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A Swartland dryland trial found Grenache noir delivered the highest red grape yields.

Macabeo led the white varieties, but researchers said both it and Piquepoul blanc struggled to ripen.

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A four-season vineyard trial in South Africa’s Swartland region found wide differences in how wine grape varieties performed under dryland conditions, with Grenache noir posting the strongest average yields among red grapes and Macabeo leading the white

group, although Macabeo and Piquepoul blanc also showed trouble reaching proper ripeness.

The results were published Thursday by WineLand in the fourth part of a research series by Carolyn Howell, Karen Freitag and Reckson Mulidzi. The trial was designed to test how alternative and standard grape scion cultivars respond in what the researchers described as an almost worst-case growing scenario: unirrigated vines in sandy loam soil near Malmesbury, an area exposed to regular water stress.

The study matters beyond agronomy because growers and wine producers are under pressure to adapt to scarcer water supplies. The findings suggest that choosing a cultivar with higher drought resilience could help limit crop losses, but they also show that stronger yields alone may not produce fruit that ripens well enough for the styles and quality targets the beverage industry needs.

Researchers planted 17 cultivars in July 2018, including nine red and eight white varieties, all grafted onto 99 Richter rootstock. The red cultivars were Arinarnoa, Durif, Grenache noir, Malbec, Marselan, Pinotage, Shiraz, Tempranillo and Touriga naçional. The white cultivars were Assyrtiko, Chardonnay, Chenin blanc, Macabeo, Marsanne, Piquepoul blanc, Verdelho and Vermentino. The vineyard was managed under the grower’s standard practices, with black plastic film installed on rows to reduce evaporation. Measurements covered four bearing seasons, from 2020/21 through 2023/24.

The researchers said vegetative growth differed sharply across cultivars. Among the red grapes, Shiraz showed the strongest vigor, while Durif, Marselan and Pinotage were among the weakest growers. Among the whites, Assyrtiko had the strongest vegetative growth, while Piquepoul blanc and Verdelho had the lowest. At pruning, cane mass confirmed those differences. The authors said the strong growth of Shiraz and Assyrtiko was already clear by August 2021, while Piquepoul blanc consistently lagged from 2021 onward.

Harvest timing also varied from season to season and by cultivar. Across the four years, harvests ranged from late January into March, depending on weather and variety. Pinotage was the earliest-ripening red cultivar. Grenache noir, Malbec, Marselan,

Shiraz, Tempranillo and Touriga naçional were among the latest reds to ripen. Chardonnay and Verdelho were the earliest white cultivars, generally ready from late January to early February. The 2023/24 season was especially early. Even so, the researchers said Macabeo and Piquepoul blanc struggled to ripen their fruit under the prevailing conditions.

In yield terms, the study found that bunch size mattered more than berry size or bunch count. Yield was poorly related to berry mass and was not driven by the number of bunches per vine. Instead, the natural tendency of each cultivar to produce larger bunches, mainly through a higher number of berries per bunch, had the biggest effect on total yield.

For the red cultivars, Grenache noir stood out. It had the highest bunch mass and the highest average yield over the four seasons, a result the authors linked to its greater number of berries per bunch. Malbec was at the other end of the range, with the fewest berries per bunch, the lightest bunches and the lowest average yield. Shiraz showed the strongest vine growth, but that did not translate into the top yield. Its average yield was 10.6 t/ha, well below the 21.3 t/ha cited by the authors from an earlier irrigated Shiraz study in South Africa’s Breede River Valley.

Among the white cultivars, Macabeo had the largest bunches and the highest average yield, again because it carried more berries per bunch. Piquepoul blanc also delivered relatively high yields compared with the other white varieties. Chardonnay had the fewest berries per bunch, the smallest bunches and the lowest average yield in the white group. The study also found that Assyrtiko, Chardonnay and Verdelho were weaker performers on cumulative yield than Macabeo and Piquepoul blanc under the same dryland conditions.

The researchers cautioned that productivity and ripening did not move together in every case. Macabeo and Piquepoul blanc yielded well, but both struggled to ripen adequately. That distinction could be important for wineries, since grapes that remain behind in ripeness can affect alcohol levels, flavor development, harvest timing and the commercial use of the fruit. In practice, that means a cultivar that looks attractive in the vineyard on tonnage may still present problems in the cellar.

The trial also adds South African field data on varieties that have had limited evaluation in the country. That is significant in a market where established grapes still dominate vineyard area. The authors noted that, nationally, Chenin blanc accounts for 18.5% of wine grape plantings, followed by Shiraz at 9.4%, Pinotage at 7.7% and Chardonnay at 7.6%. In the Swartland region, Chenin blanc makes up 20.2% of planted area, Shiraz 16.2%, Pinotage 11.1% and Chardonnay 5.8%. Testing alternatives such as Grenache noir, Assyrtiko, Macabeo and Piquepoul blanc could give growers more options as drought risk grows.

The work is the first South African study, according to the authors, to assess both vegetative growth and yield responses of selected red and white scion cultivars under dryland conditions in the Swartland on sandy loam soil. The project was funded by South Africa Wine and the Agricultural Research Council. The authors said the next part of the series will address juice characteristics and wine quality, which will be important for judging whether the most productive cultivars under drought can also meet winemaking requirements.