



Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-325

Proposal Title: Resiliency through Sustainable Management of Viburnum Leaf Beetle

Project Manager Information

Name: Seth Wannemuehler

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Office Telephone: (812) 550-7573

Email: wanne028@umn.edu

Project Basic Information

Project Summary: This project assesses Viburnum plant susceptibility to Viburnum Leaf Beetle, examining temperature and light effects on feeding, development, and survival to provide statewide stakeholders with effective management recommendations.

ENRTF Funds Requested: \$269,000

Proposed Project Completion: June 30, 2029

LCCMR Funding Category: Small Projects (G)

Secondary Category: Resiliency (A)

Project Location

What is the best scale for describing where your work will take place?

Region(s): Metro

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Viburnum Leaf Beetle (VLB) (*Pyrrhalta viburni*), an invasive Eurasian insect, poses a growing threat to Minnesota's native Viburnum species. VLB larvae skeletonize leaves, while adults lay eggs in stem cavities, causing plant decline and mortality. Since its first U.S. detection in Maine (1994), and arrival in Minnesota (2019), VLB has decimated wild and cultivated Viburnum in the metro, which serve as valuable hosts for a range of pollinators.

VLB threatens the state's native flora and the \$3.5 billion nursery and landscape industry that provides necessary ecosystem services. Many native Viburnum species in North America show moderate to severe susceptibility. While systemic pesticides offer control, they may harm pollinators, necessitating alternative strategies. Observations at the Minnesota Landscape Arboretum suggest that environmental factors like temperature and light influence infestation rates. Simple practices, such as full-sun placement, may reduce pest activity, but the relationship between species susceptibility, environmental conditions, and infestation rates remains unclear.

Research is essential to assess the unstudied Minnesota native Viburnum edule and examine environmental influences on VLB development. This project will provide critical insights for green industry professionals and land managers, supporting sustainable management strategies to mitigate VLB damage and protect Minnesota's Viburnum populations.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

Since VLB is a relatively new pest in Minnesota, it is imperative to formally recommend resistant viburnum plants and management techniques to protect this economically important industry, largely comprising state-native taxa in cultivation. While previous research has evaluated susceptibility of some Viburnum species and egg-laying behavior of VLB, knowledge gaps remain for understudied species like the Upper Midwest native *V. edule*. If resistant, these species could expand landscape resilience and sustainable planting options, but formal evaluation is required.

Additionally, variation in VLB susceptibility has been observed in other North American native Viburnum species. To further investigate this, a breeding population derived from crosses between highly and moderately susceptible species (*V. nudum* × *V. cassinoides*) will be studied to identify factors contributing to resistance and how management practices can be applied to our native taxa. A field trial will assess the susceptibility of native species alongside known resistant, introduced taxa like *V. carlesii*.

This research will investigate environmental influences on VLB development, including temperature and light, to understand their impacts on larval feeding and insect development. Findings will provide green industry producers and land managers with recommendations for selecting resilient Viburnum and implementing sustainable management strategies to protect natural and cultivated landscapes.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

This project will support the protection and conservation of Minnesota's natural resources by identifying Viburnum species susceptibility to VLB, reducing reliance on chemical controls and promoting sustainable management practices. Preserving native Viburnum populations and genetics is crucial for providing habitat and food sources for wildlife, enhancing ecological resilience, and increasing biodiversity in managed landscapes. By evaluating resistance in native species and developing management recommendations, this research will aid in the conservation of Minnesota's genetic resources and ensure long-term sustainability of natural and managed landscapes. Findings will guide land managers, conservationists, and the nursery industry in selecting and preserving resilient Viburnums.

Activities and Milestones

Activity 1: Evaluate Resistance of State Genetic Resources

Activity Budget: \$123,453

Activity Description:

While previous research has evaluated susceptibility of some *Viburnum* species and egg-laying behavior of VLB, knowledge gaps remain for understudied species like the Upper Midwest native *V. edule*. If resistant, this species could expand landscape and crop resilience, but requires formal evaluation. Current *V. edule* populations have been identified along the north shore for collection. *Viburnum edule* populations will be trialed alongside other North American native viburnums in a field plot.

A population derived from crosses between highly and moderately susceptible species (*V. nudum* × *V. cassinoides*) will be studied to evaluate VLB susceptibility. Defoliation in the offspring will be assessed using a ten-point percentage scale, and feeding behavior will be recorded on all individuals in this population (e.g. whether outer or inner leaves are consumed first). Susceptibility observations will be paired with genetic testing to explore population responses to VLB resilience. This hybrid population will support field testing and protocol development in Activity 2.

Crosses will be performed with hand pollination to ensure controlled crosses and prevent self-pollination. Seeds will be collected, sown in trays, stratified for two seasonal cycles and planted. This activity lays the foundation for breeding native *Viburnum* with VLB resistance in the Upper Midwest.

Activity Milestones:

Description	Approximate Completion Date
Establishment of <i>Viburnum</i> field plot	August 31, 2026
Crosses between native <i>Viburnum</i> completed	July 31, 2027
Collection of Minnesota native <i>V. edule</i> completed	September 30, 2027
First evaluations of <i>Viburnum</i> field plot completed	September 30, 2027
Deposition of <i>V. edule</i> germplasm and seeds completed	February 28, 2028
Additional crosses between native <i>Viburnum</i> completed	July 31, 2028
Second evaluations of <i>Viburnum</i> field plot completed	September 30, 2028
Complete genetic analysis of hybrid population	December 31, 2028
Germination of 2027 crosses completed	March 31, 2029
Recommendation of native species and identification of elite individuals for VLB resistance	June 30, 2029

Activity 2: Examine Impacts of Light Exposure and Temperature on the Ability of Native *Viburnum* Species to Tolerate Infestation by VLB

Activity Budget: \$136,295

Activity Description:

This project investigates the effects of temperature and light on *Viburnum* Leaf Beetle (VLB) larval development and egg survival in North American native *Viburnum* species. In addition to ongoing observations of VLB on 400 existing *Viburnum* specimens at the Minnesota Landscape Arboretum (MLA), controlled feeding trials in growth chambers will examine impacts of heat and light on VLB development. Larvae will be placed on leaves under three temperature treatments and three light levels, with survival and growth recorded until adult emergence.

To evaluate the impact of far-red light on VLB feeding, we will grow three VLB-susceptible *Viburnum* species under three far-red light treatments in growth chambers. Larvae will be introduced at the same developmental stage, and feeding

intensity will be measured through leaf area loss over time. Larval growth and development will also be monitored to determine if light manipulation can mitigate pest damage.

A new field plot of North American native *Viburnum* species and hybrids is being established under full sun. Shade cloth will be used to adjust field light levels. Temperature will be monitored and VLB egg overwintering survival will be tested using controlled freezing.

Novel findings will be published in a peer-reviewed journal and through Extension.

Activity Milestones:

Description	Approximate Completion Date
Establishment of <i>Viburnum</i> field plot	August 31, 2026
First feeding trial complete	September 30, 2026
First freezing experiments completed	February 28, 2027
Establishing field plot shade experiment	May 31, 2027
Second feeding trial complete	September 30, 2027
First far-red feeding trial and field shading observations complete	September 30, 2027
Second freezing experiments completed	January 31, 2028
Third feeding trial complete	September 30, 2028
Second far-red feeding trial and field shading observations complete	September 30, 2028
Third freezing experiments completed	February 28, 2029
Workshop on VLB findings in Minnesota	March 31, 2029
Final data analysis, planting recommendations, and dissemination of findings	June 30, 2029

Activity 3: Create University of Minnesota Extension Resources for *Viburnum* Species and VLB

Activity Budget: \$9,252

Activity Description:

With limited information currently available on *Viburnum* Leaf Beetle (VLB) in Minnesota, rapid sharing of research findings is essential. To address this, online Extension resources will provide up -to-date information of *Viburnum* species susceptibility and VLB management. A dedicated fact page on VLB will be hosted on the UMN Extension Yard and Garden website, the most visited Extension page. This webpage will be developed with the current information on VLB in 2026 and updated new research findings emerge from Activities 1 and 2.

Species susceptibility data will be integrated into Plant Elements of Design v3.0, the latest version of the Extension Plant Finder website. Metrics such as page views, searches, and clicks will be collected to evaluate outreach effectiveness.

To complement online resources, print resources will be distributed at field days and workshops to farmers and industry partners. These printed resources will include VLB identification, species susceptibility, cultural controls strategies, and a link to the full VLB webpage.

Activity Milestones:

Description	Approximate Completion Date
Extension fact page created	October 31, 2026
Update fact page	October 31, 2027
Update fact page	October 31, 2028
Distribute printed VLB brochures at <i>Viburnum</i> workshop completed	March 31, 2029
Integrate susceptibility data into Plant Elements of Design completed	April 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Brandon Miller	University of Minnesota	Co-PI	No

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

Findings will be shared via Extension resources (UMN Extension Yard and Garden) and susceptibility data will be integrated into Plant Elements of Design, the latest version of the Extension Plant Finder website. Additionally, findings will be disseminated in peer-reviewed publications (final reports) and through stakeholders oriented workshops. This study directly supports Minnesota's climate resilience efforts by providing scientific recommendations for selecting resilient *Viburnum*. Findings will guide land managers, conservationists, and the nursery industry in selecting and preserving resilient *Viburnum* species. After project completion, breeding populations will be maintained and cultivated by the UMN woody landscape program.

Project Manager and Organization Qualifications

Project Manager Name: Seth Wannemuehler

Job Title: Post-doctoral Associate

Provide description of the project manager's qualifications to manage the proposed project.

Dr. Seth Wannemuehler is a Post-doctoral Research Associate in the Department of Horticultural Science at the University of Minnesota. In addition to managing his own extramurally funded projects as lead PI, he also collaborates widely with researchers throughout, and external to, the Department of Horticultural Science. Dr. Wannemuehler is experienced in the specific qualifications pertinent to this proposed plant resiliency project: controlled insect feeding assays, field trialing, and working to distribute findings to public stakeholders via Extension programming.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:

This project will operate through the University of Minnesota Department of Horticultural Science.

The College of Food, Agricultural and Natural Resources Sciences (CFANS) comprises twelve academic departments as well as ten research and outreach centers, in addition to the Minnesota Landscape Arboretum, the Bell Museum, and a variety of interdisciplinary centers.

The University of Minnesota Landscape Arboretum, founded in 1958, is a 1,200-acre premier northern garden that includes 28 specialty gardens, 45 plant and tree collections, 18 model landscapes and natural areas, and an extensive collection of cold hardy plants. The mission of the Arboretum is to welcome, inform and inspire all through outstanding displays, protected natural areas, horticultural research, and education. Its vision is to be the premier northern landscape arboretum, welcoming all to enjoy, learn from, and connect with nature.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Extension educator		To format outreach materials for Extension resources (webpages and handouts). [YR1: \$2,151 (Salary: \$1,575; Fringe: \$576); YR2: \$2,227 (Salary: \$1,630; Fringe: \$597); YR3: \$2,304 (Salary: \$1,687; Fringe: \$617)]			36.6%	0.06		\$6,682
Researcher 1 (R1)		To develop and implement experiment protocols, collect data, and data analysis. [YR1: \$68,549 (Salary: \$51,813; Fringe: \$16,736); YR2: \$70,947 (Salary: \$53,626; Fringe: \$17,321); YR3: \$73,431 (Salary: \$55,503; Fringe: \$17,928)]			32.3%	3		\$212,927
							Sub Total	\$219,609
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Tools and Supplies	iButtons and Cables (Y1 \$1440 (for 30); interface port \$54; usb cable \$3)	iButtons will be used to measure real time field, greenhouse, and growth chamber temperature conditions.					\$1,497
	Tools and Supplies	Quantum sensors	Quantum sensors will be used for measuring light intensity and quality, to characterize the conditions of the experiments in the field.					\$5,136
	Tools and Supplies	Plant material (Y1 \$550 (for approximately 25 plants)	Purchased plant material of known cultivars for field and growth chamber experiments					\$550
	Tools and Supplies	Plant container pots (Y1 \$100 (for 200))	Pots needed for planting cuttings in the greenhouse for later field or growth chamber experiments					\$100
	Tools and Supplies	Petri plates (Y1 \$90 (for 200))	Supplies needed for conducting controlled feeding trials in a laboratory setting					\$90

	Tools and Supplies	Shade cloth (Y2 \$645; 4 units of 6ft x 100ft)	Shade cloth will be used to adjust light quality in a field setting for side by side comparisons of light quality on VLB feeding.					\$645
	Tools and Supplies	Treated wood field posts (Y2 \$1,100 for 50 - 8ft x 5in posts)	Field posts will be used to support shade cloth above viburnum plants in field experiments.					\$1,100
	Tools and Supplies	DNeasy Plant Pro Kit (Y2 \$1398 for 200 extractions; Y3 \$346 for 50 extractions)	DNeasy Plant Pro Kits will be used to extract DNA for examining differences between resistant and susceptible individuals in a hybrid population.					\$1,744
	Tools and Supplies	Eppendorf tubes (Y2 \$247 for 1000)	Eppendorf tubes will be used for DNA extractions, tissue collection, and long term tissue storage.					\$247
	Tools and Supplies	Laboratory safety nitrile gloves (Y2 \$50 for 500)	Gloves are necessary for safety while working in lab settings including DNA extractions and feeding trial preparations.					\$50
	Tools and Supplies	Pipette tips (Y2 \$142 for 500; Y3 \$120 for 400)	Pipette tips will be used for DNA extraction and feeding trial experiments.					\$262
							Sub Total	\$11,421
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel between Horticultural Research Center and UMN St. Paul campus: \$0.70/mile, 60 miles round trip, 50 trips/yr = \$2,100 annually; \$6,300 total	Travel between campus and the research center to conduct field trials (HRC) and controlled feeding tests in growth chambers (St. Paul campus).					\$6,300
							Sub Total	\$6,300

Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Publication	Peer-reviewed journal article(s)	Publication fees associated with submitting results for up two peer reviewed journal articles (HortScience) [Y2: \$2,000; Y3: \$2,000]					\$4,000
	Printing	Extension resource materials	Printing resource materials based on the data collected to be used to disseminate project results to public stakeholders (\$95 for 120 pages; [Y1 \$285; Y2: \$285])					\$570
							Sub Total	\$4,570
Other Expenses								
		Growth chamber rental	Controlled environment research growth chamber for housing feeding assays (\$4,380 annually)					\$13,140
		Greenhouse space rental	To grow stock plants for use in feeding evaluations in the field and in the growth chamber (\$808 annually).					\$2,424
		Genome by sequence (GBS) data processing	GBS from U of M Genomics Center (quoted \$11,536 for first tier processing for 192 samples)					\$11,536
							Sub Total	\$27,100
							Grand Total	\$269,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$269,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [c6967267-079.pdf](#)

Alternate Text for Visual Component

A logic model illustrating the problem, key resources, research activities, and expected outcomes for studying native Viburnum susceptibility to Viburnum Leaf Beetle....

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
University of Minnesota SPA Approval	818b08fd-0bc.pdf
Photos of Viburnum Leaf Beetle damage	3b988122-219.pdf
Letters of Support	d655da91-db2.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care,

treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Seth Wannemuehler, Brandon Miller, Dave La Fave

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A

