

Keeping up with tastes that are a-changing

Researchers are putting a new local avocado cultivar through its post-harvest quality paces in order to capitalise on European consumers' changing preferences.



1 THE EUROPEAN AVOCADO market is steadily moving away from green skin cultivars in favour of 'Hass' avocados that change colour as they ripen. Unfortunately, 'Hass', which is the benchmark cultivar, bears quite poorly in certain South African growing regions. Therefore, to protect and grow its export market share, the local industry had to identify and develop alternative, high-bearing 'Hass'-like cultivars.

'Maluma' has emerged as a cultivar that meets these demands. This highly productive 'Hass' selection has been extensively planted over the last few years. As an open cultivar, any

grower is free to produce it and all exporters may market it. The only restrictions concern the licensing of nurseries that supply the trees.

Despite all these advantages, the industry is not yet certain that 'Maluma's' export quality can be guaranteed, mainly because appropriate quality assuring cultivation practices, harvest methods and, importantly, storage/ripening procedures have not yet been developed.

According to Dr Frans Kruger, researcher and consultant at Lowveld Post-harvest Services, the cultivation of a tree crop, such as avocados, is only profitable when export quality can be guaranteed. "Even a high-yielding cultivar such as 'Maluma' is of little value if the post-storage quality of the fruit varies from one season to the next," says Frans.

There is, furthermore, significant competition between South Africa, Peru and Chile. To succeed, any new cultivar must have similar storage, ripening and organoleptic qualities to 'Hass' (or qualities better than). "If we can combine increased production with stable quality, the result will most definitely be increased competitiveness for the industry as a whole," says Frans. "Producers in areas that are marginal in terms of 'Hass' production will be the big winners when it comes to profitability."

In pursuit of these outcomes, Frans designed a study to upgrade the 'Maluma' cultivar's export protocol. Working with him was Dr Bombiti Nzanza, a horticulturist with considerable expertise in tomato and avocado production, storage and export. The third team member was Danie Lemmer, a PhD student and post-harvest specialist with extensive knowledge of avocado storage technology. The researchers were assisted technically

by husband and wife team Otto and Emè Volschenk.

Objectives and methodology

This study, funded by industry and the PHI Programme, ran from January 2015 to December 2016 and had five objectives:

1. Establish appropriate harvest maturity parameters.
2. Develop appropriate harvest protocols.
3. Establish appropriate storage temperature settings.
4. Develop appropriate ripening protocols
5. Determine how phenological, climatic and horticultural variables influence the quality of the fruit.

'MALUMA'S' MALADIES

The 'Maluma' cultivar has been shown to be susceptible, to a greater or lesser extent, to these seven disorders.

- Soft landings
- Grey pulp
- Black cold damage
- Vascular staining
- Variable ripening
- Poor external colour
- Post-harvest fungal infections

To achieve these, the researchers set out to answer three questions:

1. How soon after harvest do 'Maluma' fruit need to be put into cool storage?

Six trials were done to answer this question.

- Two at Mooketsi with 'Maluma' fruit only,
- Two at Tzaneen with 'Maluma' fruit only, and
- Two at Nelspruit with both 'Maluma' and 'Hass' avocados.



PROJECT TITLE
Upgrading the 'Maluma' avocado cultivar's harvest, storage and ripening protocols

PRINCIPAL INVESTIGATOR
Dr F J Kruger

CONTACT DETAILS
+27 (0)83 391 5822
fjkruger58@gmail.com

DURATION
Two years

PHI PROGRAMME & INDUSTRY CONTRIBUTIONS
R194 500 & R184 500

LEAD INSTITUTION
Lowveld Post-harvest Services, Nelspruit

BENEFICIARY
Sub-tropical fruit

FOCUS AREA
Post-harvest physiology and pre-harvest aspects

PUBLICATIONS
Three

PRESENTATIONS
Three



- 1 Dr Frans Kruger
- 2 'Maluma' is characterised by a rough skin that is less easily damaged during harvest, export and ripening.
- 3 A correctly trained young 'Maluma' avocado orchard near Tzaneen.





1 PhD student, Danie Lemmer is a post-harvest specialist in avocado storage technology.

2 The shape of the 'Maluma' avocado tree lends itself to high density planting; thus rendering this cultivar ideal for cultivation under shade netting.

3 The study paid close attention to the development of appropriate commercial ripening practices for 'Maluma' avocados.

4 'Maluma' avocados have a favourable seed-to-flesh ratio.

5 'Hass' stored at different temperatures resulted in different degrees of ripeness. 'Maluma' generally ripens faster and more synchronised than 'Hass' which makes it an excellent cultivar for ripe-and-ready programmes.



In these trials, the fruit was kept at room temperature for four different time periods before going into cool storage. After storage for 30 days, the fruit was ripened at 20°C and a full set of quality analyses performed.

2. How long can 'Maluma' fruit be stored before artificial ripening must start?

For this question, 18 trials were performed.

- Two at Mooketsi with 'Maluma' fruit only,
- 14 at Tzaneen with 'Maluma' fruit only, and
- Two at Nelspruit with both 'Maluma' and 'Hass' fruit.

In these trials, the fruit was stored for either 20, 25, 30 or 35 days. After storage, the fruit was ripened at 20°C and a full set of quality analyses performed.

3. How does the post-ripening 'soft life' of artificially ripened 'Maluma' fruit compare with that of the other commercial cultivars?

To answer this question, six trials were carried out at a commercial ripening facility in Lanseria using the following sets of fruit:

- Four from Mooketsi ('Maluma' and 'Fuerte' avocados), and
- Two from Nelspruit ('Maluma' and 'Hass' avocados).

Before ripening, the fruit was stored for 30 days at four different temperatures. After storage, the avocados were subjected to a full set of quality analyses.

The same quality analyses were done for all three research questions, namely the ripening period (number of days to ripen (DTR)); the incidence and intensity of physiological disorders at the ready-to-eat stage; and the incidence and intensity of fungal infections at the ready-to-eat stage.

Due to the importance of comparative information to the industry, early-season comparisons were made with the 'Fuerte'

cultivar, while 'Hass' was added to the mid-season trials.

Results

The findings suggest that 'Maluma' avocados must be put into cool storage within eight hours after harvest. Interestingly, the data showed that this recommendation applies to 'Hass' as well.

In terms of how long 'Maluma' fruit can be stored before artificial ripening must commence, export samples from various producers indicated that fruit from older trees with a lower nitrogen status can be stored for 30 to 35 days. Fruit from younger trees with a high nitrogen status should not be stored for longer than 25 days.

One of the most exciting findings was that the post-ripening 'soft life' of artificially ripened 'Maluma' was not inferior to that of 'Hass' and 'Fuerte'. In fact, it even appeared to be superior in certain of the trials.



“ 'Maluma' fruit from older trees can be stored for up to 35 days before artificial ripening must commence, ie. 10 days longer than fruit from younger trees. **”**
Dr Frans Kruger