

# Advancing Hazelnut Micro-propagation





# About Me





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# Forever Green Initiative (FGI)

“Everyone blames the farmers. ‘Why don’t they change?’ **But you can’t expect a farmer to turn away from corn and soybeans if there is no profitable alternative.**” - Don Wyse



Don L. Wyse, Professor and Co-Director of The Center for Integrated Natural Resources & Agricultural Management (CINRAM)





# Hazelnuts as Part of the Forever Green Initiative

- Do not require annual tillage
- Strips between rows can be planted with grass or clover
  - Pollinator habitat
  - Continuous living cover
- Riparian buffers
- Windbreaks
- Living snow fences



Forever  
Green



# Hazelnut Germplasm Improvement

## Identification of superior hybrid hazels

- Identify hybrids from on-farm plantings with best kernel quality, yield, EFB tolerance, and cold-hardiness.
- Evaluation in replicated performance trials.

## Domestication of American hazel

- Screen wild populations for superior plants.
- Evaluation in replicated performance trials.



Best from on-farm evaluations



Replicated performance trials

**The best of the best will be released to growers as a new cultivar.**



**Forever  
Green**



# A Challenge

Too much variability between seed-propagated hazel plants is agronomically unmanageable.

Example: Nut maturation dates



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# Solution: Vegetative Propagation to produce genetically identical plants



Forever  
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# Advancing Hazelnut Micro-propagation Forever Green Initiative Grant

Sub-clone four elite genotypes.  
1,000 to 2,000 plants per elite genotype.



Eighteen elite genotypes in the UMN greenhouse!



# Micro-propagation Workflow

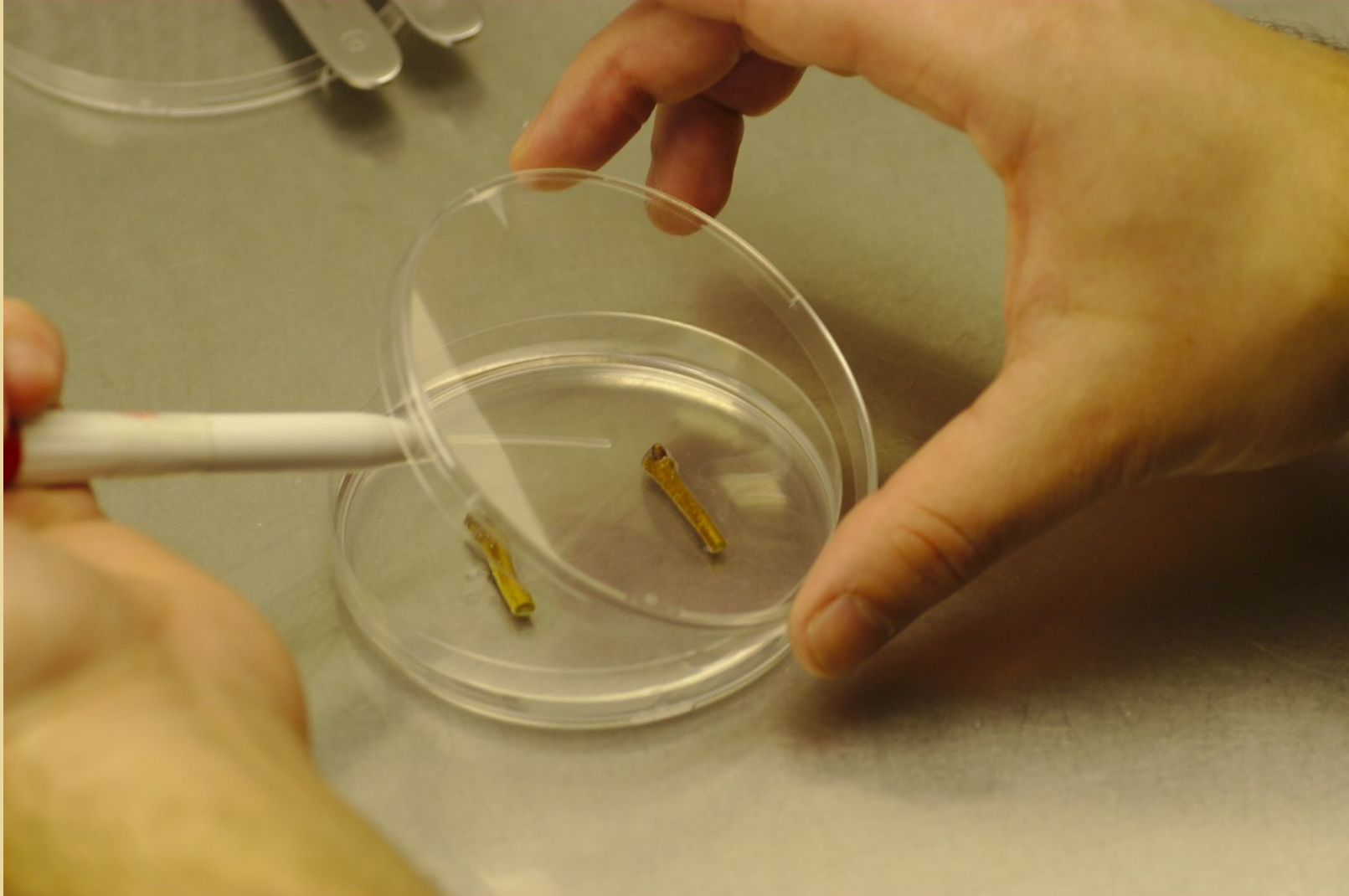




# Micro-propagation Workflow



# Micro-propagation Workflow

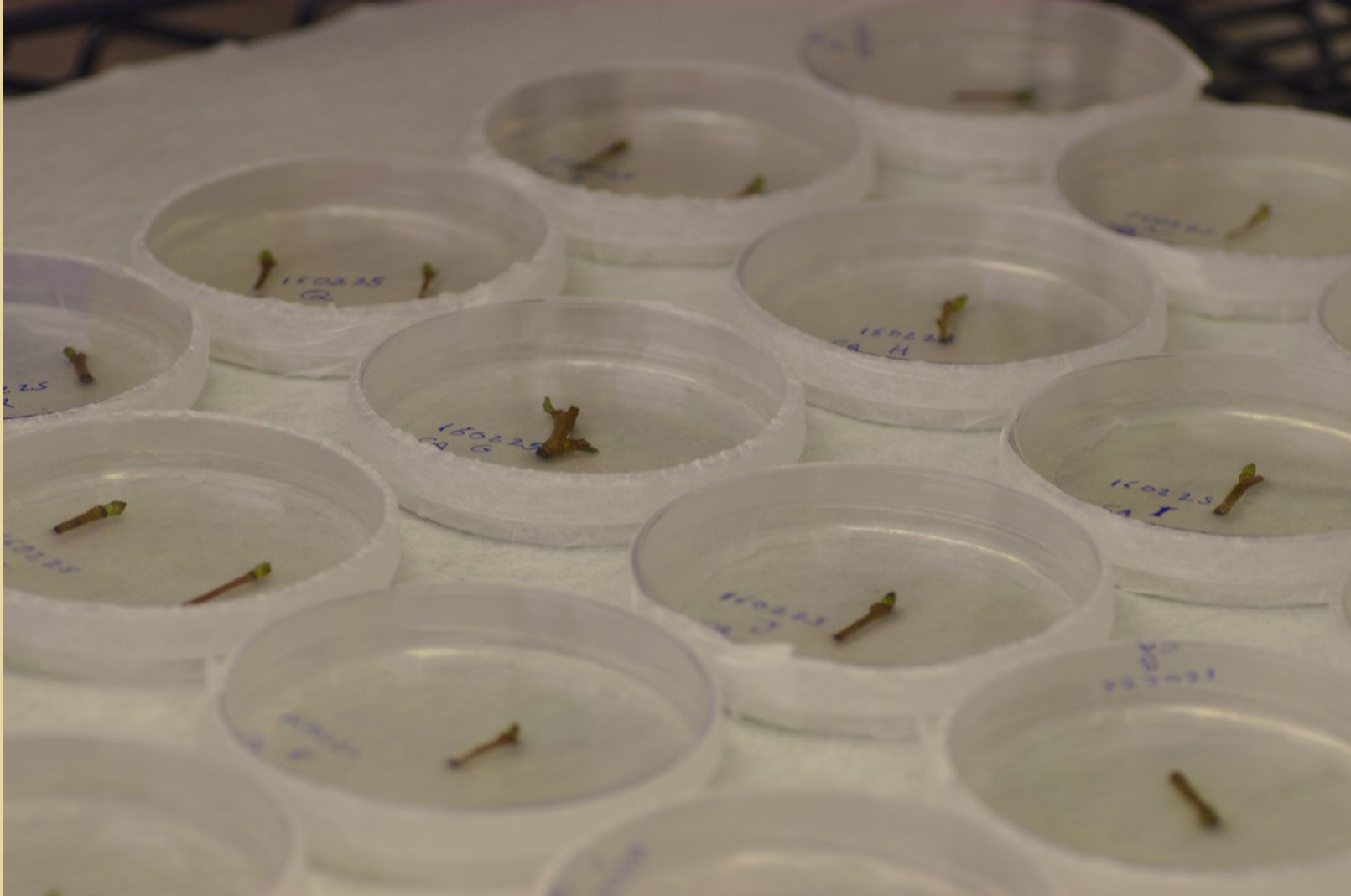




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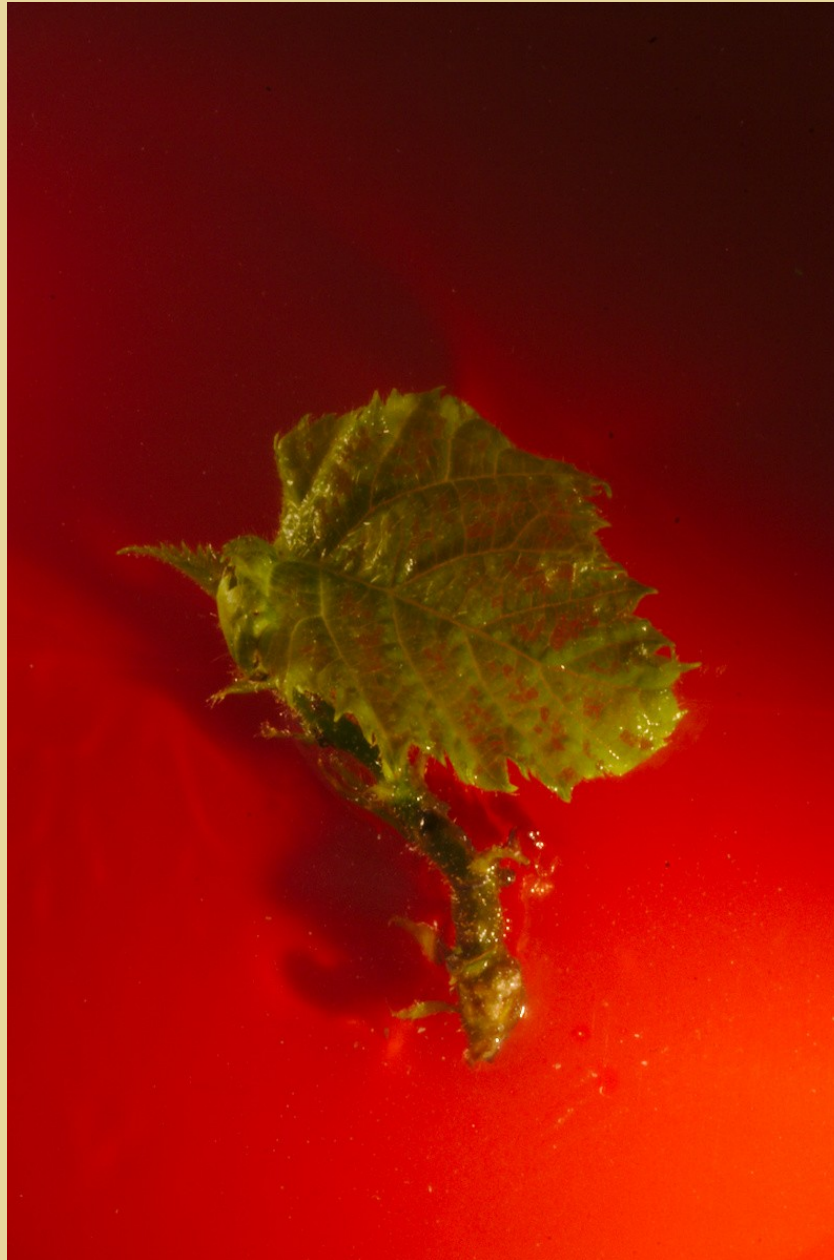


# Micro-propagation Workflow

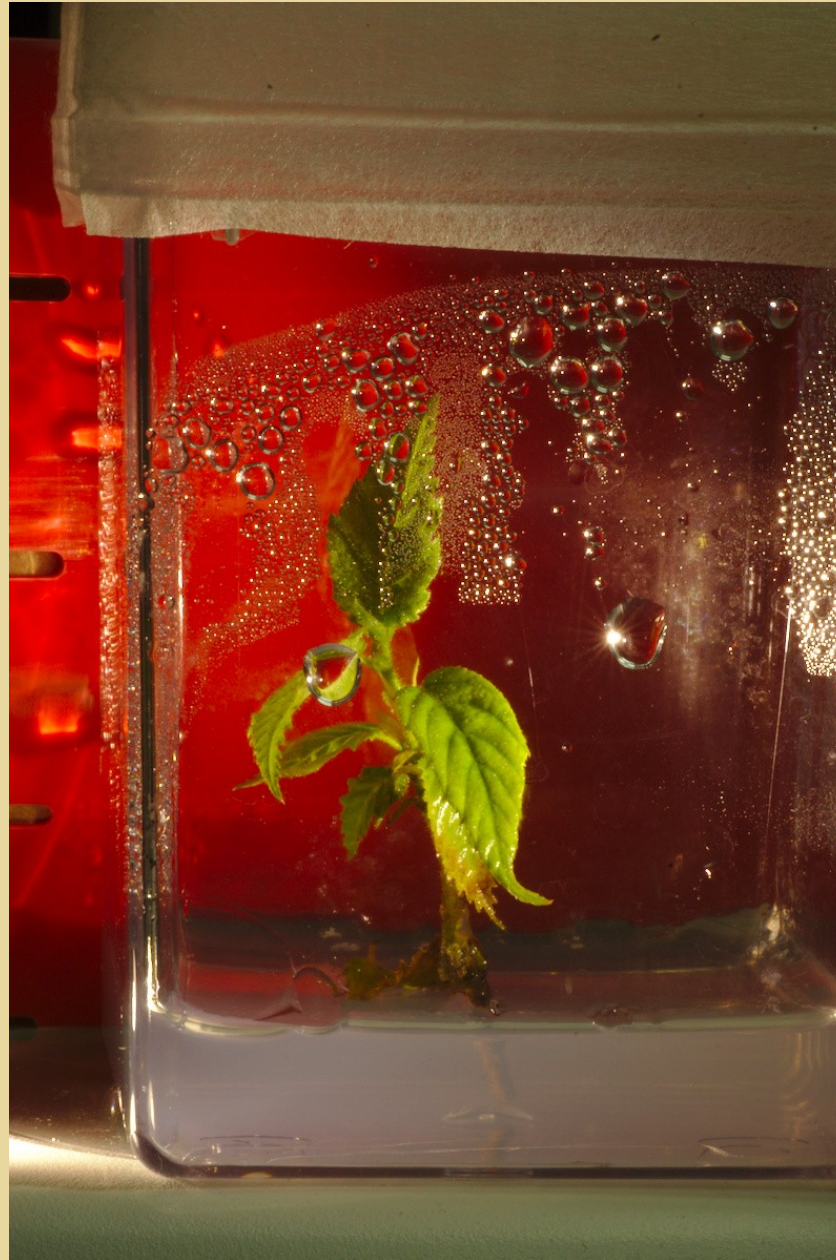




# Micro-propagation Workflow



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# Micro-propagation Workflow



Caio Alves, Student Worker



# Horticultural Approach by the Cohen Lab

- Metabolomics and metabolic flux analysis
- Cell signaling and growth regulation

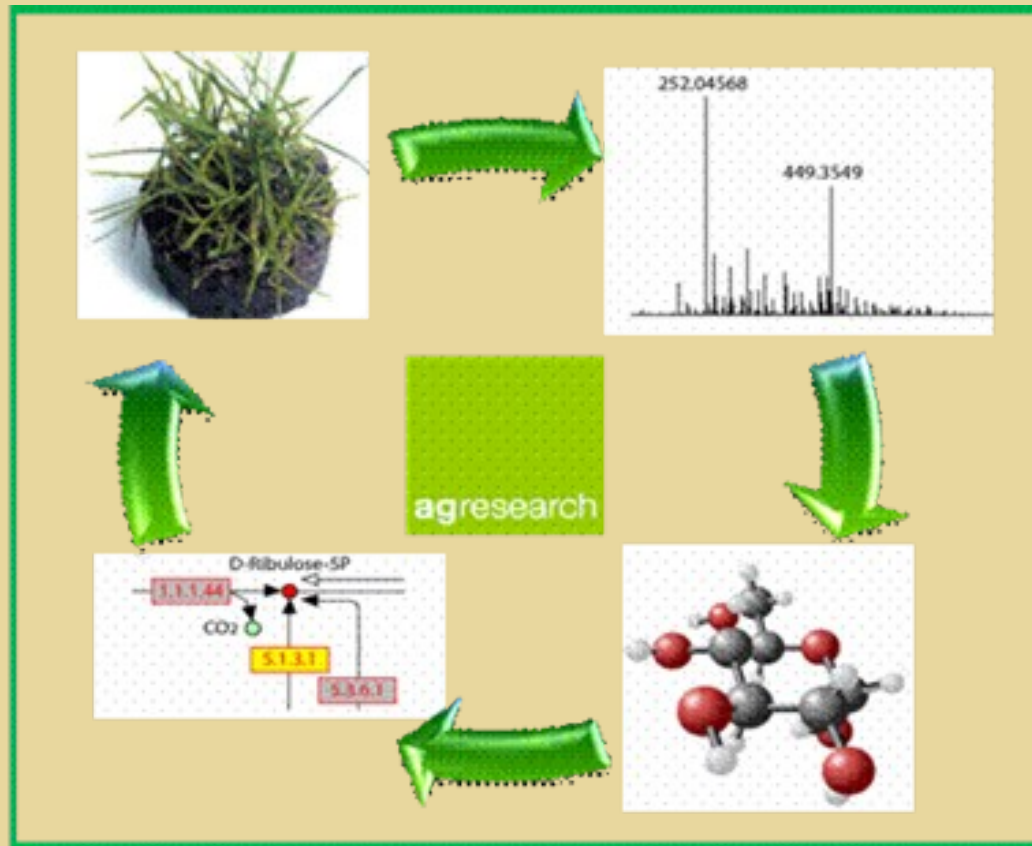


□ Jerry D. Cohen, Department of Horticultural Science





# Cohen Lab



Representation of steps involved in  
Metabolomics



# Cohen Lab: Rooting

- Auxin metabolism
- Induction of adventitious roots
- Conversion of indole-3-butyric acid (IBA) to free indole-3-acetic acid (IAA)



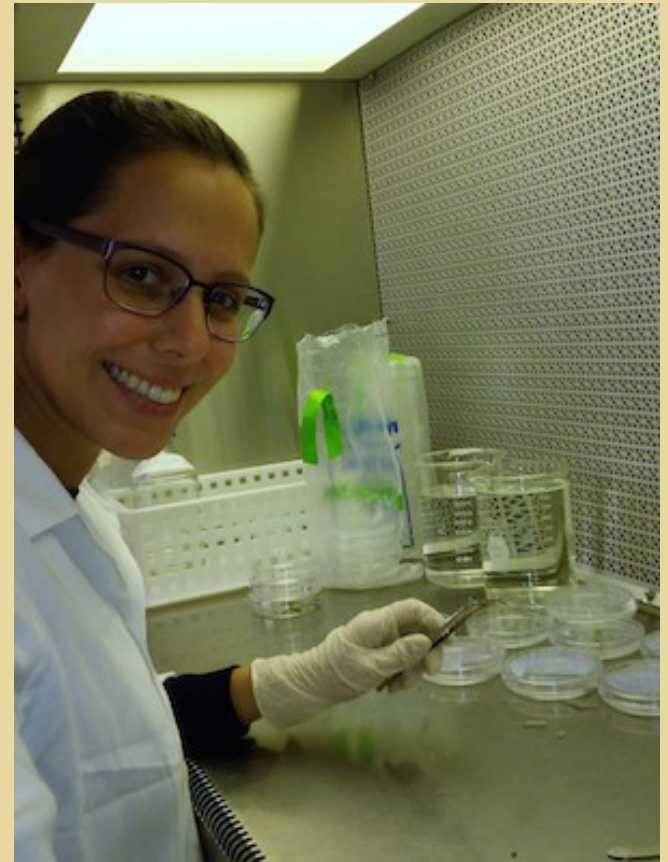
Molly Kreiser, Graduate Student





# Cohen Lab: Plant Acclimation

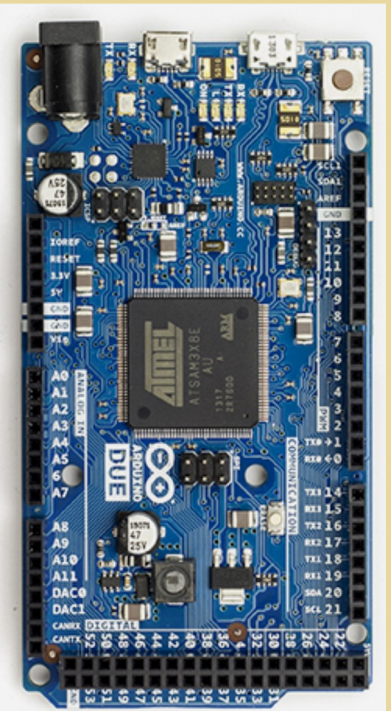
- Acclimation of hazelnuts from in vitro to ex vitro conditions
- Study of plants under stress



Renata P. Pincelli-Souza, Post Doctoral Associate



# Cohen Lab: Plant Acclimation

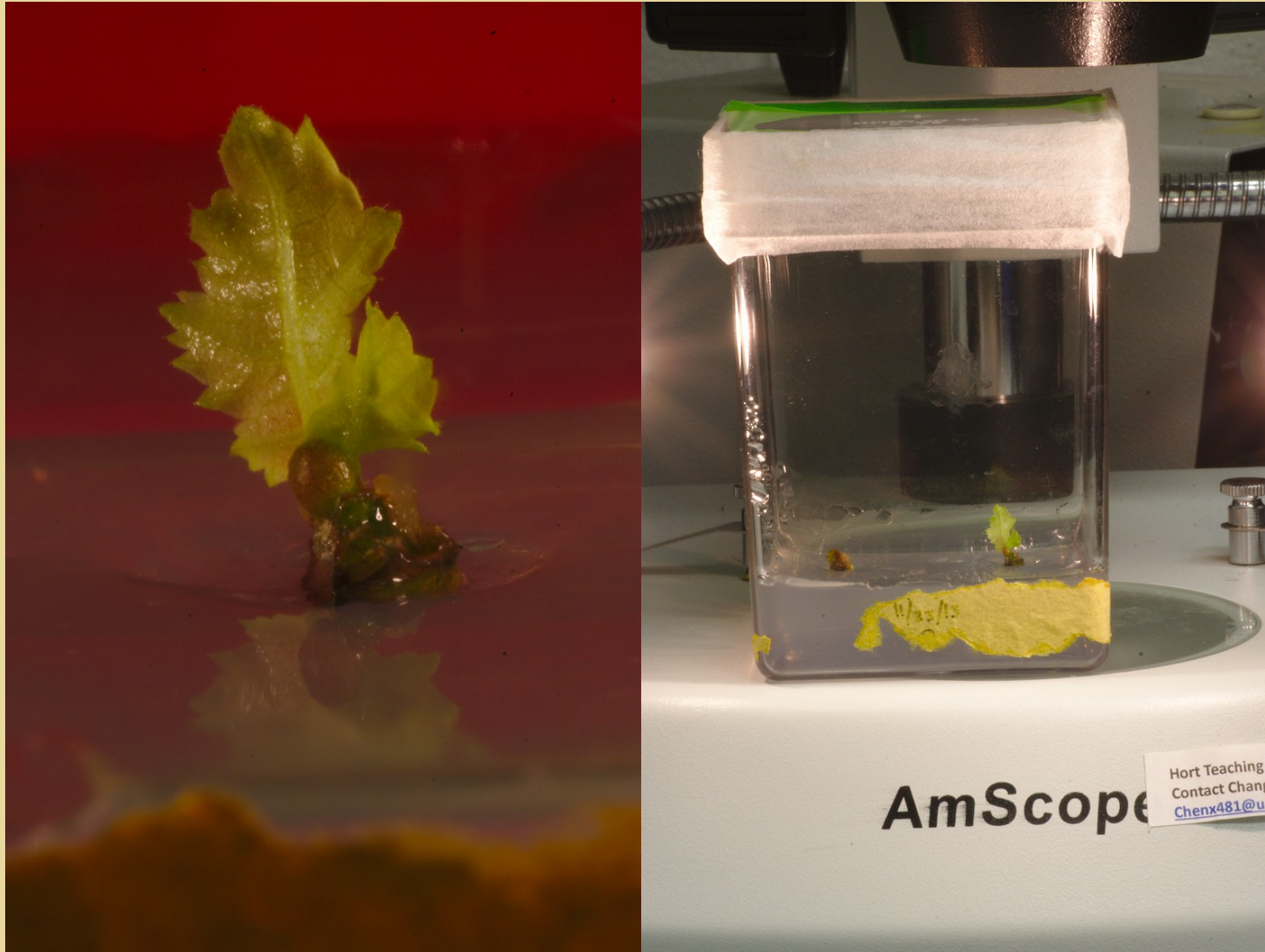




# Meristem Callus Culture



# Meristem Callus Culture





# Summary

- 1)The Forever Green Initiative (FGI) seeks to make hazelnuts an economically viable crop in the midwest.
- 2)The FGI funds the Cohen Lab to grow 4,000-8,000, elite genotype, hybrid hazelnut plants for future field studies.
- 3)The Cohen Lab uses horticultural techniques to advance hazelnut micro-propagation.



# Acknowledgements

Funding comes from the  
**Minnesota Department of Agriculture**  
through the  
**Forever Green Initiative**



Don Wyse

Jerry Cohen

Molly Kreiser

Renata P. Pincelli-Souza

Caio Alves

Lois Braun





# Q&A



*Noisetier franc à gros fruits*

P. J. Redoute - 85.

*Corylus maxima*

Langlois

