Effectiveness of mulching as an alternative method for winter protection of grapevines

Anirudh Akula¹, Imed Dami², Ajay Shah¹*

INTRODUCTION
Economics of winter damage to grapevines
- Every year, cold damages (crop loss) or kills grapes (vine loss)
  - Cost of crop loss = $1,200/acre³
  - Cost of vine loss = $125,000/acre⁴
- Cold damage from ‘2014 Polar Vortex’ in Ohio, worst damage in 20 years: $12M crop loss⁵
- $250M/year crop insurance for cold-related loss⁶

Standard winter protection method for grapevines
- Trunk protection by soil hilling
  - Soil hilling (Fig. 1) acts as an insulator to protect vine trunks against the cold
  - Current practice: each year, apply/remove soil mounds with plow

OBJECTIVE
Mulching for winter protection
- Previous research indicated that mulch application (mulching) can be effective for trunk protection⁷,⁸,⁹
- The objective of this study was to evaluate the effectiveness of mulching as an alternative method for winter protection of grapevines
- Specific research questions to be answered were:
  - Does mulching maintain the grapevine trunk temperatures above freezing?
  - Does mulching have an effect on yield?
  - Does mulching improve weed control?

METHODOLOGY
Experimental design and site
- Plant-based mulches of wheat straw, corn stover, and miscanthus (Fig. 2) were applied (Fig. 3) and evaluated in comparison to soil hilling

RESULTS AND DISCUSSION
- Mulch temperature at surface and graft union level were above freezing (32°F) despite ambient air temperature dropping below 5°F (Fig. 5)
- Mulching significantly reduced weeds (Fig. 7, 8)
- Mulching had no significant effect on yield compared to soil hilling (Fig. 6)
- Mulching had no significant effect on yield compared to soil hilling (Fig. 6)

REFERENCES

CONCLUSION AND FUTURE WORK
- All mulch treatments provided adequate winter protection comparable to the conventional standard of soil hilling by maintaining the temperatures around the graft union ~ 32°F [5,6]
- Mulching had no significant effect on yield [7]
- Mulching significantly reduced weeds with no herbicides compared to soil hilling with herbicide application [6,7] which may potentially result in reduced costs and will be further assessed
- Mulching potential to improve tissue nutrients [7] and soil quality [5,7] will be assessed in future to provide a holistic perspective of mulching for winter protection
- Instances of undesirable scion rooting [5] due to leaving mulch intact occurred, however, this was not significant and will be assessed further. Mulch height drop was not significant over the year
- The study signifies the potential of mulching as a winter protection method in grapevines and thus will be further developed and evaluated for costs/benefits as part of a sustainable grapevine production system

ACKNOWLEDGEMENTS
- This study was funded by North Central Sustainable Agriculture Research & Education (SAFER)
- We would like to acknowledge the cooperation of Ferrante Winery (Geneva, OH) for the study

Anirudh Akula
Department of Food, Agricultural, and Biological Engineering
Ajay Shah
Department of Horticulture and Crop Sciences
*
Corresponding author: dami.1@osu.edu, shah.971@osu.edu

CFAES provides research and related educational programs to clientele on a nondiscriminatory basis. For more information, visit cfaesdiversity.osu.edu. For an accessible format of this publication, visit cfaes.osu.edu/accessibility.