



GIGANTUS1: Putting a giant under the microscope

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Introduction

- Identified extreme bolting date lines
- Phenotypic changes in SALK_010647C
- GIGANTUS1 (GTS1): WD40 repeat protein¹
- Absence of expression of GTS1 in SALK_010647C¹
- Divergent phenotypes in knockout¹
- **Why does the inhibition of a gene that is naturally occurring in *Arabidopsis thaliana* seem to provide beneficial traits?**

Initial Screen:

- unPAK database: find Salk T-DNA insertion mutations with extreme bolting dates
- Selected: 4 lines less than 32 days to bolt, 4 lines more than 39 days to bolt
- 60 seed of each line sown
- Data taken: bolting, petiole length, leaf #
- SALK_010647C (GTS1) only line to show phenotype

GTS1 Part 1:

- 21 viable GTS1 adults, 11 viable Col_70000 adults
- WinRhizo: measure first 5 internodes after final main branch and first 5 internodes below apical buds

GTS1 Part 2 (ongoing):

- Goal: discovering cellular phenotypes
- 50 seed GTS1, 60 seed Col_70000
- Bolting data taken
- Basic microscope observations and staining with toluidine blue
- Cell analysis using Micromax ST133-5MHz camera on Nikon TE 300 inverted microscope and Olympus DSU Spinning Disk Confocal

GTS1 has **larger** values than Col_70000 for:

- Height ($p < 0.0001$), fruit length ($p = 0.036$) and fruit to abort ratio ($p < 0.0001$)
- Internode length From last main branch ($p < 0.0001$)
- Juvenile petiole epidermis cell length ($p = 0.0064$)

GTS1 has **smaller** values than Col_70000 for:

- Abort number ($p < 0.0001$) and branch number ($p < 0.0001$)

GTS1 **bolts earlier** ($p < 0.0001$) with **smaller rosettes at bolting** ($p < 0.0001$)

There has been **no significant difference** in fruit # for GTS1 fruit number and Col_70000 fruit number ($p = 0.062$)



GTS1 GTS1 Col Col

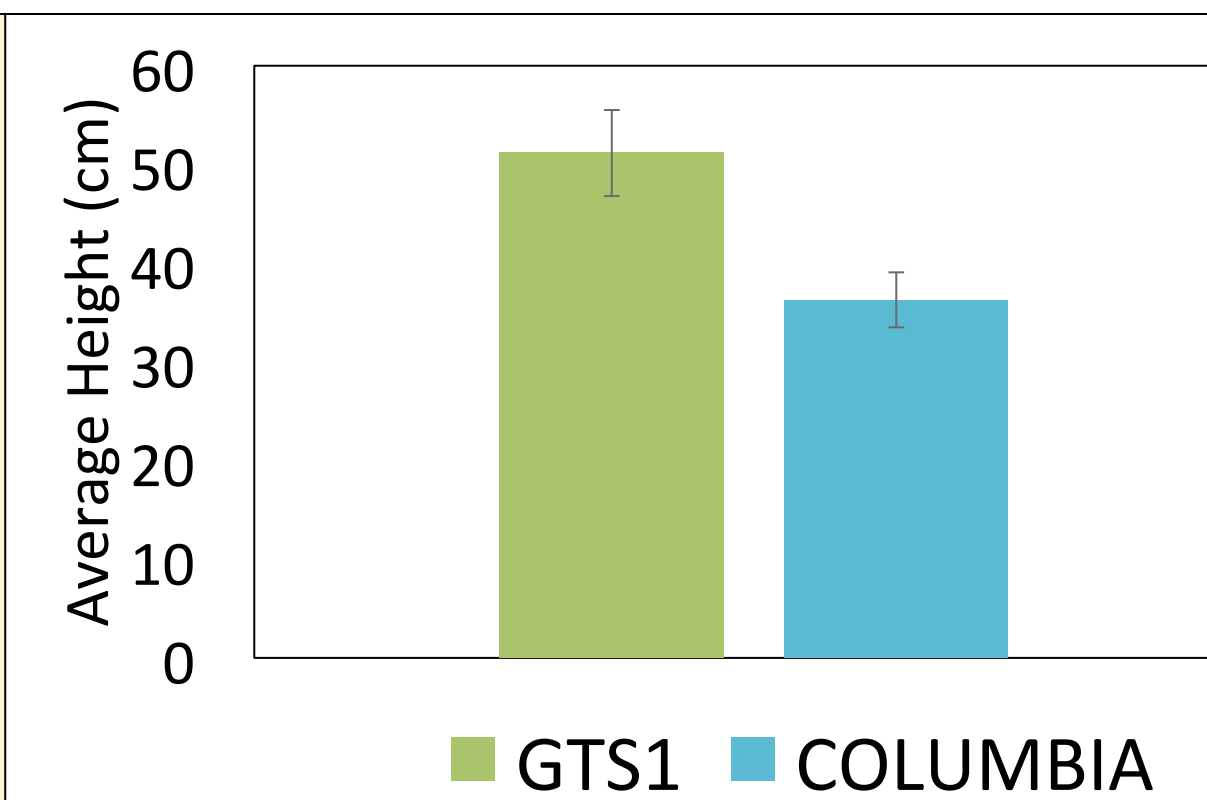


Figure 1. Average Height

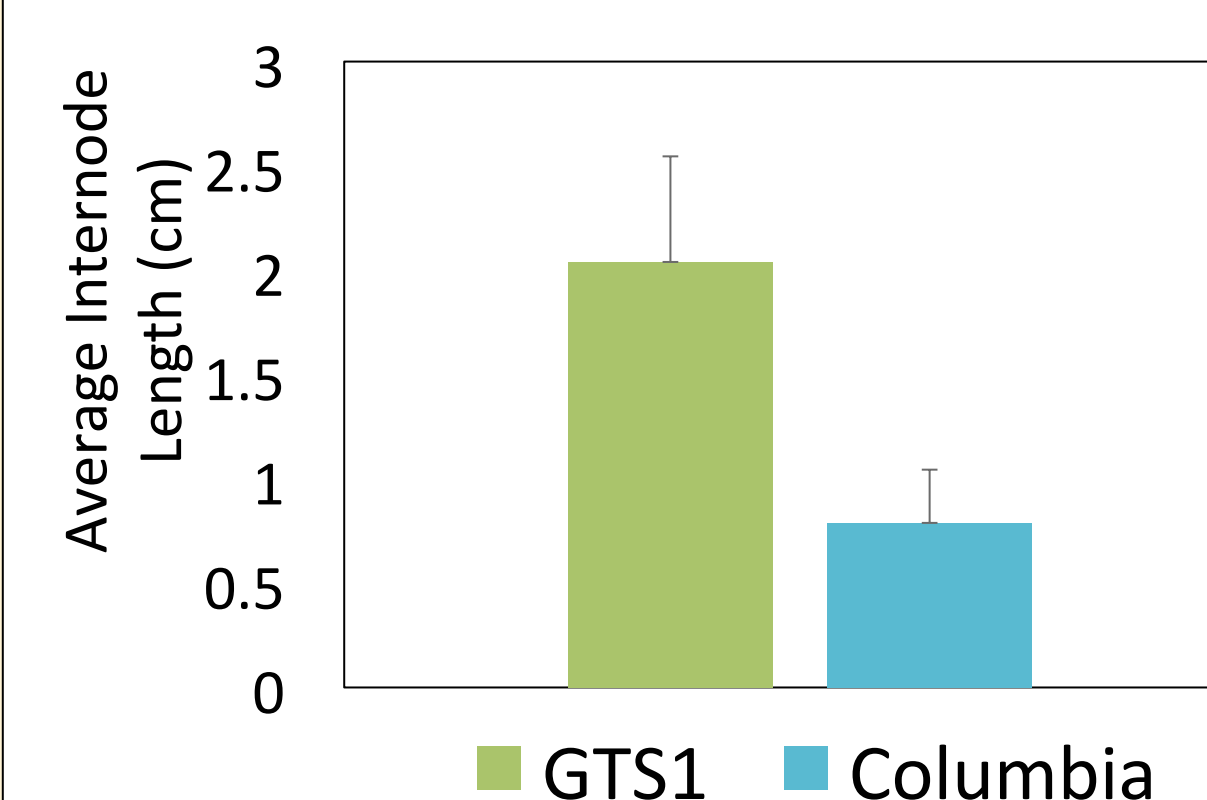


Figure 2. Average Internode Lengths



Figure 4. Juvenile GTS1 Petiole Epidermis, Bar = 1 cell



Figure 5. Juvenile Col_70000 Petiole Epidermis, Bar = 1 cell

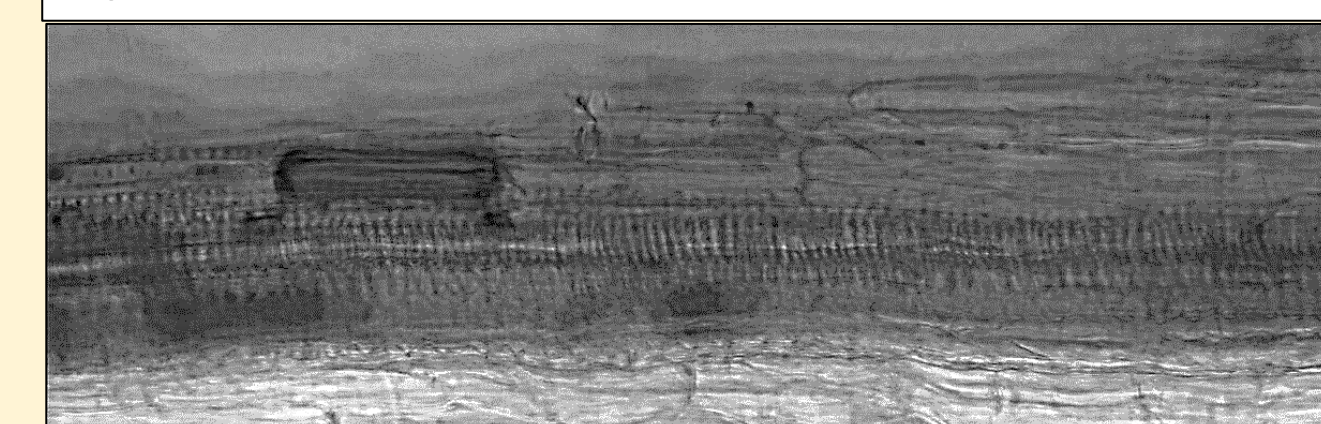


Figure 6. GTS1 Internode Xylem

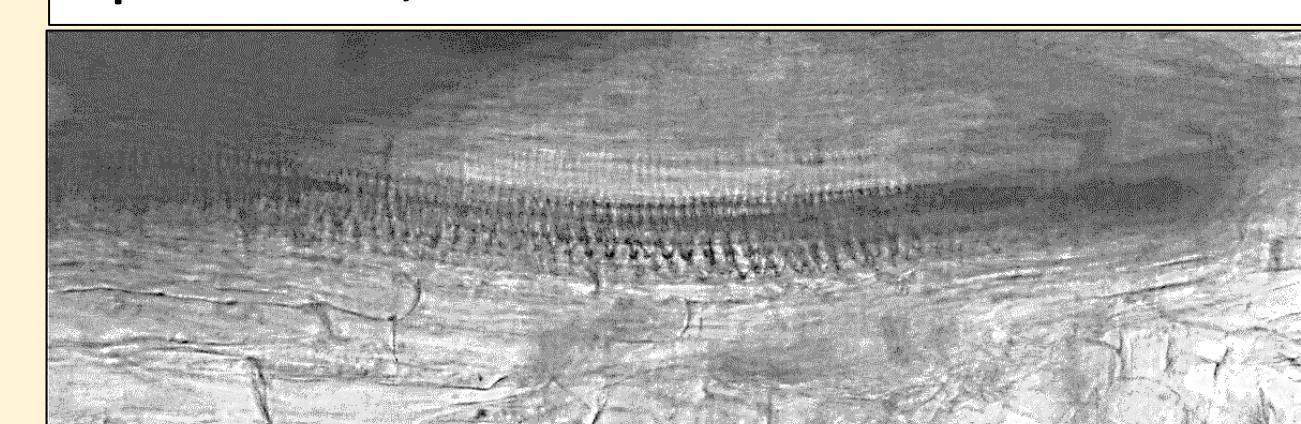


Figure 7. Col_70000 Internode Xylem

Results

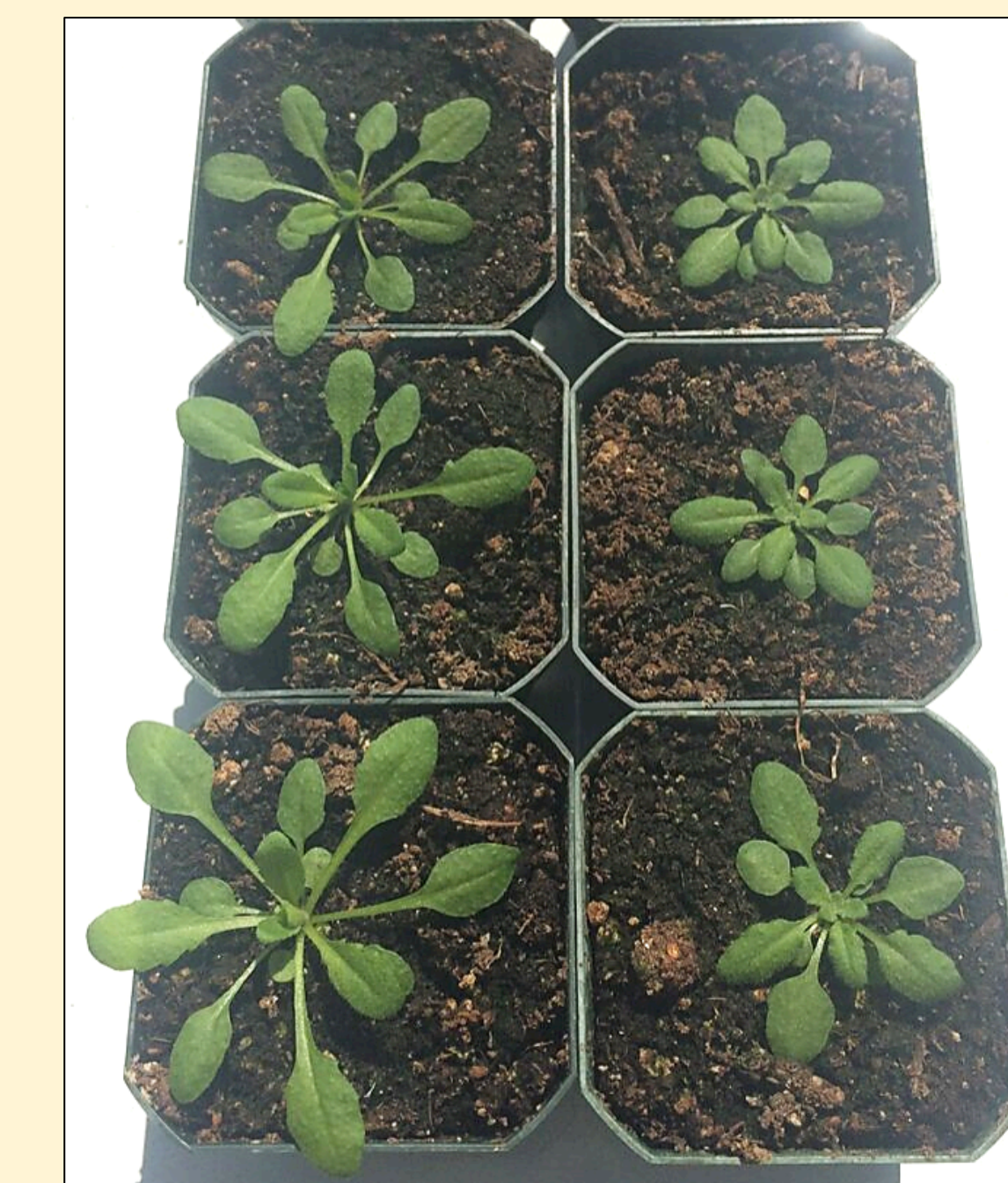


Figure 8. Rosettes of GTS1 (left) and Col_70000 (right) – early growth is faster in GTS1



Figure 9. GTS1 juvenile

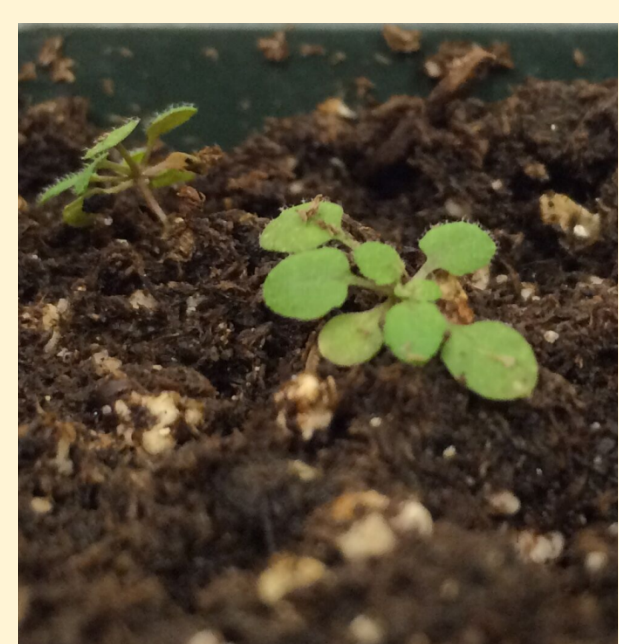


Figure 10. Col_70000 juvenile

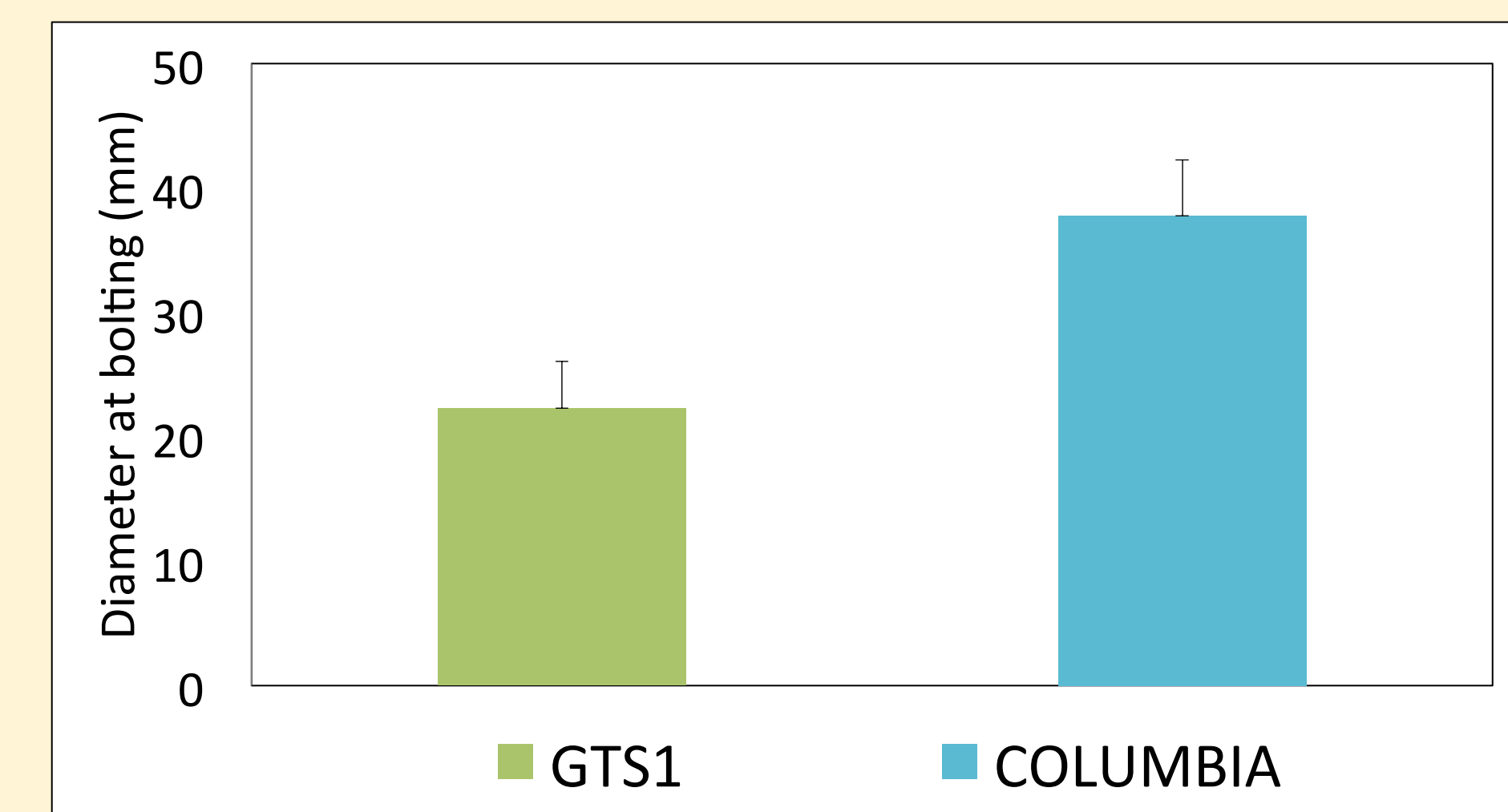


Figure 11. Average Rosette Diameter

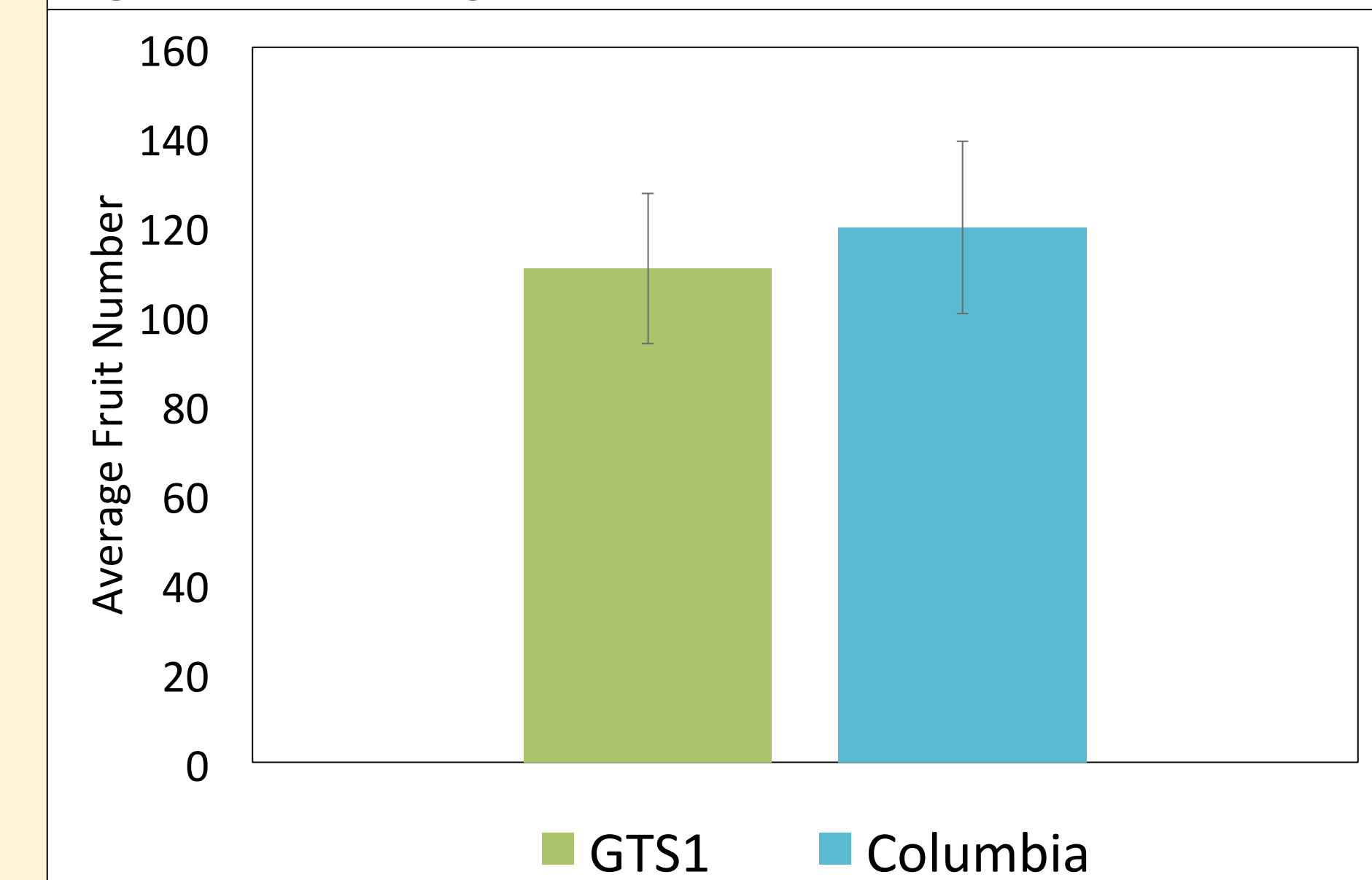


Figure 12. Average Fruit Number

Future Investigations

- Additional examinations of cellular phenotypes at various developmental stages
- Tracheid spacing comparisons (Figures 6 & 7)
- Growth in agar for root phenotype observations
- Water stress test
- Seed count per fruit
- Seed weight



Acknowledgements: the C of C UnPAK team, April Bisner, and Courtney Murren, NSF IOS 1052262 and IOS 1355106