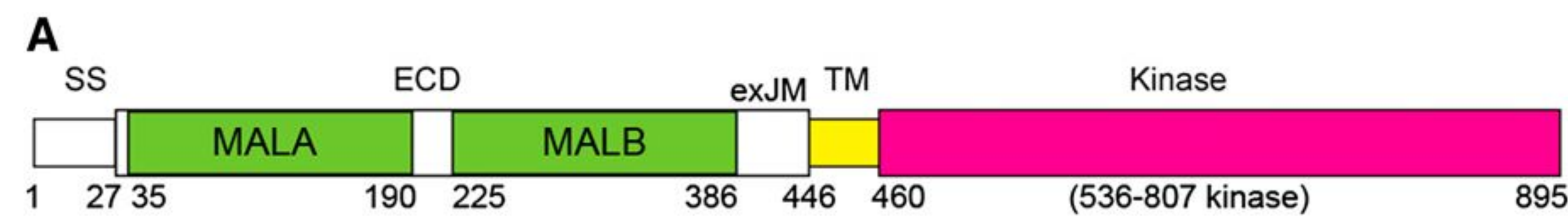


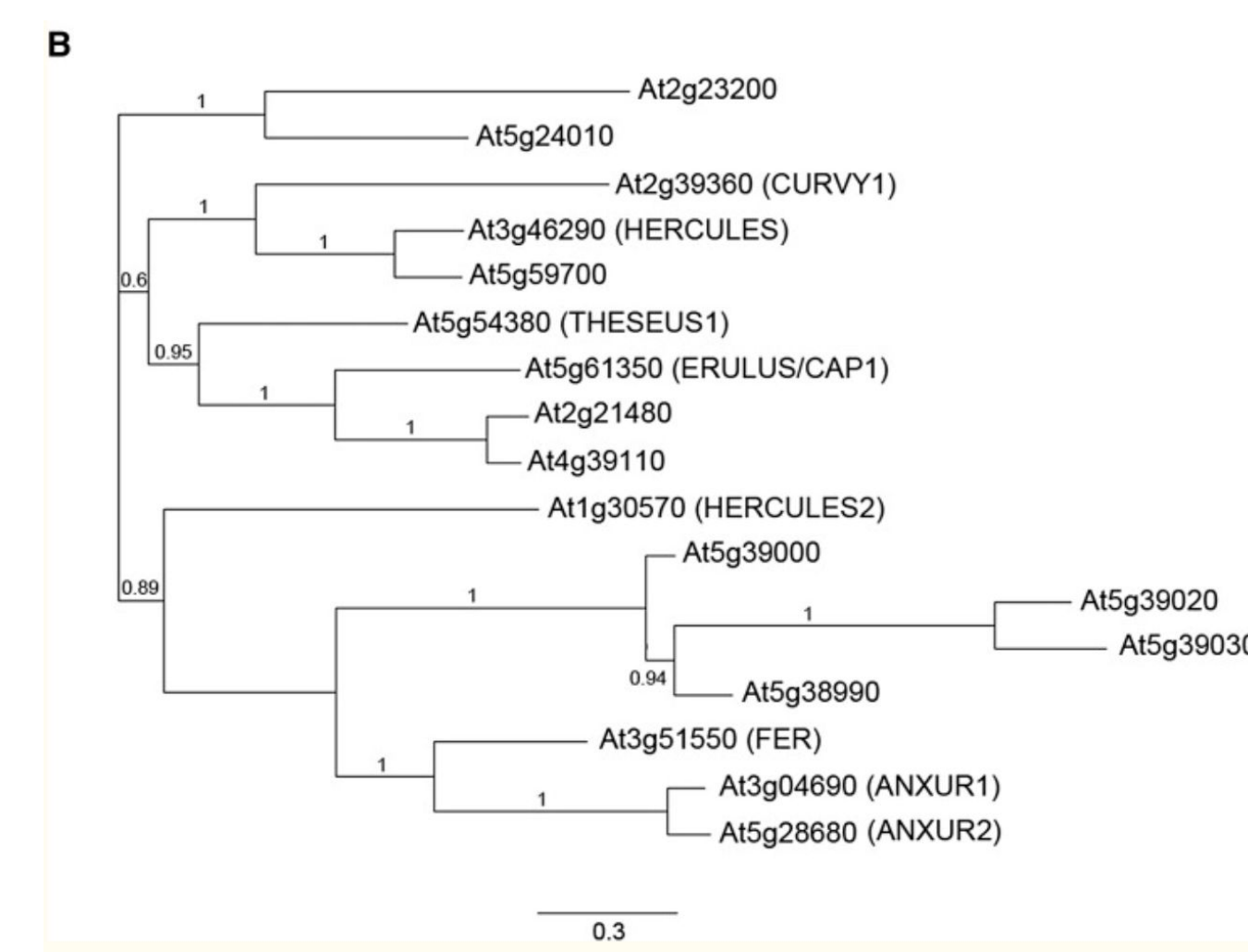


Background

Our lab's focus is mainly centered on FERONIA (FER), the most studied member of a family of 17 transmembrane receptor kinases. FER along with LORELEI-like glycosylphosphatidylinositol-anchored protein 1 (LLG1) are crucial protagonists in regulating various signaling pathways regarding root growth, reproduction, and pathogen defense in *Arabidopsis thaliana*.



Protein domain structure of the FERONIA receptor kinase in Arabidopsis. SS (signal peptide), ECD (extracellular domain), TM (transmembrane domain), are presented above. MALA and MALB are tandem malectin-like domains. exJM is an extracellular juxtamembrane region. Numbers correspond to amino acid residues (Li et al., 2016).



THESEUS1/FERONIA protein family (Li et al., 2016).

Methods and Materials

Objective: To further study the interaction with cell-wall polysaccharides potentially serving as wall-sensing functions, a study was conducted to better understand FER and LLG1 interactions with Oligogalacturonides (OGs).

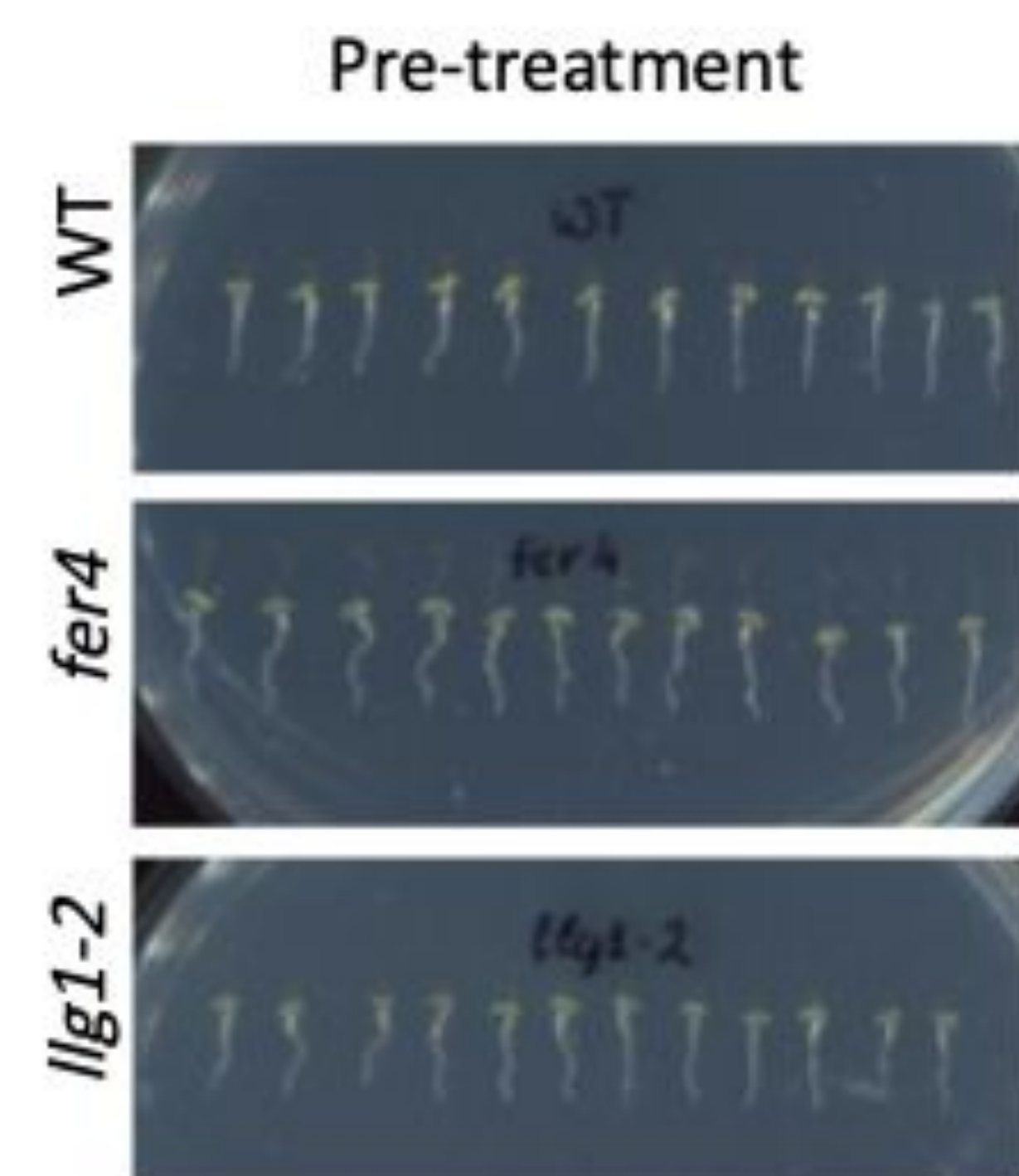
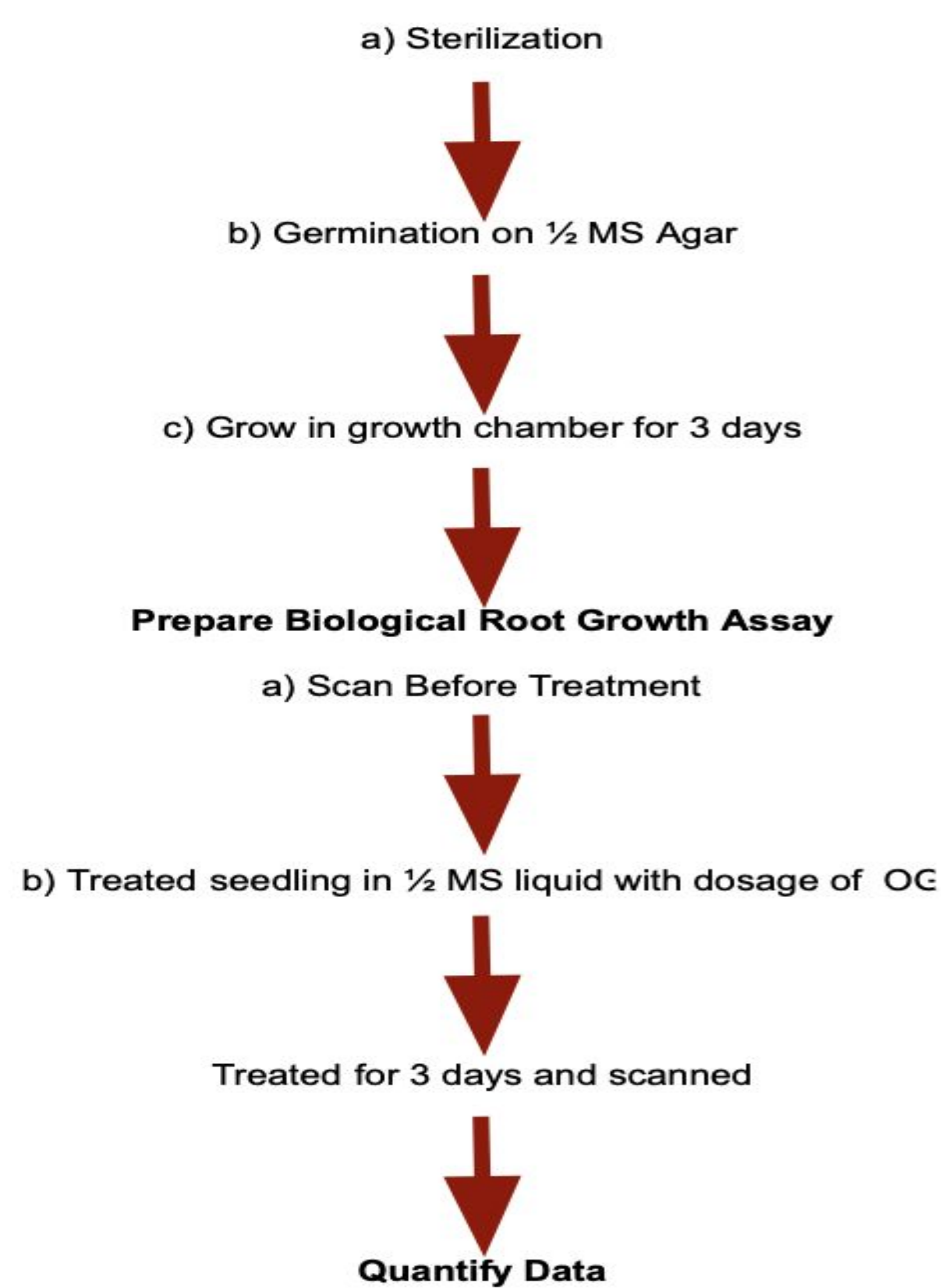
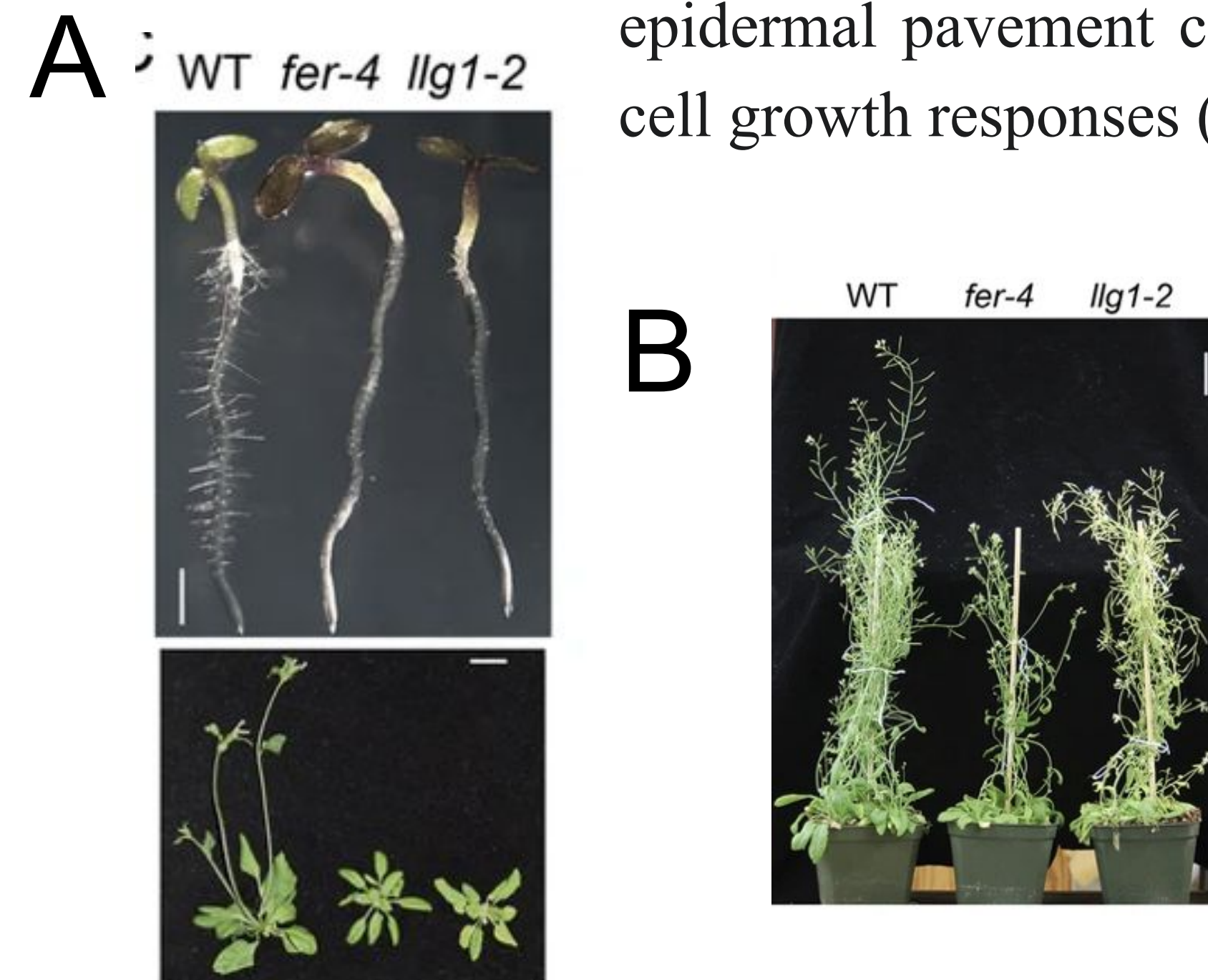


Figure 1. Image for root growth assay before treatment

Root Hair Development and Phenotype

The presence of malectin-like domains in FER family and related receptor kinases are speculated to bind carbohydrates cell wall components. Its malectin-like domains interact with pectin, a major carbohydrate polymer in the plant cell wall. These interactions have been linked to several major FER functions, including auxin- and RAC/ROP-mediated root hair growth and epidermal pavement cell patterning, and salt stress-induced cell growth responses (Feng et al., 2018).

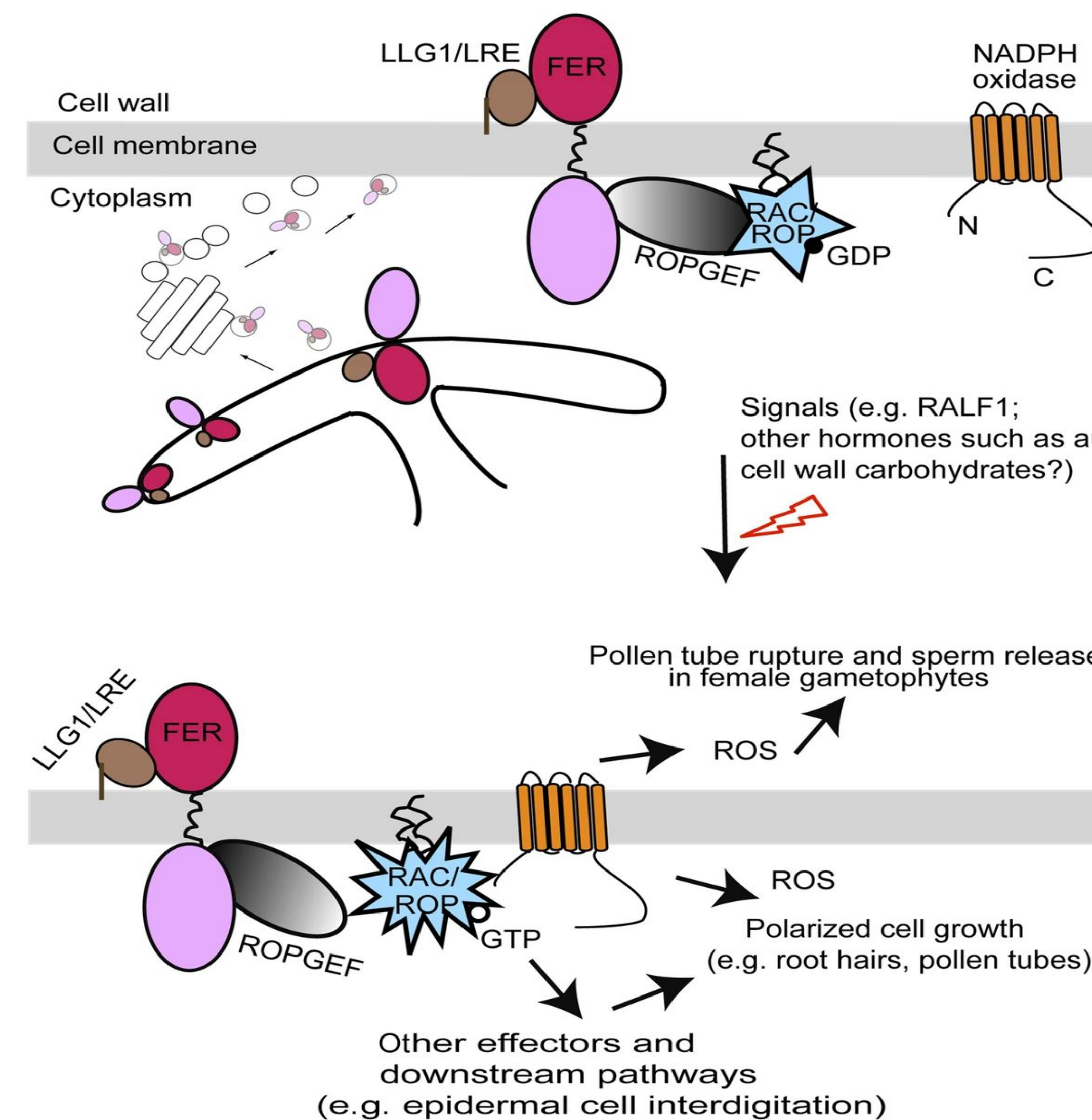


(A-B) Growth comparison between wild type (WT), *fer* and *llg1-2* plants. Four-day-old light-grown (A upper), 25-day-old (A lower), and flowering plants (B). Scale bars: 2 mm (A upper); 3 cm (A lower); 1 cm (WT), 0.5 cm (*llg1-2*, *fer-4*) (Li et al., 2015)

FER and LLG1 Complex

Both FER and LLG1 have been found to be co-receptors in mediating the release of reactive oxygen species (ROS) in female gametophyte and in a process where LLG1 acts as a chaperone protein and assists in transporting FERONIA from the endoplasmic reticulum to the cell membrane.

This particular transportation is important as the extracellular domain of FER is a malectin-like domain containing receptor kinases in plants, homologous to the animal diglucose-binding protein malectin and important for protein quality control in the endoplasmic reticulum.



A model for FER-LLG1/LRE interaction and mediated RAC/ROP signaling (Li et al., 2015)

Data Results

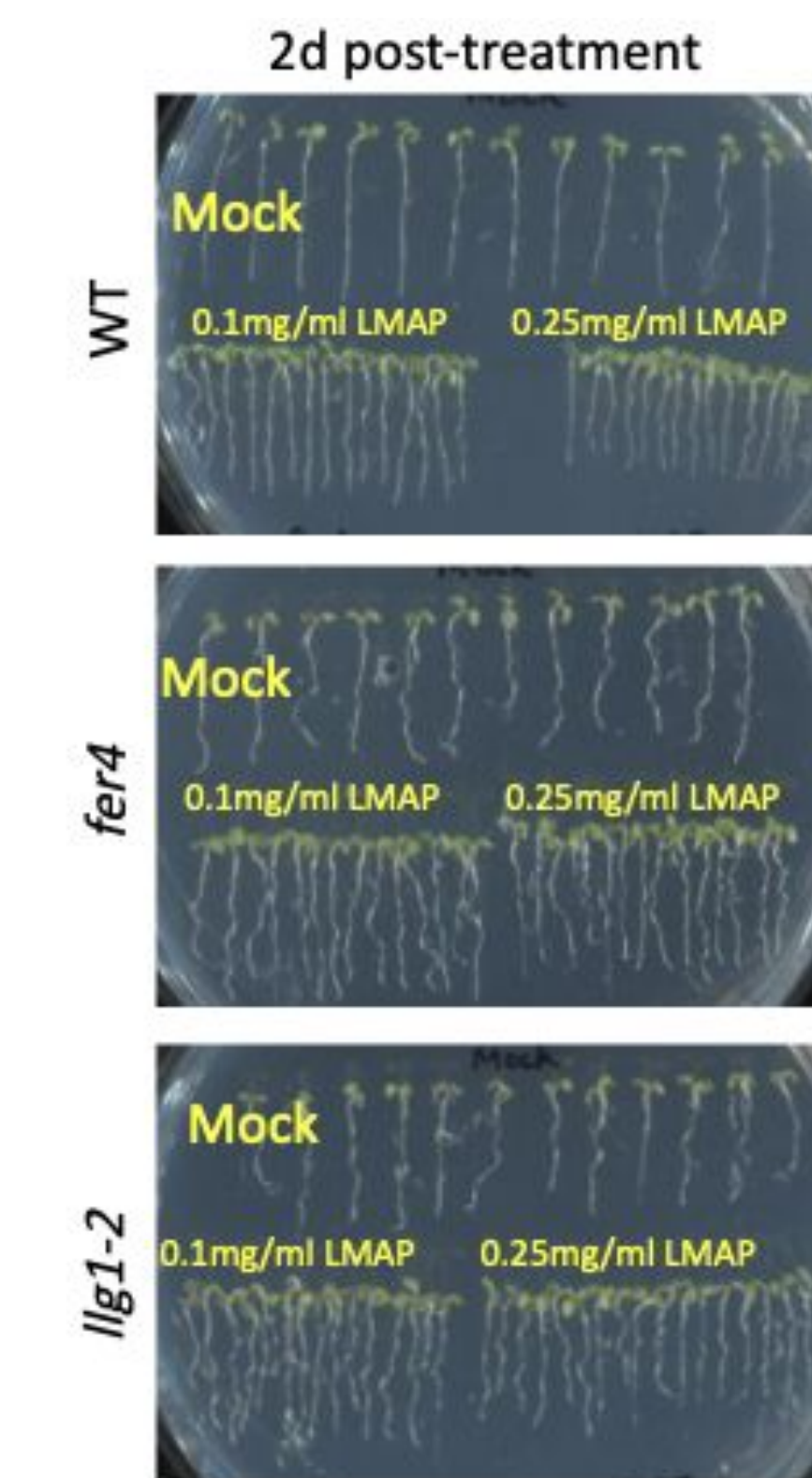


Figure 2. Image for root growth assay after 2-day treatment

From our 2-day old treatment with OG we can observe root hair growth inhibition in WT, *fer4* mutants and *llg1* mutants. Results were quantified to better compare root length from our pre-treatment seedlings and post treatment. The percentage of growth graph can be interpreted as depicting sensitivity in both *fer4* mutant and *llg1* mutant because root growth inhibition occurs.

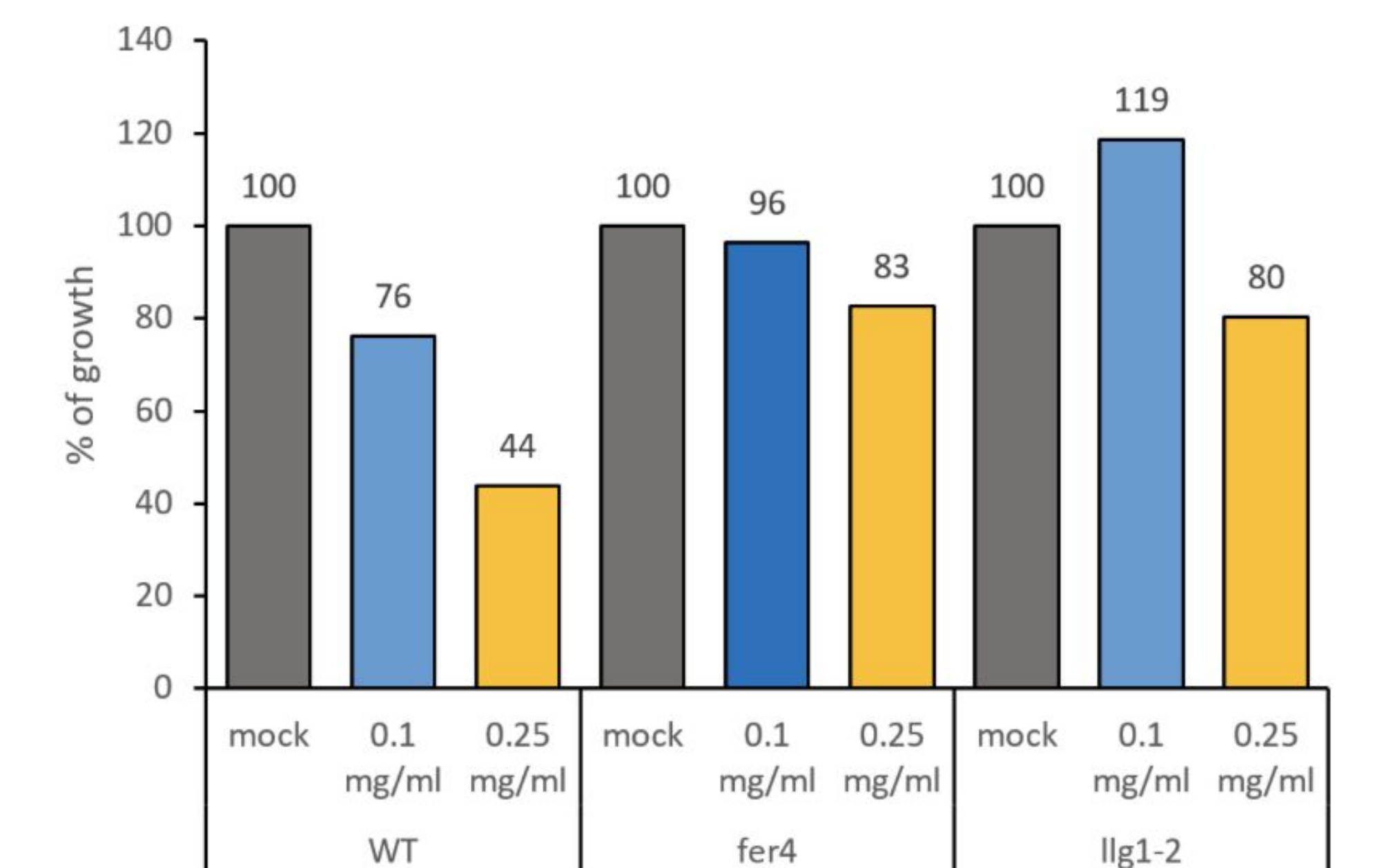


Figure 3. Percent change of root growth in WT, *fer4*, and *llg1-2*. As shown, higher concentrations of OG inhibit root growth.

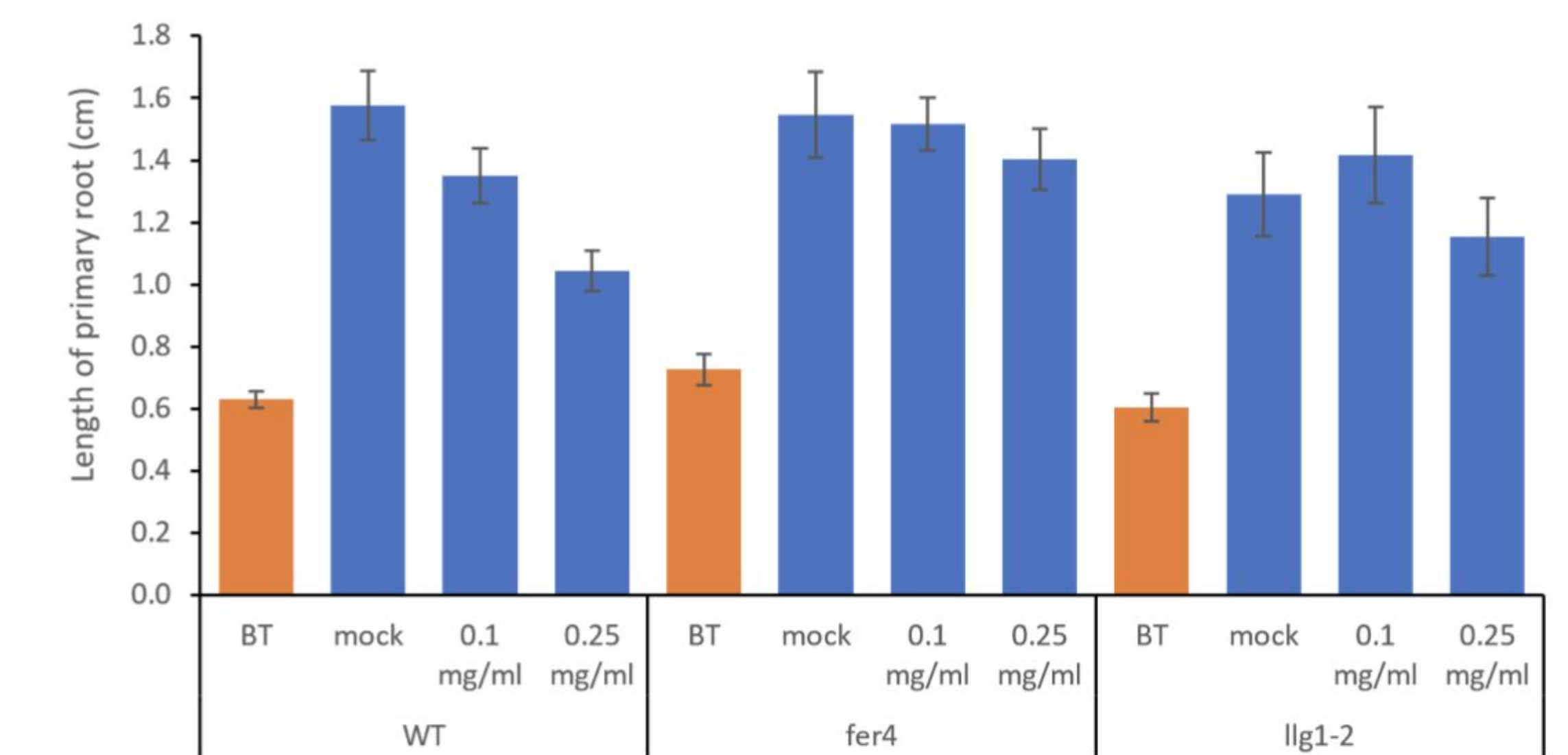


Figure 4. Graph representing qualitative data for root growth from WT, *fer4*, *llg1-2*, before and after OG treatment. Data show sensitivity in *fer4* and *llg1-2* as results demonstrate root growth inhibition.

References

Duan Q-h, Cheung AY*. Context-specific dependence on FERONIA kinase activity. *FEBS Lett* 592: 2392-2394. [A Commentary]. doi: 10.1002/1873-3468