

INVESTIGATION INTO THE POTENTIAL USE OF AVOCADO TOTAL SOLUBLE SOLIDS CONTENT FOR CROP ESTIMATE AND ORCHARD MANAGEMENT PURPOSES

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ABSTRACT

The total soluble solids (TSS) content of avocado fruit from the Tzaneen area was measured during the 2017 - 2020 export seasons. During this period, the TSS content of individual fruit varied between six and a half and eleven and a half degrees brix, while the annual means was between eight- and ten degrees brix. It was noticed that a correlation existed between the mean seasonal TSS content readings and the annual yields. For every one degree of brix that was recorded, an extra one thousand three hundred containers were exported. Crop estimates are an essential management tool for the avocado export industry. Unfortunately, the predictions are often inaccurate. The fruit's TSS content may therefore possibly serve as a tool to gauge the annual energy status of orchards. It is also possible that TSS may serve as an energy availability indicator when taking decisions regarding the feasibility of performing certain orchard management practices such as fruit thinning. We plan to test these premises during coming seasons.

INTRODUCTION

Crop estimates are an integral part of the South African avocado export industry. The information that is annually generated is used for logistical and marketing purposes. Unfortunately, the estimates are often inaccurate. An example is the 2020 season which was supposed to be an on-season. Many industry members predicted that the crop might equal that of the record breaking 2018 season. This notion was further reinforced by the low volumes experienced during the 2019 off-season. However, the export volumes were disappointing as they were not much higher than those recorded during the 2019 season.

We have recently begun exploring the factors that influence the yield variations that occur from year to year (Kruger *et al.*, 2020a). The present study aims to establish whether the total soluble solid (TSS) contents of the fruit may serve as an indicator of energy availability during a given season, and to what extent this influences the crop size.

MATERIALS AND METHODS

The TSS data used in the present report was collected during the 2017 - 2020 period. A relatively small amount of data was collected during the 2017 season

(Kruger *et al.*, 2018). This progressively increased during the 2018 (Kruger *et al.*, 2019), the 2019 (Kruger *et al.*, 2020b) and the 2020 seasons.

The export figures used in the present report were obtained from the SAAGA Exporters Forum. The number of containers exported per annum was used as the unit of account.

RESULTS

The relationship that existed between TSS and the dry matter (DM) contents of individual fruit during the four seasons is shown in Figure 1. Although our sample size was relatively small during the 2017 season, it may be deduced from the graph that the TSS contents of the fruit were lowest during this year. These were highest during 2018 while the 2019 and 2020 seasons' readings were intermediate. Although there was considerable overlap between the latter two seasons, the 2020 season's readings were concentrated towards the higher end of the 2019 season's range.

The relationship that existed between the TSS values and the number of containers exported per annum is shown in Figure 2 (only the TSS values taken between DM 20% and DM 25% were used since this was the range where the largest numbers of TSS

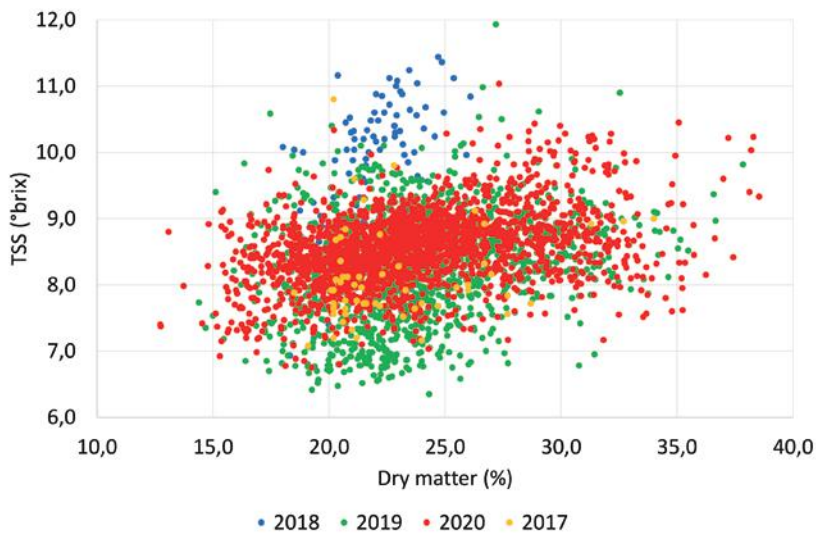


Figure 1: Total soluble solid readings taken at a Tzaneen packhouse during the 2017-2020 period. Each marker represents a single fruit or, alternatively, a reading taken from a small number (3 - 5) of pooled fruit.

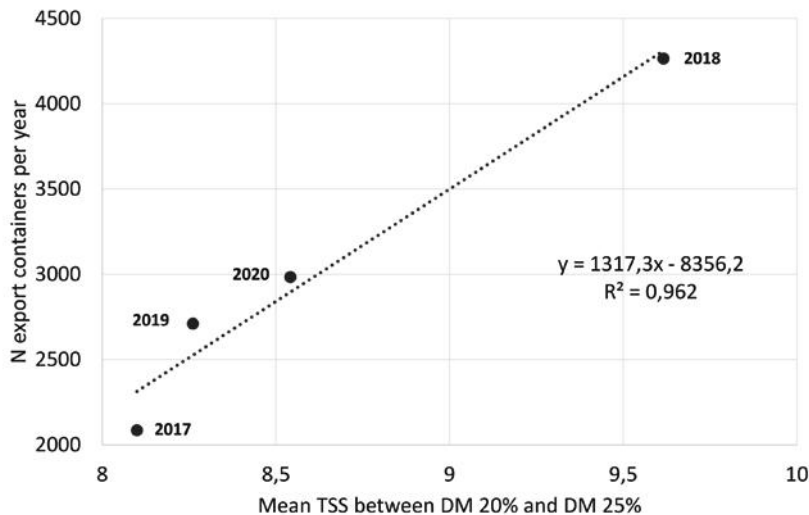


Figure 2: Relationship between the number of containers exported during the 2017-2020 seasons and the mean fruit TSS levels recorded between DM 20% and DM 25% during each season.

measurements were taken). The results indicate a relationship between the mean annual TSS content of the fruit and the yield. From the graph it may be deduced that, for each one degree of brix recorded, an extra one thousand three hundred containers may be added to the export volume.

Crop estimates are an essential management tool for the avocado export industry. The information generated is used for both marketing and logistical purposes. Unfortunately, these figures may be quite inaccurate during certain seasons. The fruits' TSS content may prove to be a valuable tool to gauge the annual energy status of orchards in order to refine crop estimates.

Another potential application concerns the efficiency of certain tree energy-level dependent management practices. One example is fruit thinning. Although certain producers claim to have consistently achieved good results with thinning, others have reported disappointing outcomes. Interestingly, at the start of the present (2021) season, we have recorded

significant variation in TSS levels between different producers. It is therefore possible that fruit thinning success is a function of orchard management efficiency.

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