



# Influence of undervine floor management on weed competition, vine nutrition, and yields of Pinot noir

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- Organic viticulture is particularly challenging in the Eastern United States, where high humidity during summer intensifies fungal diseases, prolongs shoot growth after veraison, and promotes weed growth. Many vineyards –for example in New York’s Finger Lakes Region- are on steep slopes around the lakes, so alternatives to soil cultivation, which increases erosion, are important.
- These authors compared 4 types of floor management: 1) a white (reflective) geotextile mulch (geotextiles are open-weave fabrics that block sunlight and weeds but allow water and gasses to pass through), 2) a black geotextile mulch, 3) 10-cm deep composted hardwood bark mulch, and 4) the organic grower’s standard practice (Control), which consisted of shallow cultivation of the vine row several times a year, mowing in the interrows. The geotextile treatments and the bark were applied in 1 meter strips under the vines. As frost protection, the grower hills up the vine row with soil every winter (and removes the hills in spring), and applies a 5-cm deep hay mulch on alternate interrows every winter.
- For two seasons (2004-2005), the authors studied the ability of the above treatments to 1) suppress weed growth, and 2) to improve vine growth, primary bud survival, fruit quality, and yield. For their trial, they used a Pinot noir/101-14 vineyard in Lodi, NY [another Lodi] trained to a “pendelbogen” (low head-trained, cane-pruned) with vertical shoot positioning. The soil is a fine-loam with 5-8% slope facing west. The trial was a randomized complete block design, with 6 replications and at least 4 vines per treatment.
- **Effect on light and soil temperature**. 1) In 2004, the white geotextile reflected significantly more sunlight upwards during June and July than the other treatments or the control. But the remainder of 2004 and all of 2005, there was little difference among the treatments in reflectance. 2) In 2005, the soil under the bark remained cooler early in the season and warmer later in the season than the remaining treatments. At the end of the summer of 2005, the soil with the coolest temperatures was the Control [*Why not in 2004?*]
- **Effect on weeds**. The bark mulch reduced weed cover and weed biomass compared to the Control. But both the black and the white geotextile mulches were the most effective in reducing weed cover and biomass in 2004. This was still the case in 2005, despite the fact that weeds encroached on the edges of the geotextile strips and emerged around the holes made in the fabric for the vine trunks.
- **Effect on vine water status**. Vines in all treatments were water stressed in the very-hot summer of 2005. But, even though the differences were not significant – were least stressed-, and those in the Control the least favorable –were most stressed.

- **Effect on soil analysis.** Soil in the Control had greater NO<sub>3</sub>-N availability than the other treatments. The soil in the bark treatment had higher organic matter than the other treatments, and higher soil moisture.

- **Effect on tissue analysis, vegetative growth and bud survival.** There were no significant differences among treatments in *pruning weights* or *bud survival* and small differences in *nutrient levels* (vines in the bark mulch showed slightly increased P levels).

- **Effect on yield and fruit composition. The white geotextile -but not the black- yielded more crop of equivalent fruit quality** (2.2 kg/vine versus 1.5 kg/vine in the Control). This increase was due to both more clusters per vine and higher cluster weights. Differences in juice Brix, pH, TA, dry matter content, anthocyanins and total phenols across treatments were negligible.

- **Economic analysis.** The geotextile mulches were the most expensive treatment to establish, followed by the bark mulch. Even after averaging the substantial initial cost across the 3 years of predicted durability, the higher cost of the geotextile (\$3400 per ha) was not compensated by the increased yields (extra \$2700 per ha), when compared to the grower's standard under-vine floor treatment (\$330 per ha). But it came very close! (A labor cost of \$10 per hour and a crop return of \$1764 per ton were used in the calculations.)

In summary, white and black geotextile mulches were an effective organic way to control weeds, even if they were not able to improve soil moisture, vine water status, primary bud survival, or fruit composition. Only the white geotextile increased yields without negatively affecting quality, but the extra yield did not offset the additional cost of installing the fabric. Still, reflective geotextile mulches might be a good alternative to repeated under-vine soil cultivation for organic viticulture.

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