



Influence of geotextile mulches on canopy microclimate, yield, and fruit composition of Cabernet franc

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- Growers in cool, humid regions face many challenges when they try to grow *Vitis vinifera* red varieties, including insufficient ripening and inadequate primary bud survival. In these situations, the use of reflective mulches could potentially modify the vine microclimate and improve ripening without incurring the reduced photosynthetic capacity caused by practices such as shoot thinning or leaf removal. The goal of this study was to determine whether white and/or black geotextile mulches could provide a useful alternative to conventional vineyard floor management.
- The trial took place in 2004 and 2005 at two commercial sites in the Finger Lakes region, New York, on Cabernet franc trained to a Scott-Henry system. Both sites had a silt loam soil and some problems with excessive vigor. The authors compared 3 treatments: 1) a **white geotextile mulch**, 2) a **black geotextile mulch**, and 3) a conventional grass cover crop, mowed in the middles and herbicide-killed (paraquat) on the vine strips (Control). The mulches at site A (southeast exposure) were **5 meters** wide, overlapping with each other to cover the entire vineyard floor, whereas the mulches on site B (southwest exposure) were **2 meters** wide, covering the vine rows but leaving a good portion of the row middles uncovered.
- **Effect on microclimate.** 1) The white geotextile reflected significantly more light off the vineyard floor than the black geotextile or the control. This effect was larger in the overlapping mulch than in the narrower one. The authors point out that the light increase observed was still smaller than that observed in another study using an aluminized mulch. 2) There was no significant effect of treatment on canopy temperature (at 1.2 meters aboveground). This temperature averaged 18°C in 2004 and 21.6°C in 2005.
- **Effect on vine growth.** 1) After the second year, pruning weights (vine size) were almost double in the white or black geotextile compared to the control. The authors attribute this to the suppression of weed competition [*Could a warmer root environment also contribute?*]. 2) There was no significant effect of treatment on the survival of primary buds.
- **Effect on yield.** 1) Vines in white geotextile produced more crop than those in the control in both years (6.5 vs. 5.1 kg/vine in 2004, which was significant, and 7.6 vs. 6.5 in 2005, which was not a significant difference). The results with the black geotextile were inconclusive (more than control in 2004, but less in 2005). 2) The differences in yield were due to a consistent **increase in cluster weights with the white geotextiles**. Clusters per vine were more fluctuating. Since berry size was not affected by treatment, the authors attribute the effect of increased yield to **more berries per cluster**, that is, better berry set, probably due to increased light in the white geotextile during bloom and set.
- **Effect on juice and wine composition** 1) There were little differences among treatments in soluble solids, TA or pH. Not only did the geotextiles fail to hasten maturity, but in 2004, soluble solids were higher in the control (21.8°Brix) than in both geotextiles (21.3 and 21.2°Brix for black and white,

respectively). 2) White geotextile had no effect on anthocyanins, total phenols, and antioxidant activity compared to the control. But black geotextile tended to produce fruit with less of all these components. The authors attribute this decline to the increased vine size when geotextiles were used, an effect that would be more obvious with the black than the white geotextile because the increased reflected sunlight of the white would have helped maintain good levels of anthocyanins and phenolics, despite the increased vine size.

- As the authors note, an Ontario study found no differences in sugars, pH, anthocyanins or total phenols in Cabernet franc, Cabernet Sauvignon, Pinot meunier or Pinot noir when a reflective mulch was used. In another Massachusetts study, the use of two types of mulches also failed to affect Merlot fruit composition. Finally, the authors point out that, in the present study, the responses to the reflective geotextile mulches may have been minimized due to the fact that the vineyard managers of both commercial sites thinned shoots and removed most of the leaves surrounding the clusters, so sunlight in the cluster zone may have already been high enough to be able to show an enhancing effect from the mulch.

- **Economic analysis.** (This analysis assumed that the geotextile mulches would be reusable for at least 3 years; and that Cabernet Sauvignon had a market value of \$1654 per ton.) Averaged over the three year period, both geotextiles were more expensive to install and maintain than the usual practice of mowed row middles. Despite the greater yields of the geotextile mulches, net gains were higher with the standard control treatment (mowed row middles and herbicide in the vine row). As the authors point out, installing the 2 meter geotextile mulch using a mechanical mulch applicator would have contributed to reduce costs.

In summary, vines mulched with a white geotextile had greater yields, but there were no significant differences in fruit ripening or fruit composition. The increased yields were not sufficient to compensate for the greater cost of these mulches compared to the standard practice of an herbicide weed control.

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