

Experiential Learning in Plant Breeding: Enhancing Seed Germination Research and Science Communication among Undergraduates

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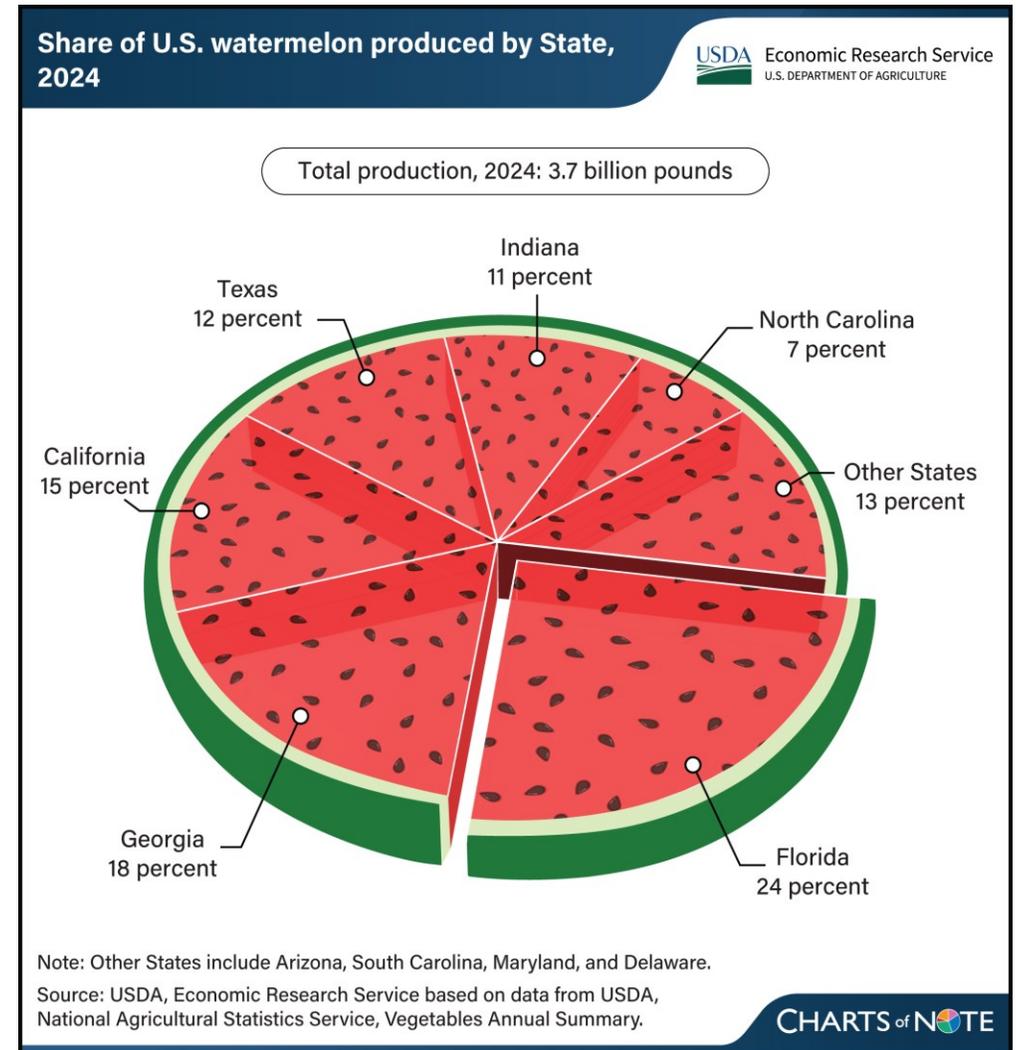


Breeding for Controlled Environments Program

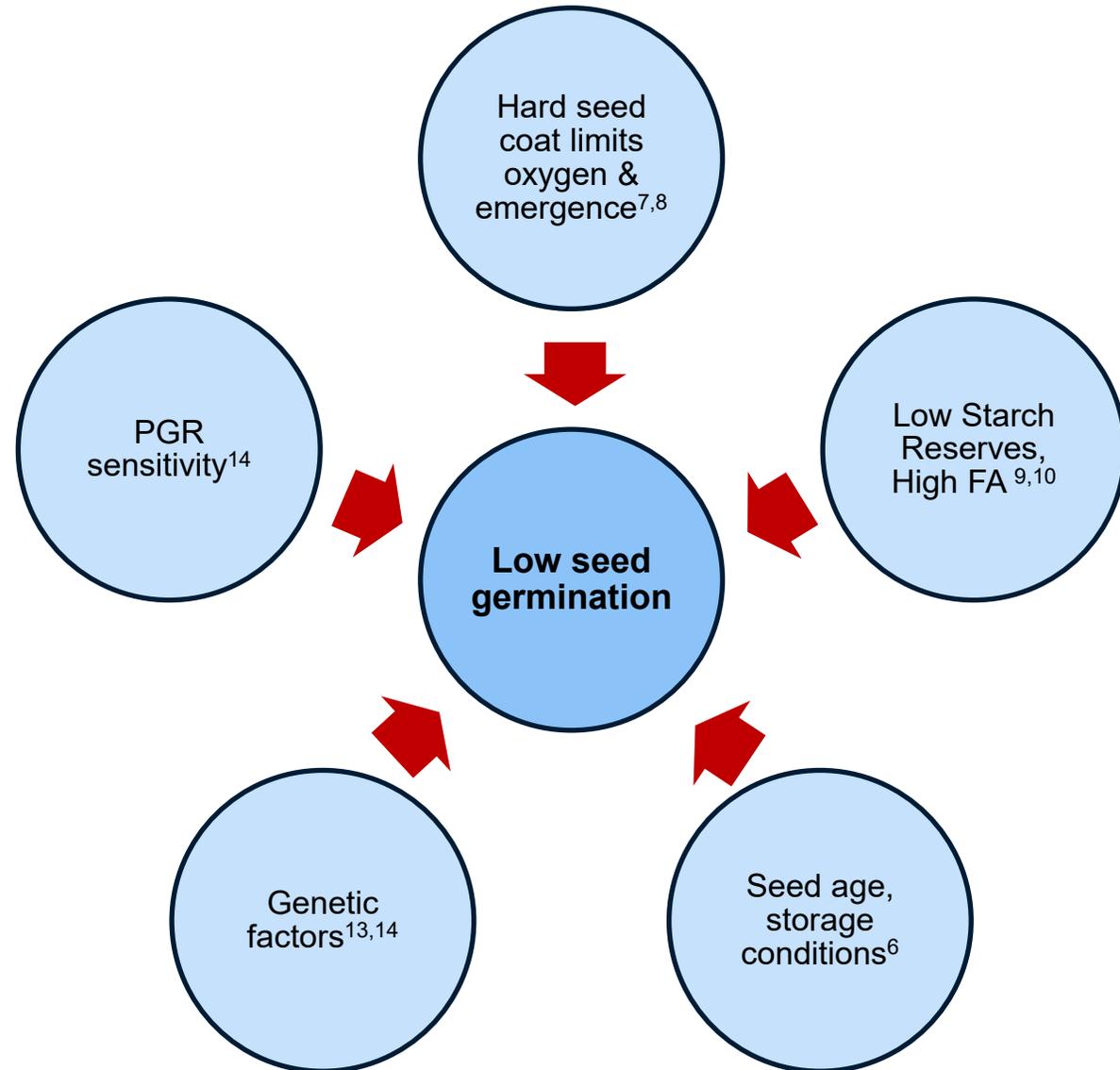


Global watermelon production

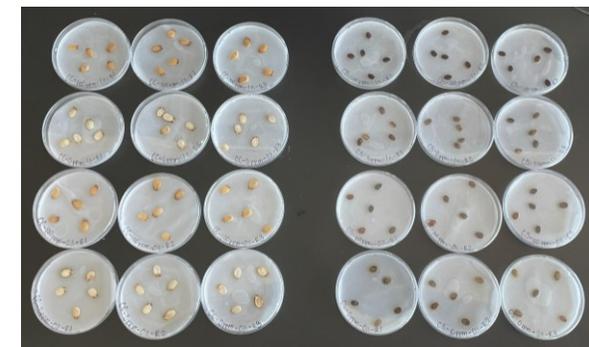
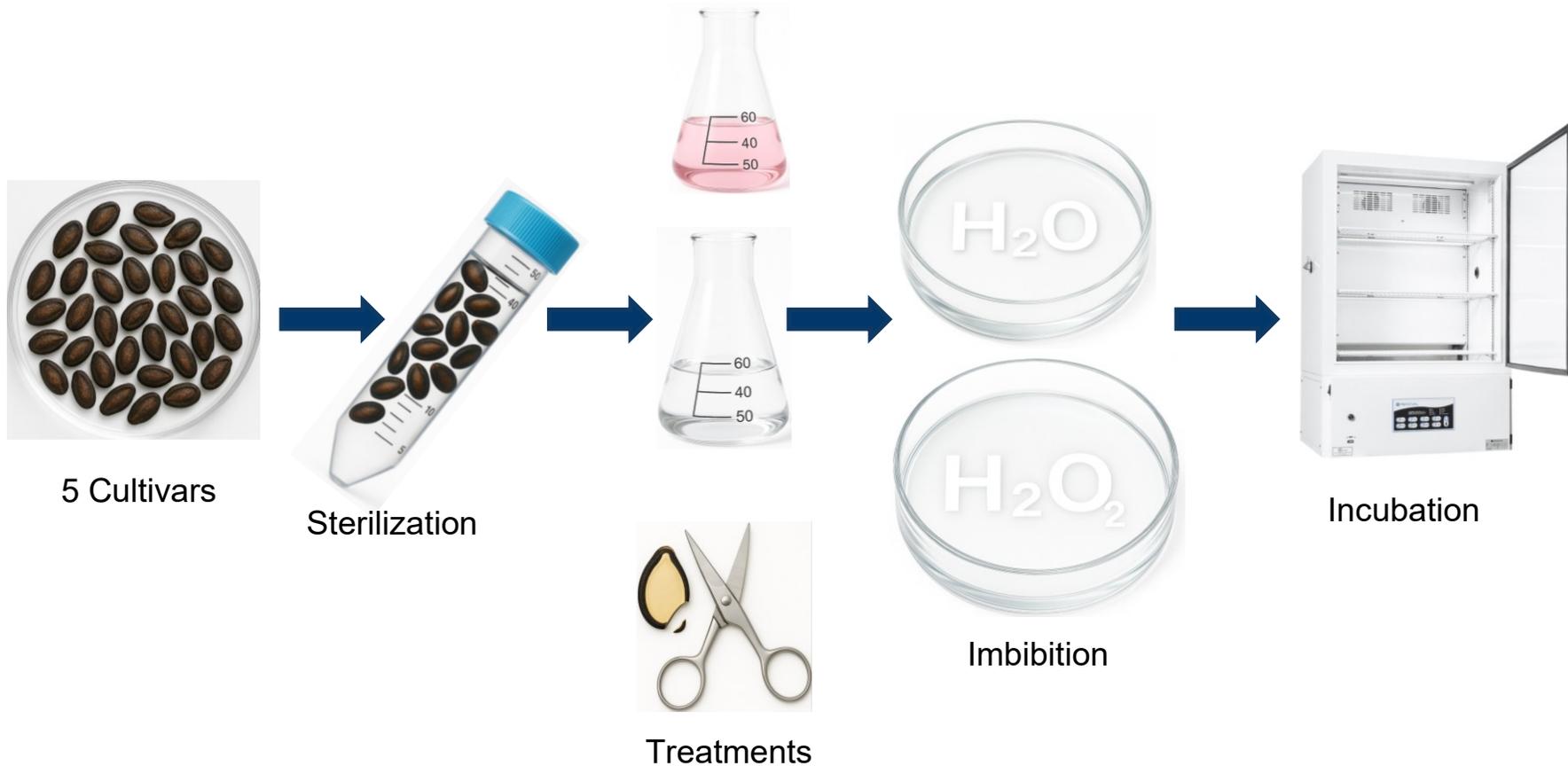
- **World** 104.9 billion kg¹
- **US** exports 181 million kg²
- 70-80% production from SE US³
- **90% seedless hybrids (triploid)**⁴
- **Seed + Greenhouse Culture + Labor**
transplanting = 30% of expenses⁵



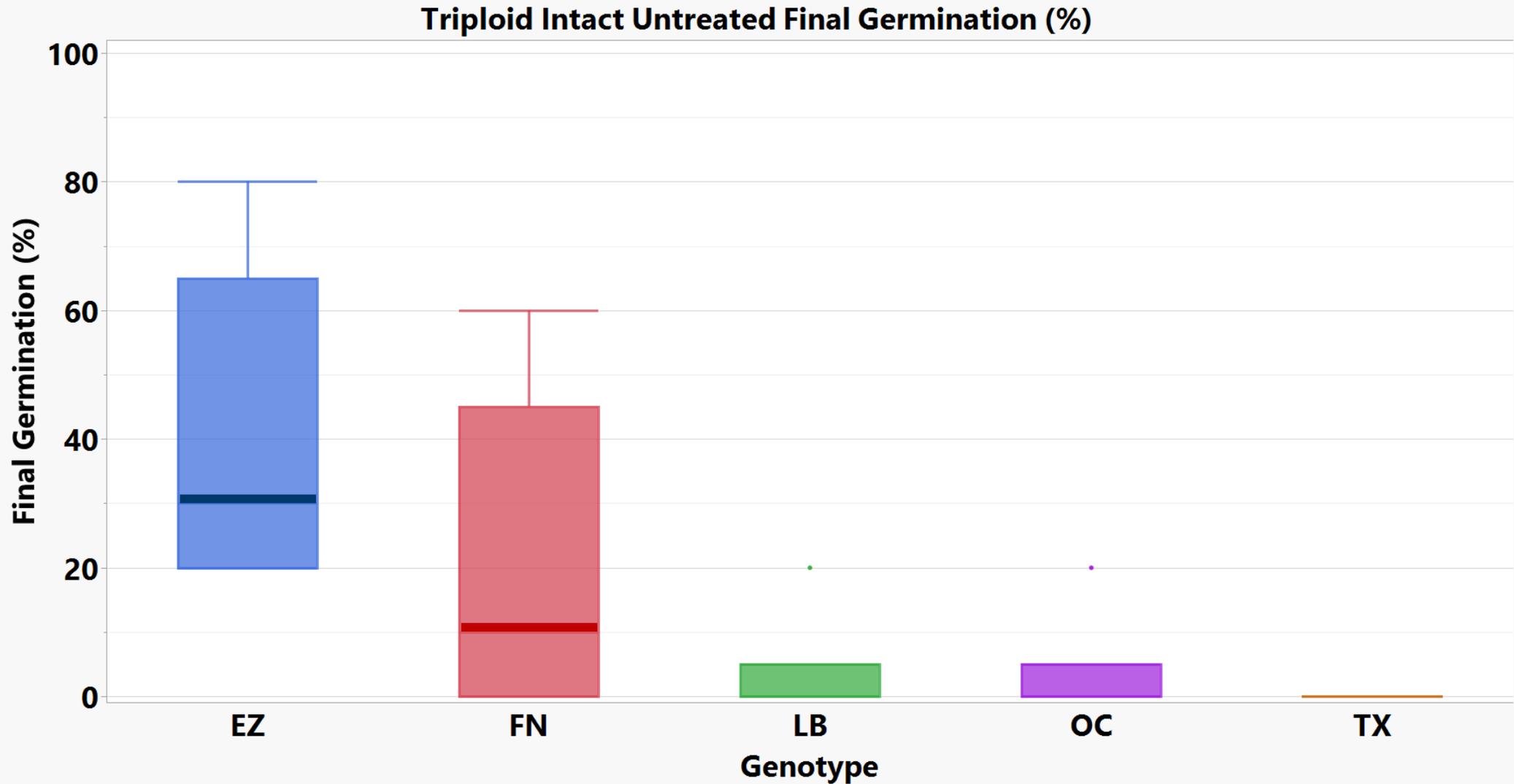
Factors inhibiting germination



Do pretreatments enhance germination?



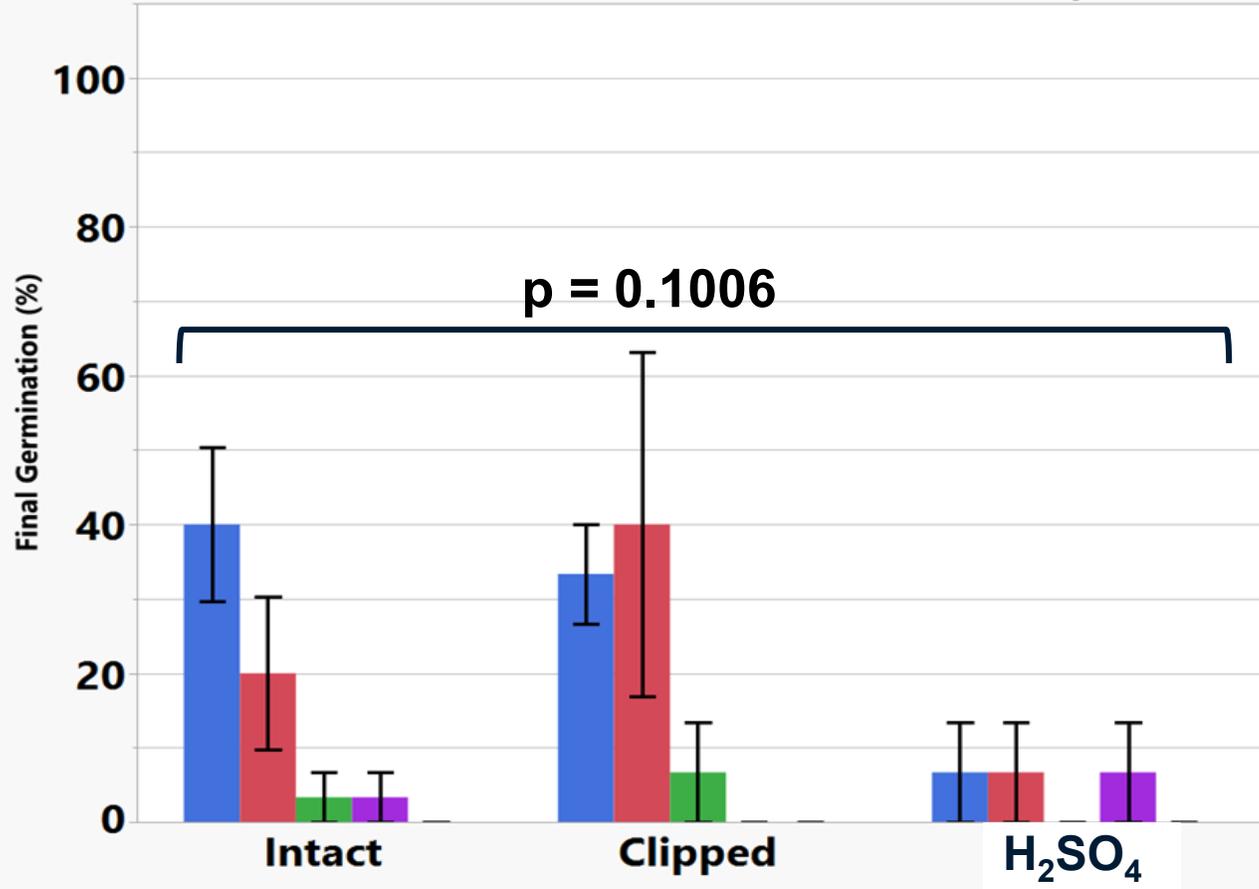
Triploid Baseline



Scarification is insufficient

Scarified Triploid Final Germination (%)

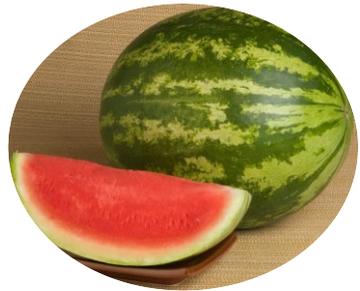
$p < 0.0001$



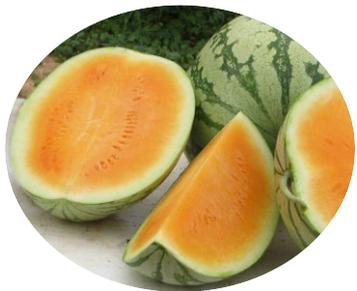
Genotypes ● EZ ● FN ● LB ● OC ● TX

Most improved

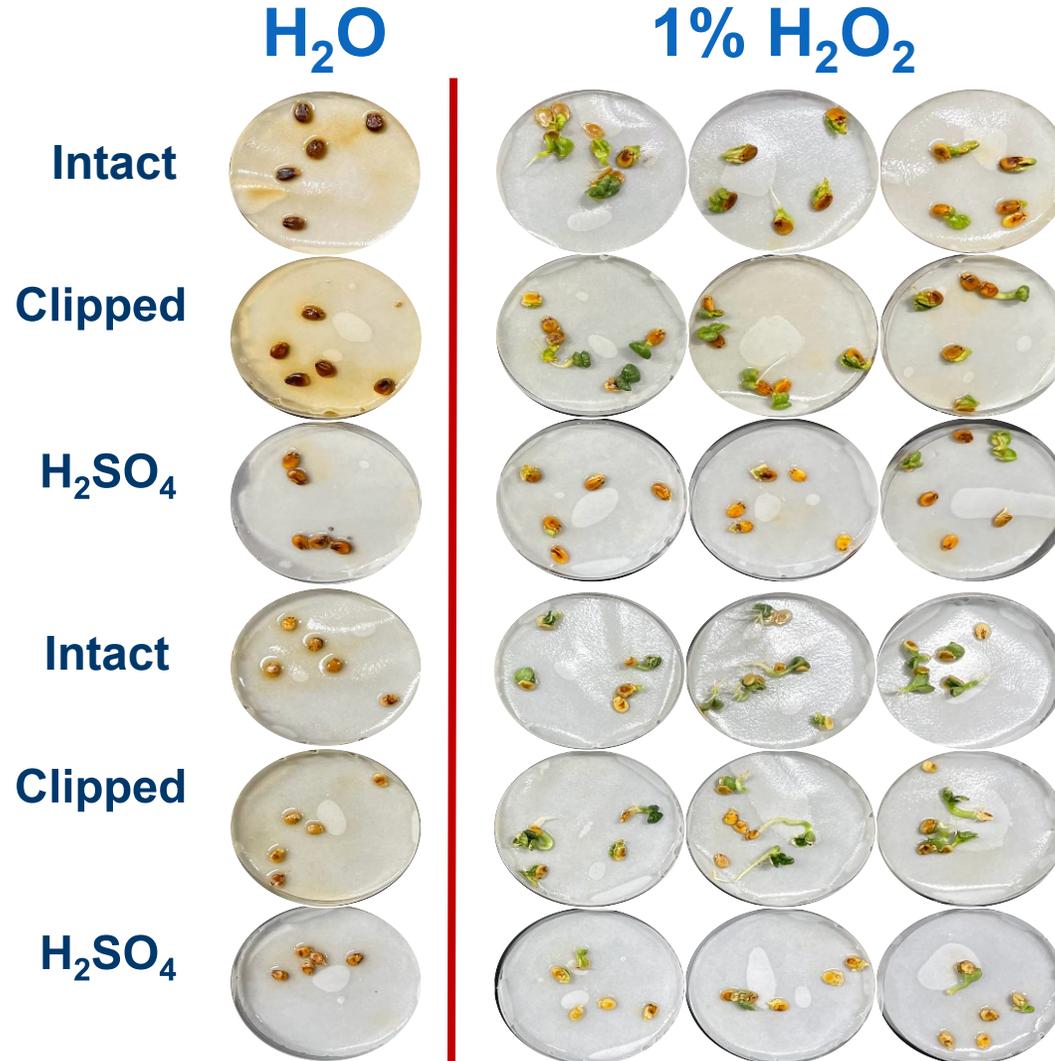
Day 12 Final Germination



(LB) Liberty

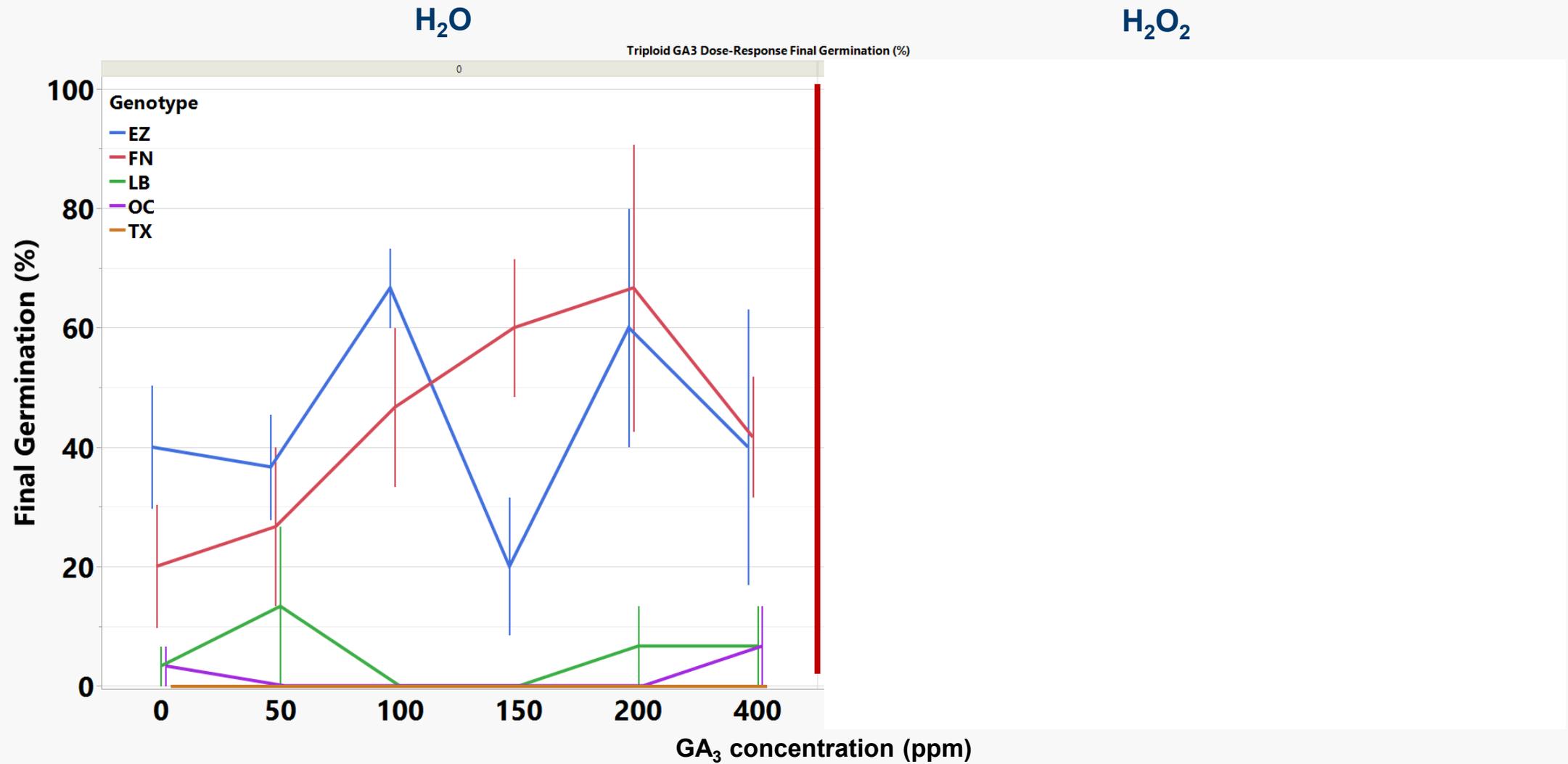


(OC) Orange Crisp

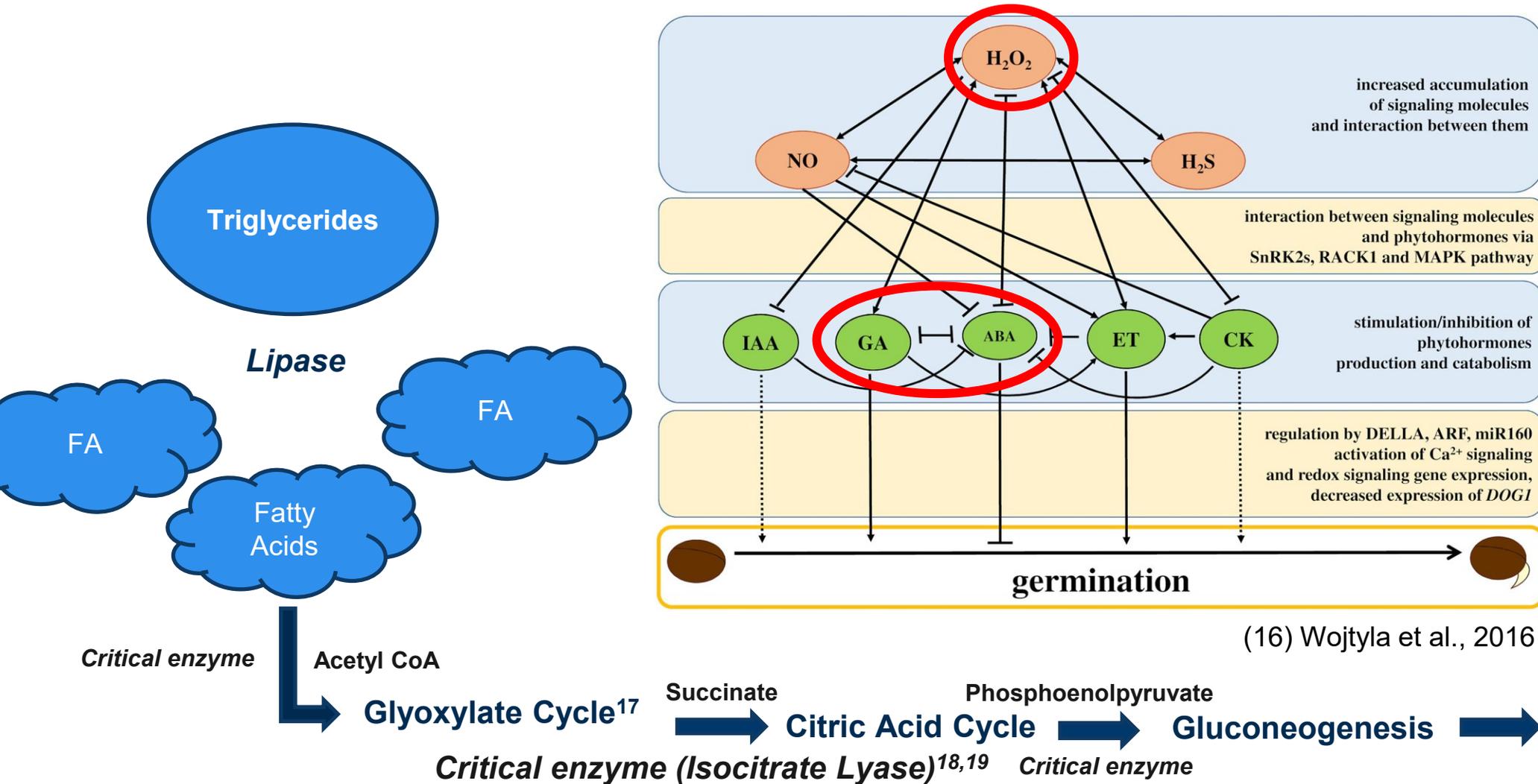


Effect	DF	Germination (p)
Genotype	4	<0.0001**
H_2O_2	1	<0.0001**
Scarification (H_2O)	2	0.1006
Scarification (H_2O_2)	2	<0.0001**
GA_3 *Genotype (H_2O)	20	0.1238
GA_3 *Genotype (H_2O_2)	20	0.0342*

H₂O₂ modulates GA₃ Response



Metabolic Mechanisms

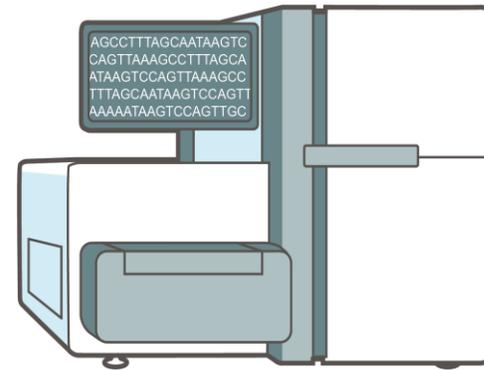


Future work

Gene Discovery^{12,13,14}



RNA extraction



RNA sequencing



qRT-PCR Validation

Research Conclusions

Limitations

- Genotypic
- Physiological
- Hormonal

Industry

- Generic H_2O_2
- Genotypic GA_3
- Scarification

Germplasm

- Enzyme genetic characterization
- Parent pre-screening

Internship Conclusions

Personal

- Self confidence
- Goal alignment
- Time management

Professional

- Experimental Design
- Data Analysis
- Story telling

Future Career

- Crop Improvement
- Molecular Biology
- Science communication

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- Controlled Environment Breeding Lab



Science Influencers

- Directors
- Administration



TEXAS A&M
AGRILIFE
RESEARCH

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