

Investigating the potential income and future water requirements of existing pecan orchards in the Western Cape

Elmi Lötze, Stephan Oberholzer and Nicolette Taylor*

Dept of Horticultural Science, Faculty of AgriSciences, Stellenbosch University

*Dept of Plant and Soil Sciences, University of Pretoria

Although pecans have been produced commercially in South Africa for a long time (1972), substantial commercial plantings in the Western Cape started relatively recently (since 2010). With the exception of a few bearing, commercial hectares in Bonnievale, Franschhoek and Clanwilliam, limited information is available about the newly established commercial orchards.

Climate change predictions for the Western Cape involve higher summer and winter temperatures and a reduction in precipitation. Pecans, with their lower chilling requirement, are an interesting alternative to the higher chilling requirement crops e.g. apple and pear in traditional fruit growing areas. However, pecans also have high water use requirements and this is the second most important factor that should be considered before planting this low chilling crop. Growing conditions in the areas where the initial orchards were established in the Western Cape, with its Mediterranean climate, differ substantially from the majority of the production regions in traditional summer rainfall areas e.g. Northern Cape and Northwest.

A report on water use of full bearing pecan trees in the Cullinan region indicated a very high water demand for pecan (Taylor et al., 2015; Ibraimo et al., 2016). Currently, another study with similar focus is being conducted in the Vaalharts and Upington regions, to extend knowledge on how climate and management practices impact water use (NJ Taylor UP, WRC and SAPPa funded). This information may not necessarily be applicable in the Western Cape. In addition, the Western Cape does not have access to irrigation water from sustainable rivers and is notorious for shallow soils, low organic content and an abundance of stone fractions in the profile. These conditions pose a new challenge with regard to the suitability of the current management strategies for large scale pecan cultivation in the Western Cape. Thus, in the long term, a regional quantification of the water requirements and climate must be conducted before pecan can be recommended in sensitive climatic regions of the Western Cape.

A research proposal was submitted to the Western Cape Department of Agriculture: Alternative crop funds to investigate the above. An MSc Agric. student was procured during

2020 to continue research on selected topics in this project. The study will be conducted over two seasons.

No database was available to indicate the current number of farms, planted areas, cultivars or locations for pecans in the Western Cape. Thus, in 2019, we conducted a survey based on an aerial survey conducted by the DoAWC (M Wallace, Elsenburg) during 2018 that indicated approximately 211 ha and 144 pecan orchards were established in the Western Cape. Results showed that this was not an accurate reflection of the commercial plantings and it was followed-up by a ‘word-of-mouth’ approach to find actual pecan producers and obtain information with regard to planting date, planting distance, irrigation type, cultivar and yield.

From this information, four young, commercial sites were selected for the initial study, which included higher planting densities than the standard 10 m x 10 m in industry. The drought severely impacted the selection of suitable sites. As limited information on production (performance) and the potential impact on the local economy for these areas is available, we will quantify horticultural aspects on these sites, as well as eventually perform an economical evaluation, to determine the suitability/adaptability of the current cultivars in the specific growing areas.

During the 2019/20 season data was collected from four experimental sites. Two sites near Vredendal and two near Hermon. All sites contained ‘Wichita’ as the main cultivar with either ‘Navaho’ and/or ‘Choctaw’ as cross pollinators. Planting distances varied between 10 m x 8 m and 10 m x 5 m to 8 m x 6 m and 8 m x 4 m. The oldest site was planted in 2015 and all orchards are irrigated. The first crops were harvested in 2020.

Data was recorded for phenology, vegetative parameters, yield and PAR interception by the canopy, on an individual tree basis, during 2019/20 and analysed statistically according to a one-way Anova. For seasonal trends and base lines, the following equipment was also installed on each site: i) continuous logging soil moisture probes (DFM software Solutions, 124 Fairview Rd, Eerste River, Cape Town) to record soil moisture and temperature down to 60 cm and ii), ‘ASM Model LXHS’ in-line mechanical water meters (Precision Meter (Pty), Ltd, Unit 4b, 11 Berkley Rd, Maitland, Cape Town, 7405, South Africa) to quantify irrigation water applied. Satellite imaging data (Fruitlook®) was obtained from the date of establishment of the trial orchards.

Furthermore, the study will include the quantification of medium term climate parameters (10 years) in the current locations where most of the new plantings have been established. Data was obtained from the ARC Infruitec-Nietvoorbij (ISCW).

References

N.J. Taylor, J.G. Annandale, N.A. Ibraimo, J.M. Steyn, M.B. Gush, 2015. Are simple empirical crop coefficient approaches for determining pecan water use readily transferrable across a wide range of conditions? 10.17660/ActaHortic.2017.1150.2

http://www.sancid.org.za/conf_proceedings/Session2/21Session2-1400-1420.pdf

<http://www.wrc.org.za/knowledge%20Hub%20Documents/Research%20Reports/1770-1-14.pdf>

[Ibraimo](#) et al., 2016. Estimating water use of mature pecan orchards: A six stage crop growth curve approach. Agricultural Water Management 177:359-368. DOI: 10.1016/j.agwat.2016.08.024



Vredendal 10m x 5m planted 2015



Hermon 8m x 4m planted 2016