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PRESS STATEMENT

Embargo: For immediate release

14 February 2022

Avocado study points way to better water management – Research provides growers with irrigation planning

Good news for avocado lovers and those among us who share a concern for the country's scarce water resources. A recent project, funded and managed by the Water Research Commission (WRC), holds the promise for improving the irrigation of avocado orchards.

As much as these buttery fruits are the key ingredient in scores of delicious summery dishes, it takes 150-200 litres to produce a single avocado of perhaps 250 g. Avophiles will remind you that the water consumption of high-value fruit like avocados should not be viewed in absolute terms, but rather against fruit with similarly high oil content. After all, we all know it's unwise to compare apples with pears. Nevertheless, the pressure remains on avocado growers to find ways to limit water loss and use the precious resource more efficiently, particularly during dry spells or drought.

A report, recently completed with the support and co-funding from the South African Avocado Growers' Association (SAAGA) and published by the WRC, represents a step towards the efficient water use of the crop, representing a "significant contribution to our understanding of avocado orchard water use". The study was led by Dr Nicolette Taylor of the University of Pretoria's Department of Plant and Soil Sciences. Researchers from the University of KwaZulu-Natal and the Agricultural Research Council also contributed to the study.

The study is a first in studying the water use of avocados, with its authors describing it as one of "very few attempts to quantify water use of avocado orchards" under different conditions, including climatic regions, seasons and stages in the growth cycle.

Most of South Africa's avocados are grown in Limpopo and Mpumalanga, but increasingly cultivation is spreading to cooler sub-tropical regions, including KwaZulu-Natal and further west. But with climate and rainfall, topography and soils differing markedly across regions, a better understanding of water use is needed to aid planning.

Irrigation must be just right. Too much water and avocado tree roots rot; too little and fruit fail to set or are poor in quantity and quality. In pursuit of this watery sweet spot, the report's research team chalked up a rare achievement. They successfully partitioned orchard water use into two components: transpiration and evaporation.

Evaporation is when water changes to vapour on soil or plant surfaces. Transpiration refers to the water lost through the leaves of plants. The distinction is important because, as the report explains, "transpiration should ideally be maximised in orchards, whilst evaporation should be minimised".



The report is believed to be the "first to provide reliable figures for water use efficiency and water use productivity". And the authors hope it will help growers better design and schedule irrigation, taking into account weather predictions for the week ahead. This will allow optimal irrigation, limiting harvest losses and squeezing out water savings – particularly important during dry spells when growers must find ways to do more with less.

The report's findings are also expected to assist with planning and site selection for new orchards and in the issuing of water licenses, making the process fairer.

From 2017 to 2020, researchers toiled away in orchards in Howick, Tzaneen and Nelspruit. They stuck probes into trees to measure sap flow at different growth stages and carefully monitored what happened when irrigation was restricted. They erected masts above orchards, fitted with equipment to log details about the air swirling above the treetops, radiation, the passage of heat and other meteorological data. They marked flower clusters on the experimental tree and recorded the number of fruits each produced.

Data from these recordings and other experiments were used to evaluate how well three different theoretical models fared when it came to estimating water use. The aim was to find a model that was reliable across different orchards and different climatic regions. As it turned out, the models proved unpromising for day-to-day planning but demonstrated real value for strategic planning.

"The study represents a significant step in the right direction, as there have been no previous reports on modelling of transpiration of avocado orchards. Future modelling exercises should also focus on modelling of soil evaporation," say the report's authors.

The study confirmed that avocado trees and yields are sensitive to even moderate spells of water deprivation. Growers should be aware of the soil water conditions and irrigation scheduling, especially during the fruit set period when rainfall is usually quite low in many summer rainfall regions.

"With worsening water scarcity challenges in the country, exacerbated by climate change, there is an urgent need to profile the water use of every crop and plant and understand its water requirements," noted WRC Executive Manager: Water Utilisation in Agriculture, Prof Sylvester Mpandeli. "The knowledge of water requirements of crops guides policy and decision-makers with coherent water allocation strategies and guide farmers with informed irrigation scheduling practices. This is critical in reducing water allocated to the agriculture sector, a sector that uses over 60% of the available freshwater water resources in the country."

An important aspect of this study is the collaboration between SAAGA and the WRC in funding the research, adds Prof Mpandeli. "The study is therefore informed by industry partners who understand the challenges they face and the need to conserve water in the agriculture sector."

Such collaboration facilitates rapid uptake of research results by farmers as they are directly involved. Other commodity groups representing crops such as macadamia, wine grapes and pears, have also partnered with the WRC in undertaking such studies in recent years.

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Note to editors:

• A PDF copy of the report, *Water Use of Avocado Orchards – Volume 1* (**WRC Report No. 2552/1/21**), can be downloaded from the WRC's website, here: <u>https://bit.ly/3AV4Mpx</u>

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