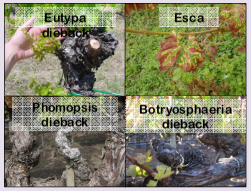
An Economic Evaluation of Early Adoption of Trunk Disease Preventative Practices in Winegrape Vineyards

Kendra Baumgartner, USDA-Agricultural Research Service,
Renaud Travadon, University of California, Davis
Monica Cooper, University of California Cooperative Extension, Napa CA
Vicken Hillis, University of California, Davis
Jonathan Kaplan, California State University, Sacramento
Mark Lubell, University of California, Davis

Selected Poster prepared for presentation at the Agricultural & Applied Economics Association's 2014 AAEA Annual Meeting, Minneapolis, MN, July 27-29, 2014.

An Economic Evaluation of Early Adoption of Trunk Disease Preventative Practices in Winegrape Vineyards



Kendra Baumgartner
USDA-Agricultural Research Service

Renaud Travadon
University of California, Davis

Monica Cooper
University of California Cooperative Extension

Vicken Hillis
University of California, Davis

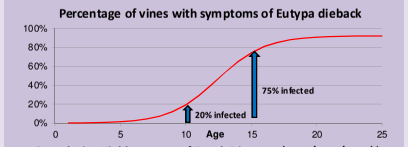
Jonathan Kaplan
Sacramento State University

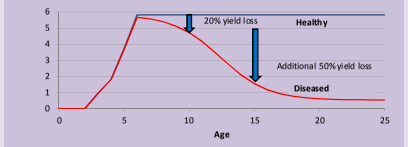
Mark Lubell
University of California, Davis

Partial funding for this project was provided through a grant from USDA NIFA Specialty Crop Research Initiative

Issue

Trunk, or wood-canker, diseases, including Botryosphaeria dieback, Esca, Eutypa dieback, and Phomopsis dieback, present a serious challenge to vineyard productivity. The majority of California vineyards over age 10 are likely infected and yield losses can reach over 90%. The overall economic impact of losses to Eutypa alone has been estimated at 14% of gross producer value. Trunk diseases take multiple years to develop and start showing symptoms years after infection has already occurred, after which point management options are limited. While preventative management practices are available, there is a hesitancy to start using them in newly-established vineyards, possibly due to uncertainties about cost-effectiveness and disease-control efficacy.



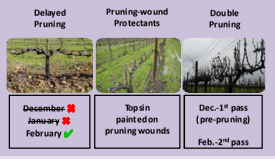


Based on Munkvoldet al. (1994) for incidence of Eutypa dieback

*yield assumption representative of production in the Northern San Joaquin growing region

Methodology

In our simulated economic experiment, we constructed a representative bioeconomic model for winegrape production in infected vineyards throughout California's diverse production regions. Our data came from the scientific literature, from interviews with growers, pest control advisors (PCA), and farm advisors, and from responses to PCA and grower survey questionnaires. The surveys also provided us with insights into incentives motivating grower decision-making. The baseline model simulated production from a healthy vineyard and then subjected it to a trunk disease, assuming no preventative action was taken. We then simulated scenarios where different practices with varying costs and efficacy were adopted at different vineyard ages. Next, we used pairwise comparisons between the baseline model and these scenarios to gauge the potential economic gains from adopting these practices; relative to no action or to waiting until a vineyard matured and symptoms of trunk diseases (and yield loss) were thus widespread.



Evidence of Biological Efficacy

Trunk Disease	Delayed Pruning	Double Pruning	Pruning-wound Protectant
Botryosphaeria	58 – 72%	58 – 72%	60 – 80%
Esca	28 – 87%	28 – 87%	52 – 58 %
Eutypa	75 – 97%	75 – 97%	100%

Sources: Amponsah et al. (2012), Larignon & Dubos (2000), Rolshausen et al. (2010), Urbez-Torres & Gubler (2011), Weber et al. (2007).

Results

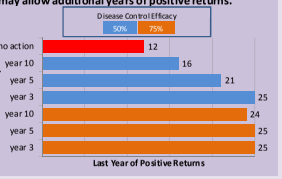
Many growers do not use preventative practices very often, especially protectants and double pruning and those who do often wait too long to do so. Further, cost-effectiveness is a more substantial barrier to adoption than maintaining yield.*

*survey results from Northern San Joaquin growers meeting. We used Turning Point, an electronic audient response system, to conduct surveys here and across California's other winegrape growing regions.

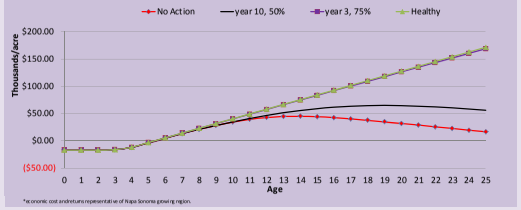
Results

Annual average returns for feasible scenarios relative to those for No Action are positive but in some cases overall returns are still negative when the practice is adopted (red cells). In addition, doing nothing cuts a vineyard's profitable lifespan by more than 50%. In Northern San Joaquin, for example, the profitable lifespan falls to 12 years. Overall, a practice adopted in year 10 can bring at least 4 more years of profitable production. Adopted in year 5 these practices can bring an additional 1 to 5 years. Adopted even earlier may allow additional years of positive returns.

Annual Average Returns	Delayed Pruning ($0/acre/year)	Topsin, Painted ($72/acre/year)
50% Effective		
year=3	$1,588	$1,522
year=5	$1,121	$1,061
year=10	$468	$421
75% Effective		
year=3	$1,977	$1,910
year=5	$1,812	$1,751
year=10	$833	$787



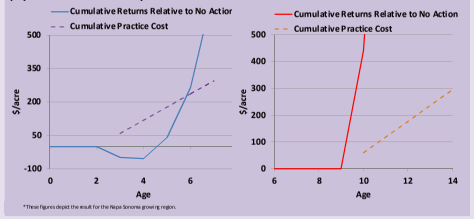
Cumulative returns from healthy vines and symptomatic vines with pruning wounds hand painted with Topsin are nearly identical when applied in year 3 but divergent significantly when adopted in year 10.*



*economic cost and returns representative of Napa Sonoma growing region.

Results

Hand painting Topsin that is 50% effective at disease control on pruning wounds starting in year 3 takes several years to pay for itself while applying the same practice in year 10 pays for itself immediately.*



*These figures depict the result for the Napa Sonoma growing region.

Conclusion

Despite reduced efficacy of later adoption, many growers adopt preventative practices after year 7, likely in part because early adoption takes several years to pay for itself while later adoption pays for itself immediately. Taking a long term perspective, however, helps make the case against delaying adoption, given that early adoption produces increased overall returns in years 10 to 25.

Communicating the economic analyses in a grower-friendly format will help make the case for early adoption by reducing uncertainty about the cost and yield of early adoption.

References

Amponsah, N.T., Jones, E., Ridgway, H.J. and M.V. Jaspers. 2012. "Evaluation of fungicides for the management of Botryosphaeria dieback diseases of grapevines." *Post Management Science* 68: 676–683.

Larignon, P., and B. Dubos. 2000. "Preliminary studies on the biology of Phaeoacremonium" *Phytopathologia Mediterranea*. 39:184-189.

Munkvold, G.P, Duthie, J.A. and J.J. Marios. 1994. "Reductions in Yield and Vegetative growth of grapevines Due to Eutypa Dieback." Phytopathology 84(2): 186-192.

Rolshausen, P.E., Urbez-Torres, J.R., Rooney-Latham, S., Eskalen, A., Smith, R.J. and W.D. Gubler. 2010. "Evaluation of Pruning Wound Susceptibility and Protection Against Fungi Associated with Grapevine Trunk Diseases." *American Journal of Enology and Viticulture* 61:113-119.

Urbez-Torres, J.R. and W.D. Gubler. 2011. "Susceptibility of grapevine pruning wounds to infection by Lasiodiplodia theobromae and Neofusicoccum parvum." *Plant Pathology* 60:261–270.

Weber, E.A., Trouillas, F.P. and W.D. Gubler. 2007. "Double Pruning of Grapevines: A Cultural Practice to Reduce Infections by *Eutypa lata*." *American Journal of Enology and Viticulture*. 58: 61-66.