

PRE-HARVEST AND PACKHOUSE PRACTICES

Impact on shelf life, fruit quality and market access



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Fruit quality starts in the orchard, but it's affected by the full scope of production practices. By Natasha Jackson

Production practices that have an effect on fruit quality include fertilisation, irrigation, pest and disease control, as well as light management. They also significantly impact fruit set, fruit size, colour development, rind integrity and internal quality, i.e. Brix, acid and Brix to acid ratio.

The removal of deadwood within the tree has numerous advantages. Deadwood is a host for pests and diseases, and can also injure your fruit during picking and during harsh windy weather. The removal of deadwood, as well as fallen and decayed



fruit is a very important orchard sanitation practice to prevent postharvest decay. Fruit that has dropped from the tree should be picked up daily and removed completely from the orchard, to be mulched or discarded (according to CRI guidelines).

Harvesting practices (Fig. 1 and 2): Citrus fruit is alive and should be handled with the utmost care. The fruit has an optimal window period during which it must be harvested. The maturity indexing of the fruit should start six weeks before the expected harvest date, to ensure that the fruit is harvested in the optimal picking window, for long shelf-life. Furthermore, fruit should be harvested at the desired colour plate, or if degreening is to be done, at colour break.

Pickers should be well-trained prior to the start of the picking season. Explain to them what is expected during harvesting and why. Examples are the consequence of harvesting fruit with long stems (longer than 2 mm), as well as the consequence of any damage caused to the fruit by long fingernails, deadwood, picking clippers, etc. Invest in good harvesting shears as poor-quality implements are the main culprit for picking injuries. They should have a blunt nose and rounded blades to reach the stem easier without causing any injuries to the fruit rind.

During harvesting, ensure that bagged fruit is not squeezed between the body of the picker and the picking ladders. Fruit should not be dropped into the picking bag, but rather gently placed into clean picking bags. The picking bags should be cleaned daily, and pickers should not run with picking bags full of fruit. After picking, the fruit should be rolled out gently from the picking bags into the picking bins. Harvested fruit should not be placed in the sun for long periods before being transported to the packing facility. Keep picking bins in a shaded, well-ventilated area with a cool breeze. Where this is not possible, customised shade



net covers over the bins may be a short-term solution. Hot winds and the sun will cause the fruit to dehydrate and enhance physiological rind disorders.

Fruit in transit to packing facilities should be covered with, for instance, heavy duty material like tarpaulin or blankets, to prevent excessive moisture loss, and the accumulation of dust on the fruit. During transit, the fruit may chafe and cause minuscule injuries, which are a perfect place for pathogens that give rise to diseases like sour rot (caused by *Galactomyces citri-aurantii*) and green mould (caused by *Penicillium digitatum*) to enter and cause infections. Therefore, fruit should be transported to the packhouse on roads that are in good condition.

Packhouse delivery inspection: Draw a sample of citrus fruit delivered to the packhouse, inspect it properly according

to the False Codling Moth Management System (FMS) and upload the information on Phytclean. Use this sample to estimate the pack-out percentage. Report the percentage of missing calyxes and long stems to the production managers – a missing calyx also qualifies as an injury. Inform them of any problems and explain the consequences thereof. With this information, they can communicate with the harvesting teams to adjust their picking styles, to improve quality. Use this same sample to dip the fruit in an Indigo Carmine solution (5 g per 10 l of water) to determine the extent of picking injuries. Report the results back to the production managers, in case corrective action is needed.

Drench: Drenches help to remove the field heat and protect the fruit against decay during degreening and storage. Fruit sustain injuries during harvesting and

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transport. Thus, fruit needs to be treated with registered postharvest chemicals to limit the growth and sporulation of pathogens during the degreening process. It is important to determine which registered postharvest chemicals should be applied, considering the intended export market to which the fruit will be exported. It is also important to ensure that the chemicals are mixed adequately and remain in suspension in the drench. After drenching, fruit must be completely dry before entering the degreening facility, to avoid green rings or chemical burns on the rind.

Degreening: Fruit that has an optimal internal quality but poor colour that is not yet suited for the markets, can be degreened. However, degreening has a negative effect on fruit quality and shelf life. The fruit that has been degreened will suffer moisture loss, age faster physiologically, tend to be puffier, have accentuated blemishes, and undergo increased stem-end rind breakdown and decay. It is important to note that fruit must be of an even colour plate for it to achieve uniform degreened colour. Some basic guidelines for degreening include minimising the ethylene concentration, minimising the exposure times, maintaining a moderate temperature appropriate for the citrus type being degreened, maintaining a high relative humidity, removing excess CO₂ and using registered postharvest treatments to protect your fruit during degreening. Once the fruit is ready for packing, remove it from the degreening facility and leave it in a shaded, cool and well-ventilated area for six hours. When the fruit is being tipped onto the pack line, ensure that the decayed fruit is removed before the fruit enters the packhouse. Decayed fruit is covered in millions of spores that should not be released inside your packing facility.

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Decay control (Fig. 3): Registered postharvest chemicals may be used in the drench, fungicide bath or flooder, as well as in the wax to protect the citrus fruit against latent pathogens and wound pathogens. These pathogens can enter the rind where the fruit has been injured during harvesting and during packing. The most critical element in effective decay control is continuous, diligent packhouse sanitation. Waxes are additionally applied to prevent moisture loss and to protect the fruit from chilling injury. Postharvest treatment for decay control is also available as pre-blended wax formulations, which is a more suitable option than blending it in the packhouse.

Consignment preparation: Completed pallets should be placed into cooling as soon as possible. If there are no cooling facilities available, store completed pallets

in a cool, dry and well-ventilated area and ensure that they are promptly loaded onto a truck. Once under cooling, the respiration of the fruit slows down, thus the physiological ageing of the fruit is delayed. When the cold chain is broken, the respiration rate will increase as the temperature increases, this will cause fruit to lose moisture and age physiologically, resulting in a shorter shelf life.

In conclusion: Citrus fruit is a perishable product that should be handled with utmost care. Harvesting should be done at organoleptic maturity to extend the shelf-life. It should be treated, packed and cooled as soon as possible after harvest, and the cold chain should never be broken. Careful management of production practices, picking and packing procedures helps to optimise fruit quality and shelf life for the destination markets.

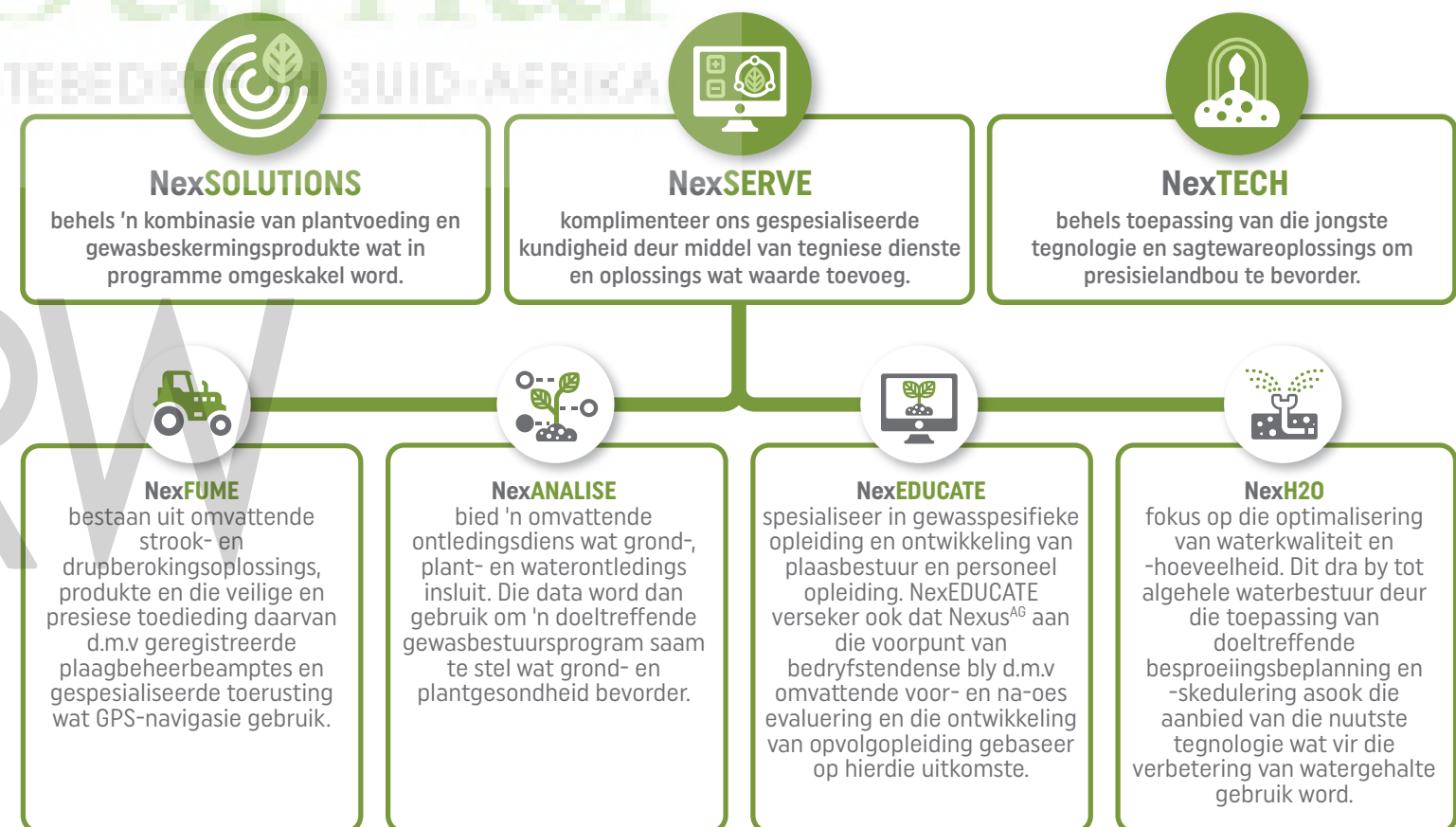


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