

SERA_Temp27: Nursery Crop and Landscape Systems

Status: Draft

Duration 10/01/2022 to 09/30/2027

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NIFA Reps:

Statement of Issues and Justification

Nature and significance of the issues for which multistate coordination is proposed

Production of nursery crops contributes significantly to state, regional, and national economies, with total national annual sales of \$4.5 billion (USDA, 2019). The nursery industry provides plants that enhance the aesthetic quality of urban and rural landscapes, increase property values, and provide numerous environmental benefits (Toscano et al., 2019). Nursery crops are grown utilizing multiple production systems (container-grown, field-grown balled and burlapped, and pot-in-pot), each requiring differing amounts of inputs (fertilizer, irrigation, and pesticides) that affect crop growth and quality. Nursery producers are located throughout the United States, thus crops are subjected to various levels and types of abiotic (temperature, moisture, light intensity, etc.) and biotic (insect, disease, and weed pests) stressors. Landscape plantings are also commonly subjected to adverse conditions that negatively affect establishment, growth, and survival including extreme weather (drought/flooding, intense heat/cold, etc.) and poor soils (compacted, high salinity, nutrient deficient, etc.).

Exposure to abiotic and environmental stresses can kill plants in extreme instances, but more commonly plants respond to these stresses through reduced growth followed by a slow decline in quality and increased susceptibility to insect and disease pests. Drought and flood events negatively affect field-grown crops and landscape plantings, while several states/municipalities have instituted restrictions on water use in landscapes and for agriculture production. Extreme temperatures (high or low) and early or late season freezes can negatively impact plant ornamental properties and survival. Runoff of irrigation and fertilizer can contaminate surface and underground water sources. Identification of taxa and practices that reduce inputs and biotic/abiotic stress would have a positive environmental impact.

How the proposed activity addresses national and/or regional priorities

Mitigating environmental stresses during nursery crop production and landscape plant establishment is necessary to ensure the long-term viability of these crops under ever-changing climate conditions. Developing improved nursery crop production practices to minimize abiotic stresses would increase crop quality and profitability while potentially improving landscape establishment. Identifying plant taxa that tolerate adverse conditions or developing methods to mitigate environmental stresses would also improve landscape values by maximizing plant establishment and survival.

Stakeholders, customers, and/or consumers

This collaboration will support a wide range of green industry professionals including scientific researchers, nursery and greenhouse crop producers, landscapers, landscape architects, extension personnel, garden centers, and garden enthusiasts.

Objectives

1. Develop improved practices for monitoring, detection, and reducing negative effects of abiotic stress during ornamental crop production to reduce production times and increase product quality at the point-of-sale.
 2. Investigation of plant responses to abiotic stress factors associated with climate change and evaluation of methods (germplasm selection, biostimulants, cultural practices, etc.) to mitigate negative impacts on landscape plant establishment and performance.
 3. Evaluation of selected plant taxa at multiple trial locations over a 3- to 5-year period to determine performance and adaptability across the southeastern U.S. region and identify abiotic/biotic stressors that lead to reduced plant quality.
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Procedures and Activities

1. Develop improved practices for monitoring, detection, and reducing negative effects of abiotic stress during ornamental crop production to reduce production times, mitigate negative environmental impacts, and increase product quality at the point-of-sale.

- Evaluate the impacts of abiotic stresses (drought, excess moisture, nutrients, supraoptimal root zone temperature, light intensity, etc.) on crop growth and quality during crop production in containers and in the field.
- Evaluate methods and products to mitigate effects of abiotic stress during crop production.
- Identify plant taxa/cultivars that are tolerant to various sources of abiotic stress.

2. Investigation of plant responses to abiotic stress factors associated with climate change and evaluation of methods (germplasm selection, biostimulants, cultural practices, etc.) to mitigate negative impacts on landscape plant establishment and performance.

- Evaluate the responses of abiotic stresses (drought, excess moisture, nutrients, supraoptimal root zone temperature, light intensity, etc.) on various taxa
- Evaluate methods to mitigate effects of abiotic stress during plant establishment in landscape settings.
- Identify plant taxa/cultivars that are tolerant to various sources of abiotic stress.

3. Evaluation of selected plant taxa at multiple trial locations over a 3- to 5-year period to determine performance and adaptability across the southeastern U.S. region and identify abiotic/biotic stressors that lead to reduced plant quality.

- Develop guidelines for conducting multi-year field trials to document short and long term effects of various abiotic stress factors and variations in climate conditions.
- Select multiple related taxa or multiple cultivars within a species that may exhibit varying responses to abiotic stress factors and climate conditions.
- Conduct multi-year field trials at multiple sites to evaluate plant establishment, growth, performance, and survival under various climate conditions.

Expected Outcomes and Impacts

- A major goal of the working group is to identify taxa with improved abiotic and biotic tolerances to the southeastern U.S. region and to promote improved cultural practices for maximizing plant quality and survival during production and landscape establishment. A broad range of green industry stakeholders will benefit from this work including commercial producers, landscape architects, garden enthusiasts, extension personnel, etc. Specific outcomes will include:
- Develop a collaborative regional plan to evaluate the effects of abiotic stress in the production and/or landscape establishment and performance of ornamental crop species.
- Identification of taxa with improved abiotic stress tolerance to reduce the need for replacement plants in the landscape and hence improve consumer confidence in gardening.
- Identification of taxa with improved biotic stress tolerance to reduce the use of pesticides in production and landscape environments.
- Development of cultural practices and novel techniques to reduce abiotic stress factors during crop production and landscape establishment and improve overall plant quality and survival.
- Provide producers, landscapers, consumers, and extension personnel with science-based information on plant performance in multiple regions of the southeastern U.S. For example, determine cold hardiness based on multiple year trials in multiple locations.
- Improve the accuracy of information delivered to the public on performance of taxa either within a state or regionally. This information can be integrated into existing commercial or public publications/branding materials.

Educational Plan

Information gained from research efforts related to abiotic stress factors such as drought, flooding, cold hardiness, heat tolerance, salinity, and nutrient deficiencies, etc. will be disseminated collectively and individually to crop producers, landscaper, and consumer audiences via scientific articles, industry trade magazines, digital sources (websites, social media, etc.), and presentations in extension and popular information channels. Additionally, a number of working group members teach formal university plant-based courses or Master Gardener courses, in which results will be integrated.

Organization/Governance

Guidelines for SERA-27 Officers:

CHAIR: Responsible for coordinating activities throughout the year, working with the Plant Evaluation Committee to ensure plant evaluation information is collected and compiled, and planning the working program for the next meeting. She/he may delegate or request assistance from the Secretary or Executive Committee Member to accomplish these objectives or making recommendations and decisions as needed throughout the year.

SECRETARY: Responsible for taking minutes of the meeting and distributing them in coordination with the IEG Chair and Administrative Advisor. The Secretary also works with the Chair to develop an annual report that is submitted to the Administrative Advisor for posting on the NIMSS system. The minutes and annual report must be written, reviewed, approved and posted on the website and the NIMSS system within 60 days after the annual meeting. It is the intent of the SERA-27 for the Secretary to serve as the Chair the next year.

EXECUTIVE COMMITTEE MEMBER: Functions as a member of the Executive Committee in decision-making between annual meetings and to assist the Chair as assigned. It is the intent of the SERA-27 for the Executive Committee Member to serve as the Secretary the next year.

MEETING HOST: The host for our annual meeting is responsible for making arrangements for meeting space, local tours/events, a hotel, etc. The Host coordinates with the Chair regarding local requirements for the formal program/agenda for the annual meeting. The Host and/or Chair provides the details of the local arrangements, travel, and agenda to the Administrative Advisor who maintains the e-mail addresses of members. The Host/Chair may also send such information to the members by mail. The Administrative Advisor can provide Email addresses.

UNIFORM PLANT TRIALS COORDINATOR: The coordinator is responsible for facilitating initiation of new field plant trials and compiling summaries of completed field plant trials. Duties include soliciting members for prospective field plant trials, communicating prospective collaborations to all members, reviewing proposed data collection protocols, communicating reminders for timely data submissions to respective trial participants/managers, and maintaining a database of ongoing and completed field plant trials.

Literature Cited

Toscano, S., A. Ferrante, and D. Romano. 2019. Response of Mediterranean Ornamental Plants to Drought Stress. *Horticulturae* 2019, 5, 6. doi:10.3390/horticulturae5010006.

U.S. Department of Agriculture (2019). 2017 Census of Agriculture. Retrieved from: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf.

Land Grant Participating States/Institutions

TN

Non Land Grant Participating States/Institutions

Participation

Participant	Is Head	Station	Objective	Research						Extension	
				KA	SOI	FOS	SY	PY	TY	FTE	KA
Witcher, Anthony	Yes	Tennessee State University	1,3	102	2110	1060	0.10	0.00	0.00	0	0

Combined Participation

Combination of KA, SOI and FOS	Total SY	Total PY	Total TY
102-2110-1060	0.1	0	0
Grand Total:	0.10	0.00	0.00

Program/KA	Total FTE
0	0
Grand FTE Total:	0
