

Extension briefs

JUNE AND JULY 2026

By the Citrus Research International Extension Team

Integrated pest management False codling moth (S.D. Moore)

Orchard sanitation must continue diligently during the harvesting period. Furthermore, all all fruit that remains on trees after harvest must be removed and destroyed no later than two weeks after completion of harvesting. This is because false codling moth (FCM) activity does not cease during winter, and any remaining fruit could serve to facilitate this activity. Plus, this winter fruit creates a reservoir of inoculum of FCM for the following spring. Conversely, removal of all fruit after harvest could dramatically reduce FCM levels in the following season. Fruit fly numbers can also build up on unharvested fruit. Recent research has demonstrated that initiation of mating disruption in July in the warm northern regions can be highly effective, both in

protecting late hanging Valencias and in suppressing the first FCM generation of the new season, but it is important to check with the applicable product supplier whether their registration permits this. Pack houses must continue to implement all aspects of the FCM systems approach (FCMSA) for fruit destined for the EU, diligently and accurately. For example, grading of fruit on the packing line must be conducted as stringently as possible. Advisably, pack houses should slow down the line speed to enable closer scrutiny of fruit. A designated inspection table, equipped with excellent lighting, should be installed just before final grading and sizing. For optimal results, staff appointed to conduct such inspections and grading must have 20/20 vision and be properly trained and incentivised. Pallet inspections by the Perishable Products Export Control Board (PPECB) are also a critical component of the FCMSA, to help filter out infested fruit. Overall, this process requires full collective cooperation for the best outcome.

Red scale (S.D. Moore)

Growers who recorded red scale infestation during the past season should consider applying narrow distillation range horticultural mineral oils. These constitute the most IPM (integrated pest management)-compatible treatment option for red scale.

Furthermore, currently available and registered oils are safe for the tree. Also, if used according to recommendations, they will not result in phytotoxicity or crop reduction. This is contrary to the old, less refined oils. The best period to apply this treatment is from budswell to budburst (mid-July to mid-August). The grade of oil to be applied and the region of the country (hotter northern or cooler Cape) dictate

the concentration to be used (generally 1.0–1.25% for medium-grade oils). When spraying oil, apply it as a full cover, film wet spray. Only spray stress-free trees. Prune the trees before spraying to help improve spray coverage of the tree framework, where much of the red scale survives over winter. Other treatments for red scale would normally be applied in August, September or after petal fall, and will be discussed in later editions of the Extension Briefs.

Ant management (E.V. Mauda)

Ants are usually indirect pests on citrus. They interfere with the behaviour of natural enemies of key IPM pests (e.g., red scale and mealybug). Ants sometimes even transport pest species (e.g., mealybug) to different parts of the plant. The winter months are ideal to control ants before honeydew-producing pests, such as aphids, increase with the spring growth flush. Ant scouting should be done after heavy rains or persistent rainfall, as this is when they become more active. During scouting for ants, look for their ground trails leading to trees and soil mounds in orchards. Examine tree trunks for the presence of ants on a fortnightly basis. Likewise with tree trunks, every fortnight. Trees should also be skirt-pruned to prevent branches from touching the ground later in the season when bearing fruit. If 30% or more of the trees in an orchard are infested, the entire orchard needs to be treated. Whereas, if less than 30% of the trees are infested, only the infested trees should be treated. Options for ant control include the use of bait treatments such as Siege, which targets brown house ants, and SAGA bait, which targets both the pugnacious ant and the brown house ant. In the Western Cape Province, fipronil and lambda-cyhalothrin can be used to control Argentine ants. The



Coenraad Fraenkel



André Combrink

use of either Paraffin wax + polyisobutylene or Butene + Homopolymer + Paraffin wax can be employed as trunk treatments to exclude ants from trees. Ideally, ants should only be controlled in the tree or prevented from accessing trees, as they can be effective predators of pest pupae (particularly FCM and fruit flies) in the orchard soil.

Naoespraktyke (P.J.R. Cronjé)

Die korrekte produksiepraktyke, soos bemesting en besproeiing, asook snoei, is uiters belangrik vir voorkoming van na oes fisiologiese afwykings. Daar is egter gedurende die oes en pakproses kritiese faktore waarop gelet moet word, wat die voorkoms van skildefekte, asook algemene vrugkwaliteit kan beïnvloed. Bepaal die optimum plukvenster vir elke kultivar per boord deur h maand voor die beplande oesdatum met rypheidsindeksering (interne kwaliteit en skilkleur) te begin. Daar moet

gepoog word om die temperatuurlading op die vrug te beperk, vanaf die plukproses tot in die pakhuis, deur die vrugte se veldhitte so gou moontlik te verwyder (bv. deur vrugte gouer te stort/doop). Die paklyn het h invloed op skiltoestand, asook die voorkoms van skildefekte. Dis belangrik dat noukeurige aandag aan alle bewegende dele (bv. rollers en borsels, asook wakstipe en aanwending) geskenk word. Ontgroening is h belangrike aspek van sitrusnaoeshantering en moet optimaal bestuur word. Neem ook die interaksie tussen kultivar, vrugrypheid en die effektiwiteit van ontgroening in ag. As vrugte te vroeg (onvoldoende kleur-ontwikkeling aan boom) in die ontgroeningskamer beland, sal die gewenste kleur nie ontwikkel nie. Vrugte neig dan om h geler of bleker voorkoms te toon. Gedurende ontgroening is daar egter aspekte wat streng beheer moet word, nl. etileenkonsentrasie (1-3 dpm), temperatuur en relatiewe humiditeit (95%+).

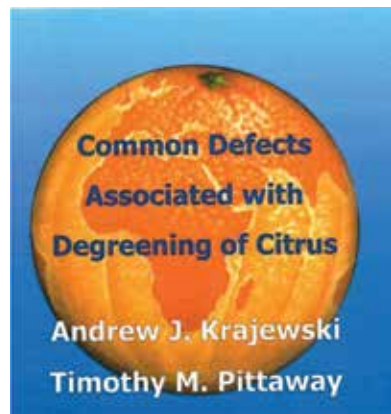
Optimum-ontgroeningstemperatuur

Satsuma-mandaryne: 18 tot 21 °C,
Clementine- en Nova-mandaryne 19 tot 22 °C,
Nawellemoene 21 tot 23 °C, ander lemoene 23 tot 24 °C, Pomelo's en suurlemoene 24 tot 25 °C.

Ontgroen altyd meer sensitiewe vrugte teen die laagste temperatuur. Die etileenbehandeling is die doeltreffendste as vrugte van dieselfde kleur gelyktydig behandel word. Die duur van die behandeling moet ook so kort as moontlik wees. Hou die CO₂-vlakke onder 0.3% (3000 dpm) deur die ventilasie sodanig te stel; hoë CO₂-vlakke verlangsamen die ontgroeningsproses deur as kompeterende inhibeerder teen etileen op te tree. h Stadiger ontgroeningstempo sal h verlenging van die tyd in die ontgroeningskamer vereis en 'n verkorte rakleef tyd tot gevolg hê. Vir meer inligting,

Hannes Bester

MC Pretorius



Common Defects
Associated with
Degreening of citrus
- CRI Shop

raadpleeg *Common Defects Associated with Degreening of Citrus* deur Krajewski en Pittaway, wat hier bestel kan word: <https://www.citrusres.com/shop/>.

Die koueketting se invloed op vrugkwaliteit is van kardinale belang en sal die voorkoms van skildefekte, asook algemene kwaliteitsaspekte soos vrugfermheid en rakleef tyd beïnvloed. **Belangrik:** die koueketting mag nie onderbreek word nie, m.a.w. as vrugte tot op die gewenste temperatuur verkoel is, mag die temperatuur nie weer styg nie.

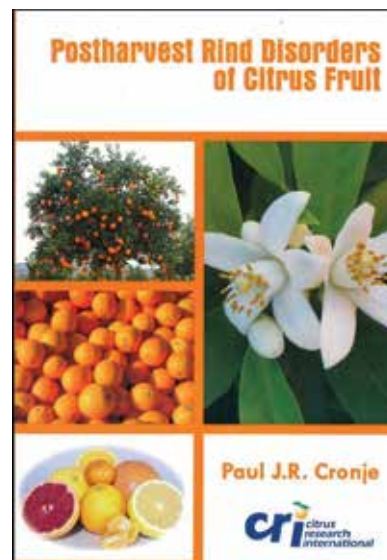
Crop and fruit quality management (P.J.R. Cronjé)

Maturity indexing on mid-season to late cultivars should now commence to predict the rate of change in fruit maturity, for harvest at optimal maturity. The aim is to define changes or the rate of change in acids and sugars, and to build up a database over several years. Random weekly sampling of fruit from each of 10 representative trees should start four to six weeks prior to the expected harvest date.

Titratable acidity is determined by titration with sodium hydroxide and sugar content (Brix°), and by using a refractometer. The sugar to acid ratio must be calculated, and fruit colour should be read from a colour chart. These parameters should be plotted on a graph over time to identify trends, estimate harvest dates, and spot and manipulate problem areas in internal and external quality parameters.

Degreening and postharvest 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. Cronjé, are must-reads for any grower. Both are available to order from CRI at www.citrusres.com.



Postharvest Rind
Disorders of Citrus Fruit
- CRI Shop

Pickers' training and monitoring

Picking bags should always be carried on the hip to avoid crushing of fruit between the body and the ladders, bins, or trees. Picking bags should always be free of leaves,

shoots or sand and kept dry throughout. Short fingernails on pickers will prevent lesions on fruit. Clippers and ladders must be handled correctly, i.e., no long stems and keep limited contact between ladders and fruit. Avoid picking of low-hanging fruit and collecting of dropped fruit. Two sorters should be stationed at each bin, wearing gloves, with the fruit quality of each picker monitored via the sorters by an appointed team leader.

Pruning

For early and mid-season cultivars, pruning should be done promptly after harvest.

These should be removed during pruning:

- old, broken, and dead shoots/twigs
- weak and entangled shoots crossing each other or hanging downwards
- any rootstock regrowth
- water shoots
- excessive regrowth from main frame shoots on the inside of the tree.

Light levels above 30% of full sunlight are necessary for optimal photosynthesis. At least one "window" cut should be made to allow adequate light distribution and improve bearing wood. Increase in photosynthesis and light distribution will lead to increased fruit size and internal fruit quality (Brix°), better fruit colour development, increased rind integrity, as well as more uniform fruit distribution across the tree.

Pruning can also be used as a thinning technique Prune more heavily after a light crop if a heavy crop is expected, and when the orchard has a history of alternate bearing. A follow-up pruning of regrowth in the summer is of critical importance. Pruning tools should always be sanitised with 10% Jik solution when moving from one orchard to another. Also, pruning ensures much more cost-effective spraying and better spray penetration during pest and disease control. Remove pruning debris soon after pruning.

Flower induction

Citrus trees require a rest period of about six weeks to ensure adequate flower induction. The two mechanisms involved in floral induction in citrus are (1) low temperature, and (2) controlled-drought stress. Both prevent root activity. In the absence of low-temperature rest, citrus trees should be exposed to controlled drought stress for a period of four to six weeks during June and July, if possible.

Fertilisation/Bemesting (P.J. Raath and J.G.K. Coetzee)

Leaf analysis /Blaarontleding

June and July are the final window within which to get leaf analyses done. It is still the best diagnostic method to measure trees' nutritional stats. Beskou blaar-analise as 'n aanvulling tot grond-analises, eerder as die enigste norm wat vir die daarstelling van 'n bemestingsprogram gebruik kan word. Dit is ook nuttig in gevallestudies waar blare vanaf "siekk" bome gemonster word, asook vanaf naburige, nie-geaffekteerde bome. Die gesonde/beter bome se blare dien dan as direkte kontrole, sodat die tyd van monsterneming en al die ander veranderlikes minder krities, of nie ter sake is nie. Geen norm word gebruik nie, maar wel die relatiewe verskille tussen die twee monsters.

Soil analyses/Grondontledings

Should coincide with leaf analyses and be done every second year on sand soils. Take soil samples from the same spot every year, for accurate historic dataset development for the soils. Sampling areas can be marked with GPS coordinates, and sample sections where trees are performing poorly can be marked separately. Gereelde grondontledings in bestaande boorde verseker die handhawing van optimale groeitoestande, die vermoë om veranderings in grondvrugbaarheid te bespeur en dat daar korrekatief opgetree kan word. Dus, vóór die ontwikkeling van voedingsprobleme wat boomprestasie benadeel.



Natasha Jackson



Jan Landman

as seasonal evaluations. The fertilisation programme for each season starts in July or August of the previous year, depending on the production area. Due to the properties of the specific chemical ion, the properties of the soil, and the physiological requirements of the trees certain basic rules should be adhered to when applying fertilisers to citrus. Blaarbespuitings word gebruik om tekorte reg te stel, of om die bome se fisiologie te manipuleer. Vir manipulasie is dit hoofsaaklik lae biuret-ureum of kaliumnitraat wat gebruik word. Indien nodig, moet beide bespuitings ses tot agt weke voor die 50% blomstadium toegedien word. Dit is meestal Julie of vroeg-Augustus.

Postharvest pathology (W. du Plooy and L. Mamba)

Even during peak periods, important basic practices like sanitation and fungicide application remain vital in pack houses.

Other analyses

Analyse manure or compost to determine the nutrient value and occurrence of unacceptable elements (e.g., heavy metals) in the organic material. The amount of organic material applied is determined by the concentration of nutrients in the compost or manure. The nutrient content of organic material is much lower than inorganic fertilisers, and often in an inappropriate ratio compared to the trees' nutritional requirements. Beware of applying excessive amounts of nutrients that are out of sync with the trees' requirements.

Fertilisation/Bemesting

Potential yield is an indicator for fertiliser application quantities. Use historic yield data to determine a realistic target yield and basis from which the fertilisation requirement is compiled. The fertilisation programme should then be adjusted, using the results from both soil and leaf analyses, as well

Pack house sanitation

This practice aims to mainly:

- Remove infected fruit from the pack house environment.
- Sanitise surfaces with appropriate treatments. These actions will reduce the inoculum (spore) levels and the risk for future infections and fungicide resistance development.

Surfaces to consider in sanitation

- **Pack line surface** Treat daily with a registered, food-safe sanitising product. It is important that the product does not leave a residue and is quick and easy to use.
- **Fruit surface** Prioritise a fruit disinfectant treatment when entering the pack house. Chlorine (Calcium Hypochlorite) is the most popular active for this purpose. Strictly manage the chlorine concentration, pH and ORP.

Alternatives such as liquid or powder PAA (a disinfectant and sanitiser for rapid pathogen reduction) formulations can also be used. In the case of PAA, there is no need to adjust the pH. However, the PAA concentration levels must be managed carefully, and fruit must be dried timeously (both are to prevent rind injury).

- **Floors and walls** These must be washed weekly with a registered soap and disinfectant product. In these areas, a product that leaves a residue (such as a QAC product) can be used. Use a registered soap before sanitation, as a dirty surface can't be sanitised. The areas to clean include the pack house, degreening rooms, and cold rooms.
- **Degreening rooms and cold rooms** Must be washed and then, where possible, fumigated with a suitable product that can reach into all crevices. Avoid the risk of residue transfer; never fumigate when there is fruit in the room.
- **Orchard bins** Along with picking bags, orchard bins must be washed and sanitised before re-use.

Sources of inoculum (spores)

- **Orchard spores** naturally occur in the orchards. So, orchard sanitation is key to reducing the inoculum load.
- **Post-degreening fruit** Degreening conditions are favourable for disease development and, unfortunately, some sporulating fruit are often tipped into the pack house system.
- **Waste fruit** Have a process in place to remove this fruit promptly. Keep the waste in sealed containers.
- **Juicing fruit** treated with fungicides often linger in the pack house area until it's transported to the juicing plant. Therefore, decay on such fruit holds a resistance risk.
- **Small fruit** If not properly graded out,



Irma Raspel



Vernon Jacobs

this fruit can fall between brushes or gaps between units and lie unseen on drip trays in the pack house.

- **Retention samples** Shelf-life fruit has also been treated with fungicides and holds a similar resistance risk as juice fruit.

Recommendations for reduced risk of infection or resistance development

- Treat all harvested fruit within 12–18 hours. Most fungicides cannot control infections that are older than a day.
- Drench fruit with fungicide protection on Friday afternoon. Don't wait until Monday.
- Degreen fruit for the absolute minimum period.
- Exceeding the pack line volume limit can cause accelerated agitation and movement of the fruit. This will result in bruising and injuries and will reduce the efficacy of sanitation and fungicide treatment. Spread the fruit out for optimal treatment.
- Risks related to rushing fruit through the various control points:

- Chlorine treatment: poor disinfection, spores surviving.
- Fungicide dip tank: loading sub-optimal residue, poor infection control.
- Wax applicator: poor wax deposition on the fruit; sub-optimal residue loading, poor moisture retention, negative impact on quality.
- Limit the time from harvest to packing and the eventual introduction to the cold chain.

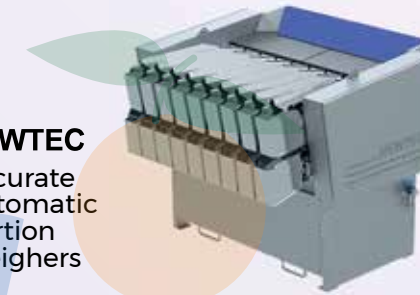
Advice for managing retention fruit

- Have a dedicated task manager.
- Evaluate fruit daily, noting decayed fruit on the carton, then remove or isolate it. Plus:
 - Immediately place infected/discarded fruit in a tightly sealed plastic bag to reduce the risk of releasing inoculum (spores) into the pack house atmosphere.
- Green mould sporulation inhibition is a very important criterion to note. Loss of sporulation inhibition indicates either fungicide resistance or poor application. Prevent spore spread by keeping fruit that exhibit sporulation inhibition – white mycelium with few to no green spores – in sealed transparent plastic bags and incubating it for another week for assessment.
- After the sporulation inhibition rating the bagged fruit must be destroyed (with the bag) well away from citrus orchards and pack houses, to prevent spores from entering any production area.
- Do not keep fruit for longer than the shipping period. Ideally, the retention room should be some distance away from the clean area and completely enclosed with controlled access. Clean and treat this room with a suitable soap and sanitiser at least once a month.



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