

Relating *FBS3* Gene Function To Plant Health and Salt Stress Gene Co-expression utilizing *A. thaliana*



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Plant Health

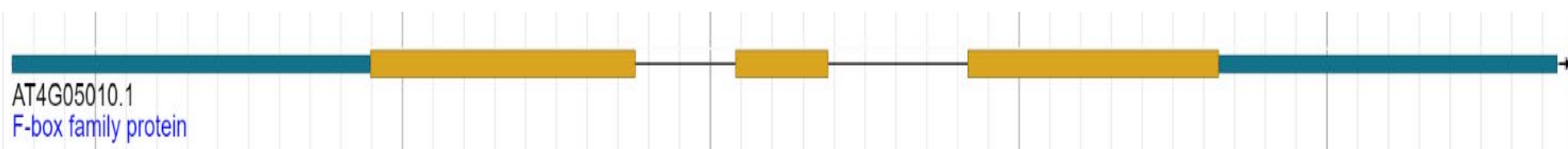
- Global warming is a pressing modern issue leading to many environmental alterations that negatively impact plant organisms
- Increasing global temperatures lead to increased Salt Salinity via the evaporation of water in soil.

F-BOX Family Proteins

- Ubiquitin Proteasome System (UPS) helps the plant deal with stress and activating stress responses
- Works with the UPS and tags proteins with ubiquitin for degradation
- Are stressed induced proteins and consist of 4 genes in *A. thaliana*.

FBS3

Located on chromosome 4



FBS3 was knocked out through the insertion of T-DNA into the coding region (in yellow) of its sequence. This can be used to compare the function of Arabidopsis with and without gene function.

Hypothesis

The *FBS3* gene in *A. thaliana* functions to increase salt resilience and changes to *FBS3* will alter gene expression in growth metabolism and salt induced stress genes.

qPCR

- Quantitative PCR is a method used to quantify gene expression via primers that target specific genes and measure how much mRNA is present of that gene.

Primer Optimization

- Methods of assessing primers:
 - Considering :
 - Annealing temperature
 - Primer hairpins
 - Self Dimerization
 - Primer Efficiency via dilution series

i.e. Hairpin formation

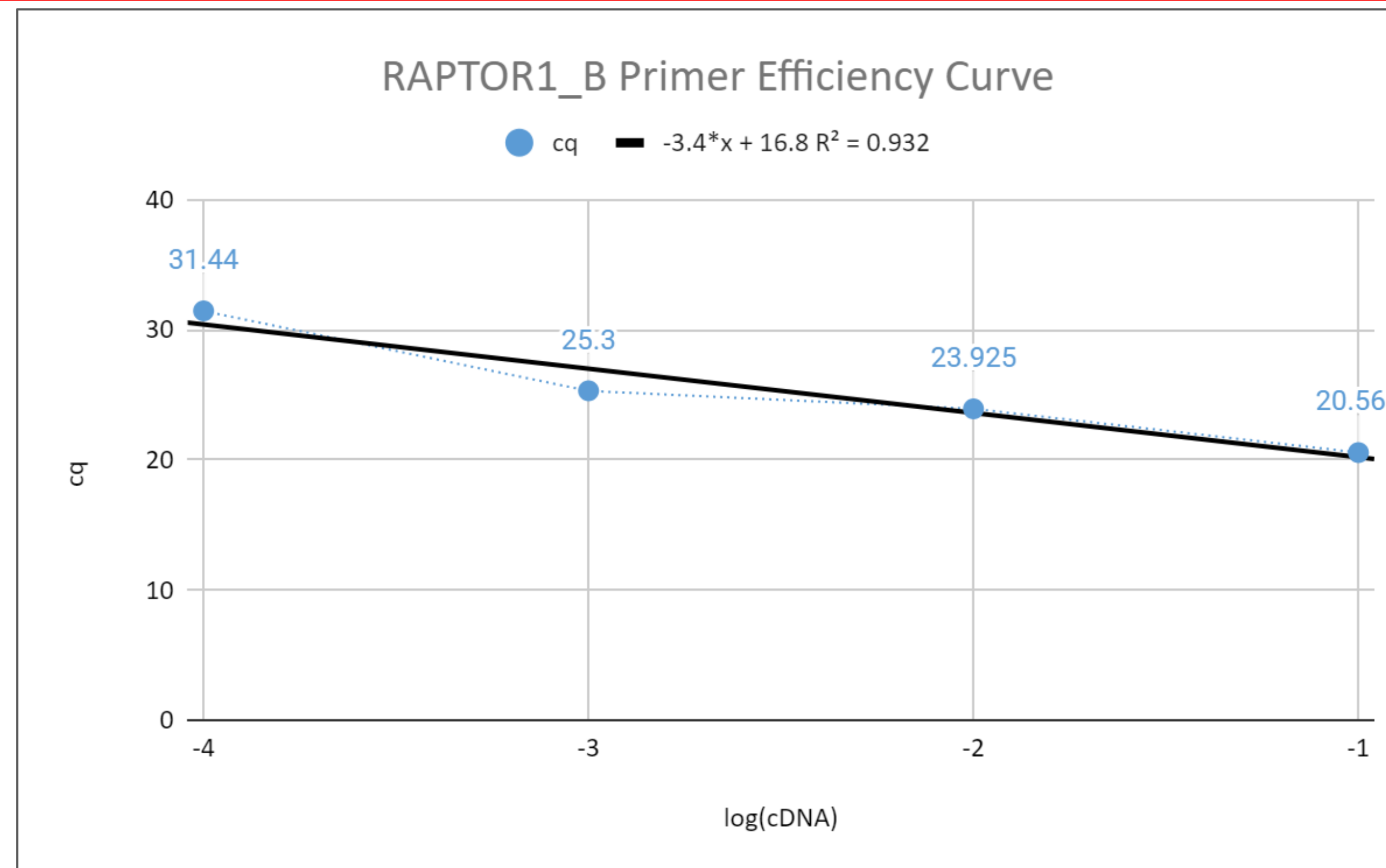
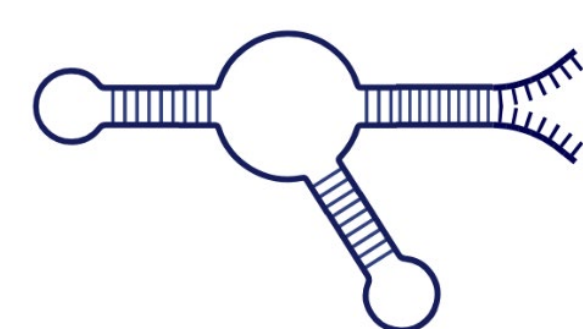


Figure 2. Primer dilution curve consisting of a 10 fold cDNA dilutions. The efficiency is calculated via the delta-delta Ct method.

$$\text{Efficiency}(\%) = \left(10^{\frac{-1}{\text{slope}}} - 1\right) * 100 = 96.8\%$$

log(cDNA)	cq
-4	31.44
-3	25.3
-2	23.925
-1	20.565

Amplification Of Genes In qPCR

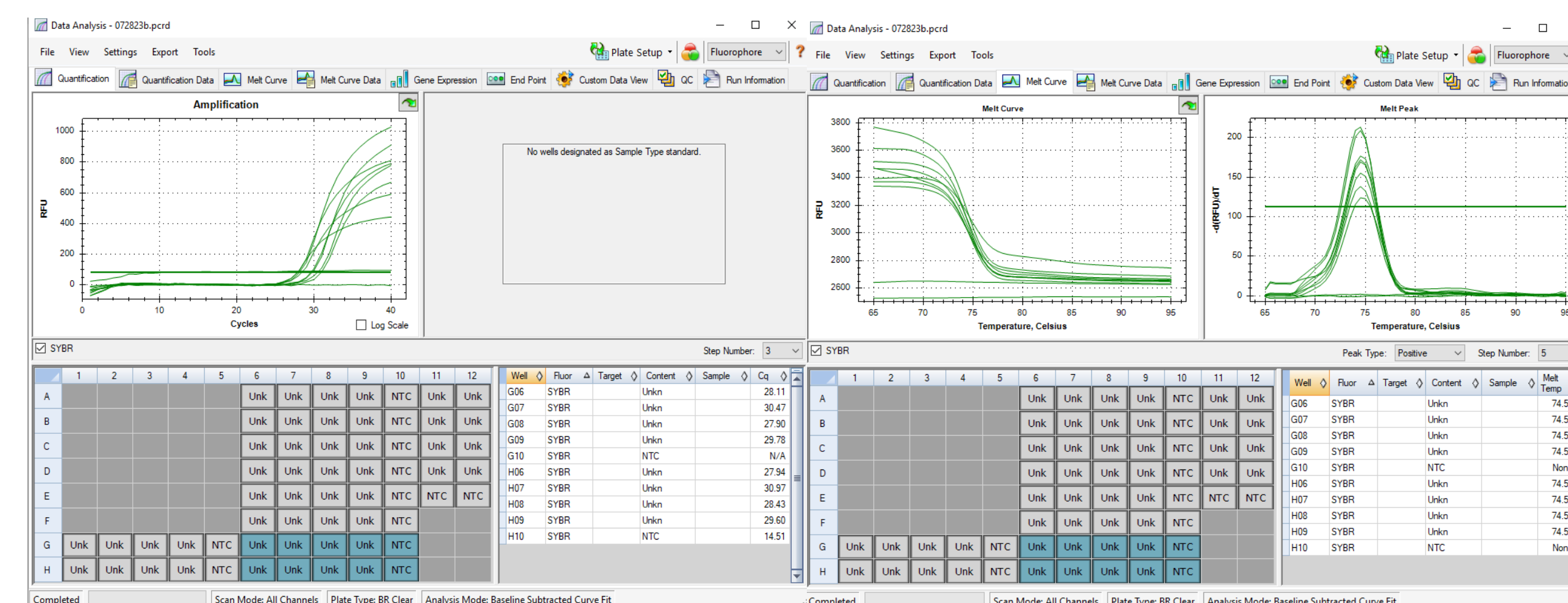


Figure 3. qPCR amplification curves of the gene *RGF3*. This gene is related to growth exhibited in the roots and is responsible for maintaining root stem cells in *A. thaliana*.

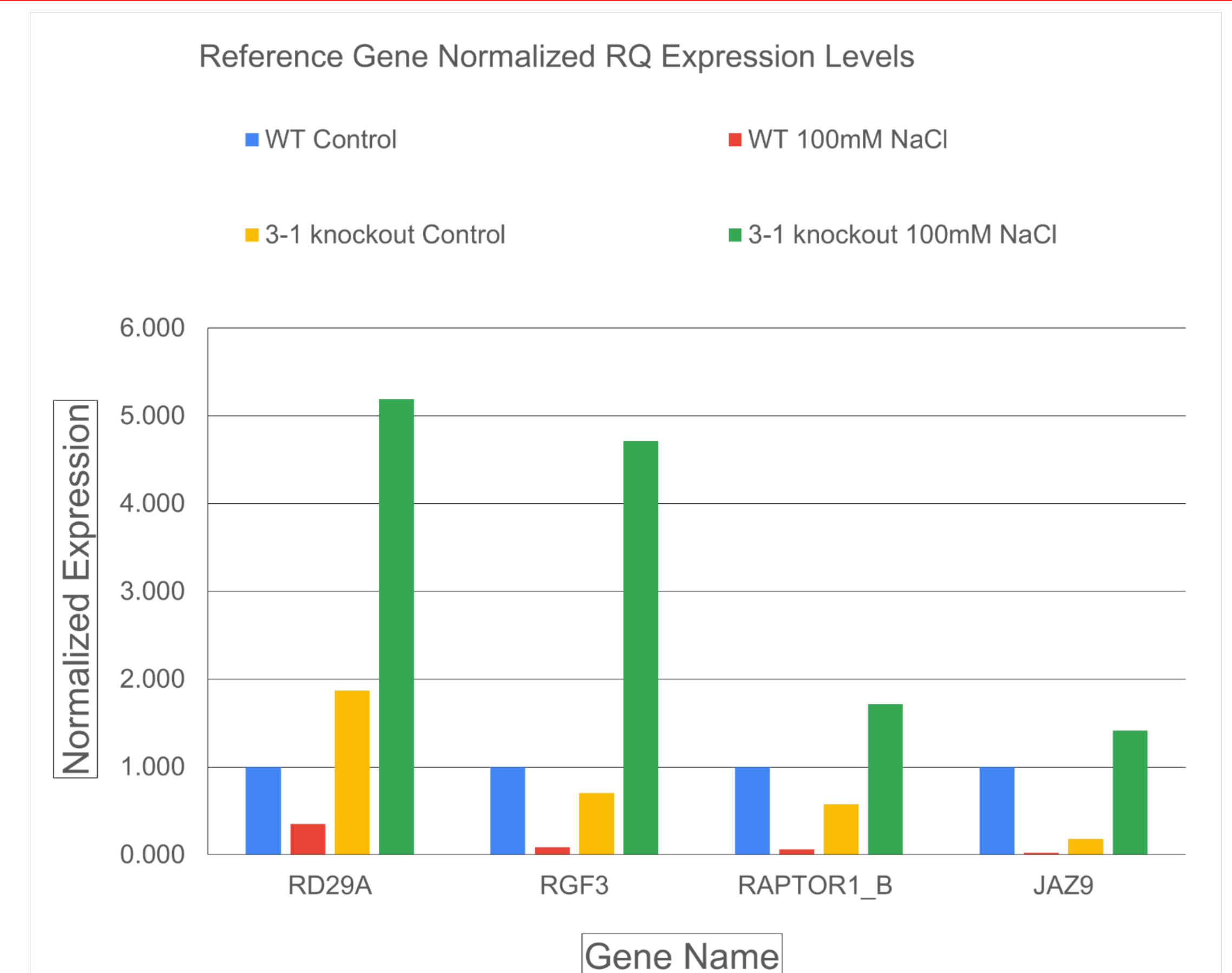


Figure 4. qPCR amplification levels normalized with the reference gene IPP2. n=1 (one biological replicate). These levels show a decreasing expression trend amongst WT plants while showing an increased trend with *FBS3*

Conclusion

- FBS3* possibly mediates salt stress response and plays a role in inhibiting the expression of metabolic and growth pathways when the plant is placed in salt stress

Future Plans

- Testing *FBS3* primers and optimizing results for more accurate gene amplification levels
- Root vs. Non-root part of *A. thaliana* to view how *FBS3* expression varies across different areas of the plant
- Testing more genes and viewing their co-expression with *FBS3*

Acknowledgements

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