicator
 - Wax load should be between 1 and 1.2 litres per ton fruit depending on manufacturers' recommendations
 - Over application can lead to MRL exceedance
 - Under application will lead to poor fruit quality preservation and poor disease control
 - The wax solution should be agitated continuously (24 hours a day, 7 days a week)
 - Thiabendazole tends to precipitate to the bottom of the wax drum and cannot be fully suspended again
 - Drying tunnels after the wax applicator should not be overheated

- Require from the wax manufacturer what the optimum temperature should be for the specific wax

- The correct drying of the wax is crucial to ensure that the desired effect is gained

PHYTOPHTHORA BROWN ROT

Adequately skirt trees to minimise the risk of *Phytophthora brown rot* infection after rainfall.

Do not pick skirt (low hanging) fruit for packing. Remove this fruit before harvesting and send for processing.

Spray contact fungicides only (copper at 200 g per 100 l) as a preventive measure against *Phytophthora brown rot* after rainfall. Contact fungicides must be re-sprayed after any follow-up rainfall.

Foliar applications of phosphonates for the control of Root and Collar rot will be effective against brown rot.

PACKHOUSE

Ensure that packhouse chemicals are applied at recommended concentrations and packhouse procedures and critical control points are managed diligently.

Pack very strictly with regard to injuries, creasing, over mature fruit, etc.

IMPORTANT POINTS TO REMEMBER

All damaged fruit are *high risk* for export.

Latent and wound pathogen infections on the tree lead to further development of latent pathogen infections, and the spread of wound pathogen infections in exported cartons.

Over-ripe fruit, past optimum internal quality, that are destined for cold disinfestation markets are less resistant to cold damage during storage/shipping and more susceptible to decay.

Minimise the delay between picking and packing.

Fruit arriving in the market with quality problems often sells at reduced prices and ultimately becomes a major loss for the grower. Producers must be aware of the risk involved in exporting this fruit and decide whether to export the fruit, or not.

KEEP NEXT SEASON IN MIND

- Orchards should be stripped from any leftover fruit after harvest
- Fruit should be removed from the orchard, mulched and buried
- Do not let this fruit be left close to an orchard and allowed to rot
- The purpose of this exercise is to reduce and limit the amount of pathogen inoculum in the orchard, which will reduce the disease pressure in that specific orchard during the next season
- The best time to remove dead wood is directly after harvest
- Latent pathogens survive on dead wood in trees
- Pruning in order to open the tree canopy should also be done now, this will reduce the development of dead wood
- As you go through the packing season make notes of problems and faults in the packline, which should be addressed during the off-season.