

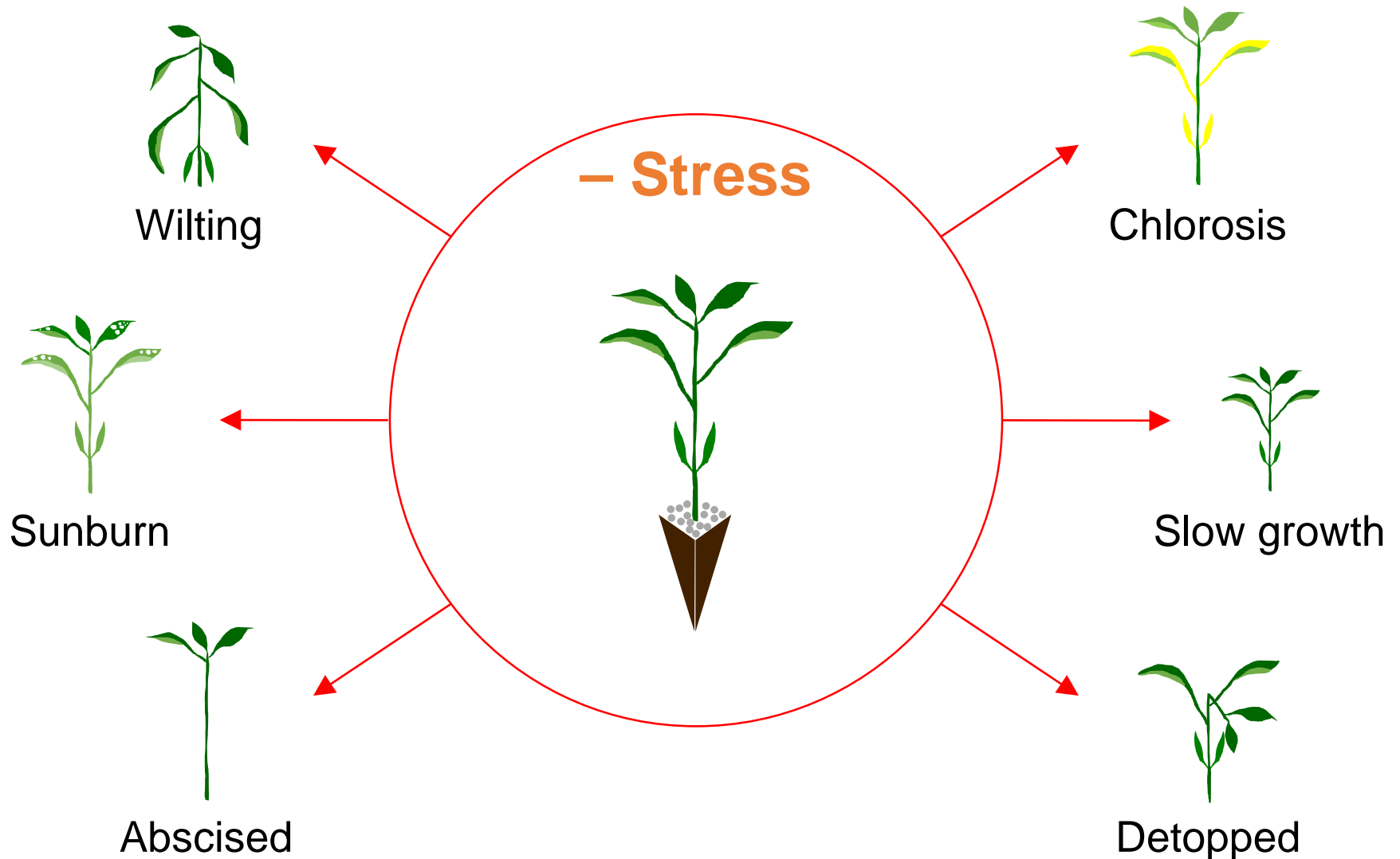
# **Eliminating Transplant Shock by Hormonal Control to Improve Growth and Yield of Tomato**

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# 'Transplant Shock'

Mechanical Stress + Water Stress + Heat/UV Stress



# Transplant Stress Management



## Goal

To improve field establishment, earliness, and total yield.



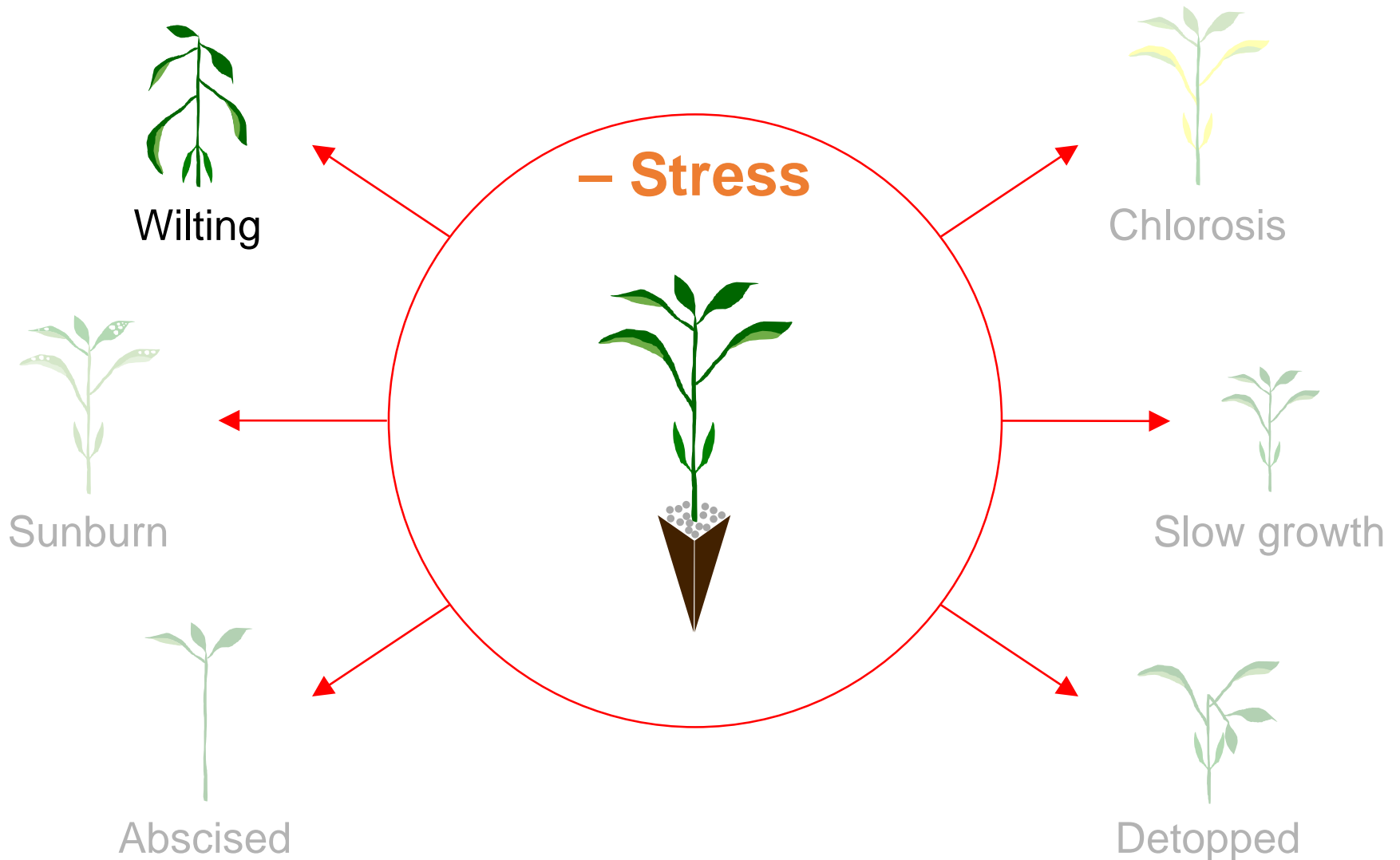
## Techniques

- Hardening (reduction in fertilizer/water)
- DIF (day and night temperature difference)
- Preplanting chilling
- Mechanical conditioning (brushing transplants)
- Antitranspirants
- Reflective material (kaolin clay)
- **Plant hormones**



# 'Transplant Shock'

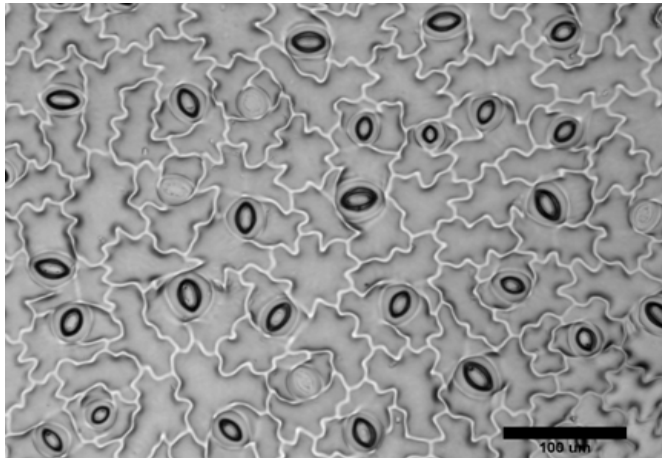
Mechanical Stress + Water Stress + Heat/UV Stress



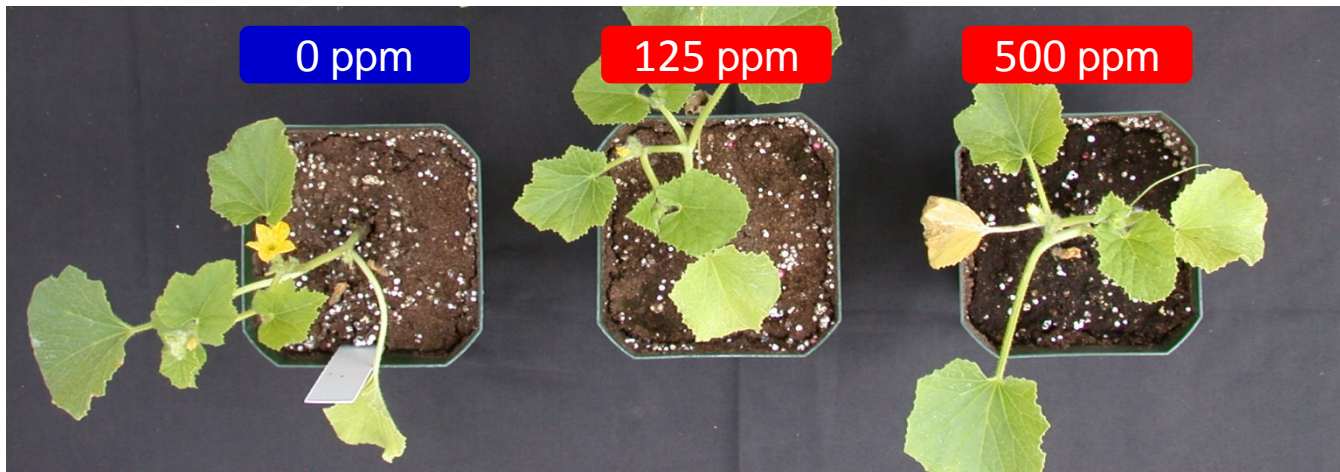
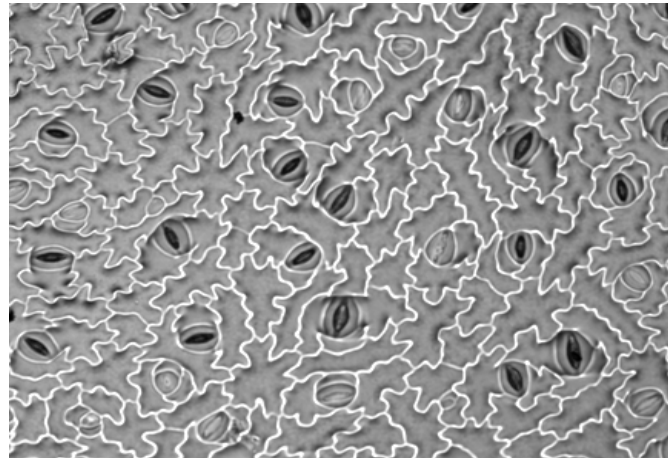
# Abscisic Acid (ABA)

“Reduce plant water loss by closing stomata”

– ABA

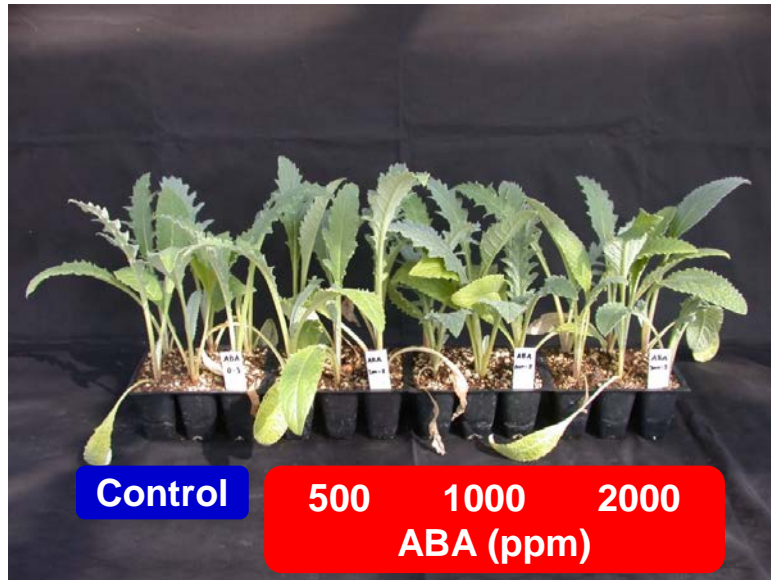


+ ABA

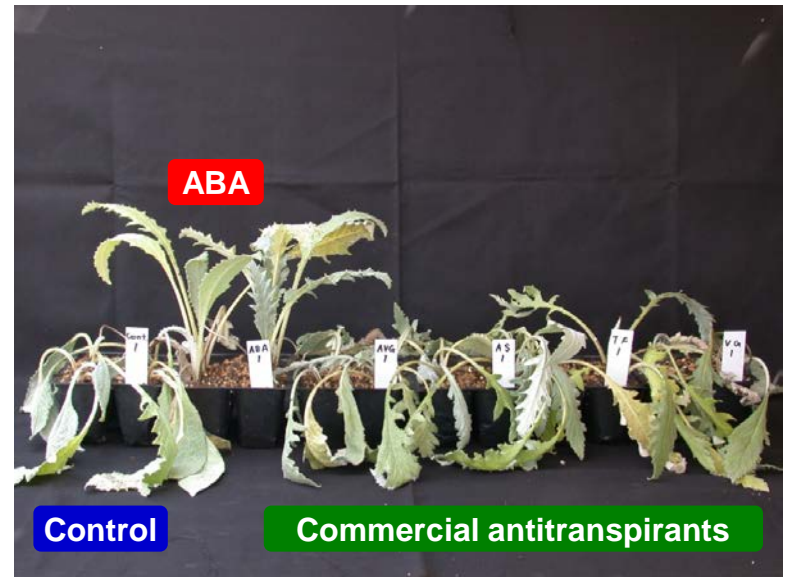
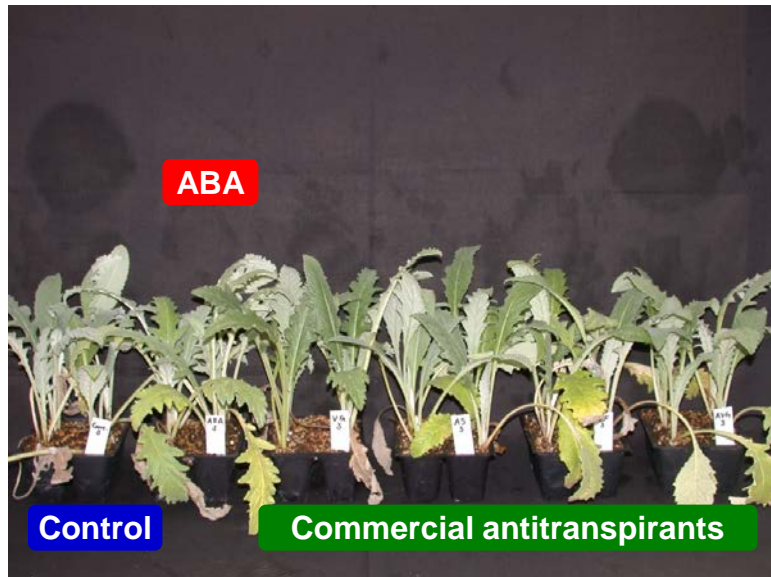
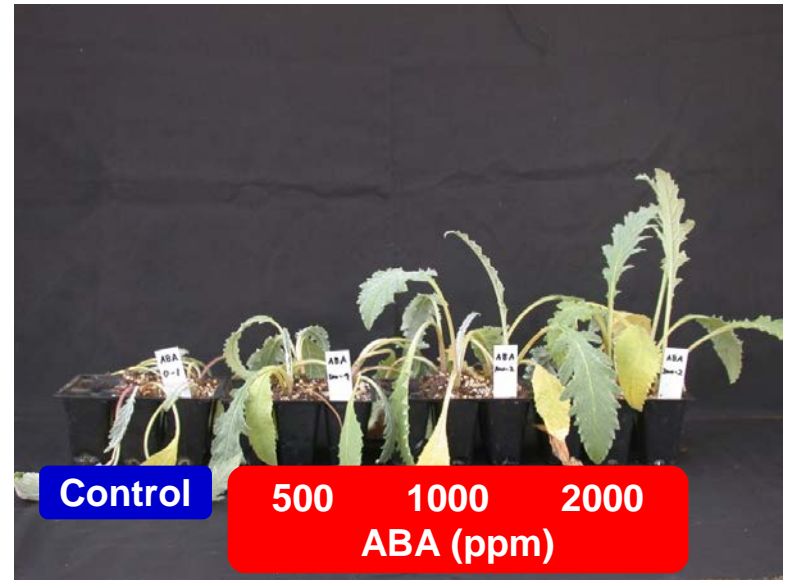




Day 0 (well-watered)

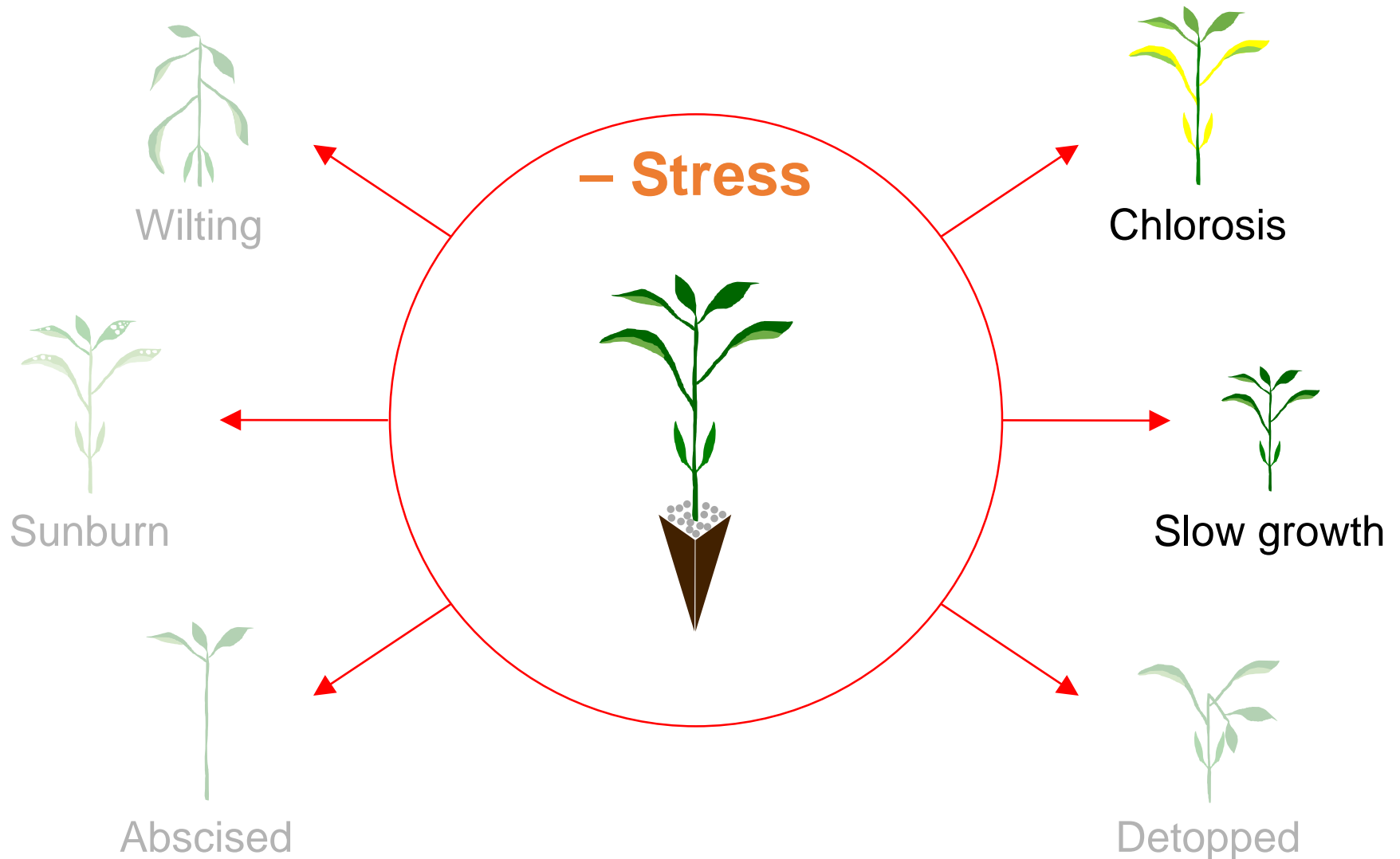


Day 3 (dehydration)



# 'Transplant Shock'

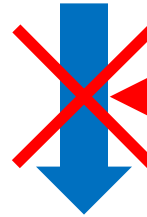
Mechanical Stress + Water Stress + Heat/UV Stress



Mechanical Stress



Ethylene



Ethylene Inhibitor

## Stress Adaptation responses

- Stem thickening
- Reduction in stem elongation
- Reduction in leaf expansion
- Leaf chlorosis



## **Objective**

To examine the effect of ethylene inhibition prior to transplanting on post-planting growth and yield

## **Goal**

Eliminate “transplant shock” and maximize the growth potential to increase fruit yield

# Materials and Methods

## Cultivar:

Florida 47

## Treatments:

- 1) Water
  - 2) 1-MCP at 12.5 ppm
  - 3) 1-MCP at 50 ppm
- \*1 day before transplanting



## Experiment Design:

Randomized complete block design with 3 replication



## 1-MCP concentration

0 ppm

12.5 ppm

50 ppm

10/16  
(20 d)



10/21  
(25 d)



10/29  
(33 d)



**“Faster Growth”**



10/29 (33 d after transplanting)

0 ppm

1-MCP concentration

12.5 ppm

50 ppm

Rep 1



Rep 2



Rep 3



**“More Uniform Growth”**

# Plant Growth at Harvest

1-MCP concn (ppm)	Shoot FW (kg)	Stem diameter (cm)	Flower # per plant
0	1.24	1.41	126
12.5	1.46	1.41	136
50	1.48	1.36	143
1-MCP effect	<b>17-19%↗</b>	<b>NS</b>	<b>10-14%↗</b>

**“More branches & more flowers by 1-MCP”**

# Yield

1-MCP concn (ppm)	Fruit # per plant	Fruit size (g)	Marketable yield (lb/acre)
0	11.9	145	210,544
12.5	13.6	155	239,635
50	15.1	143	249,076
1-MCP effect	<b>17-19%↗</b>	<b>NS</b>	<b>10-14%↗</b>

**“>10% ↗ in fruit number & yield by 1-MCP”**



# Conclusion

- Absciscic acid is effective in minimizing water stress during transplanting by limiting transpiration.
- 1-MCP (ethylene inhibitor) can minimize transplant shock caused by mechanical stress and improve fruit yield.
- 1-MCP has no negative side effects.
- The effectiveness of 1-MCP depends on the magnitude of transplant shock (more stress → more beneficial stress control effects).

# Acknowledgements

## Collaborations and Support

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