Project Title:
Evaluation of the 8 mm penetrometer plunger to determine harvest maturity on plums.

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Objectives and Rationale

The objective of this trial was to establish if an 8 mm penetrometer plunger can accurately determine flesh firmness as a harvest maturity parameter and also as an indicator of flesh firmness after arrival in the market place. The standard 11.2 mm plunger as currently used in South Africa was used as reference. The ultimate aim is to standardise the method used to determine flesh firmness in South Africa, with other stone fruit producing and importing countries.

Methods

Flesh firmness was determined on ‘Fortune’, ‘Laetitia’ and ‘African Delight’ plums with penetrometer plungers of 8 mm and 11.2 mm diameters. Firmness was determined, at harvest, after cold storage (SOS) and after shelf life (EOS). At each of these evaluations, firmness was determined on the same fruit with an 8 mm plunger on the one cheek of the fruit and with an 11.2 mm plunger on the other cheek. Fruit quality was also determined at SOS and EOS.

Key Results

For the three cultivars tested there were slight variations in the regressions comparing the 8 mm and 11.2 mm plungers at the three evaluations, namely; at harvest, SOS and EOS. On average the conversion factors varied between 1.8064 (R2 0.7236) for ‘Fortune’, 1.7691 (R2 0.7910) for ‘Laetitia’ and 1.7016 (R2 0.6322) for ‘African Delight’. The average across cultivars was 1.76 which is comparable to the conversion factor of 1.8 that was previously established for nectarines. The flesh firmness distribution curves established for the 8 mm and 11.2 mm plungers for each of the cultivars showed similar trends and there was a normal distribution of flesh firmness readings in all cases. Clear patterns on the effect of the various harvest maturities on fruit quality after cold storage could not be established and it differed between cultivars. However, at the EOS fruit quality evaluation all the cultivars showed a tendency to develop more shrivel at the later harvests, despite the fact that flesh firmness differences between the harvest dates were small.

Conclusion and Discussion

Milestones 1 and 2 were achieved and it was established that both the 8 mm and 11.2 mm penetrometer plungers tested could measure flesh firmness accurately with R2 values of up to 0.791.

The fact that shrivel generally increased in the later harvested fruit, and in some cases internal disorders as well, points to environmental factors that probably had a greater effect on these disorders than flesh firmness, in the range that was tested.