FINAL REPORT

Washington State Grape and Wine Research Program

DUE June 30, 2019

by email to: ARCGrants@wsu.edu

PROJECT TITLE: Qualitative Survey of Washington State Vineyards for Potential Insect Vectors of Grapevine Red Blotch Disease

Project Duration: ***(2 years)***

PI Name:	**DOUG WALSH**
Organization	WSU ENTOMOLOGY/ IAREC
Address	24106 N. BUNN RD
Telephone	509.786.9287
Email	DWALSH@WSU.EDU

CO-PI Name:	**JONATHAN O'HEARN**	**CO-PI Name:**	**PETER FORRENCE**
Organization	WSU ENTOMOLOGY	Organization	WSU ENTOMOLOGY
Address	SAME AS WALSH	Address	SAME AS WALSH
Telephone		Telephone	
Email		Email	
CO-PI Name:		**CO-PI Name:**	
Organization		Organization	
Address		Address	
Telephone		Telephone	
Email		Email	

Cooperator Name:		**Cooperator Name:**	
Organization		Organization	
Description of participation:		Description of participation:	

BUDGET AND OTHER FUNDING SOURCES

FINAL FINANCIAL REPORTING

BUDGET *(LIST COMPLETED BUDGET NUMBERS)*

	Year 1 FY	**Year 2 FY**	**Year 3 FY**
	Jul 17 – Jun 18	Jul 18 – Jun 19	Jul XX-Jun XX
Total	$12,279	$12,692	
Footnotes:			

Total Project Funding:

Project Budget Status: *Although this is a "final report" we have some funds in reserve to complete pcr-based tests of vines that were used in transmission assays. Virologists working with other membracid treehoppers have quantified a 2-yr latent period before redblotch virus reaches a detectible titer in grape vines.*

Project Summary:

The three cornered alfalfa tree hopper *Spissistilus festinus* has been confirmed to vector an emerging viral pathogen called grape vine redblotch disease (GRBaV). *S. festinus* is a membracid, native to southern-tier US states, and are ubiquitous in California alfalfa fields. There are 1 million acres of alfalfa in California. There are no records for *S. festinus* in Washington State. In Oregon *S. festinus* persists in the Rogue River Valley but not in the Willamette Valley; postulating that *S. festinus* has a northern threshold? In Oregon in 2015 it was observed that GRBaV was spreading in the Rogue River Valley more rapidly than in the Willamette Valley. This trend changed late-season 2016 as OSU scientists observed rapid spread of GRBaV in the Willamette Valley in the absence of *S. festinus*. Several other species of membracids are now suspected as potential vectors of GRBaV. In summer 2017 and 18 we completed comprehensive surveys in all the major wine grape appelations in Washington State as well as in alfalfa fields, pear orchards and riparian habitats. In these surveys we captured two species of treehoppers. We captured a single individual adult male *Palonica* spp. in a riparian habitat east of Prosser in a riparuian habitat along the Yakima river. We think it might be a *Palonica pyramidata*, but we're not sure. In numerous locations, specifically riparian habitats, field margins of alfalfa fields, and in pear orchards we captured buffalo treehoppers *Stictocephala bisonia*. Research had been completed on this insect by USDA-ARS scientists in the mid 20th century centered near Wenatchee, WA. Fortunately, we never captured any buffalo treehoppers in any vineyard we surveyed. We did establish a colony of buffalo treehoppers in summer 2018 and completed transmission assays on grape vines in the greenhouse. As stated above virologists have determined that there can be a latent period greater than 2 years before virus becomes detectable. We are awaiting the results of our transmission assays. What is interesting is that in these transmission assays we permitted the buffalo treehoppers to persist as long as they survived through summer and fall 2018. Eventually they died during winter. In spring 2019 we observed an egg hatch on the potted grape vines in the greenhouse. The buffalo treehopper nymphs progressed through 2 to 3 nymphal instars, but they eventually died prior to

achieving adult status. This preliminary data would indicate that grape vines are likely not a preferred host plant for buffalo treehopper.

Project Major Accomplishments:

We completed 2 years of comprehensive surveys of Washington State vineyards. We completed bi-weekly surveys of vineyards in Paterson, WA, various locations around the Yakima Valley, and Mattawa. On 3 dates in 2017 and 2 in 2018 surveys were completed in Walla Walla/ Milton Freewater and Wenatchee/ Lake Chelan. Again as stated above no buffalo treehoppers were ever detected in a vineyard. Sampling methods included passive sticky card traps, shake samples of the vineyard canopy, and sweep net samples of ground cover.

Riparian areas and field margins of alfalfa fields were the areas we found the greatest abundance of buffalo treehoppers. Sweep netting was the method by which we captured the greatest numbers of buffalo treehoppers. We have captured very few nymphs. We have captured mostly adults.

In summer 2018 we caged adult buffalo treehoppers on potted Chardonnay vines in the greenhouse and the adults persisted on these vines until the vines went dormant at which point they died. In March 2019 as these vines broke dormancy we observed egg hatch and nymphs on these grapevines. We monitored the development of these nymphs on the grapevines and after developing through 2 to 3 nymphal instars all the buffalo treehopper nymphs died. For now it appears that while grapes may not be a preferred host for the buffalo treehopper it seems like buffalo treehoppers can persist as adults on wine grapes vines, but they vcannot complete development on wine grape vines. However, this is very preliminary data.

In summer 2018 we conducted transmission assays following the protocols developed by Brian Bahder in California with the treecornered alfalfa treehopper. An exception is that Brian completed his transmission assays with only 1 treehopper per caged vine. With threecornered alfalfa treehopper this resulted in a transmission rate of about 30%. For proof of concept we completed our transmission assays with both 5 and 10 GVRBaV infected treehoppers per vine. We really wanted to give the buffalo treehopper the acid test. Presently we are in a hurry up and wait mode to see if transmission is successful. We will run PCR tests on these vines for the next several years to determine if the buffalo treehopper is a potential vector for GVRBaV. As stated previously there appears to be a long latent period between infection of a vine and our ability to detect successful virus transmission.

From communications with viticulturists over the past 2 years it appears that GVRBaV is not spreading rapidly in Washington State. So for now we continue to live a charmed life here in Washington in regards to GVRBaV compared to California and southern Oregon where the disease continues to spread.

Information Dissemination, Extension, and Outreach Activities:

January 17, 2019	Monitoring Mealybugs for Potential Imidicloprid Resistance and Buffalo Treehoppers for Imidicloprid Susceptibility. Washington Wine Commission. Prosser, WA
November 9, 2018	Red Blotch Vectors. Washington Grape Society. Grandview, WA

August 7, 2018	Monitoring mealybugs for potential Imidacloprid resistance. Washington State Wine Grape Research Program. Prosser, WA presented by Sally O'Neal
April 4, 2018	Potential for Red Blotch Disease in Washington. Washington Advances in Viticulture and Enology. Prosser, WA
March 15, 2018	Managing Vectors of Grapevine Leafroll Disease. Washington Advancements in Viticulture and Enology, Richland, WA
November 17, 2017	Insect and Mite Management. Washington Grape Society. Grandview, WA
May 2, 2017	No Rain, Cold Winter: the Terroir of successful IPM in Washington State Vineyards. Washington Advancements in Viticulture and Enology
April 19, 2017	Investigation of Vectors of Grapevine Red Blotch Associated Viruses in California and Oregon & Plans for Washington State. Washington Advancements in Viticulture and Enology.
November 10, 2016	Grape Pest Update. Washington Grape Society. Grandview, WA
July 14, 2016	Pest Management: Successes & New Challenges. Washington Advancements in Viticulture and Enology. WSU-Tri-Cities