Testing Efficacy of HydroShield product on the Reduction of Rot and Phytotoxicity of European and French American Hybrid Wine Grapes in Georgia

UNIVERSITY OF GEORGIA EXTENSION

Burke, P. *[1] , Eason, N.[2] , MacAllister, C. [3], Hoppers, A. [4], Williams, J. [5], Brannen, P. [6], Hickey, C. [7]

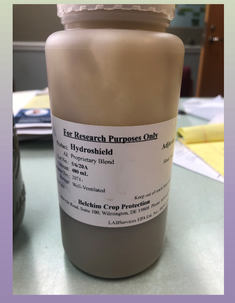
[1]Extension Agent, UGA Extension, Carroll County, Carrollton, Georgia 30117
[2]Extension Agent, UGA Extension, White County, Cleveland, Georgia 30528
[3] Extension Agent, UGA Extension, Dawson & Lumpkin Counties, Dawsonville, Georgia 30534
[4]Extension Agent, UGA Extension, Fannin & Gilmer Counties, Blue Ridge, Georgia 30514
[5] Extension Agent, UGA Extension, Towns & Union Counties, Hiawassee, Georgia 30546
[6] UGA Extension Specialist, Small Fruits Pathology, Athens, Georgia 30605
[7] Previous UGA Extension Specialist, Viticulture, Athens, Georgia 30605

INTRODUCTION

A demanding vineyard management program is required to effectively control the intense insect and disease pests of wine grapes in the humid, subtropical climate of the southeastern US. Sour rot, a disease complex caused by yeast, acetic acid bacteria (both already present in and on the grapes), opportunistic fungi, Drosophila fruit flies, and wounds, has received increased recognition by stakeholders and researchers as of late. Sour rot can result in a significant reduction in yield and quality of wine grapes. Invasion of the sour rot complex occurs at the point of grape berry injury caused by mechanical or growth cracks, wounds, or even insect feeding. Despite implementing recommended sour management protocols, 50% of growers in Georgia, North Carolina, and Virginia characterized their problems with sour rot as either “moderate” or “severe” in a recent survey in 2019 or equivalently 38% of the acreage in Georgia, 25% in North Carolina, and 20% in Virginia. Thus, given that crop losses continue to be incurred despite using current sour rot management recommendations, we feel it necessary to evaluate alternative and practical means to manage the pervasive, sour rot complex in wine grape vineyards.

THE PRODUCT

HydroShield, a food grade, agricultural product developed by Dr. Clive Kaiser at Oregon State University, is a hydrophobic spray that forms a film around fruit and prevents water ingress when it rains. HydroShield increases cuticular thickness and reduces water loss from fruit. HydroShield has been shown to increase cuticular thickness in cherry and blueberry, decrease spotted wing drosophila (SWD) penetration and oviposition (Walton et al. 2018), and thus decrease blueberry and cherry crop loss due unmarketability. HydroShield has not been evaluated for its ability to manage sour rot in wine grapes. Further, increasing skin thickness and berry firmness could maintain wine grape skin integrity and limit sour rot ingress. HydroShield is a food grade product (made of celluloses and pectins) and has no pesticidal components. HydroShield may prove to be a sustainable, environmentally safe sour rot management tool that does not incur risk of pest resistance development. The product should provide a means of preventing berry dehydration, splitting of berries, disease development, and reduction of drosophila damage. Supposedly, the SWD slips on the film and cannot oviposit.



Phytotoxicity on Pino Grigio

Phytotoxicity on Blanc du Bois

METHODOLOGY

Two HydroShield formulations were tested for their effectiveness as sour rot management tools in wine grape vineyards in north and west Georgia. Both Hydroshield formulations (palm oil and other oils or fatty acids that are food grade) were applied at a 0.5% v/v rate, calculated to deliver 50 gallons of total spray volume per acre. At each location, five replications of each treatment were applied to a randomized complete block with CO_2 backpack sprayer (R & D Sprayers, Opelousas, LA) with a TeeJet adjustable cone tip nozzle (5500-PPX12) (TeeJet Technologies, Wheaton, IL) at a pressure of 25 psi to runoff. An untreated control was included. Applications were initiated on BB or pea-sized fruit, depending on phenology at project initiation, and were conducted at approximately two-week intervals till shortly before harvest. All other IPM practices were those utilized and provided by the vineyard managers for each site. Where observed, sour rot incidence (% infected clusters) and severity (average % damage per cluster) were rated at commercial harvest on all clusters within an experimental unit. Phytotoxicity was also rated.

RESULTS

Depending on location, HydroShield 1 and HydroShield 2 were successfully applied 3-6 times. For all trial sites, spray initiation occurred prior to veraison, the presumed timeframe in which drosophila damage can initially occur and in which sour rot initiates. Neither sour rot nor significant phytotoxicity were observed in Union or Lumpkin counties, so no data was collected from these locations. Though no damage was observed on fruit at any location, significant leaf damage was observed at two sites (Blanc du Bois [Carroll County] and Vidal blanc [Fannin County]), and very minor damage was confirmed at a third (Pinot grisio [Lumpkin County]). Marginal leaf burn was consistent as a symptom of damage, but other symptoms, yellowing and bronzing of leaves, was specific to particular cultivars. Sour rot was present in plots from Fannin and White counties, but sour rot management was not consistently controlled with either HydroShield formulation.

	Leaf phytotoxicity[a] (Carroll County)		Leaf phytotoxicity (Fannin County)	
	Scorch and yellowing		Scorch and yellowing	Bronzing
Treatment	Incidence (% leaves damaged)	Severity (avg. % leaf damaged)	Severity (avg. % leaves damaged)	Severity (avg. % leaf damaged)
Untreated control	2.0 b[b]	0.1 b	5.0 b	0.0 b
Hydroshield 1	54.0 a	14.0 a	35.0 a	65.0 a
HydroShield 2	54.0 a	13.5 a	30.0 a	60.0 a

	Sour rot[a] (White County)		Sour rot (Fannin County)	
Treatment	Incidence (% infected clusters)	Severity (% cluster infected)	Incidence (% infected clusters)	Severity (% cluster infected)
Untreated control	68.0[b]	8.4 ab	70.0 a	6.8
Hydroshield 1	44.0	3.8 b	55.0 ab	5.5
HydroShield 2	72.0	11.8 a	43.3 b	4.0

[a]Sour rot incidence and severity was assessed on 26 Aug (White County) and 15 Sep (Fannin County).
[b]Means within columns followed by the same letters are not significantly different when comparing each pair using Student’s t test statistic (P=0.05).

DISCUSSION

Very limited phytotoxicity was observed on *V. vinifera* cultivars and on one hybrid, Seyval blanc. However, significant leaf phytotoxicity was observed on two hybrids. Oils are known to interact with Captan products to produce phytotoxicity, but oil is also potentially dangerous with sulfur, lime sulfur, and likely other chemicals. Both varieties that exhibited severe symptoms of scorch, yellowing, and bronzing had *V. aestivalis* in the parentage, and this species is known to be sensitive to some chemicals. Other grape species have also been observed to have particularly negative responses to specific chemicals. In the case of the phytotoxicity observed in this trial, the HydroShield products could be negatively interacting with specific (or multiple) chemicals, grape parentage, environment, or various interactions of all of these. Application of chemicals through use of backpack sprayers can provide increased phytotoxicity as compared to the same chemicals applied with an airblast or other commercial sprayer – an artifact of the system. However, the potential for phytotoxicity is revealed by such trials, and it cannot be ignored; commercial testing may indicate that HydroShield products are in fact safe, but this would be an important next step prior to market introduction.