

Using under-vine cover crops to replace herbicides application in Northeast vineyards

Justine Vanden Heuvel¹, Lindsay Jordan², Adam Karl², Ming-Yi Chou³ and Michela Centinari⁴

¹ Associate Professor, SIPS, Horticulture Section, Cornell University, Ithaca NY, jev32@cornell.edu

² Former Masters Student, SIPS, Horticulture Section, Cornell University, Ithaca NY

³ Ph.D. Student, SIPS, Horticulture Section, Cornell University, Ithaca NY, mc2478@cornell.edu

⁴ Former postdoc, SIPS, Horticulture Section, Cornell University, Ithaca NY; Current Assistant Professor in Penn State University, University Park PA

Reasons to substitute herbicide with under-vine cover crops:

Herbicide resistance, soil runoff, nutrient leaching, and environmental contamination can result from extended use of herbicides in vineyards. Under-vine cover crops are known to benefit long-term soil health and could provide competition for water and nutrients, helping to alleviate the problem of excessive vine vigor.

Effect of under-vine cover crop on soil and vine:

Six multi-year, replicated field experiments have been conducted to investigate the impact of under-vine cover crops in vigorous *vinifera* vineyards in the Finger Lakes region of New York State. Under-vine cover crops of buckwheat and annual rye grass resulted in few consistent differences in vine vegetative growth, yield, vine nutrient status at veraison, or midday water status. Chicory, white clover, and native vegetation as under-vine cover crops reduced pruning weight, vine yield, and vine nitrogen level. Soil microbial respiration was greater in native vegetation and white clover cover crop treatments compared to glyphosate plots, while organic matter loss were greater in glyphosate plots compared to cover crops. Less nitrogen leached from native vegetation plots compared to glyphosate and white clover plots. Impact of under-vine cover crops on must composition was inconsistent.

Effect of under-vine cover crop on wine sensory property:

When subjected to wine sensory analyses, under-vine cover crops impacted the perceived aromatic properties of Riesling but not the aromatic and gustatory properties of Cabernet franc.

Economic analysis:

Economic analyses suggest the cost of planting and maintaining an under-vine cover crop is considerably lower than maintaining an herbicide strip. However the more competitive cover crops can reduce vine yield resulting in less fruit or wine available for sale; partial budget analysis of treatments in a Cabernet franc study with young vines revealed that under-vine cover crops reduced revenue by more than \$2,000 per acre when yield was reduced by approximately 50%.

Conclusion:

The potential of under-vine cover crops to reduce vine size, maintain soil quality, and decrease the leaching of nutrients in comparison to herbicide use have been demonstrated in these experiments, however the impacts of different cover crop treatments on aromatic properties of the resulting wines requires further investigation. Under-vine cover crop maintenance is cheaper than an herbicide strip and can be adopted in vineyards when maximal yield is not desired.