Oregon Department of Agriculture and Oregon Association of Nurseries

Nursery Research Grant Proposal 2025

DATE: August 27, 2024

TITLE: Embryo rescue of wide cherrylaurel hybrids

PRINCIPAL INVESTIGATOR

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COOPERATOR

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BACKGROUND:

The common cherrylaurel (*Prunus laurocerasus* L.) is a popular home and commercial landscape plant often used to create attractive hedgerows. However, like most stone fruit species, the common cherrylaurel can succumb to shothole disease (especially in areas where they are grown with overhead irrigation). Observations of Portuguese cherrylaurel (*Prunus lusitanica*) suggest that it is resistant to shothole disease. It would therefore potentially be useful breeding material for conferring tolerance of shothole disease to common cherrylaurel through hybridization and introgression. However, attempts to create hybrids between these two species have thus far been mostly unsuccessful, perhaps owing to the vast difference in ploidy between the common cherrylaurel ($2n = 22x = 176$) and the Portuguese cherrylaurel ($2n = 8x = 64$). Recently, my cooperator, Dr. Ryan Contreras, has identified several haploid ($11x$) common cherrylaurel plants which have shown greater promise in crosses with Portuguese cherrylaurel. In addition, Dr. Contreras has $12x$ and $16x$ Portuguese cherrylaurels in his research collection that may be more compatible with either $11x$ or $22x$ common cherrylaurel.

Embryo rescue is a commonly used strategy to recover viable hybrids from otherwise incompatible crosses between distantly related species or between plants with differences in ploidy levels. Embryo development has not yet been well studied in the Portuguese cherrylaurel x common cherry laurel crosses, so the stage at which these embryos arrest is currently unknown. In the proposed project, I will perform reciprocal crosses between Portuguese and common cherrylaurel in several different ploidy combinations and study development of the resulting embryos using microscopy to identify the stage of arrest, facilitated by comparisons with control crosses that produce viable seeds. I will then isolate pre-arrest embryos and apply and test several embryo rescue techniques to facilitate the production of Portuguese x common cherrylaurel hybrids.

Successful viable F1 hybrids that result from this project are also likely to be infertile, making it easier to export these plants to states that require no fruit to be present on cherrylaurels. In addition, knowledge gained from testing these embryo rescue techniques will enable future production of wide hybrids.

PROJECT OBJECTIVES:

•Perform reciprocal crosses 8*x* and 12*x* Portuguese with 11*x* common cherrylaurel
•Perform reciprocal crosses 16*x* Portuguese with 22*x* common cherrylaurel
•Perform control crosses with compatible cherrylaurels
•Identify stage of embryo arrest for Portuguese/ common cherrylaurel crosses
•Apply and test embryo rescue techniques to recover hybrid plants

METHODS

• Traditional crossing methods using pollen collected during 2024 and 2025 as appropriate
• Embryo dissection and confocal / scanning electron microscopy
• Prepare growth media with different formulations for in vitro embryo rescue
• Monitor embryo development and induce rooting if necessary

TIMELINE:

•Early-to-mid-Spring 2025: Conduct crosses using Portuguese cherrylaurel as the pollen donor and common cherry laurel as the recipient and control compatible crosses; monitor embryo development
•Late Spring - Early Summer 2025: Conduct crosses using Portuguese cherrylaurel as the pollen donor and common cherry laurel as the recipient and control compatible crosses; monitor development
•Spring - Summer 2025: Test embryo rescue techniques
•Summer-Fall 2025: Evaluate and analyze results

BUDGET:

Salary	
Master's Student Support (0.25 FTE for 9 months)	$11,229.75
Other Payroll Expenses	$5,035.88
Services and Supplies	
Tissue culture media reagents, culture vessels	$3,000
Microscope user fees	$800
TOTAL	**$20,065.64**