Characterization of four Chenin Blanc-rootstock combinations to assess grapevine adaptability to water constraint.

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Abstract

Climate change impacts water availability for agriculture, notably in semi-arid regions like South Africa, necessitating research on cultivar and rootstock adaptability to water constraints. To evaluate the performance (vegetative and reproductive) of different Chenin Blanc-rootstock combinations to the two water regimes, a field experiment was established in a model vineyard at Stellenbosch University, South Africa. Chenin Blanc vines grafted onto four different rootstocks (110Richter, 99Richter, 1103Paulsen and US 8-7) were planted in 2020. The vines are managed under two contrasting water conditions - dryland and irrigated (industry norm). Each combination had one row under irrigation and two rows under dryland conditions. Five panels were selected in each of the 12 rows for monitoring purposes with the center vine in each selected panel being the target vine.

Vegetative measurements (trunk circumference, lateral leaf area and pruning mass), physiological monitoring (stomatal conductance and midday stem water potential), phenological progression and reproductive measurements (average yield per vine, average bunches per vine and average bunch mass) were conducted for the 2022-23 and 2023-24 seasons. Root studies were also done in the 2023-24 season. Initial data analysis revealed performance differences among rootstocks within the same irrigation regime (rootstock response) and between dryland and irrigated conditions (rootstock-irrigation response). Dryland vines showed faster post-véraison phenological progression. In terms of stem water potential, vines grafted to R110 and R99 responded similarly under irrigated conditions whilst 1103Paulsen and US 8-7 displayed similar trends under dryland conditions. Results reveal that some combinations may be adapted better to conditions of water constraint. This information is useful for planning strategies to mitigate challenging conditions in terms of the availability of water resources.

Keywords: grapevine, rootstock, water stress, vine performance, vine response.