16-001

FY16 Application for Nursery Research Funding
Washington State Department of Agriculture - Nursery License Surcharge

(Please use one application packet, including the Progress Report page for each proposal. You must use our form - *failure to do so may result in not funding your project.*)

Project Title: Establishment and evaluation of beneficial insect-attracting native plant ground covers in Wine Grape Vineyards

Project Leader: David G. James

Institution (if any): Washington State University

Mailing Address: IAREC, 24106 N. Bunn Road, Prosser, WA 99350

Email: david_james@wsu.edu **Project Phone Number:** (509) 786 9280 **Cell Number:** (____)

Note: Project leader or his/her designee must be available at above project phone number on **February 27, 2015** between the hours of 10:00-12:00 and 1:00-3:00.

(Check One) New Project X Continuing _

Start Date: July 2015 **Completion Date: June 2018**

Amount Requested for (FY16) July 1, 2015 to June 30, 2016: $ 11, 877

If this is a multiple year project, please estimate and list the following information for each future July 1 - June 30 period listed below through project completion:

Fiscal Years (FY)	July 1, 2016 to June 30, 2017	July 1, 2017 to June 30, 2018	July 1, 2018 to June 30, 2019	July 1, 2019 to June 30, 2020	July 1, 2020 to June 30, 2021
$ Amount Needed	$ 12, 000	$ 13,000			

If you are increasing the above amounts since your last application, please explain why:

*Please list **all** other sources and amounts of funding for this project for the current year only: **(Please notify us by February 15 if other funding has been approved and from where.)**

Source	$ Amount Applied For	Approved	Pending Date of Notification
Washington State Grape and Wine Research Program	**$23, 318**		**March/April 2015**

Total Amount Needed to Fund Project (include all sources*) $ 35,195

If total amount from all sources is not granted, will you be able to complete the project? **Partially: There would be reductions in number of plant species used and parameters measured, according to funding level provided**

Please indicate which sector(s) of the nursery industry stand to benefit from the results of your research: (Letters of support from the industry are encouraged.)

Native plant nurseries (letter of support from one nursery attached)

Submit 16 copies of this proposal to: Tom Wessels, Plant Services Program Manager, P.O. Box 42560, Olympia, WA 98504-2560, twessels@agr.wa.gov, or fax (360) 902-2094
All applications must be postmarked by December 31, 2014.

Please summarize the purpose of this research: (you may attach additional sheets if necessary or submit this summary in your own format)

Conservation biological control of insects and mites is the central element of integrated pest management in Washington wine grapes (James 2001, 2014, James and Prischmann 2011). However, sustainability of this low pesticide-input IPM varies from location to location and season to season. All of the arthropod pests that affect wine grapes in eastern Washington are endemic and regulated by attendant suites of natural enemies (Prischmann et al. 2007). These natural enemy communities occupy native habitats and vegetation, which in eastern Washington are primarily within the dominant shrub-steppe ecosystem (James and Price 2004). A good way to get predators and parasitoids of wine grape pests closer to vineyards thereby improving efficacy and sustainability of biological control, is to provide the habitat and resources they need either within the crop and/or very close by. Recent research has demonstrated the value of conserving native plants and habitats in or near Washington vineyards for enhancing populations of natural enemies and biological control of grape pests. We have also identified a large number of native plant species that are particularly attractive to predators and parasitoids important in grape pest biocontrol (e.g. James et al. 2014a). Some of these plants may have potential as in-row ground covers for vineyards. Although we demonstrated some years ago that flowering ground covers comprised of non-local plant species increased numbers of natural enemies and improved biological control, it was difficult to establish and sustain these non-native plants under eastern Washington conditions. Native ground cover plants have a significant advantage in being adapted to local conditions, requiring little or no supplemental moisture. The use of a beneficial insect-attracting native ground cover or covers in Washington vineyards would go a long way towards enhancing the efficacy and sustainability of biological control, an industry priority. Increasing sustainability is the next challenge for wine grape IPM in WA. Sustainability in the IPM context can be defined as biologically-based pest management which strengthens, or remains strong, from year to year with minimal chemical intervention (James 2014b). The key to strengthening Conservation Biological Control, the central plank of wine grape IPM in Washington, is to provide a diversified, native habitat (refugia, ground cover) that contains resources for predators and parasitoids year-round. 'Farmscaping' creates a vineyard landscape that is attractive to beneficial insects by containing elements of the native habitat. Habitat restoration also has other significant benefits beyond improving grape IPM, for example, wildlife conservation.

Results from this project will be summarized in digital and hard copy extension bulletins. Study results will be distributed to stakeholders through electronic formats, such as WSU web sites and at grower meetings, workshops and field days. Information will be posted on two web sites (http://www.facebook.com/pages/Vineyard-Beauty-with-Benefits-Restoring-Habitat-for-Beneficial-Insects and http://www.wavineyardbeautywithbenefits.com/) and stakeholders will be provided annual project updates and summaries. Results will be presented at regional and national professional society meetings and published in trade publications and scientific journals.

OBJECTIVES

1. To develop a native plant ground cover or covers for eastern Washington wine grape vineyards that is cost-effective, practical and enhances efficacy and sustainability of biological control of pests.
2. Establish native plant ground cover plot trials in WSU vineyards at Prosser and Richland.
3. Evaluate native plant ground cover plots for establishment, survival, persistence and impact on grape production.
4. Evaluate native plant ground cover plots for attraction of beneficial insects and grape pest suppression.

Methods of research:

A vineyard ground cover plot trial using five native plant species was established at WSU-Prosser in April-May 2013. A second vineyard ground cover trial using another six species of beneficial insect-attracting native plants will be established at WSU-Tri Cities in Richland in spring 2015.

Native Plant Vineyard Ground Cover Plot Trial WSU-Prosser: Seedlings or rootstocks of 5 native plant species (*Asclepia speciosa* Showy Milkweed, *Eriogonum. compositum* Northern Buckwheat, *Eriogonum heracleoides* Parsnip Buckwheat, *Monardella odoratissima* Coyote Mint, *Achillea. Millefolium* Yarrow) identified as being highly attractive to a range of natural enemies important in biological control of wine grape pests in eastern Washington, were established in replicated plots in a research vineyard at WSU-Prosser during April-May 2013. Approximately 40-50 plants of each species were established in each plot (~6 x 18') bordered on each of two sides by 3 grapevines. Ground cover plots were separated by non-planted grass/weed plots. Three plots were established for each plant species in each of two grape varieties (Chardonnay and Merlot). Two of the plant species (*A. millefolium, M. odoratissima*) flowered in 2013 and 2014 was the first season of flowering for all 5 species. Data on populations of pest and beneficial insects and mites within each plot (including plots without native ground covers) will be collected monthly during April-October, derived from leaf samples and sticky traps. Ten leaves will taken randomly from mid-canopy grapevines in each ground cover plot. A single yellow sticky trap will be placed mid-canopy on grapevines in each ground cover plot and removed after two weeks. Leaf samples will be stored at 5 C until examined under a stereomicroscope (SM). All insects and mites will be identified, counted and recorded. Similarly, sticky traps will be scanned under the SM with all insects, identified, counted and recorded. A select group of motivated inmates at Washington State Penitentiary (Walla Walla) trained in insect and mite identification, will conduct some monthly assessments of grape leaves and sticky traps (at no cost to the project). Previous work and experience with inmates since 2012 has demonstrated their high commitment and favorable predisposition to entomological data collection. A dual favorable outcome of reliable data and beneficial exposure of inmates to a worthwhile scientific and educational endeavor is expected.

Data on grape yield, ripening and quality in the native ground cover plots will also be collected during harvest each year. Fruit quality characteristics such as Brix, pH, tritratable acidity, color etc will be measured using routine analytical tools (e.g. refractometer, auto-titrator, spectrophotometer). Measurement of these parameters is necessary to monitor any possible adverse (or beneficial) effects from the groundcovers on fruit production.

A second replicated vineyard ground cover trial using another six species of beneficial insect-attracting native plants will be established at WSU-Tri Cities in Richland in spring 2015. Candidate plant species for this trial are *Eriogonum niveum* (Snow Buckwheat),
Eriophyllum lanatum (Oregon Sunshine), *Apocynum androsaemifolium* (Spreading Dogbane), *Gaillardia aristata* (Common Blanketflower), *Eriogonum umbellatum* (Sulphur flower Buckwheat) and *Erigeron speciosus* (Showy Fleabane). Establishment and data collection protocols will be identical to those of the WSU-Prosser trial.

Benefits to the Nursery Industry

A successful outcome to this project will result in significant opportunities for the native plant nursery industry in Washington to increase production and market potential. Identification of one or more beneficial insect-attracting native plant ground covers, agronomically suited to eastern Washington wine grape vineyards, should result in strong future demand for these plants from the wine grape industry.

LITERATURE CITED:

James, D.G. (2001). Beneficial arthropods in Washington vineyards: Screening the impact of pesticides on survival and function. Grape Post Oct-Nov (p.7-10)

James, D.G. and Price, T.S. (2004). Field-testing of methyl salicylate for recruitment and retention of beneficial insects in grapes and hops. Journal of Chemical Ecology 30, 1613-1628.

James, D.G. (2014). Pest management in Washington State vineyards: Case study. Pp. 26-27 In Farming with Native Beneficial Insects: Ecological pest control solutions. **The Xerces Society Guide. Storey Publishing MA.**

James, D.G., Seymour, L.S., Lauby, G. and Buckley, K. (2014a). Beneficial insects attracted to native flowering buckwheats (***Eriogonum* Michx.)** in central Washington. Environmental Entomology 43: 942-948.

James, D. G., Seymour, L., Lauby, G. and Buckley, K. (2014b). Beauty with benefits: Butterfly conservation in Washington State, USA, wine grape vineyards. **Journal of Insect Conservation (In Review).**

Prischmann, D.A., James, D.G., Storm, C.P., Wright, L.C. and Snyder, W. E. (2007). Identity, abundance and phenology of Anagrus spp. (Hymenoptera: Mymaridae) and leafhoppers (Homoptera: Cicadellidae) associated with grape, blackberry and wild rose in Washington State. Annals of the Entomological Society of America 100: 42-52.

Expenditure Breakdown:
(Please include salaries, supplies, travel, etc.)

Salaries	
Research Intern Salary (18%)	$ 4, 770
Supplies[2]	$ 3,000
Travel[3]	$ 875
Employee benefits (54%)	$ 2, 576
Total	**$ 11,877**

[1]Salary. Assistance with sample collection and evaluation and routine maintenance of plots.
[2]Native plant plugs, Research consumables and lab disposables for sample collections and processing
[3]Vehicle charges (@56c/mile for travel to WSU-Tri Cities from WSU-Prosser and return.

The information requested on this page will have a direct bearing on whether your research request is approved or denied. Letters of support from the industry are also encouraged.

I am writing in support of Dr. David James' application for nursery research funding. I operate a native plant nursery in Peshastin in the Wenatchee Valley and have supplied Dr. James with native plants appropriate to his work with biological control enhancement in vineyards. I have a B.S. in Entomology from Cornell University and for 5 years worked for Washington State University Cooperative Extension in Wenatchee, promoting the adoption of biorational pest management for orchardists across the state. In that work, and in my own orchard in Peshastin, I have seen the benefits provided by biological pest control when predators and parasites are preserved and encouraged in agricultural settings. In the Wenatchee Valley, where I worked with 15 pear growers to reduce pesticide use, we found that proximity to native flora increased the biological control of key pear pests. Research in this area, as Dr. James is doing, can produce valuable and practical information to allow growers to reduce pesticide use while maintaining good crop yields and quality.
Best of luck!
Ted

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Ted Alway
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