

Effects of *OsMADS27* Overexpression on Asian Rice (*Oryza sativa*)

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INTRODUCTION

Chilling tolerance in Asian rice (*Oryza sativa*) is a polygenetic trait. The transcription factor *OsMADS27* has previously been shown to help in stress response to salt (Chen et al., 2018) and has been implicated in the chilling stress response. From unpublished RNAseq data done in *OsMADS27* overexpression *Indica* plants from the Schläppi Lab, peroxidase (POX) genes that may contribute to chilling tolerance, based on preliminary data, were observed to be upregulated. However, these results have yet to be validated for both subspecies due to technical difficulties with expression quantification. Furthermore, previous studies have only examined the phenotypes of one subspecies of Asian rice, *Japonica*, overexpressing *OsMADS27*. In this study we investigated plants of both subspecies overexpressing *OsMADS27*.

METHODS

Transgenic overexpression rice plants, from both subspecies (*Indica* and *Japonica*), were grown. Root and shoot length were measured for all transgenic plants at 7, 10, 12, and 14 days from germination. After 2 weeks, cuttings from leaves of transgenic plants were taken for either DNA extraction for genotyping or for RNA extraction to measure gene expression levels. Leaves from wild type plants of both subspecies were also taken and their RNA extracted for control purposes.

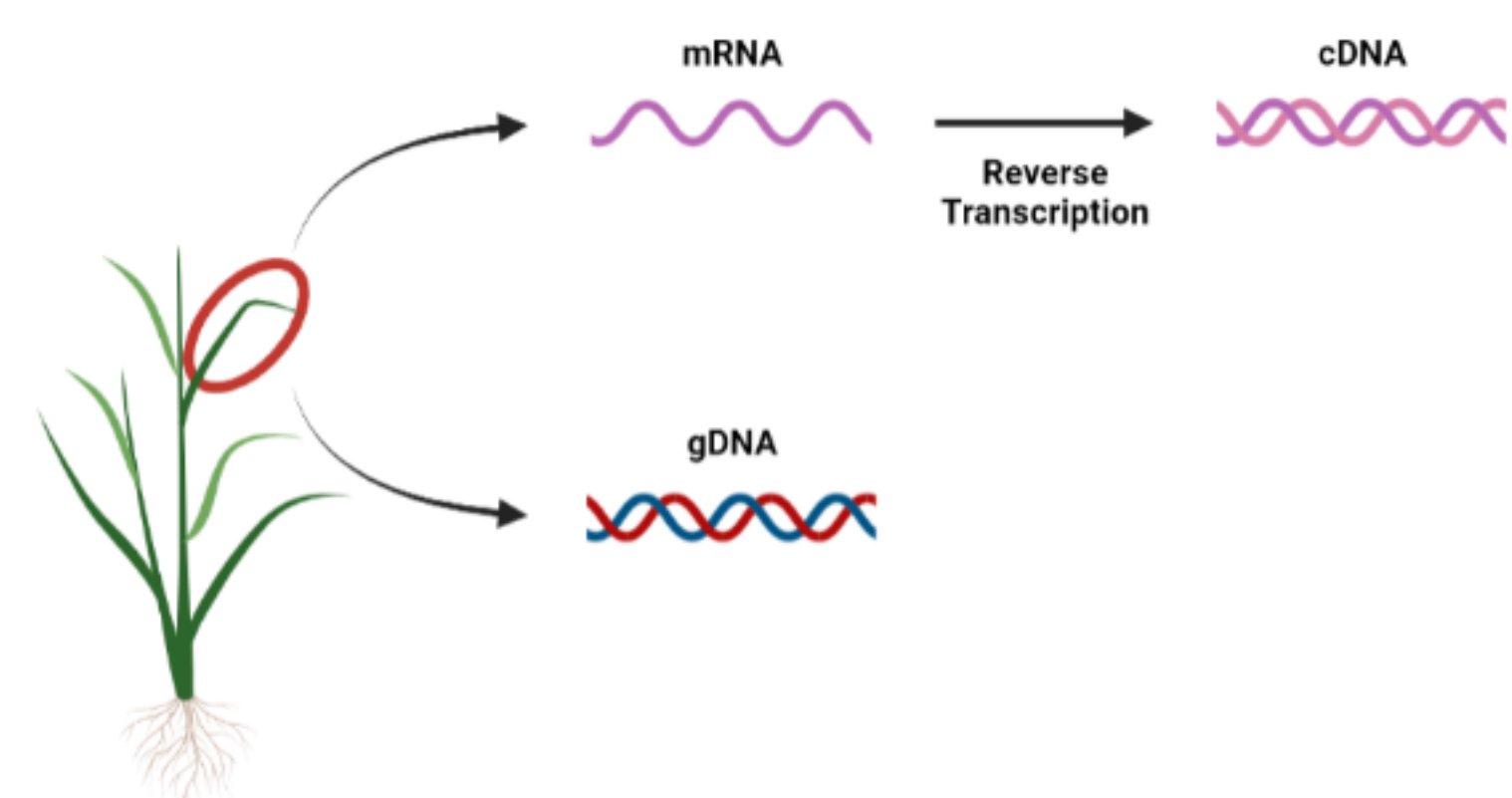
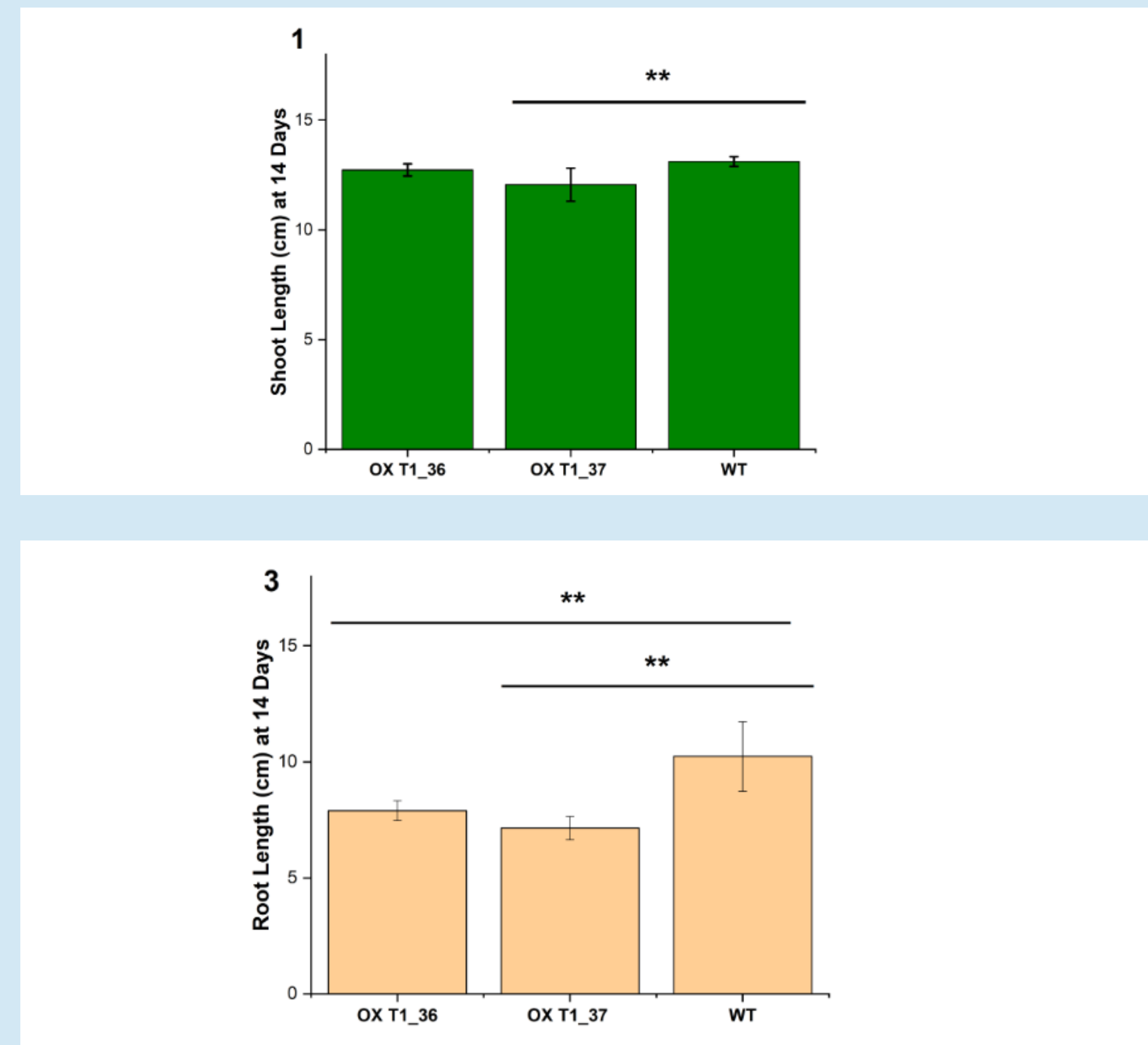


Figure 5: Diagram of workflow to achieve usable genetic information for testing

RESULTS

Japonica (Krasnodarskij 3352)



Indica (Kasalath)

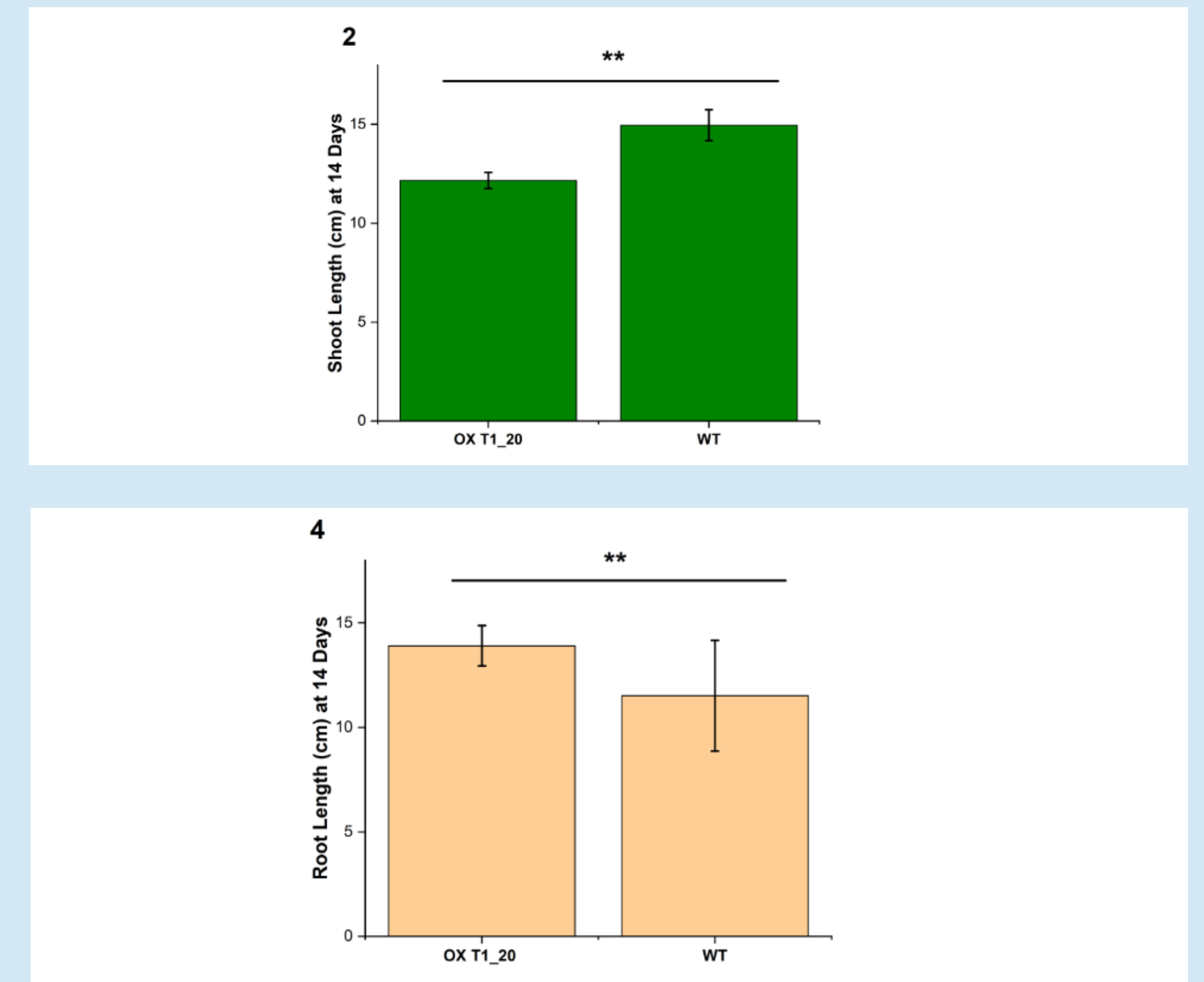


Figure 1 & 2: Average shoot length after 14 days of growth for overexpression and wild-type *Japonica* and *Indica* plants
Figure 3 & 4: Average root length after 14 days of growth for overexpression and wild-type *Japonica* and *Indica* plants

Discussion

- *Japonica* phenotype observations reflect previous studies (Chen et al. 2018), but the observed *Indica* phenotype has not been previously reported
- Observed differences between subspecies could be due to differing targets of *OsMADS27* and/or due to the *OsMADS27* used in the overexpression lines were from a *Japonica* background and have an amino acid substitution (Thr230Ala) compared to the native *OsMADS27* from *Indica* plants used in this study

CONCLUSION & FUTURE DIRECTION

- *OsMADS27* overexpression appears to induce differing phenotypes in the two subspecies of Asian rice.
- More molecular biology work is needed to understand the targets of *OsMADS27* and how they contribute to chilling tolerance.
- More phenotyping work, such as electrolyte leakage and low temperature seedling survivability, is needed to fully understand the effects *OsMADS27* overexpression has on Asian rice

ACKNOWLEDGEMENTS

This work was done through Marquette's Biological Sciences Department's Summer Research Program. Thanks to Danielle Barrett and Miriam Schwabe for their help during genotyping.