

## Chemeketa Community College Bio Control Rearing Facility

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This project will establish Chemeketa's Biocontrol Rearing Facility. Faculty will support Horticulture students in the establishment, maintenance, record keeping, and presenting results of this project. One student will be awarded a student researcher position to work collaboratively with the Horticulture Program faculty and Woodburn Nursery & Azaleas. This student position will increase the connection between Chemeketa and the nursery industry as well as provide insight into what biological control practices are effective at a commercial nursery. The main collaborators of this project will be Woodburn Nursery & Azaleas and Sound Horticulture.

### **Project background and benefit to the Industry:**

Biocontrol is becoming increasingly important in many sectors of agricultural industries, specifically in nursery and greenhouse production. Nurseries are seeking ways to reduce their pesticide use for a variety of reasons including the cost savings associated with fewer chemicals purchased, the pesticide applicator's health and safety, and the associated environmental benefits. Consumer awareness regarding chemical usage, specifically neonicotinoids, and the effect on native pollinators and honeybees is also driving the demand for alternatives. Chemeketa's Biocontrol Rearing Facility will develop a workforce that has the skills necessary to help advance the use of biological control agents as part of a nursery IPM program. Chemeketa's Biocontrol Rearing Facility will be incorporated into Chemeketa's Crop Health Certificate curriculum, supporting eleven courses. Additionally, funds from this project will support a joint student researcher at Woodburn Nursery & Azaleas and the Chemeketa Agricultural Complex to provide experiential training in the rearing of biocontrol agents. This experience will provide a direct connection and comparison to help both Chemeketa's Horticulture Program and Woodburn Nursery advance their use of biocontrol.

### **Project objectives:**

- Evaluate, improve, and create nursery specific guidelines utilizing currently understood techniques for rearing and applying biological control agents. Specifically focusing on predatory mites, rove beetles, predatory wasps, and feeder mites for use in nursery and greenhouse production.
- Evaluate compost tea application for its effectiveness on fungal disease suppression focusing on *Fusarium* spp., powdery mildew, certain root rot diseases, and *Botrytis* spp.
- Develop a workforce that is trained in developing, implementing, managing, and evaluating an IPM program that focuses on biological control as a means to reduce IPM costs and the reliance on chemicals while protecting the applicator and the environment.
- Present the results of this project at the Farwest Trade Show, the Biocontrols USA Conference and Expo, Digger magazine, and events at the Agricultural Complex.
- Establish Chemeketa's Biocontrol Rearing Facility and invite industry professionals, community members, and high school teachers to tour the projects taking place at the Agricultural Complex.

### **Overview of methods and timelines:**

#### ***Winter Term 2021***

- Student Researcher is hired and begins work at Woodburn Nursery & Azaleas and Chemeketa Horticulture Program
- Construction of Biocontrol Rearing Facility and release of agents from Sound Horticulture
- Students in the *Biological Control Agents* course document experimental design.
- 2021 Chemeketa Gardens production begins
- Students rear and release biocontrol agents and generate data

#### ***Spring Term 2021***

- Students continue to rear and release biocontrol agents and generate data
- Student Researcher develops protocols for scouting and monitoring at the Agricultural Complex
- Attend Biocontrol USA Conference
- Principal investigator and Co-PI create a written mid-year progress report

#### ***Summer Term 2021***

- Attend Farwest Trade show and conference
- Host field day for community members and local high school teachers
- Scout and monitor pest and beneficials
- Establish outdoor insectary habitat for beneficials

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### **Fall Term 2021**

- Students continue to rear and release biocontrol agents and generate data from indoor and outdoor environments
- Student Research culminates data in preparation for presenting to the nursery industry at the Biocontrol USA Conference 2022 and other events
- Principal investigator and Co-PI create a written final report for the Oregon Association of Nurseries
- Results of project are shared with the nursery and greenhouse industry through publications such as Digger magazine

### **Budget summary:**

**Supplies: \$6,493** The predatory mite *Stratiolaelaps scimitus*, the rove beetle *Dalotia coriaria*, and the feeder mite *Tyrophagus putrescentiae*, will be raised in plastic containers with holes drilled in the lid for air flow, which are then covered with mesh that has been hot glued to the lid. There will be 280 containers which will allow for a rotation of different stages of rearing. The containers will be placed on four metal racks which can be wheeled into lab areas for student lessons and activities. These supplies will be reused and allow for the continuation of this project beyond the grant period. Coco coir, vermiculite, and a polymer will be used as bedding materials within the containers. The amount of bedding materials will sustain rearing production for the entirety of the project. In order to create a constantly homogeneous mix of bedding materials a cement mixer will be used. Wheat bran and dog food will be used as a nutrient source and will need to be blended into small pieces before each feeding. Two copies of the textbook: *Mass Production of Beneficial Organisms* will be purchased to aid in student lessons and the advancement of Chemeketa's Biocontrol Rearing Facility.

**BioControl Agents: \$805** The *Aphidius* species of predatory wasps require a different rearing technique which includes banker plants to be grown in the greenhouse. Winter wheat will be used as the banker plants which will be grown in 10" round plastic hanging baskets. Each container will be covered with a hair net to keep the predatory wasps confined until they are ready to be released. The initial banker plants will be purchased from Sound Horticulture. These plants are pre infested with the cereal aphid *Rhopalosiphum padi*, which does not affect most greenhouse plants, and will be used to feed the predatory wasps. We will continue to grow winter wheat and spread the cereal aphid from plant to plant to sustain the ongoing rearing of predatory wasps. With the exception of the predatory wasps, all biocontrol agents will be reared indoors. Each of the biocontrol agents will be purchased from Sound Horticulture. Initially the project will start with 250,000 predatory mites, 5,000 rove beetles, 500 predatory wasps, and 300,000 feeder mites. The rearing efforts of this project will multiply the number of biocontrol agents exponentially.

**Equipment: \$2,600** In order to provide the ideal conditions for reproduction a small room of the Agricultural Complex will be outfitted with a ductless heater and humidifier. Compost tea will also be studied as a management strategy to reduce the need for chemical inputs while limiting their negative impacts on biological control agents. A compost tea brewer will be purchased from Sound Horticulture along with enough supply of compost tea catalyst for a year's worth of applications to the greenhouse and nursery areas at the Agricultural Complex.

**Personnel: \$4,633** A student researcher will be selected to work for 10 hours a week for 3 terms both at Chemeketa's Biocontrol Rearing Facility and at Woodburn Nursery & Azaleas. During this time the student researcher along with other Horticulture students will present the progress, results, and future of the project at the Farwest Trade Show in Portland. Paid work experiences are an important part of developing workforce skills.

**Conference: \$2,810** The student researcher along with Horticulture faculty members will attend the Biocontrol Conference and the Farwest Trade Show the work of this project will be shared. Additionally, the results of this project will be featured in Digger magazine as well as at the Agricultural Complex. In future years, industry professionals, community members, and high school teachers will be invited to tour Chemeketa's Agricultural Complex and the Biocontrol Rearing Facility.

**Total request: \$17,314**

<b>Personnel</b>	
Student researcher \$13/hr, 10 hr/wk for 11 wk for 3 terms plus 8%	\$4,633
<b>Equipment</b>	
Industrial size compost tea brewer	\$1,500
Humidifier	\$100
Ductless heater and installation	\$1,000
<b>Biocontrol agents</b>	
Stratiolaelaps scimitus- predatory mite	\$195
Dalotia coriaria- rove beetle	\$250
Aphidius species including A. colemani, A. ervi, and A. aphelinus, all are predatory wasps	\$160
Tyrophagus- feeder mite	\$200
<b>Supplies</b>	
Containers	\$2,800
Racks	\$400
Mesh	\$30
Coco Coir	\$280
Vermiculite	\$54
Polymer	\$325
Wheat Bran	\$22
Blender	\$300
Banker plants	\$52
Dog food	\$45
Hot Glue Gun	\$21
Cement mixer	\$379
Hair nets	\$23
Round 10" plastic hanging basket	\$592
Media for Banker Plants	\$250
Winter Wheat Seed	\$84
Mass Production of Beneficial Organisms (2 copies- book)	\$240
Compost tea catalyst	\$596
<b>Conferences</b>	
Biocontrol Conference in Portland attendance x4	\$1,200
meals	\$160
Travel Portland twice	\$115
Portland Farwest Show booth space	\$1,335
<b>Total</b>	<b>\$17,341</b>