



Cover cropping in the “Vinhos Verdes” wine region. A three-year study in the variety Alvarinho

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- This study evaluates the effect of 4 techniques of vineyard floor management - **permanent natural cover crop, herbicide treatment, cultivation, and natural cover crop alternated with cultivation** – on 1) weed diversity, 2) soil fertility and water potential, 3) vine vigor, 4) yield, and 5) fruit composition.
- The trial was conducted for 3 consecutive years in the “Vinhos Verdes” region of Northern Portugal. The block was a 5-year-old Alvarinho, grafted to 196-17 Cl, trained to a single cordon with a single foliage wire, and planted at a density of 3 x 3 m on a sandy loam. The experimental design was a random block with 4 repetitions for each of the 4 treatments above.
- 1) **Effect on weed evolution.** The type of floor management influenced the type of weed species selected. For instance, the herbicide treatment favored “summer species” (*Chenopodium*, *Senecio*, *Sonchus*), whereas the cover crop treatment favored both cereals and legumes (*Cynodon*, *Ornithopus*, *Trifolium*). Both types of cover crops are expected to improve soil conditions, since legumes tend to improve soil *nitrogen*, while cereals tend to improve soil *structure*.
- 2) **Effect on soil fertility and water potential.** The technique of floor management did not affect soil chemical composition, with the exception of the 20-50 cm (8-20 inches) horizon, which was significantly higher in phosphorus in the herbicide treatment. Water availability was always adequate in all treatments during the first 2 years (water potentials exceeded -0.2 MPa, or -2 bars). Only in the third year did a moderate stress started to develop, but differences across treatments were too small to be significant.
- 3) **Effect on vine vigor.** The herbicide and the cultivation treatments had significantly higher pruning weights than the others. This difference was due to a higher shoot weight, since all treatments had the same number of shoots per vine. Given that the average shoot weight of the herbicide treatment (54 g) was slightly higher than what is considered ideal, the authors believe the cover crop treatment can be an effective way to counter the high vigor often present in Alvarinho. If this devigoration becomes excessive, the authors suggest a reduction of the cover-cropped area, or alternating the cover crop rows with cultivated rows.
- 4) **Effect on yield.** The cover crop treatment had significantly lower yield (6.5 kg/vine) than the herbicide or the cultivation treatments (9.5 and 9.6 kg/vine, respectively). The “cover crop alternated with cultivation” treatment was intermediate (7.9 kg/vine). This difference was mainly due to differences in cluster weight, not cluster number.

- 3) **Effect on fruit composition.** Alcohol and titratable acidity were not affected by floor treatment, whereas pH did show some differences: the herbicide treatment had always higher pH than the rest. Overall, the authors believe the differences in vigor and yield did not have an important impact on berry ripening metabolism.

In conclusion, the competition due to a permanent cover crop caused a significant reduction of vigor and yield - through a reduction of the weights of both the shoot and the cluster - but it did not have a significant effect on must composition. When faced with the competition of a cover crop, the vine was able to auto-regulate its vegetative and reproductive growths, which allowed it to maintain its “source/sink” ratio. These results clearly show that cover crops can be an effective tool to modify vine vigor. The authors hope to repeat the experiment in much drier years to ensure that cover crops would not have negative effects on ripening or vine longevity under less favorable conditions.

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