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"Viticulture components of three Malbec clones on two rootstocks in Oakville, Napa Valley, California"

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• Malbec, also known as Cot, fell out of favor in France in the late 19th century due to poor fruit set. Since then, clonal selection has produced clones with a more acceptable set. Even though several Malbec clones have been certified by Foundation Plant Services (FPS), at UC Davis, these clones have not been characterized, and it is unclear whether they can produce commerciably-acceptable, consistent yields. Also, rootstock choice can have an impact on scion yield, and poorly performing Malbec clones might be improved by rootstock.

• So these authors studied 3 FPS certified Malbec clones (FPS 4, FPS 6, FPS 8) to determine 1) if they could produce a commercially acceptable yield, and 2) if their performance might be affected by grafting to 2 commonly used rootstocks, 110R and Teleki 5C. The experiment ran for 4 years (1997-2000) in Oakville, California, on a gravelly Bale clay loam. The vines were VSP-trained (bilateral cordons), spaced at 2.4 m x 3.0 m, and spur-pruned to11 shoots per meter of cordon. The trial design was a randomized split-split-plot, with 8 replicates per treatment, where *rootstocks* were the main plots, Malbec *clones* the subplots, and *year* the sub-subplots.

• **Yield components**. 1) **FPS 8 produced the highest yield**, FPS 4 intermediate, and FPS 6 the lowest. All yield components –cluster count, berry count, and berry weight- showed this same trend. 2) Clones on 110R outproduced those grown on 5C. The yield difference between the two rootstocks was not consistent among clones, resulting in a significant clone-rootstock interaction. 3) There were significant differences in yield across years, with more than four-fold difference between the smallest crop (2.8 kg/vine, 1998) and the largest (11.4 kg/vine, 1997). Once again, seasonal differences in yield among clones were not consistent, resulting in significant year-clone interaction.

• **Fruit composition**. 1) **FPS 6 had the highest average soluble solids and pH** at harvest, while FPS 8 had the lowest. FPS 8 averaged the lowest titratable acidities, while **FPS 4 had the highest acidities**. Potassium concentration was much lower in FPS 8 than in FPS 4 or FPS6. 2) The advantage of any given clone regarding Brix was very dependent on yield (so looking at just "average yield" may be misleading). For example, in years when yields were high, FPS 8 lagged behind in sugar accumulation; however in years of lower yield, FPS 8 performed better and had similar soluble solids as other clones.

• **Vegetative growth.** 1) Consistent with the yield results, **FPS 6 had the highest pruning weight and shoot weight, and FPS 8 had the lowest.** 2) There were no differences between rootstocks in average vegetative growth. However, there was a significant rootstock-clone interaction. For example, FPS 6 always had higher pruning weight on 5C than on 110R. (Rootstock effect was small and inconsistent for clones FPS 4 and 8)

In conclusion, Malbec FPS 8, although not consistent from year to year, produced enough fruit even in poor-crop years to be the most economical. Even though canopy manipulations, such as shoot tip removal, may become widespread enough to make lighter-yielding clones like FPS 4 and 6 more profitable, the authors' current advice is to plant FPS 8.

	Pruning weight (kg/vine)	Cluster weight (kg)	Total yield (kg/vine)	Brix	pH	TA
FPS 4	2.8 b	0.95 b	5.1 b	23.2 b	3.44 b	7.5 a
FPS 6	3.0 a	0.76 c	3.8 c	23.5 a	3.48 a	7.1 ab
FPS 8	2.0 c	1.80 a	10.5 a	22.1 c	3.36 c	6.9 b

All values are averages of four years
Only a few parameters measured by the authors presented here.
Values which share a letter are practically the same (with probability of 5 in 100 of that not being true, or $p<0.05$)

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