Rootstock drought tolerance under dry-farmed conditions in Oregon's Willamette Valley

Jeremy D. Schuster and Patricia A. Skinkis*

Oregon State University, Department of Horticulture, Oregon Wine Research Institute, 4017 Ag & Life Sci Bldg, 2750 SW Campus Way, Corvallis, OR 97331. *patricia.skinkis@oregontate.edu

Purpose of the Study

Rootstocks are used in vineyards worldwide and have been the focus of many studies. However, rootstock performance varies based on regional climates and soil types. As Oregon experiences warmer seasons and variable precipitation patterns, growers are interested in rootstocks with more drought tolerance than the commonly planted rootstocks: 3309C, Riparia Gloire, and 101-14 Mgt. In Oregon's Willamette Valley, annual precipitation is typically sufficient to make dry-farming possible and use of irrigation is limited.

Material and Methods

To address rootstock suitability for drought tolerance, a mature rootstock trial (planted in 1997) was evaluated during the 2021 and 2022 growing seasons. The trial includes Pinot noir (FPS clone 02A Wädenswil), grafted onto eight rootstocks, including 3309C, Riparia Gloire, 101-14 Mgt, 1616C, 110R, 140Ru, 1103P, SO4, and own-rooted vines. The vineyard was dry-farmed during the trial and for more than a decade prior. Vines were evaluated for vegetative growth, yield, water stress, and fruit composition.

Results

Pinot noir grafted to rootstocks 1103P, 1616, and 140Ru had higher stomatal conductance and lower stem water potential, indicating less water stress compared Pinot noir grafted to the rootstocks more commonly used in the region. Drought tolerant rootstocks had the biggest effect on vine vegetative growth, with double the dormant pruning weight of more commonly used rootstocks. Canopy density, as measured by leaf area index, was greater for drought tolerant rootstocks later in the season. Rootstocks had limited effects on Pinot noir yield, but Pinot noir grafted to drought tolerant rootstocks had higher yields than Riparia Gloire. There were no statistical differences in yield between the other rootstocks. Pinot noir on all rootstocks had similar berry concentrations of total phenolics and tannins at harvest, but Pinot noir on drought tolerant rootstocks had lower anthocyanin concentration compared to Pinot noir on more commonly used rootstocks. No differences in Pinot noir total soluble solids or pH at harvest were observed with the different rootstocks. However, Pinot noir grafted to drought tolerant rootstocks had higher titratable acidity compared to commonly used rootstocks. These findings show that Pinot noir grafted to drought tolerant rootstocks have increase vegetative growth, maintain higher berry acidity levels, and have lower concentrations of anthocyanins compared to Pinot noir on the region's commonly used rootstocks. Drought tolerant rootstocks are an alternative way to produce Pinot noir with modified fruit chemistry relative to a changing climate.

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