e-GRO Alert

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# Increasing Success with Tissue Culture Acclimation

*Plant acclimation is a crucial step in preventing plant loss when propagating tissue culture plants.*

Heidi Lindberg
wollaege@msu.edu

Paul Fisher
pfisher@ufl.edu



Plants are propagated by tissue culture (Photo 1) for several reasons. Tissue culture allows for rapidly producing large numbers of clones that are disease- and virus-free, in a sterile, controlled environment. Sometimes tissue culture is used to multiply plants that are difficult to propagate by vegetative cuttings or other means. Tissue culture-produced plants are grown in a highly controlled environment under low light conditions during the laboratory phase (Photo 2). Growers who plant tissue culture-derived plantlets into trays for root development may see a high percentage of shrinkage (crop losses, Photo 3), because the greenhouse environment is relatively harsh compared with laboratory conditions.

Photo 1. Plants produced by tissue culture in agar gel. (Photo: Isabella Violante, Walters Gardens)



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Therefore, to increase success with tissue culture plants as they transition from the laboratory into the greenhouse, growers should add an acclimation step where the microclimate is less harsh prior to the final growing environment. Acclimation growing conditions should include moist but not saturated substrate, high humidity, low light levels (~100 µmol/m$^2$/s of light intensity, with a daily light integral of 5 mol/m$^2$/d), low air speeds, and warm temperatures (74-78 °F).

There are two methods to acclimate tissue culture plantlets and create this microclimate: either in a sole-source electric lighting growth chamber (vertical indoor propagation, “VIP”) or in the greenhouse. Some large propagators who have incurred high levels of loss in the greenhouse have adapted seed germination chambers by installing LED lights, to create VIP rooms for these tender plants (Photo 4, 5). VIP chambers have either LED side- or top-lighting and fogging systems to maintain a high relative humidity. The light levels are low (70 to 100 µmol/m$^2$/s) but usually run 24 hours under constant temperature and humidity conditions that only require irrigation 2-4 times per day.

Growers can also create a microclimate more suitable to acclimation within their greenhouse by tenting with remay cloth and providing shade (Photo 6). The plants under the remay cloth are darker, cooler, and with higher humidity, which reduces plant stress during the sensitive acclimation phase (Photo 7).


Photo 2. Low light conditions are provided in a tissue culture laboratory (Photo: Paul Fisher, UF/IFAS)

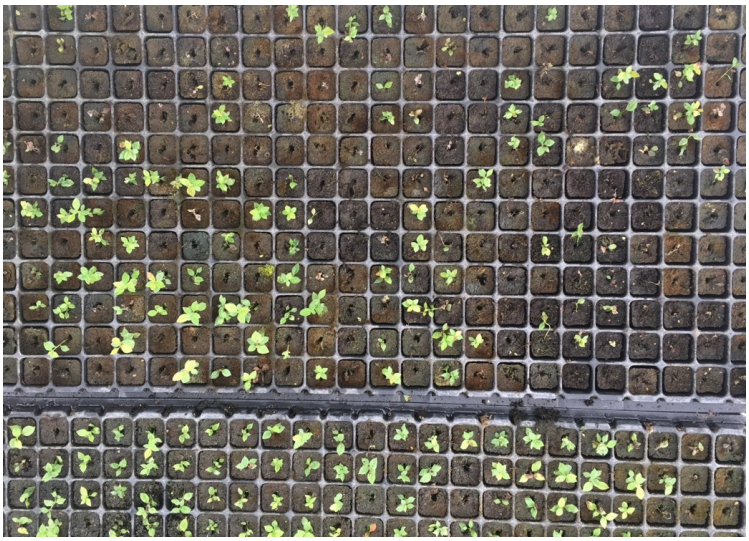

Photo 3. Plant losses of tissue culture plants are common in greenhouses if stressful conditions during acclimation (the initial rooting stage). (Photo: Paul Fisher, UF/IFAS)

Photo 4 and 5. These vertical indoor propagation chambers have either LED side- or top-lighting and fogging systems to maintain a high relative humidity. (Photos: Heidi Lindberg)

Photo 6. Remay tenting of crops to reduce light level and plant temperature, and increase humidity in the greenhouse. (Photo: Paul Fisher, UF/IFAS)

After plants have been acclimated the final step is hardening off. During the hardening off stage, plants should be kept more dry, grown under 10+ mol/m$^2$/d, relative humidity of 50-70%, and air temperatures of 60-72 °F depending on plant species. The greenhouse environment should also provide air movement in the canopy to prevent plant disease and increase nutrient and water uptake.

Plant acclimation is a crucial step in preventing plant loss when propagating tissue culture plants. Implementing these practices will increase the success rate and profit margin for growers.

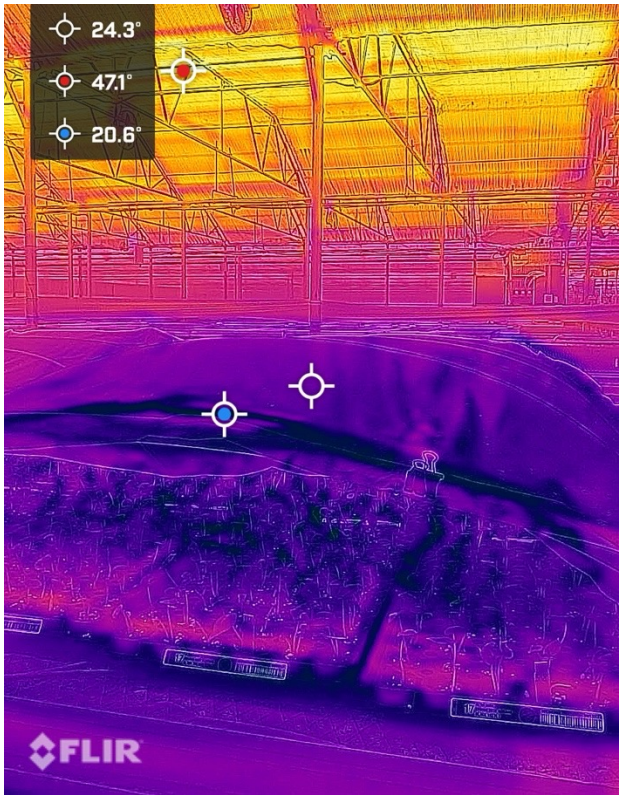


Photo 7. A thermal image shows the cooler plant temperatures under a remay tent compared with the rest of the greenhouse (Photo: Paul Fisher, UF/IFAS)

## e-GRO Alert

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### CONTRIBUTORS

**Dr. Nora Catlin**
Floriculture Specialist
Cornell Cooperative Extension
Suffolk County
nora.catlin@cornell.edu

**Dr. Chris Currey**
Assistant Professor of Floriculture
Iowa State University
ccurrey@iastate.edu

**Dan Gilrein**
Entomology Specialist
Cornell Cooperative Extension
Suffolk County
dog1@cornell.edu

**Dr. Chieri Kubota**
Controlled Environments Agriculture
The Ohio State University
kubota.10@osu.edu

**Heidi Lindberg**
Floriculture Extension Educator
Michigan State University
wolleage@anr.msu.edu

**Dr. Roberto Lopez**
Floriculture Extension & Research
Michigan State University
rglopez@msu.edu

**Dr. Neil Mattson**
Greenhouse Research & Extension
Cornell University
neil.mattson@cornell.edu

**Dr. W. Garrett Owen**
Sustainable Greenhouse & Nursery
Systems Extension & Research
The Ohio State University
owen.367@osu.edu

**Dr. Alicia Rihn**
Agricultural & Resource Economics
University of Tennessee-Knoxville
arihn@utk.edu

**Dr. Debalina Saha**
Horticulture Weed Science
Michigan State University
sahadeb2@msu.edu

**Dr. Beth Scheckelhoff**
Extension Educator – Greenhouse Systems
The Ohio State University
scheckelhoff.11@osu.edu

**Dr. Ariana Torres-Bravo**
Horticulture/ Ag. Economics
Purdue University
torres2@purdue.edu

**Dr. Brian Whipker**
Floriculture Extension & Research
NC State University
bwhipker@ncsu.edu

**Dr. Jean Williams-Woodward**
Extension Plant Pathologist
University of Wyoming
jwilwood@uwyo.edu



## Cooperating Universities

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