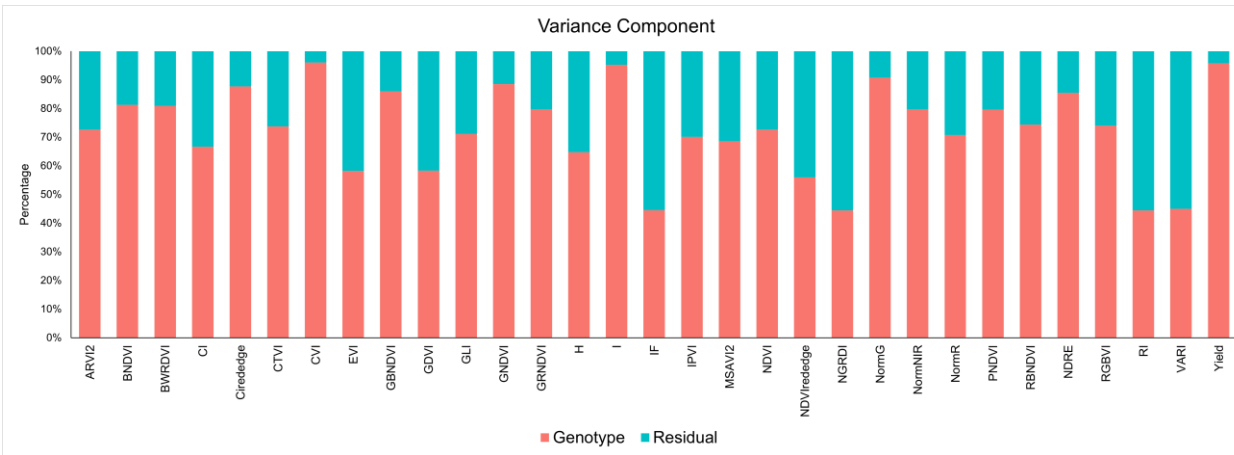
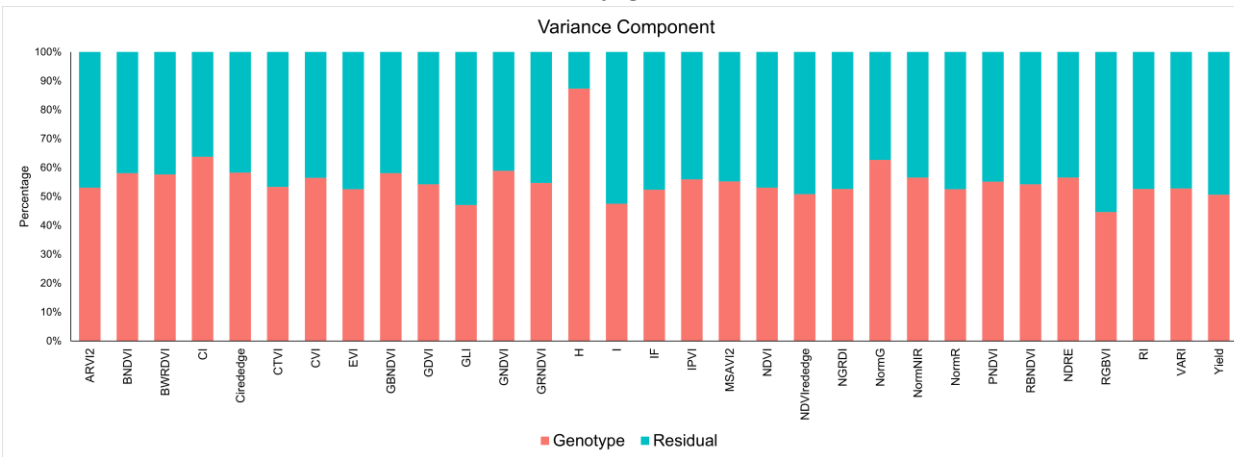


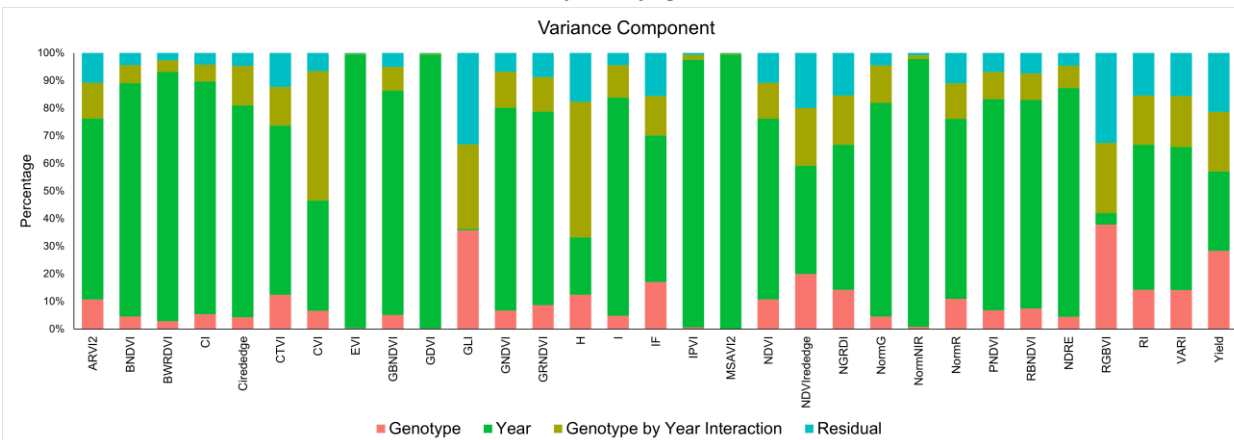
2022



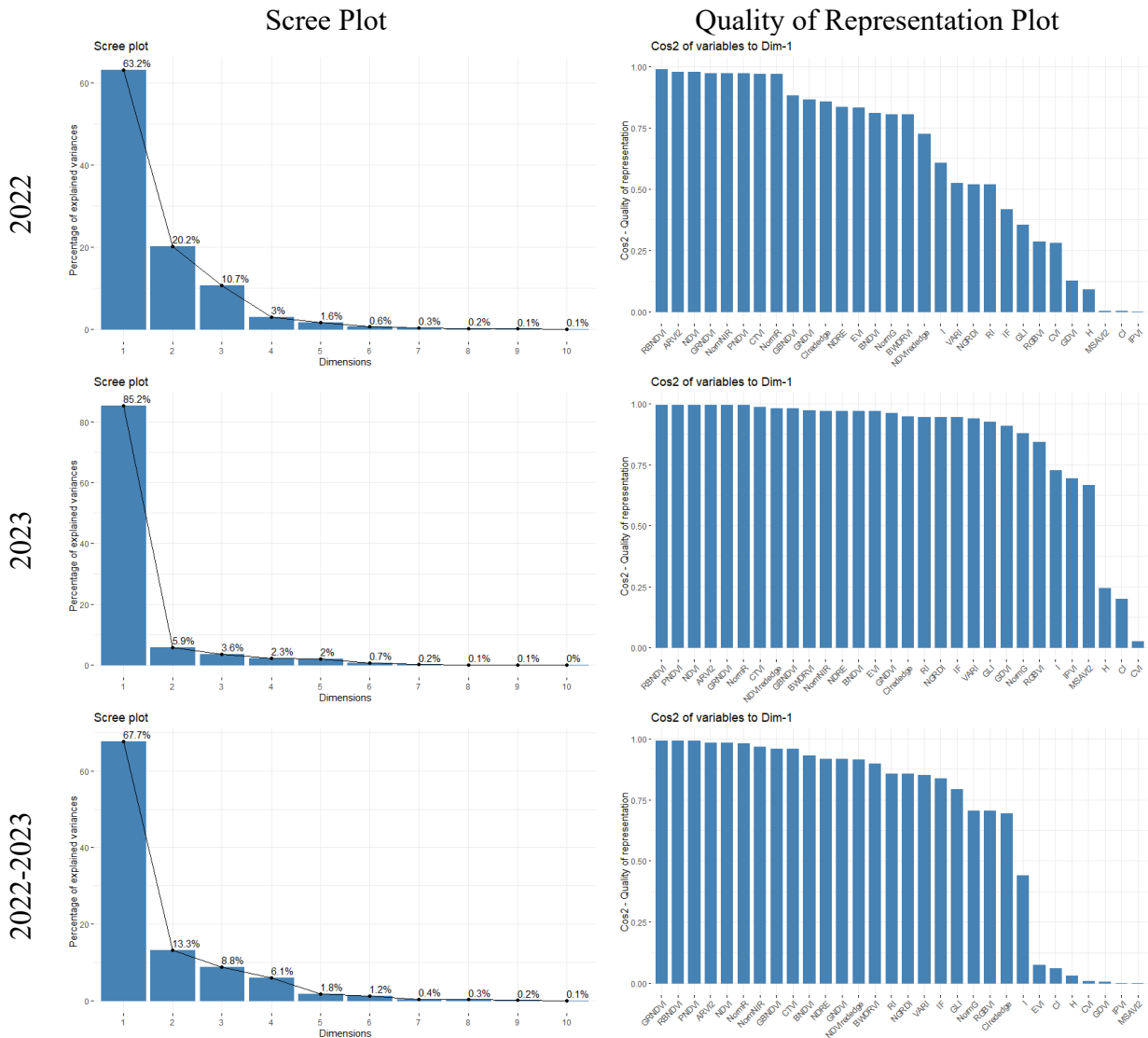
2023



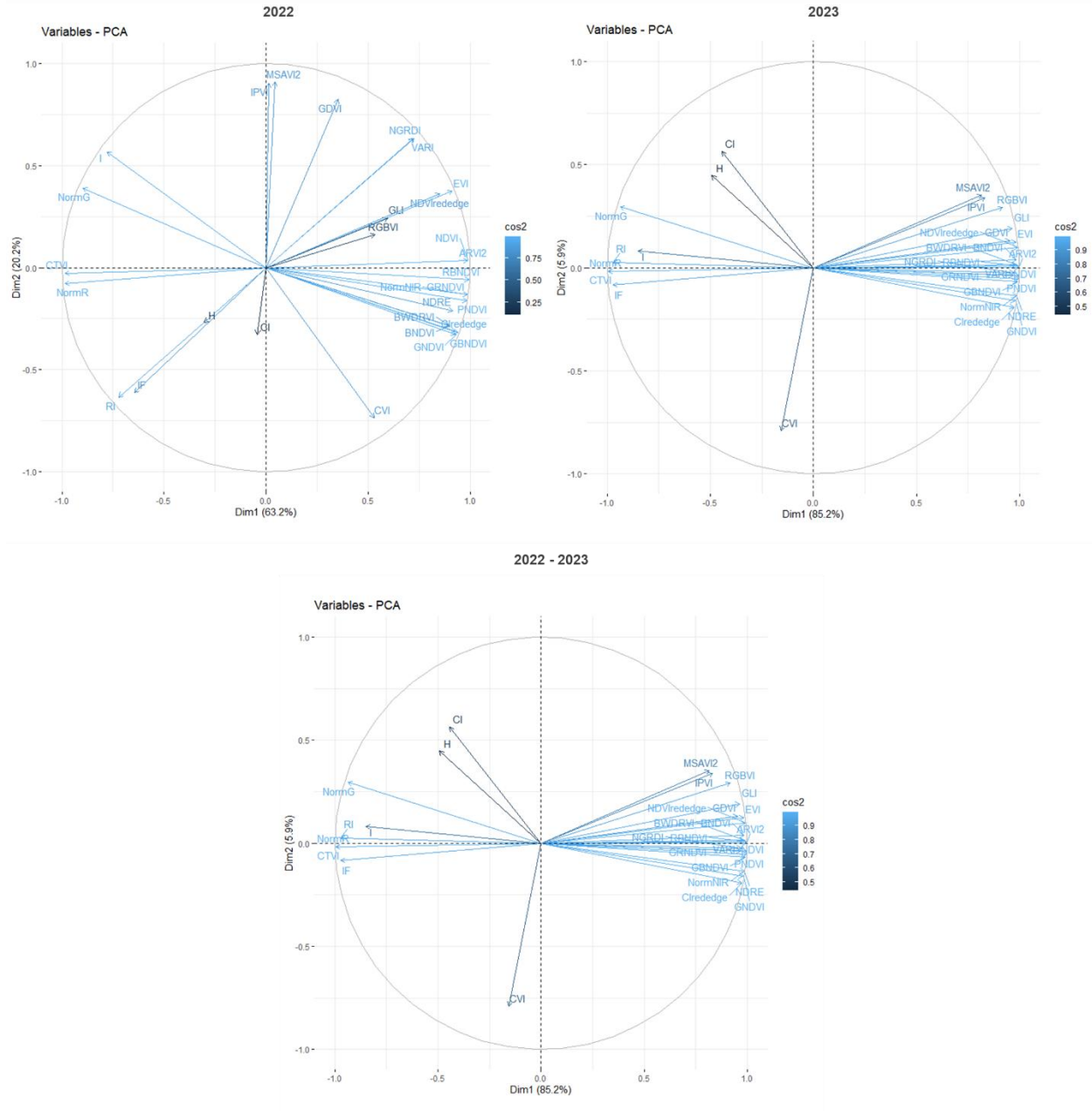
2022-2023



Supplementary Table 4.1. Variance components of grain yield and vegetation indices from the 2022 and 2023 trials independently showing percentage of variation due to genotype and residual effect, and across years showing percentage of variation due to genotype, year, genotype by year interaction, and residual effects.



Supplementary Figure 4.2. Scree plots showing the percent contribution of each of the principal components to the variations observed among the genotypes due to vegetation indices, and corresponding quality of representation plots showing the contribution of the vegetation indices to the variation observed among the genotypes controlled by the first principal component.



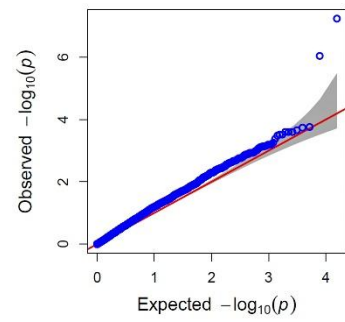
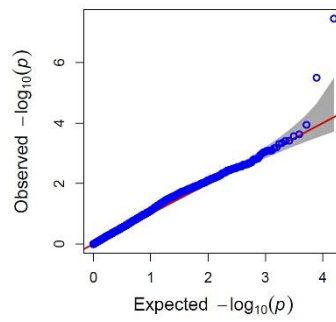
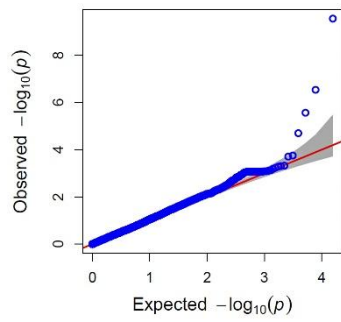
Supplementary Figure 4.3. PCA biplots from (a) 2022 trial, (b) 2023 trial, and (c) across years visually representing the relationship among the 30 generated vegetation indices and their contribution to the variation observed among the genotypes. The direction of the arrows indicates the contribution of the vegetation indices with principal components 1 (dim1) and 2 (dim2), while the length of the arrows indicates the magnitude of contribution to the principal components.

2022

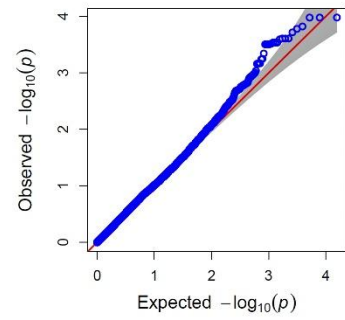
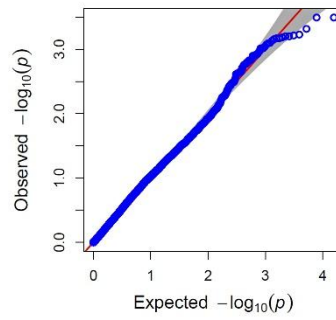
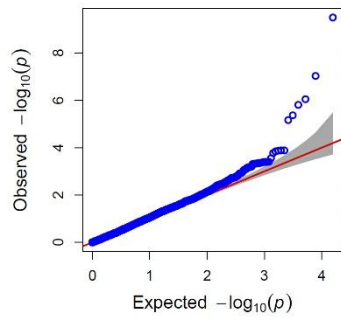
2023

2022-2023

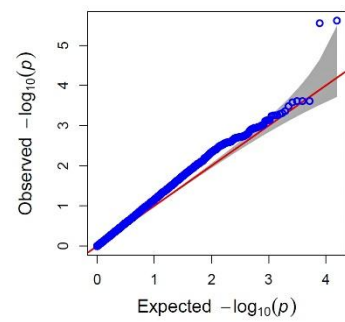
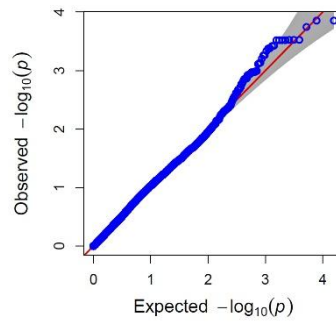
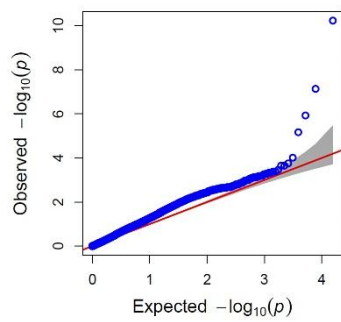
Yield



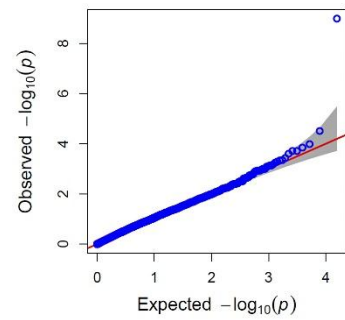
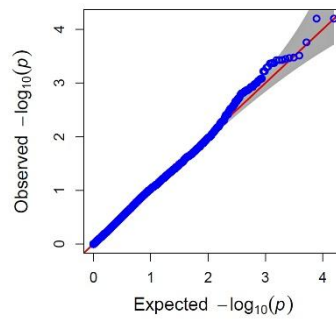
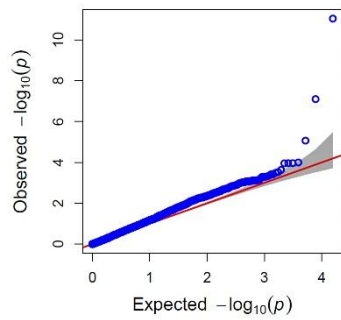
ARVI2



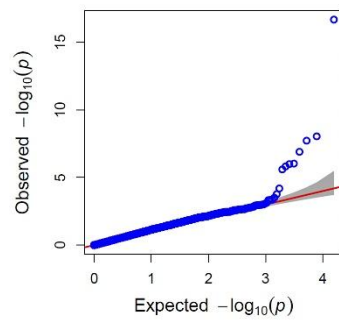
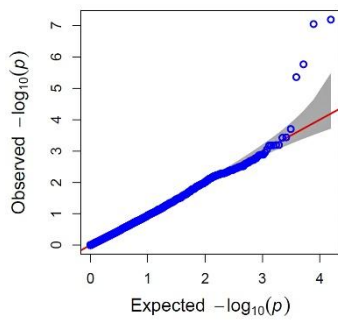
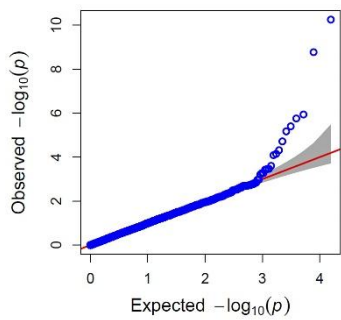
BNDVI



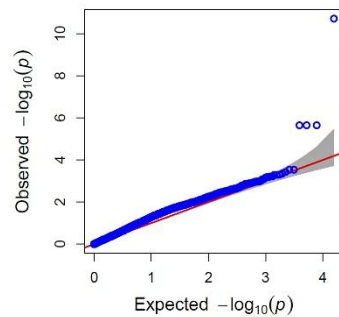
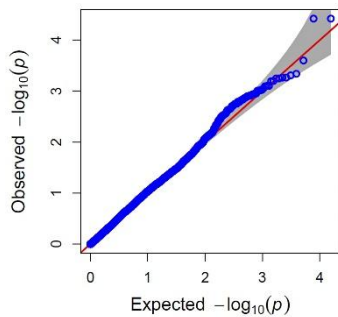
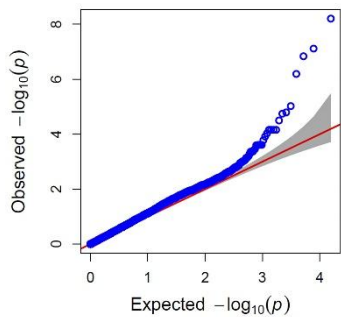
BWD RVI



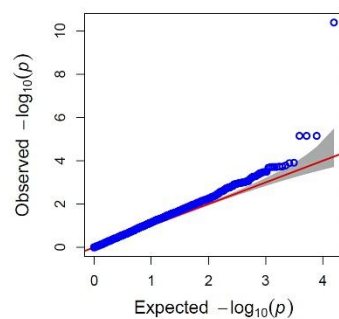
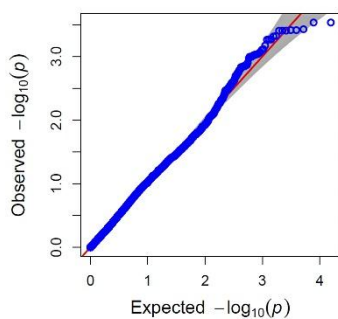
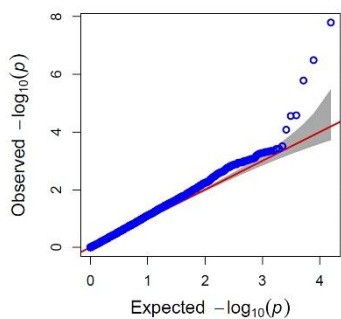
CI



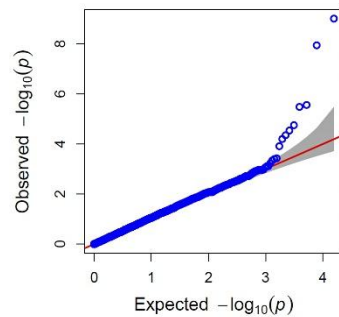
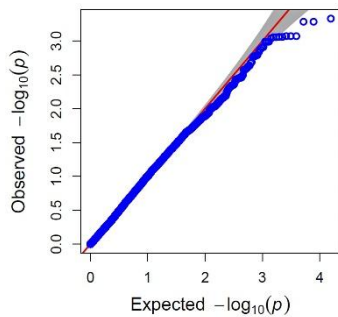
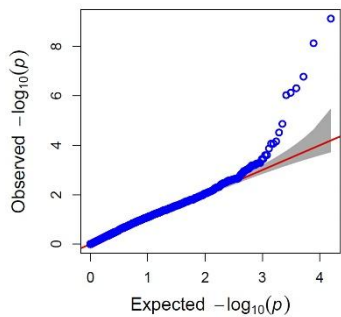
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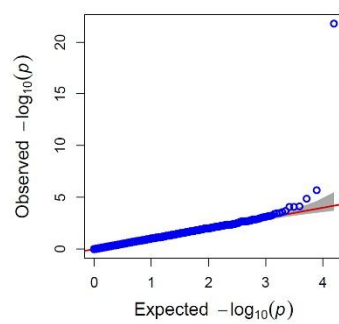
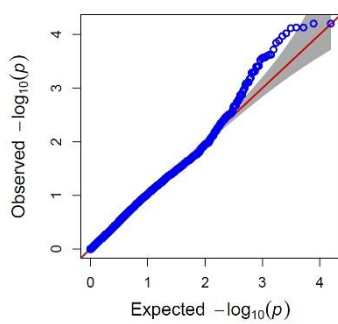
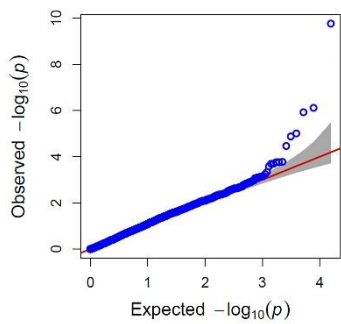
CTVI



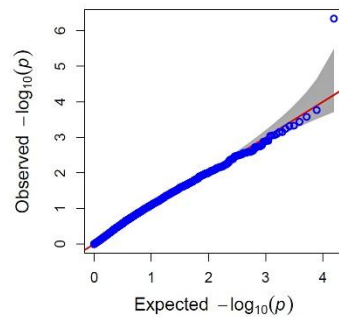
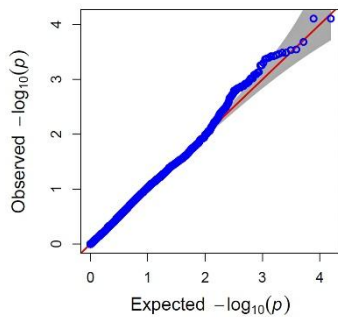
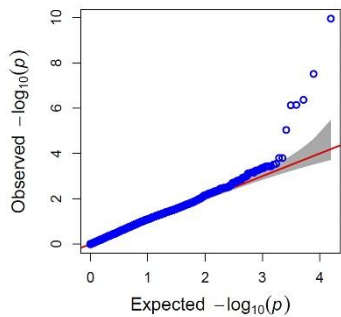
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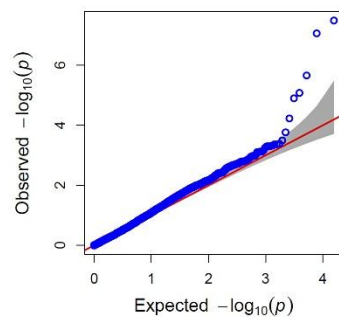
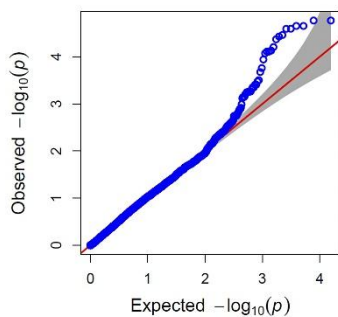
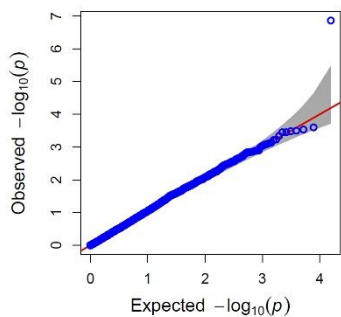
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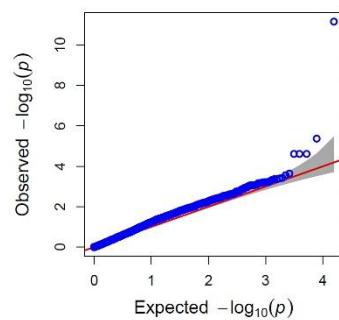
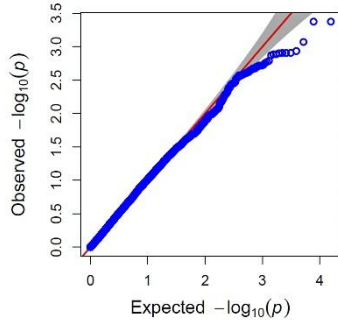
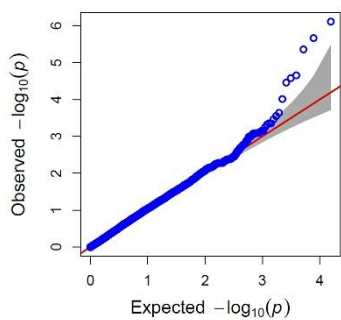
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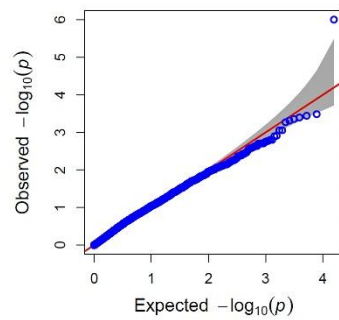
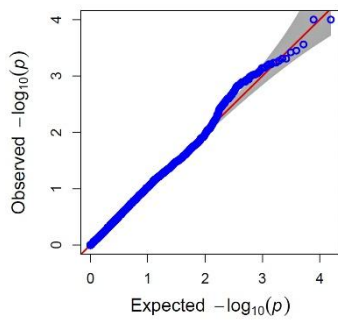
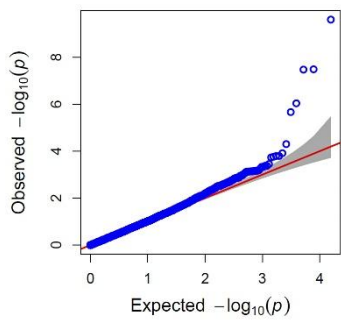
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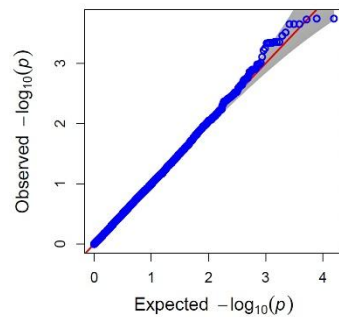
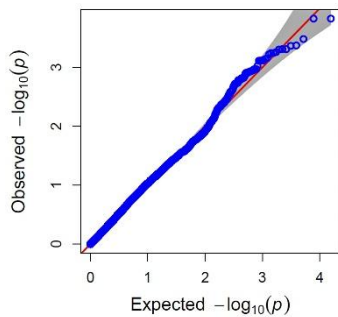
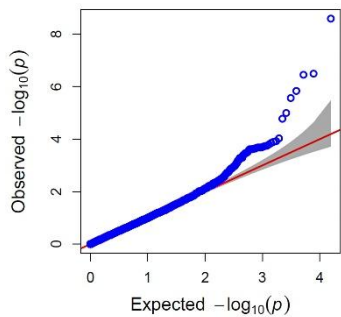
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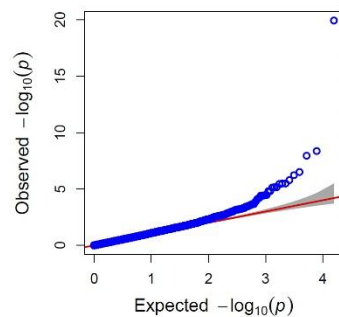
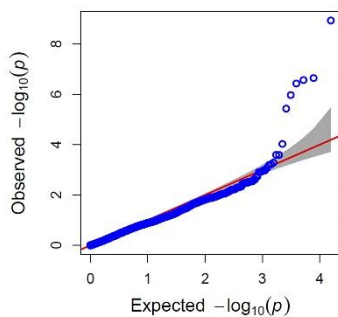
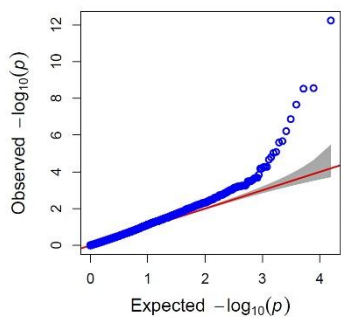
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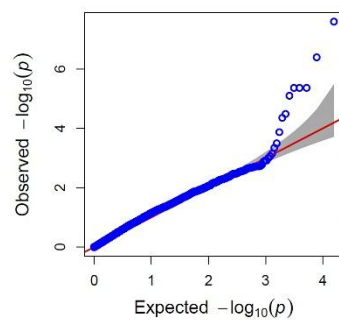
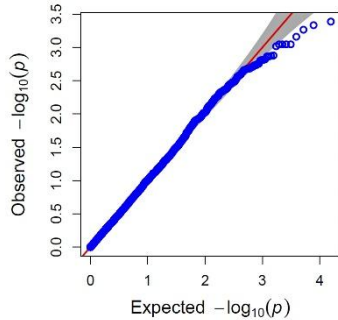
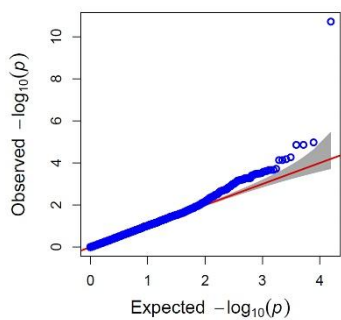
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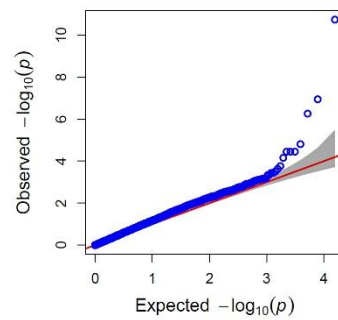
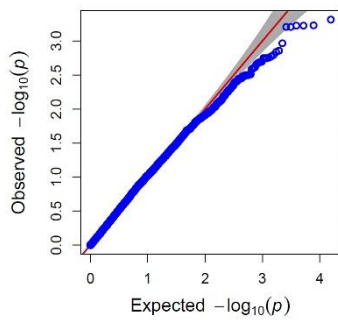
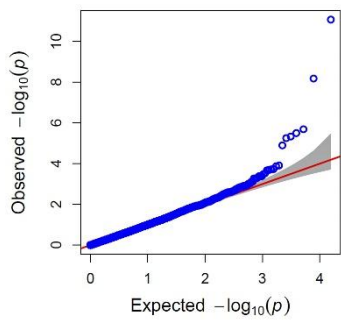
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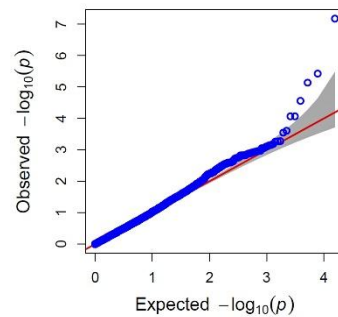
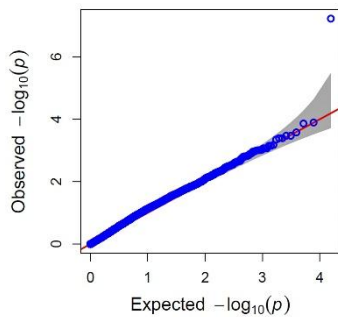
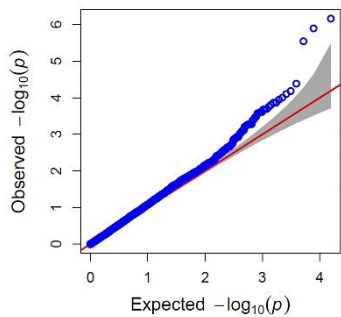
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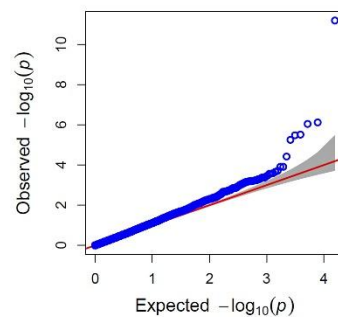
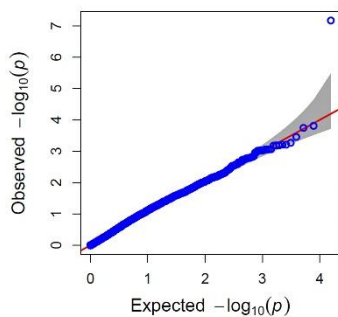
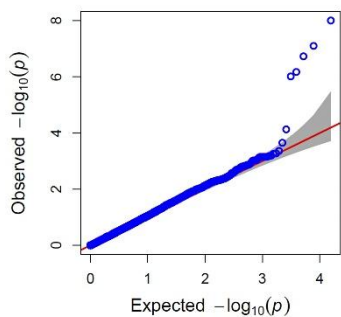
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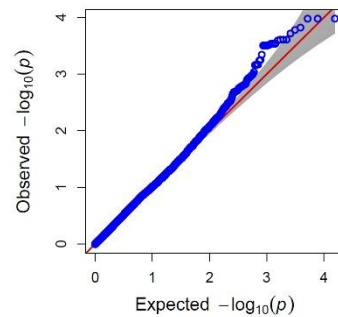
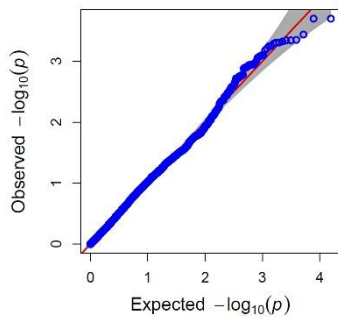
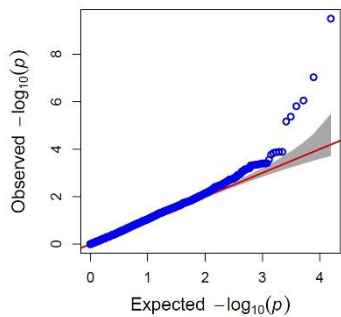
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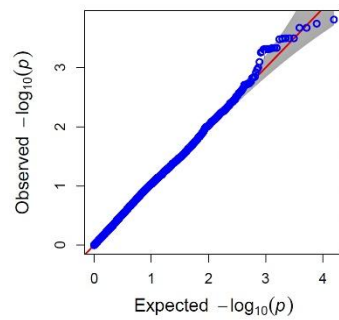
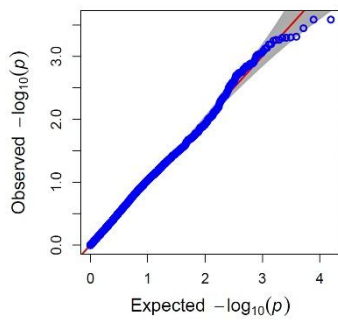
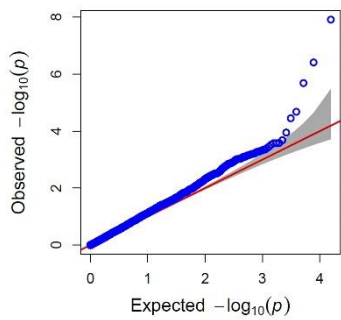
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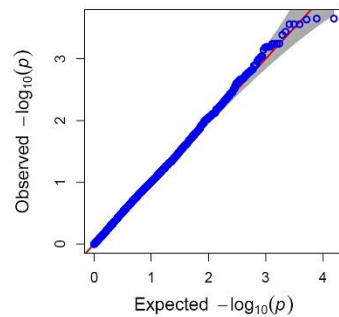
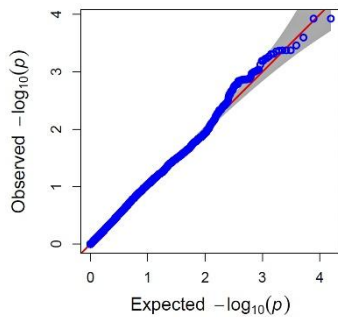
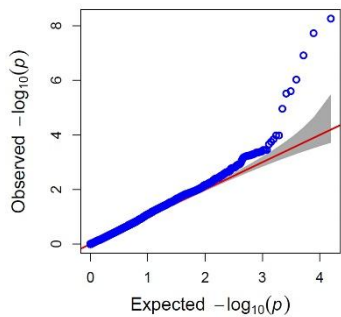
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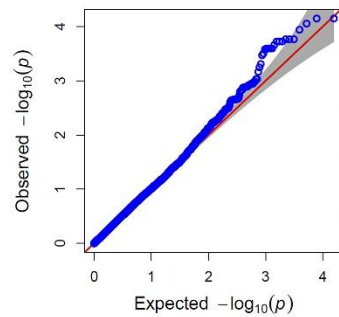
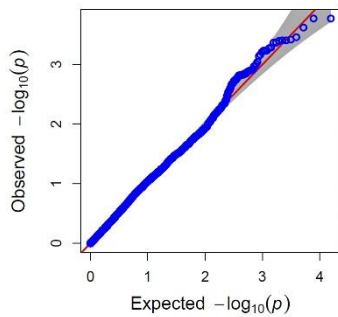
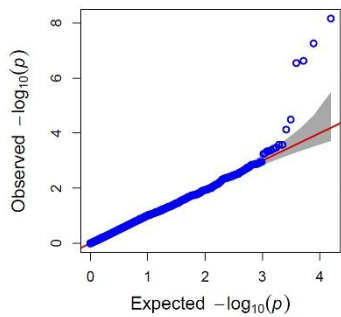
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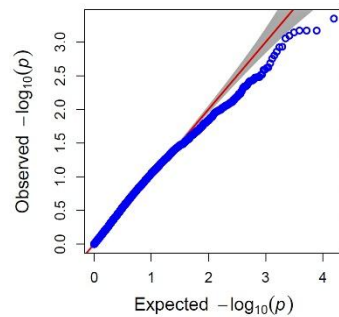
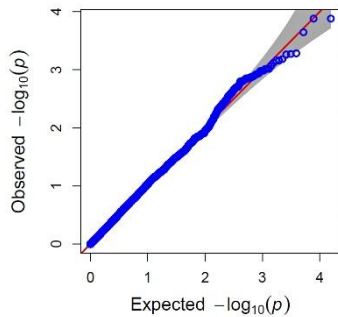
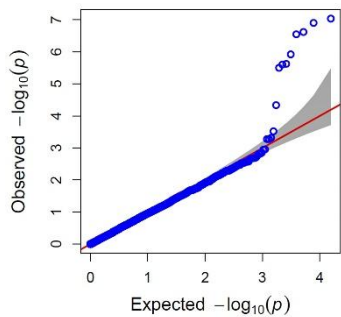
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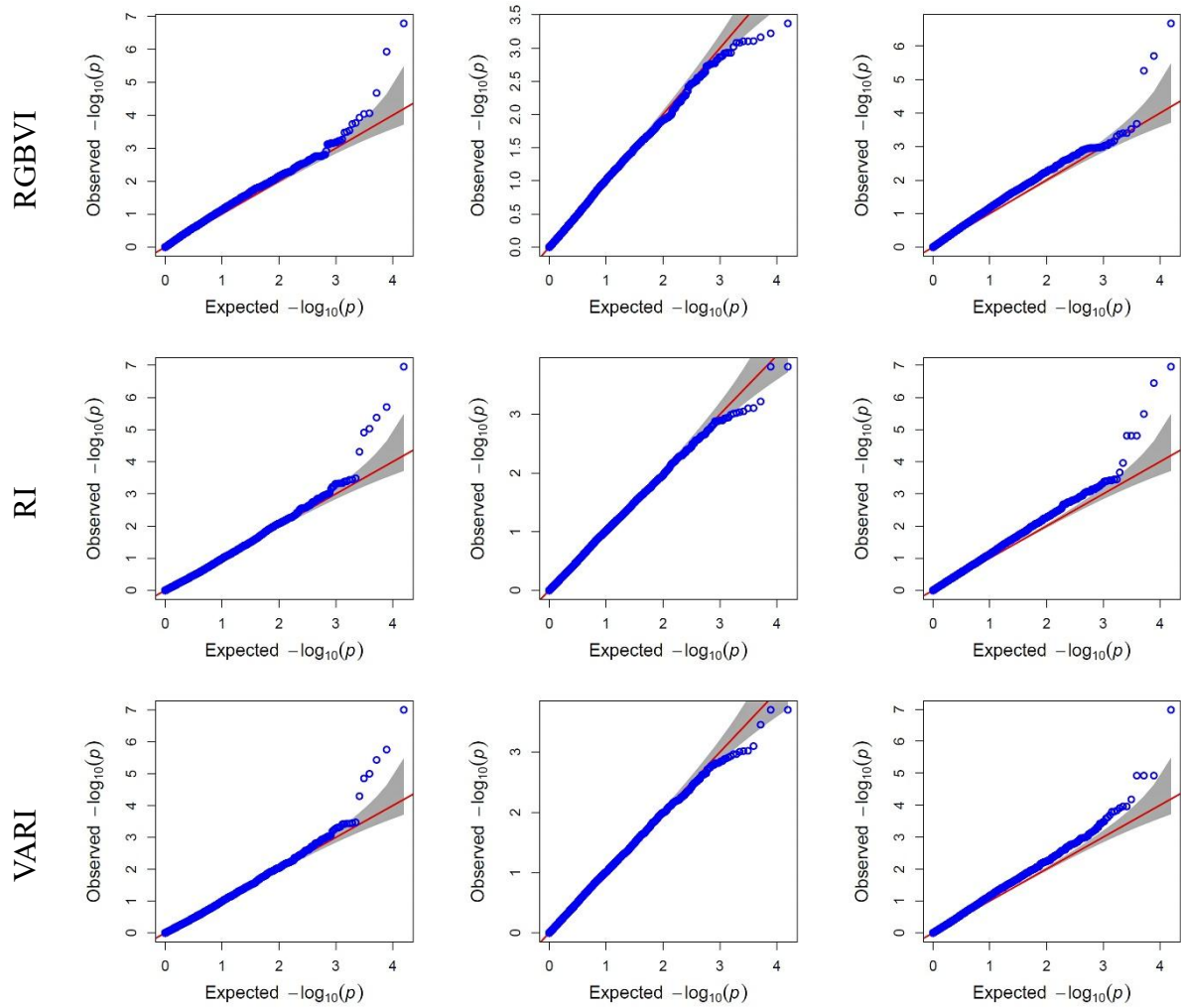


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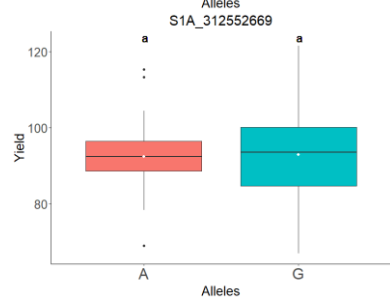
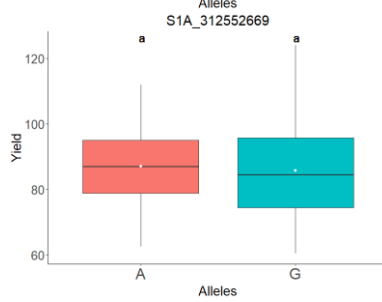
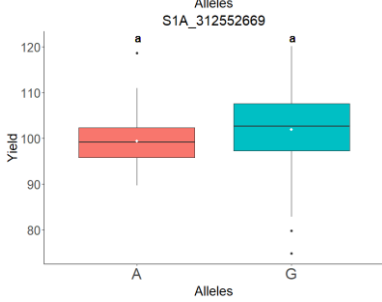
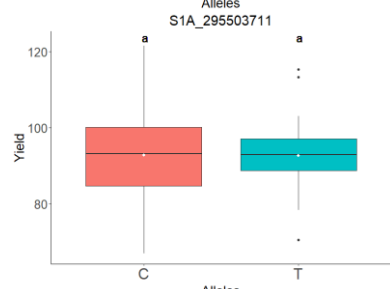
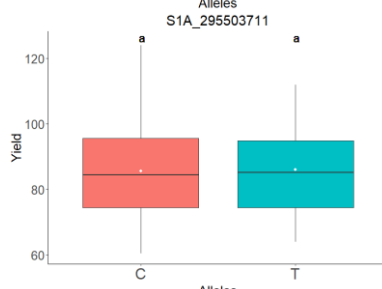
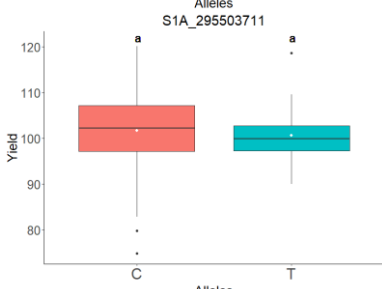
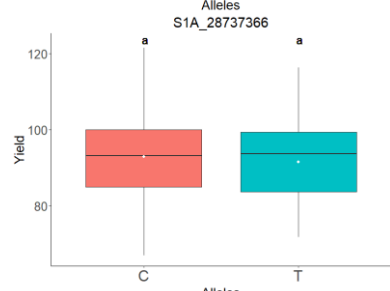
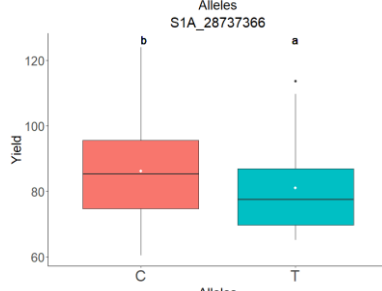
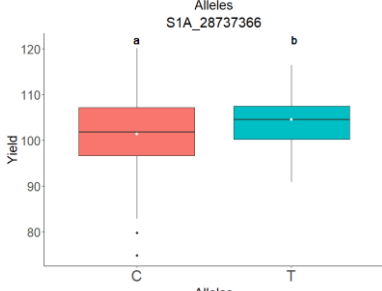
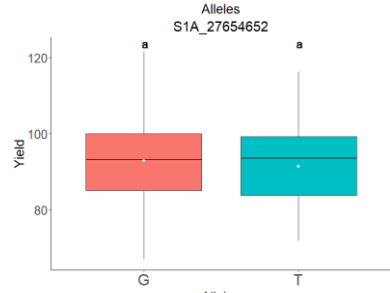
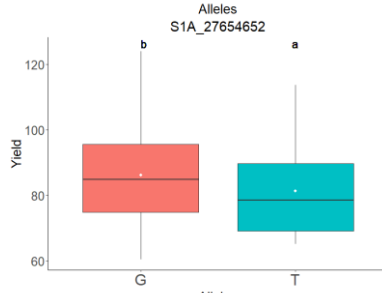
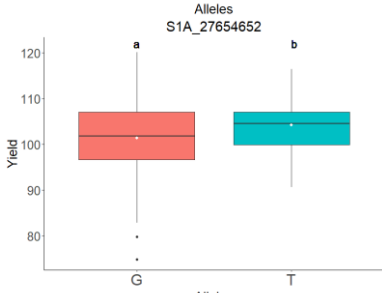
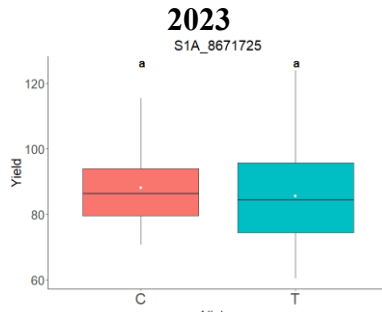


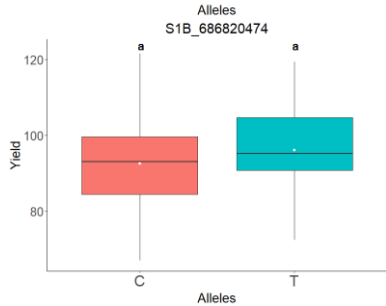
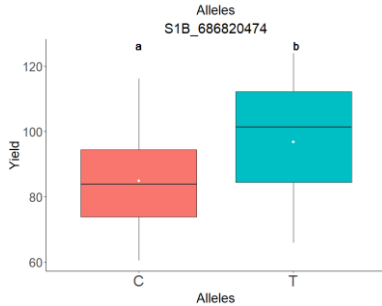
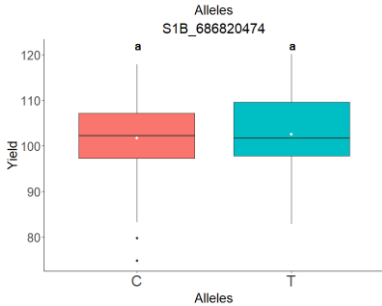
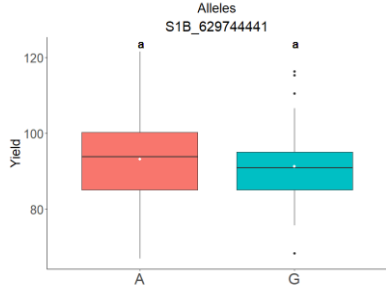
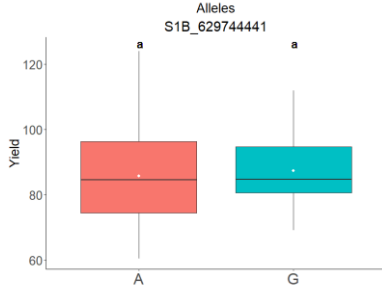
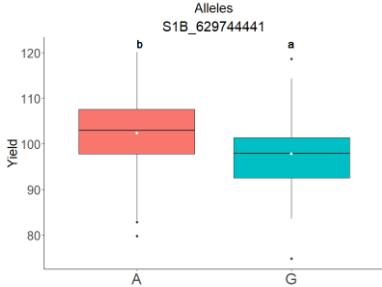
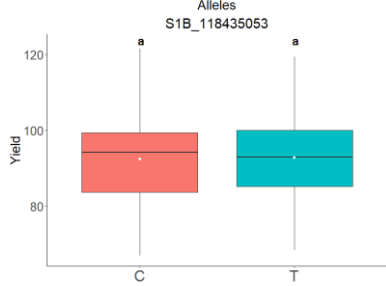
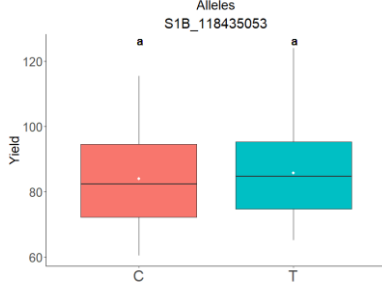
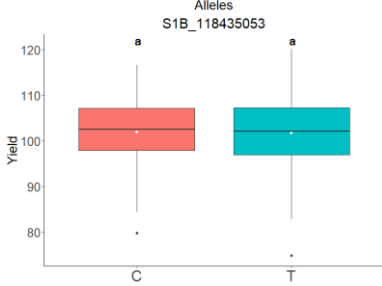
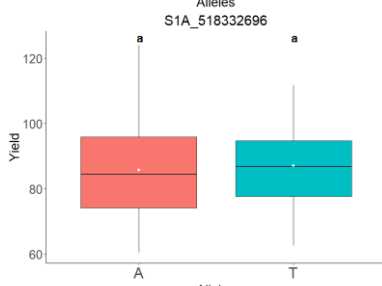
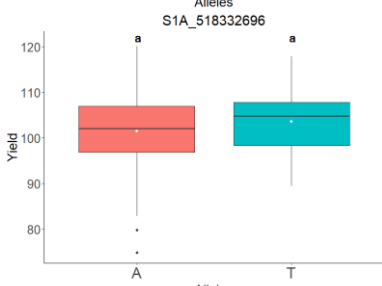
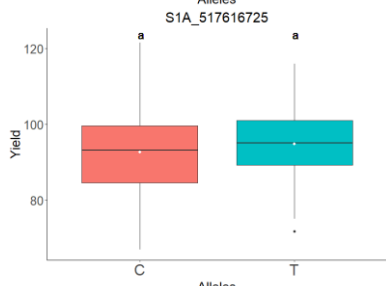
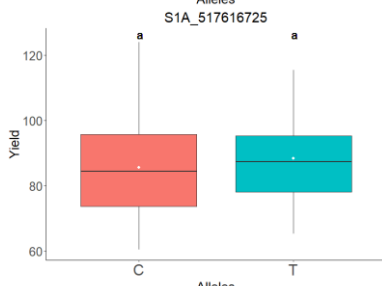
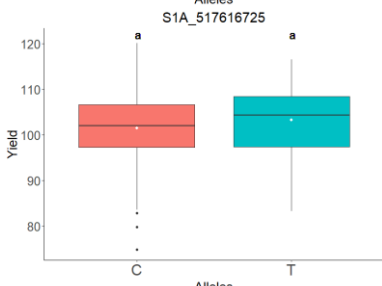
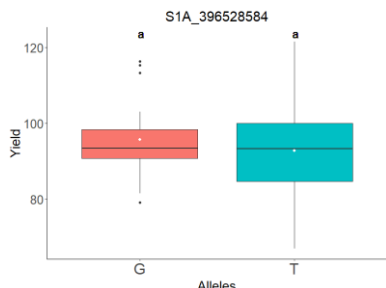
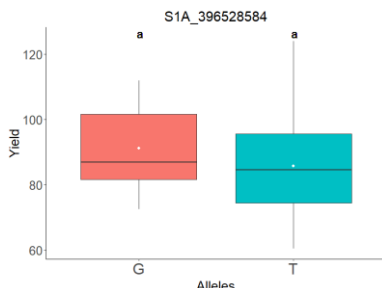
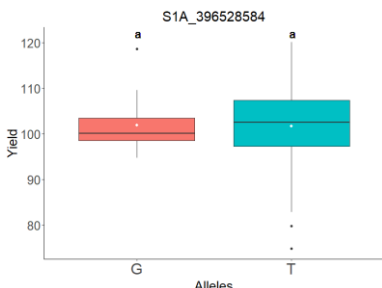
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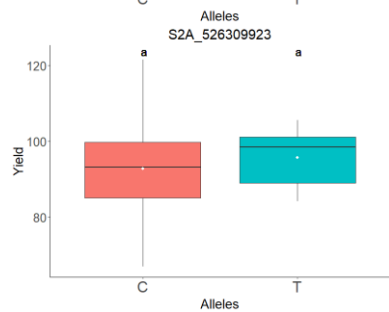
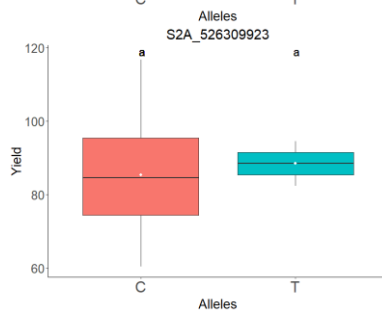
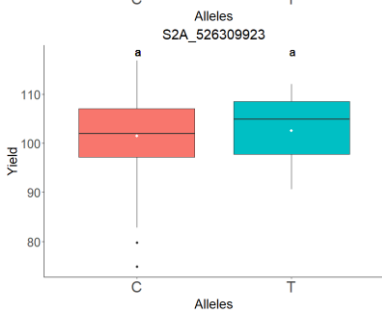
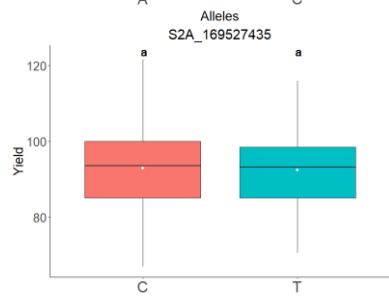
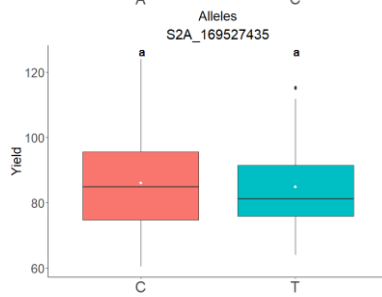
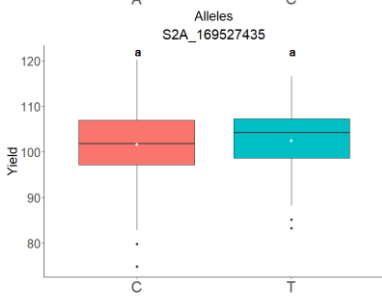
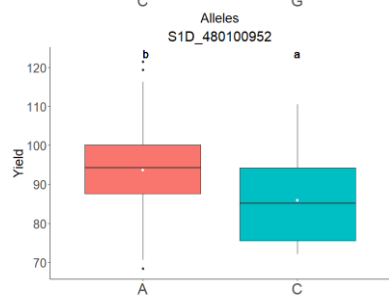
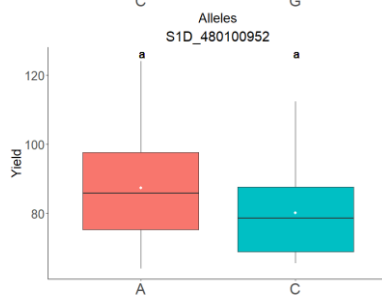
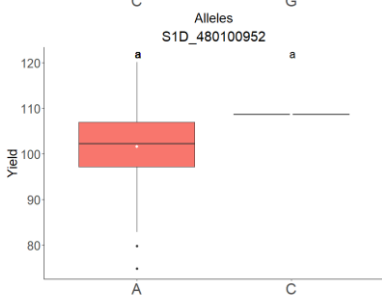
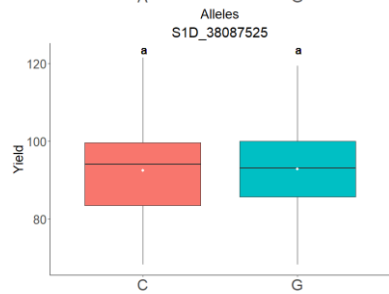
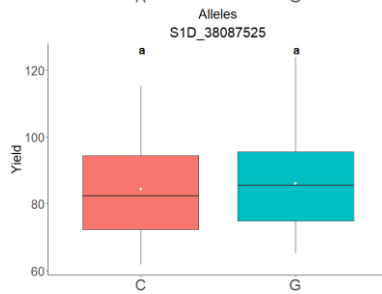
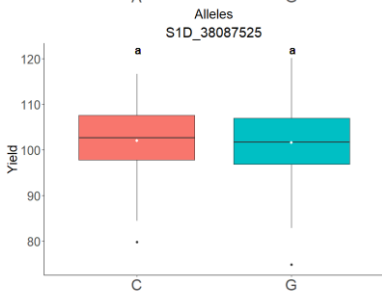
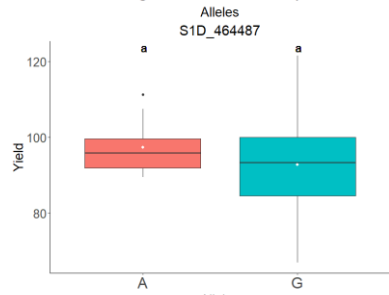
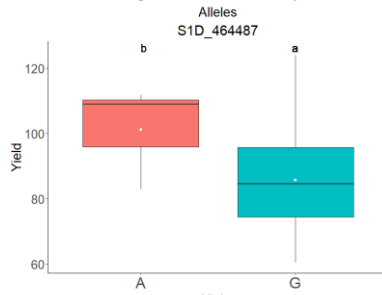
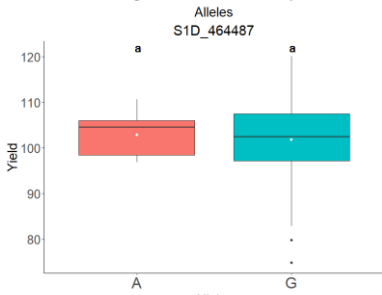
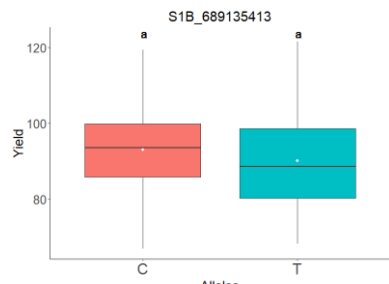
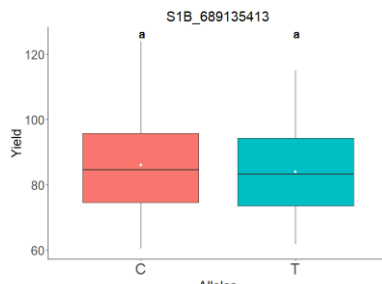
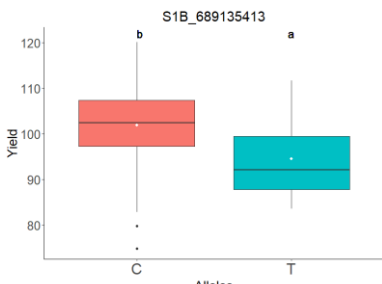


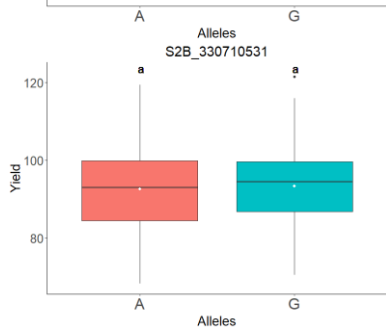
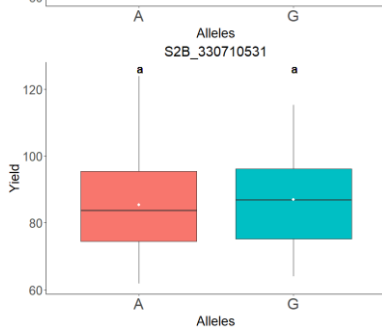
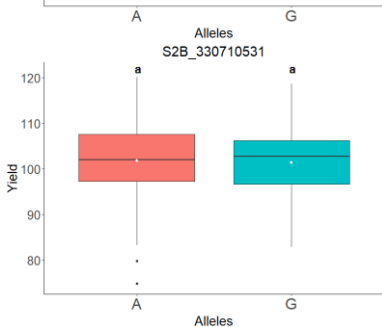
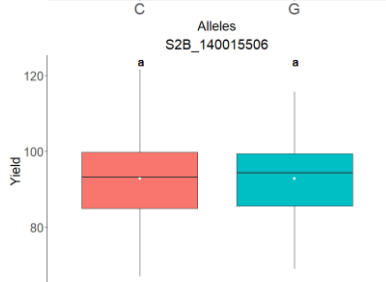
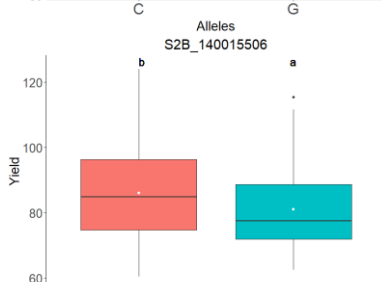
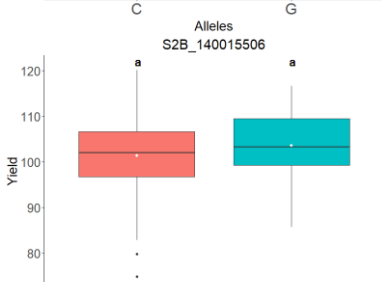
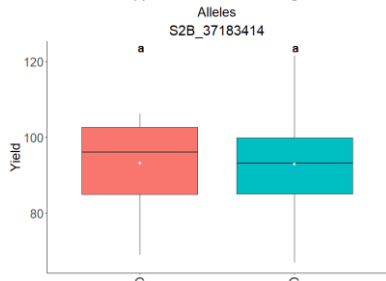
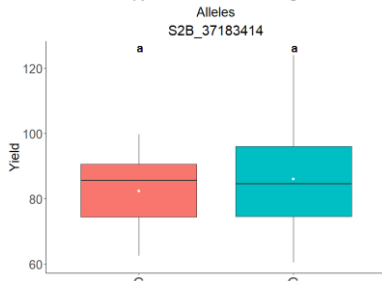
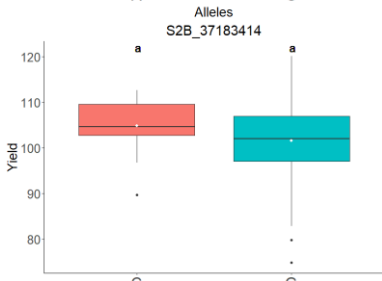
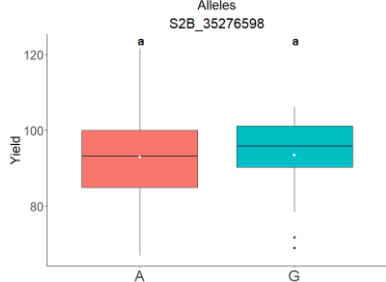
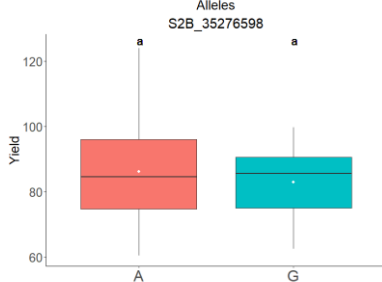
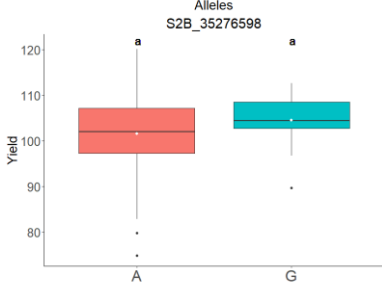
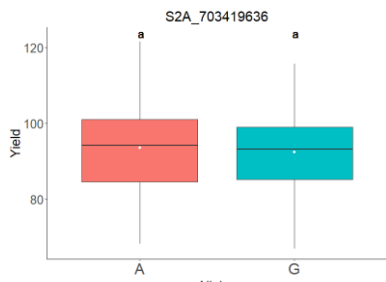
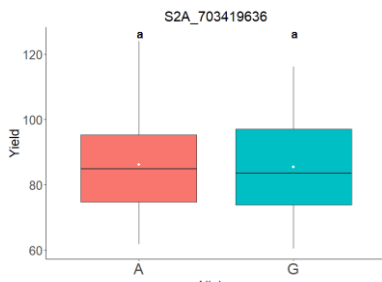
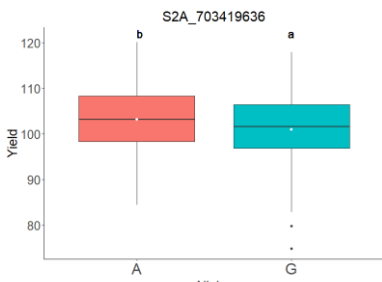


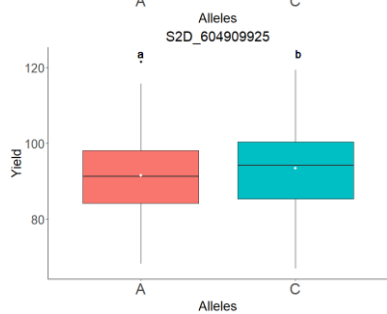
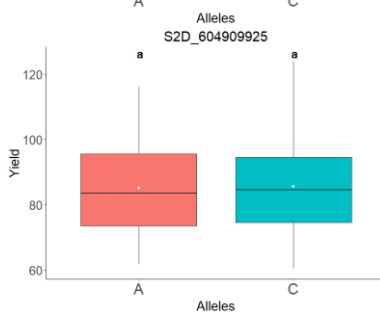
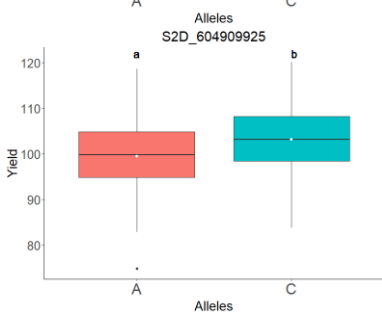
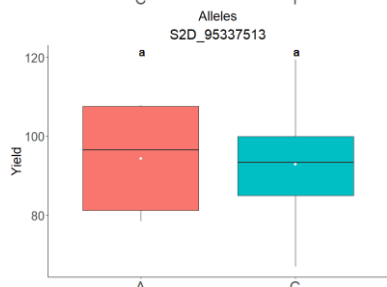
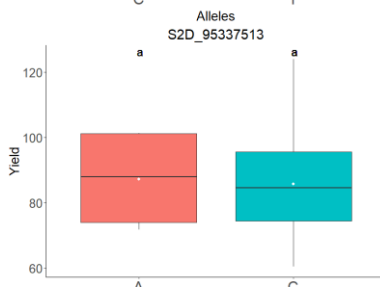
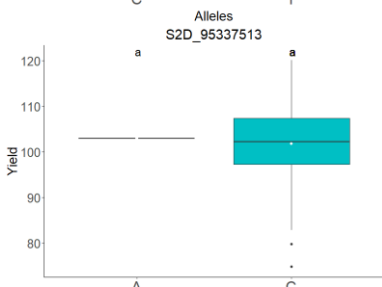
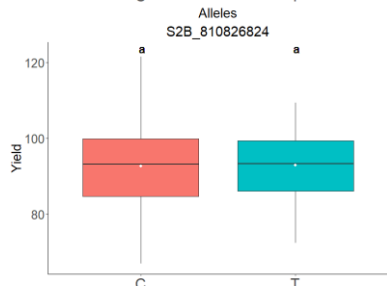
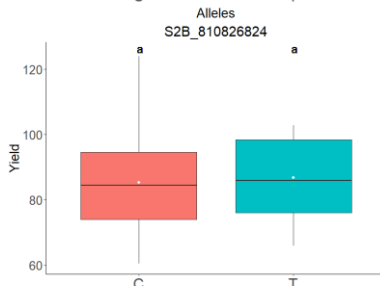
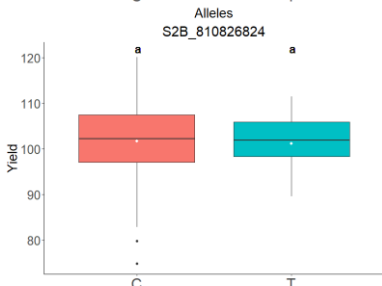
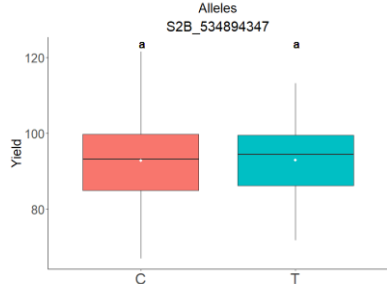
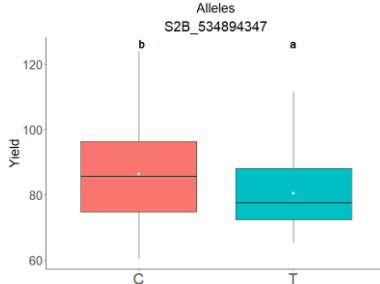
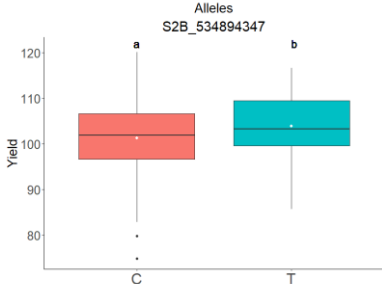
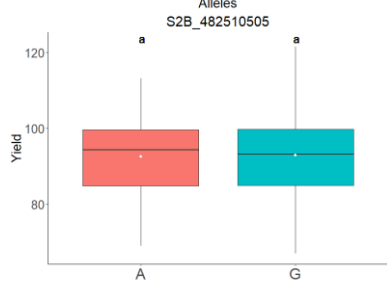
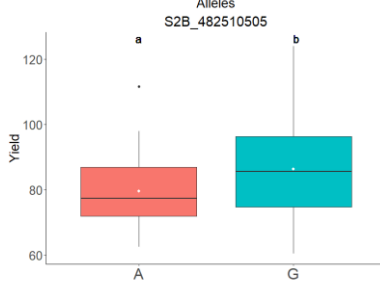
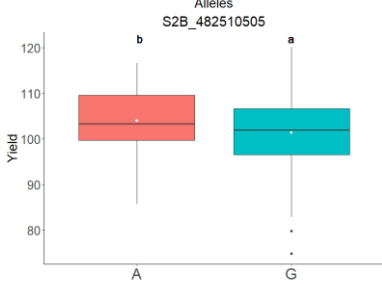
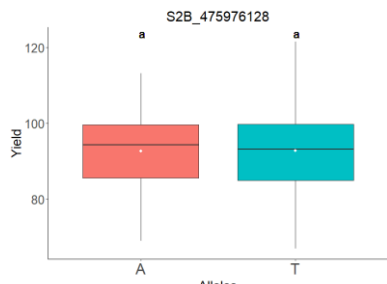
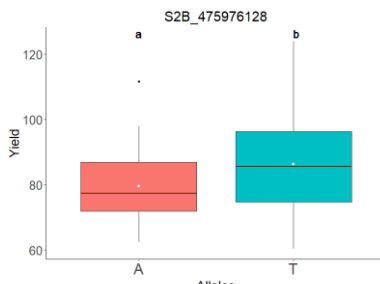
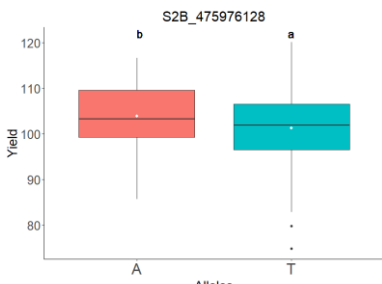
Supplementary Figure 4.4. Quantile-quantile (QQ) plots from genome wide association conducted for grain yield and all the vegetation indices from the 2022 trial and 2023 trials independently, and combined trials using BLINK model by GAPIT in R.

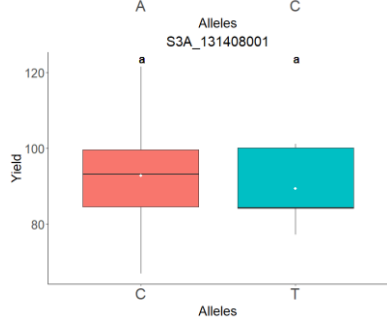
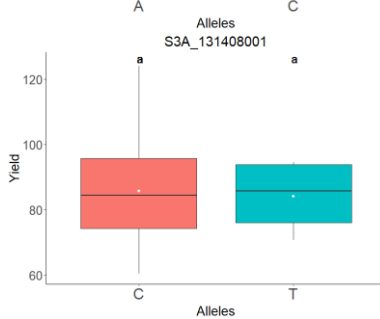
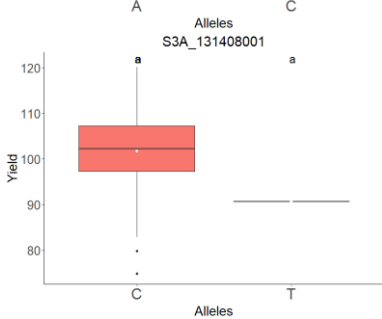
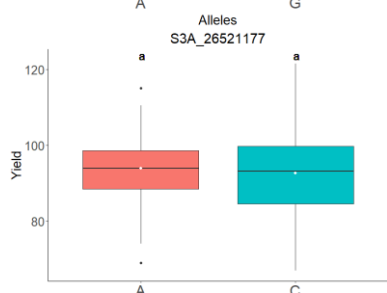
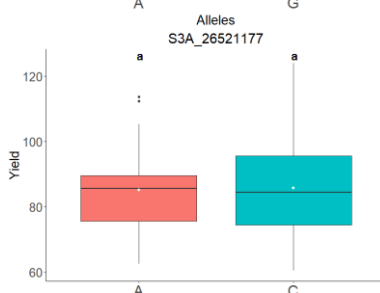
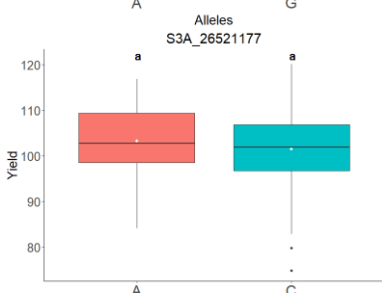
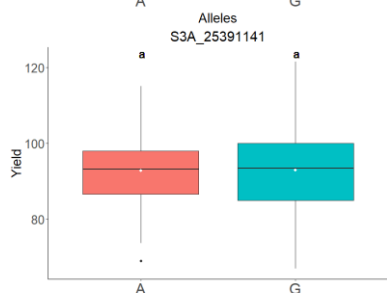
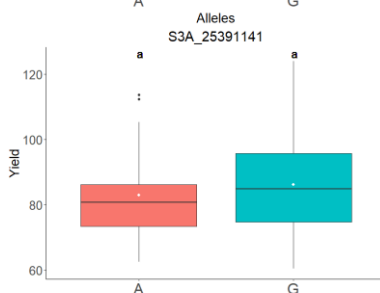
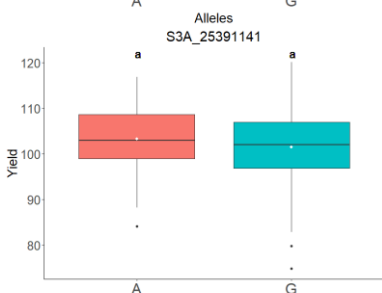
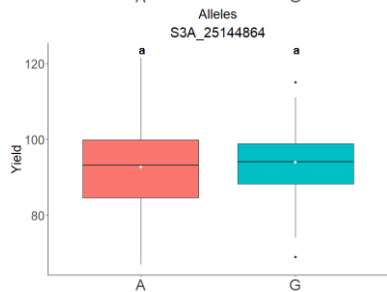
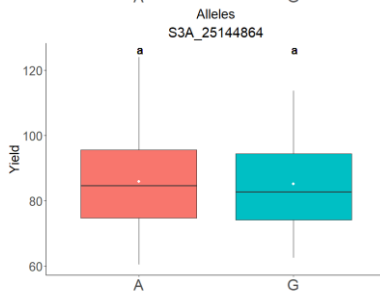
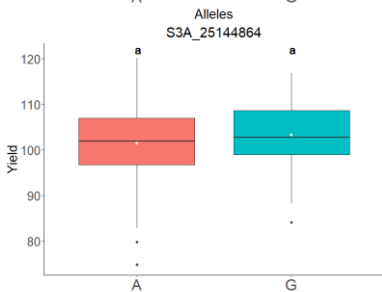
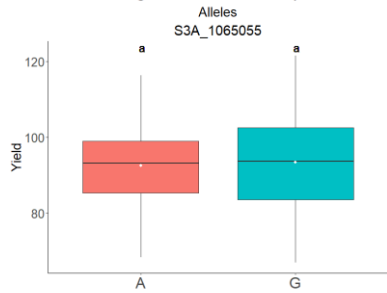
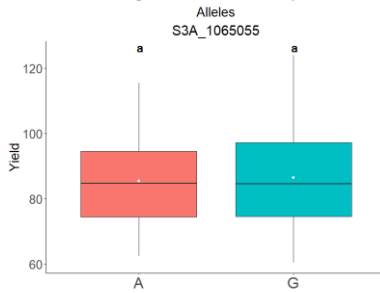
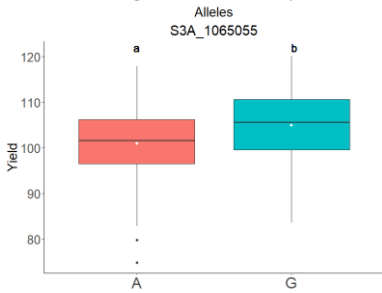
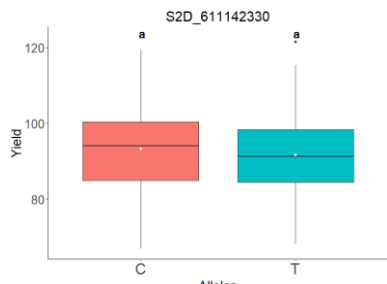
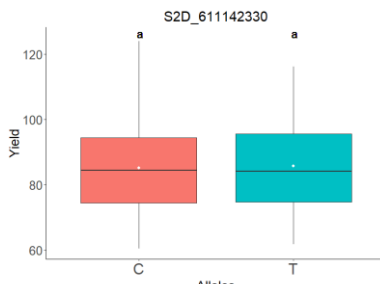
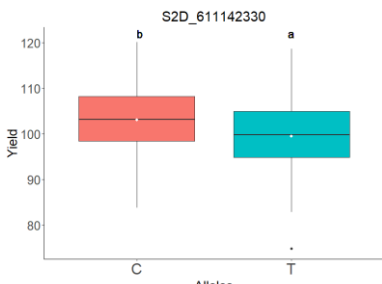


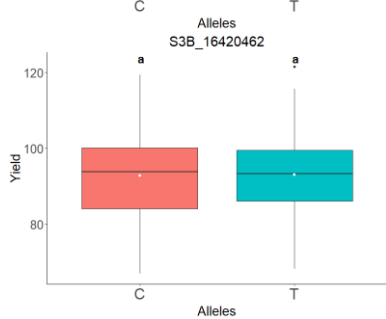
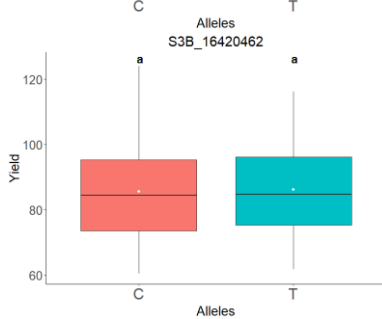
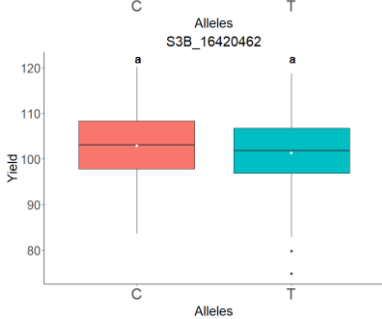
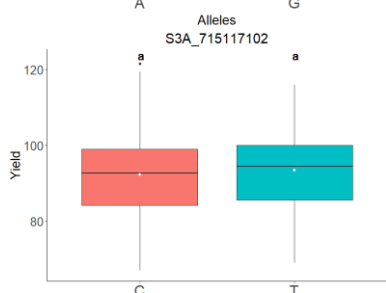
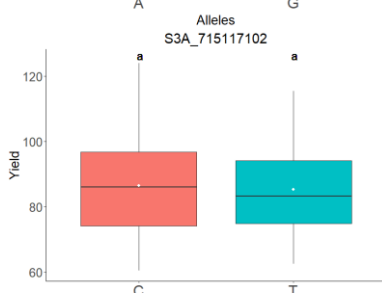
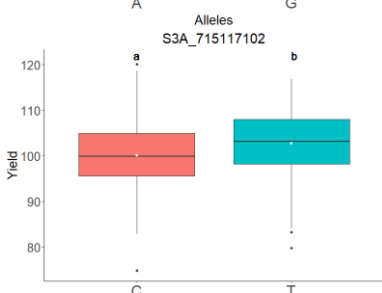
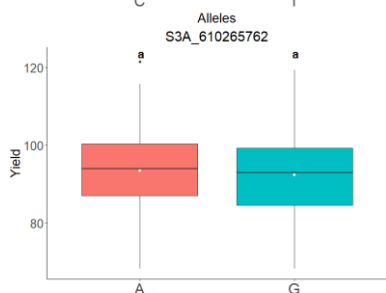
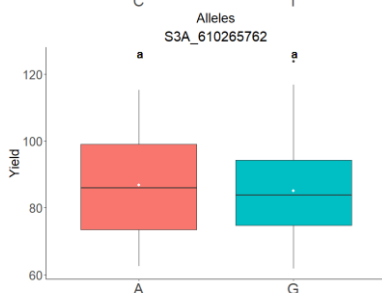
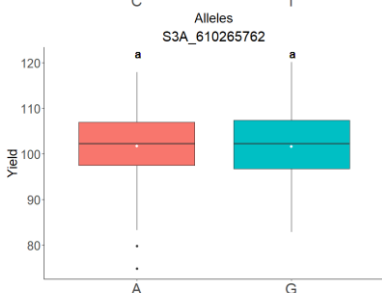
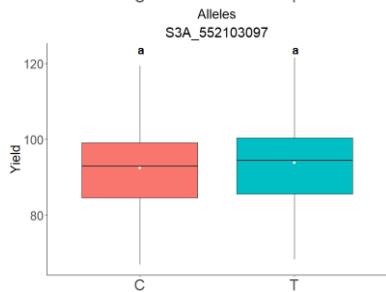
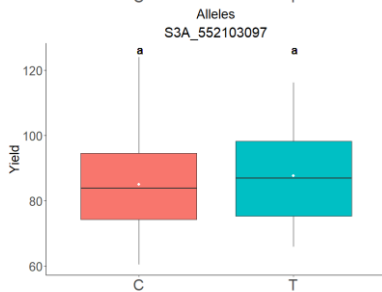
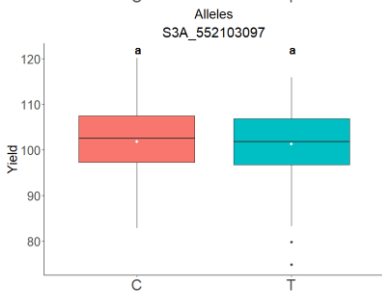
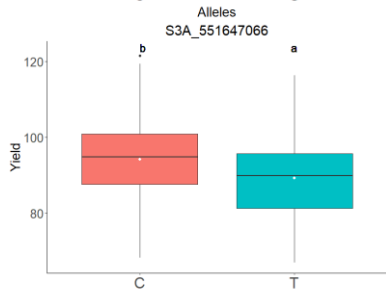
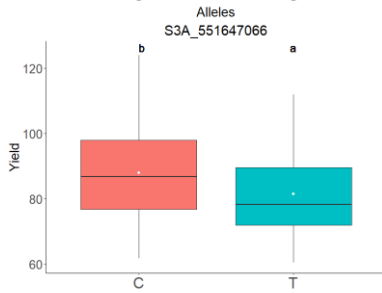
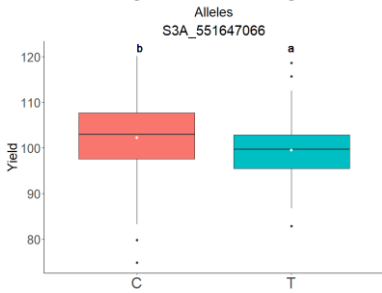
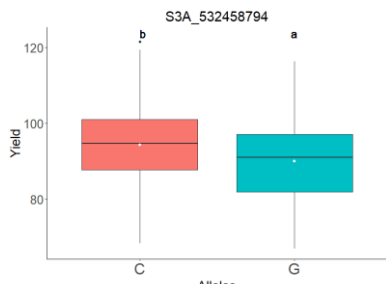
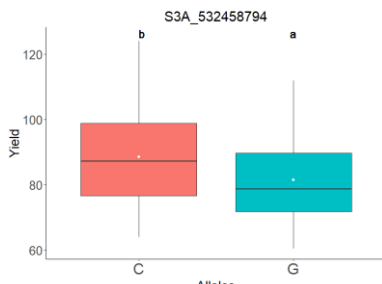
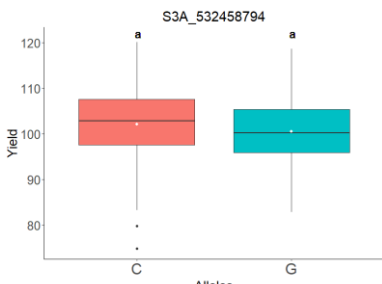


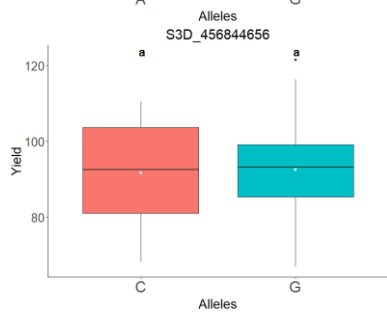
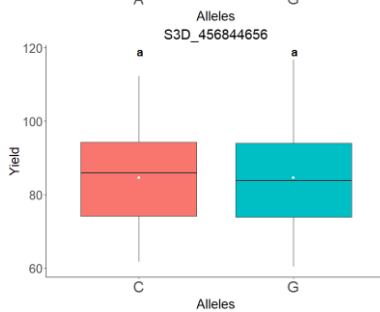
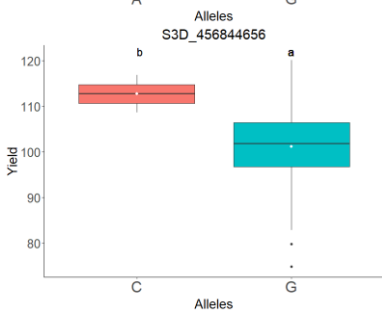
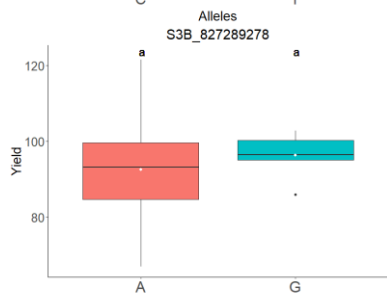
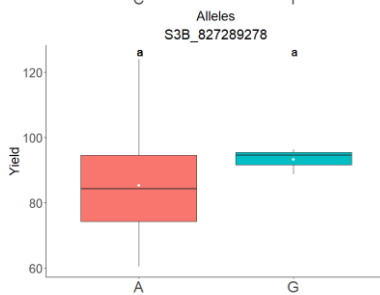
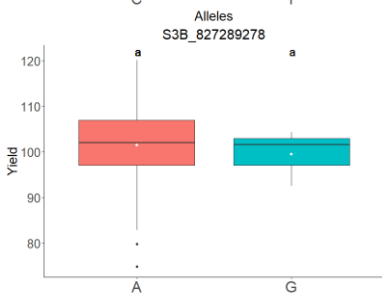
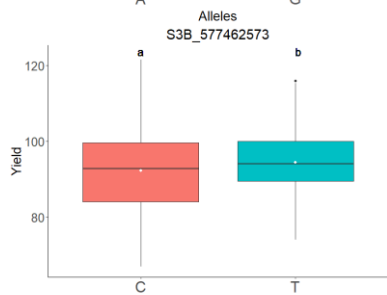
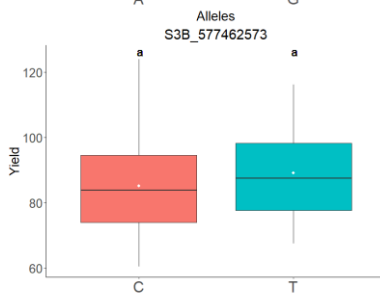
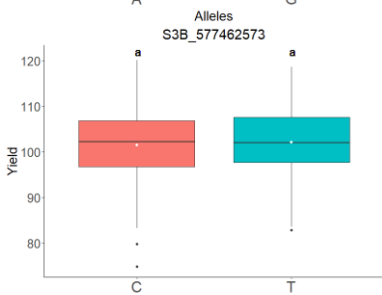
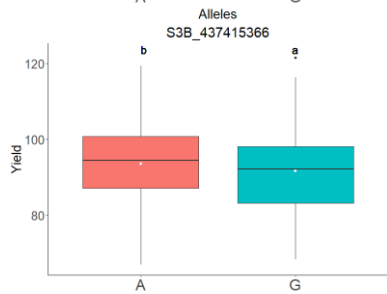
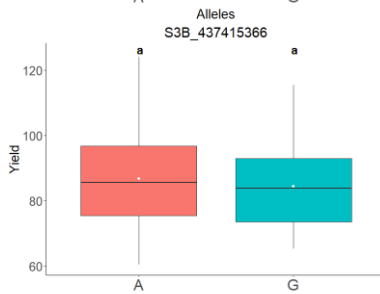
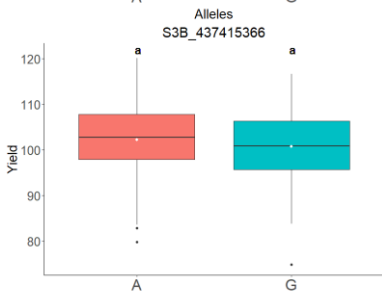
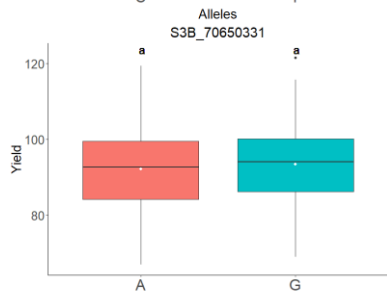
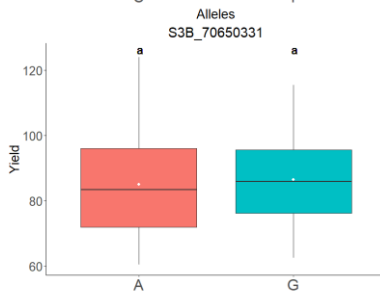
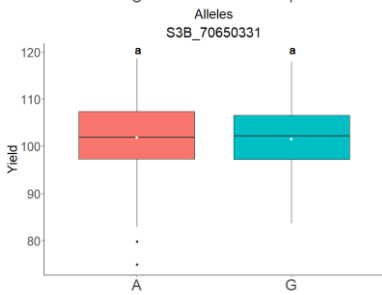
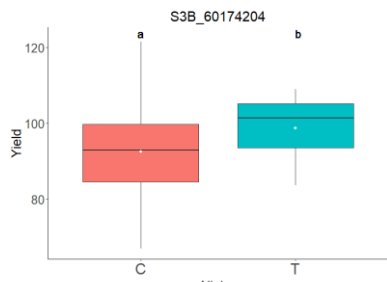
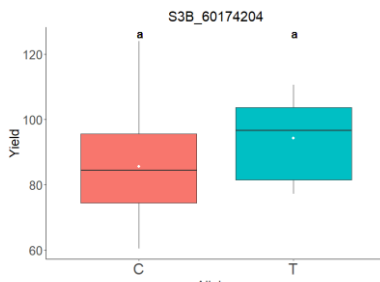
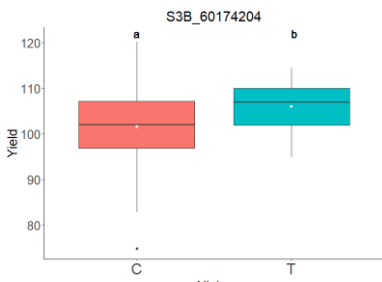


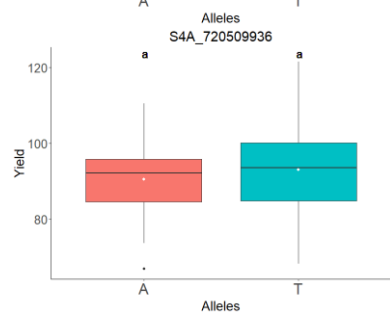
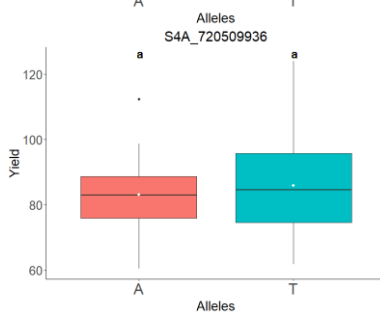
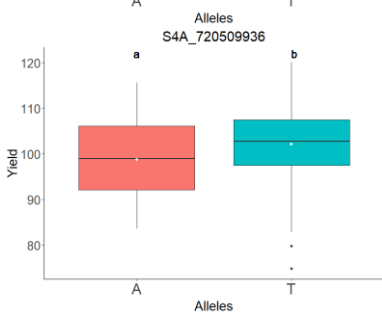
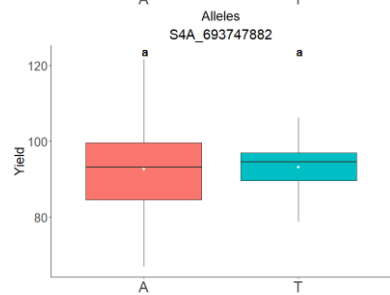
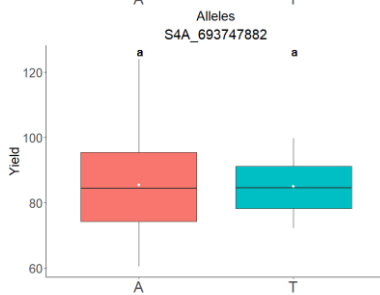
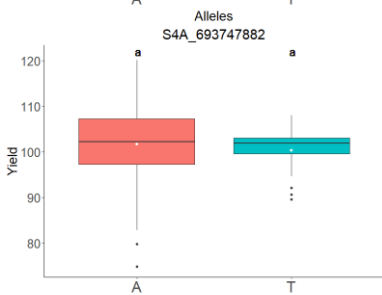
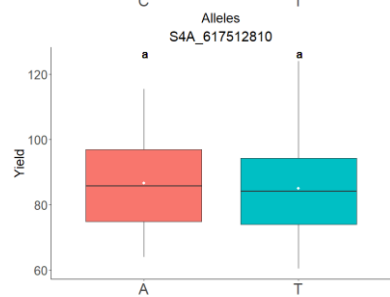
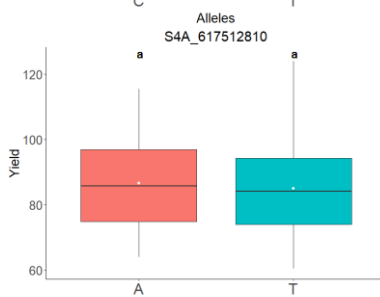
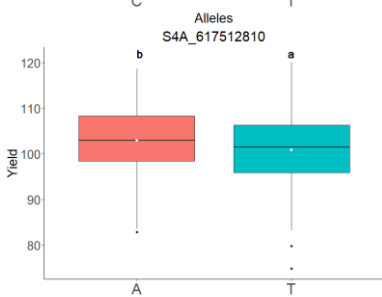
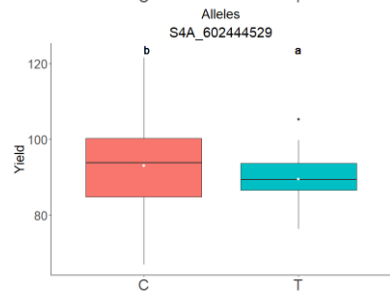
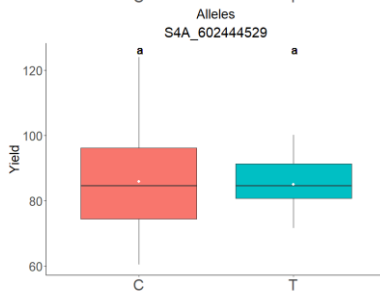
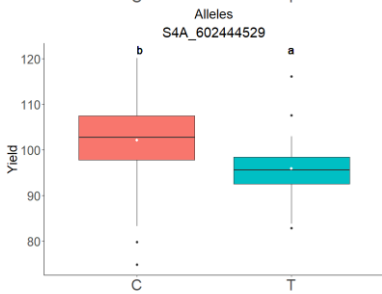
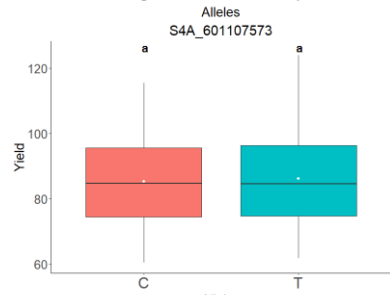
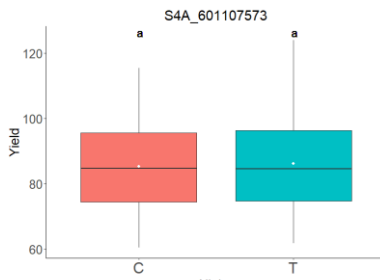
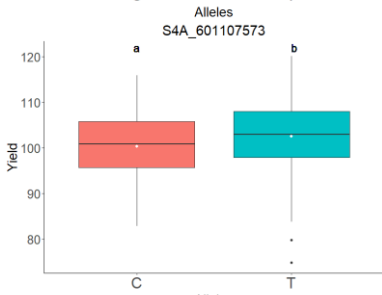
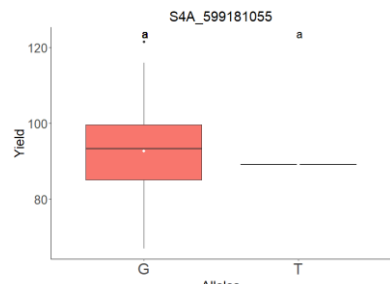
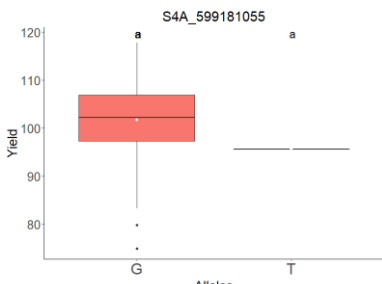


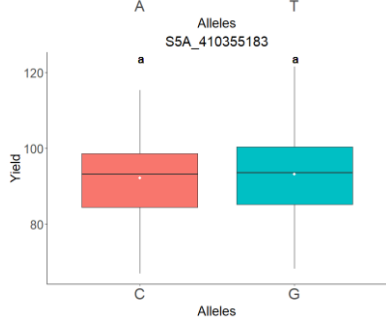
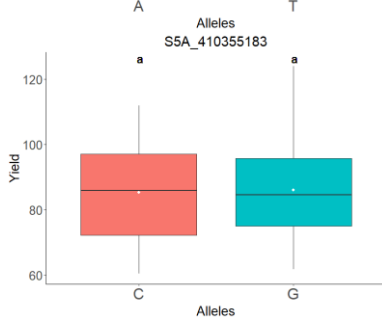
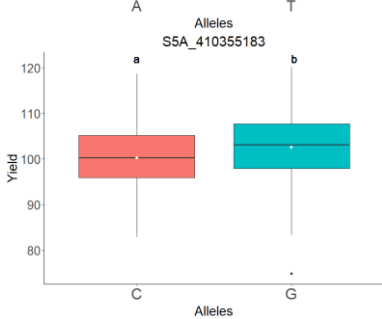
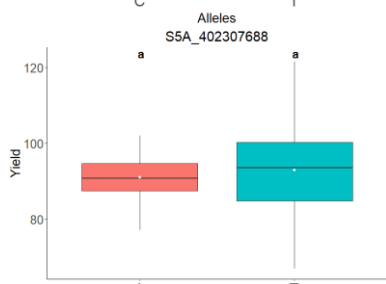
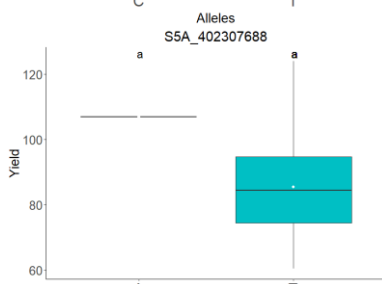
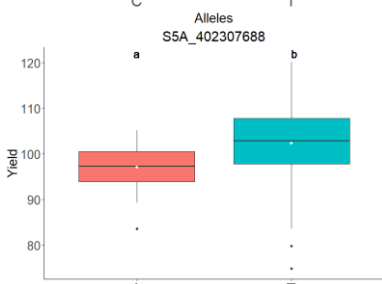
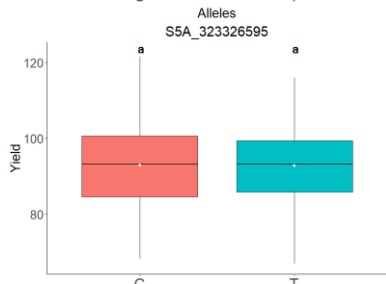
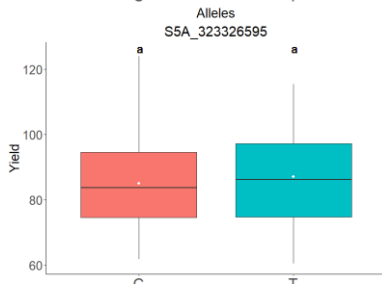
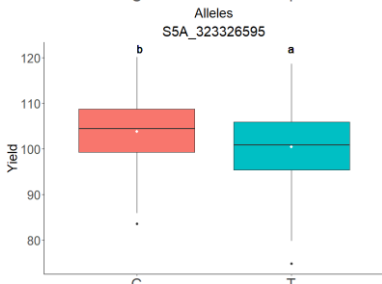
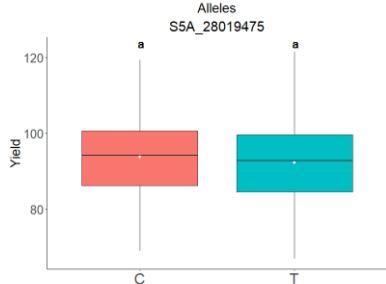
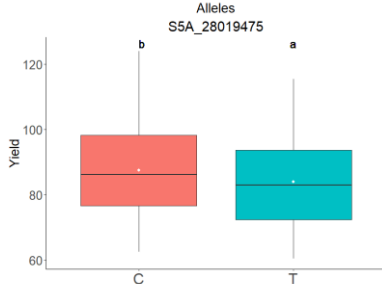
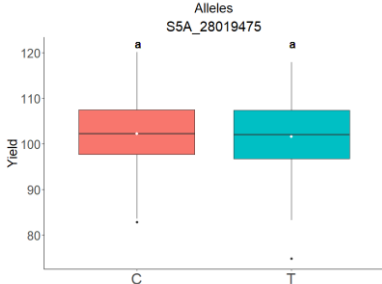
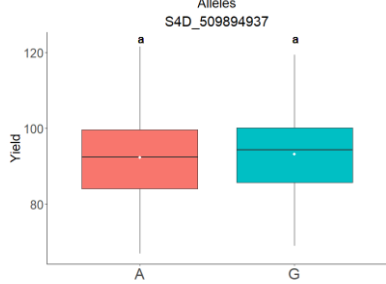
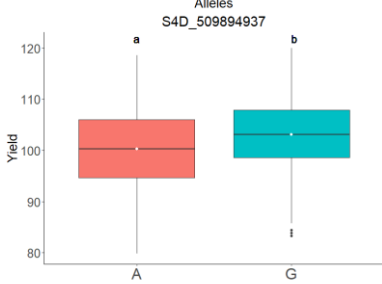
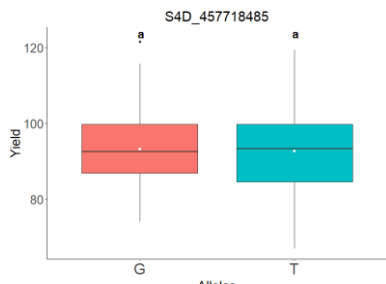
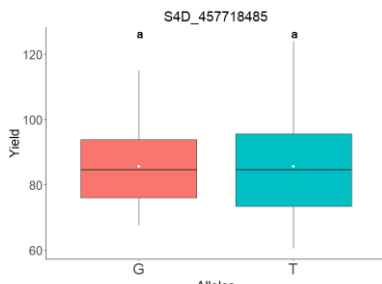
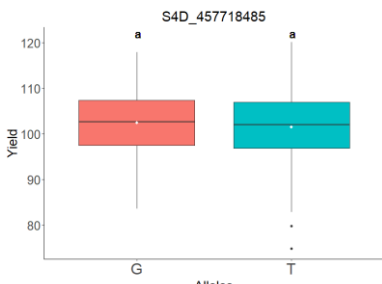


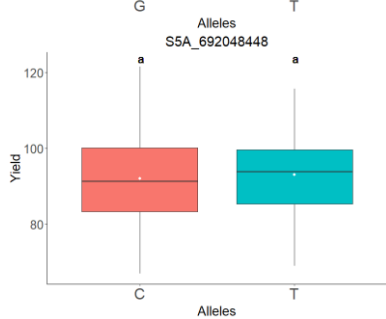
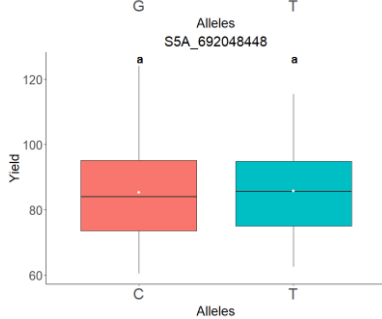
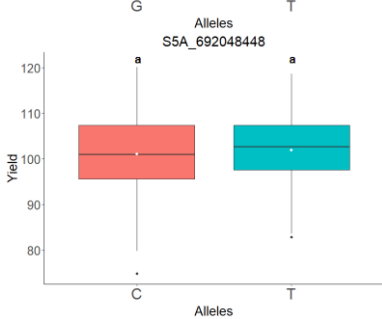
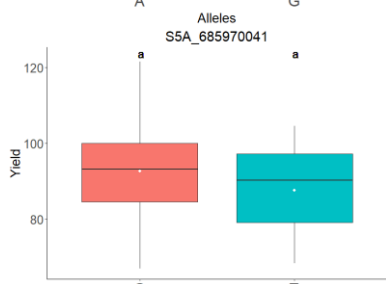
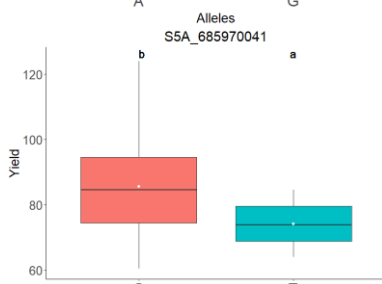
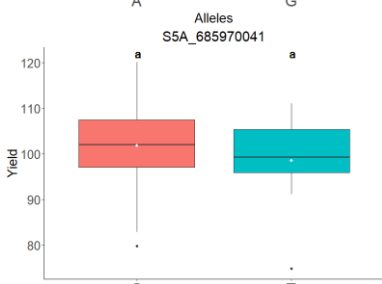
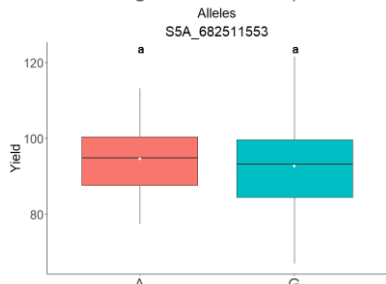
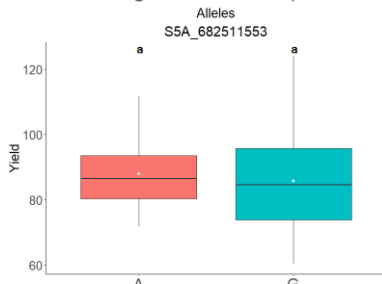
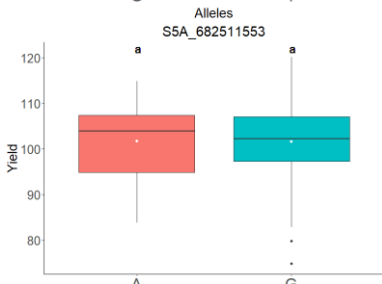
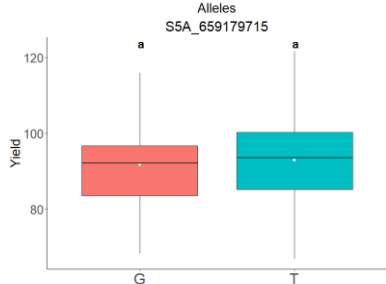
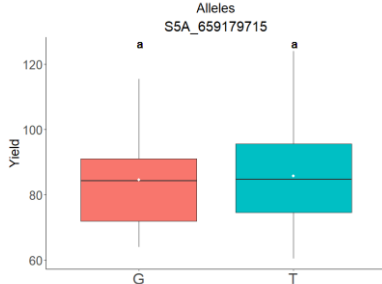
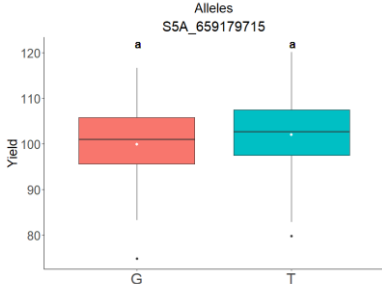
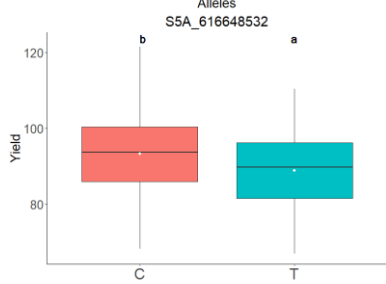
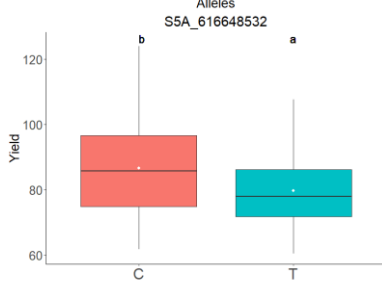
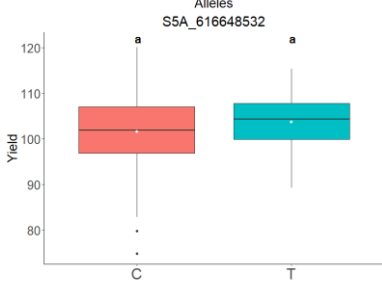
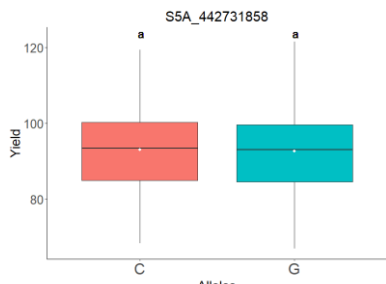
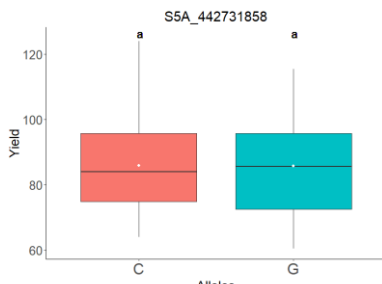
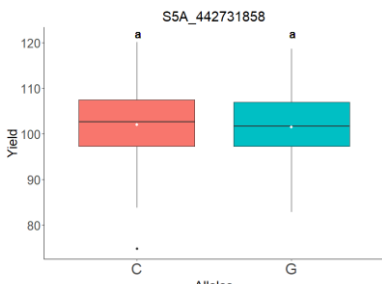


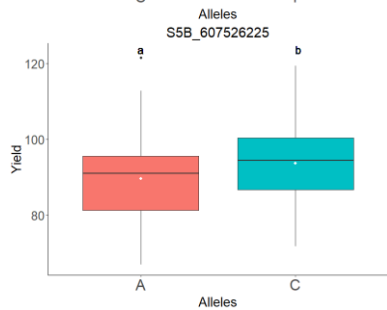
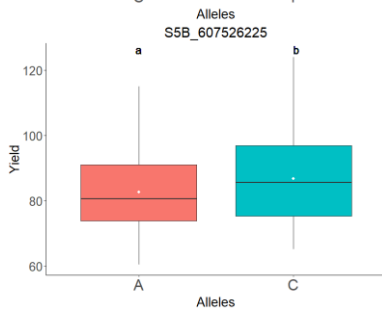
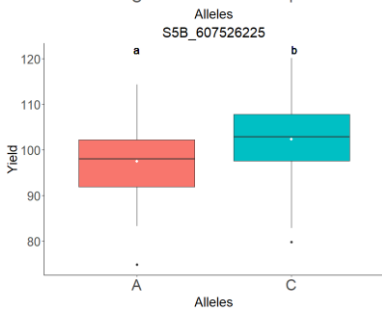
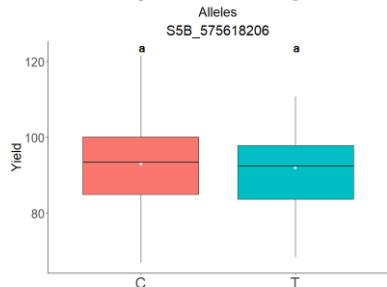
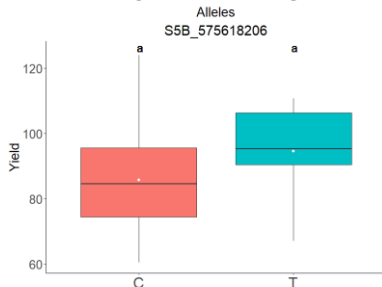
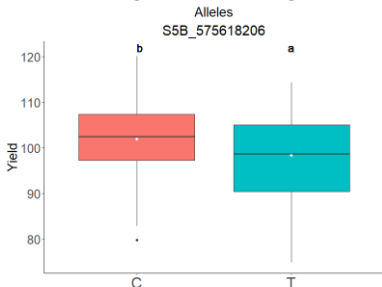
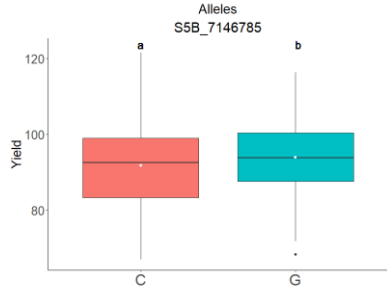
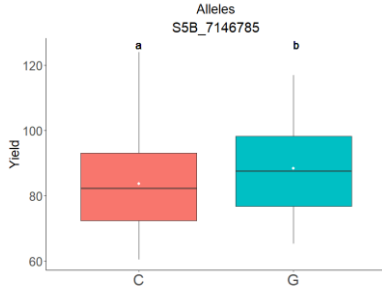
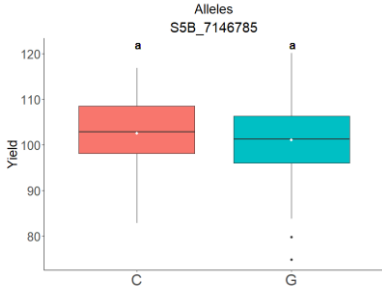
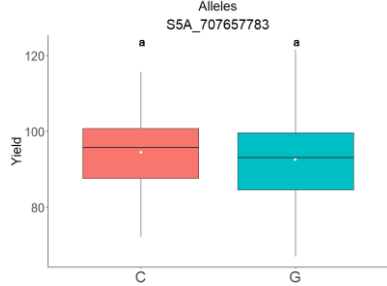
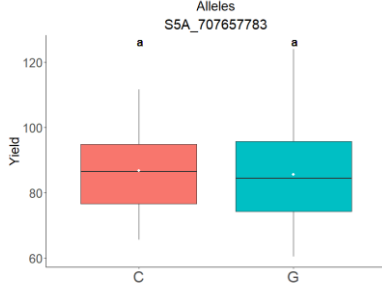
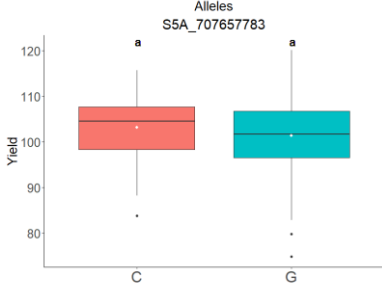
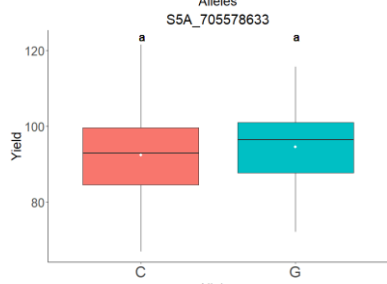
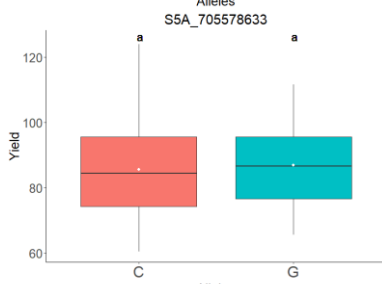
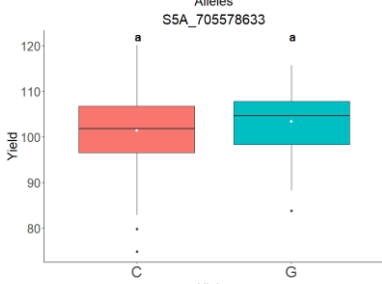
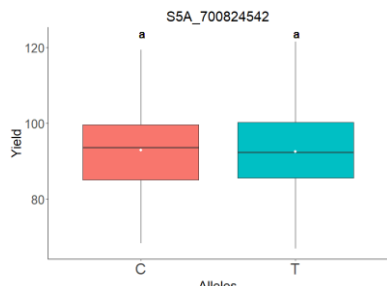
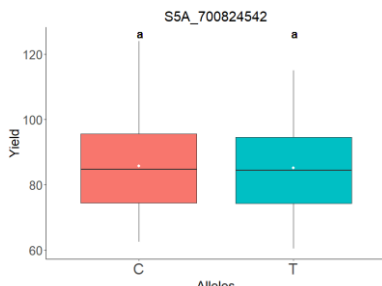
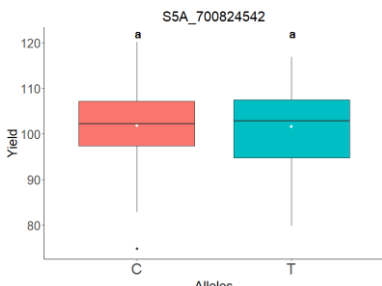


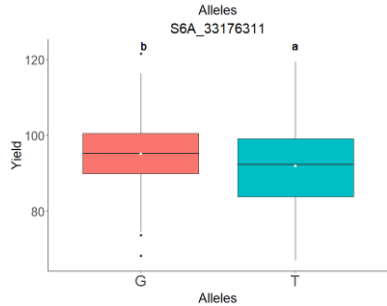
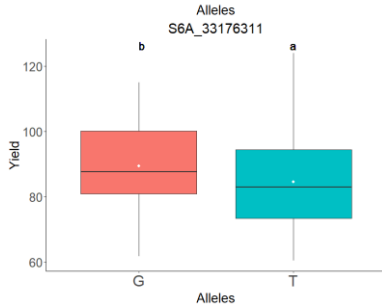
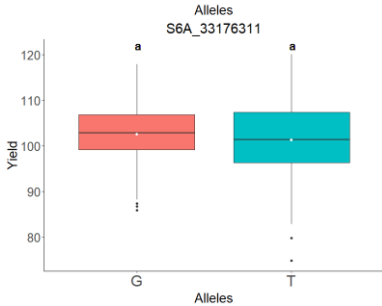
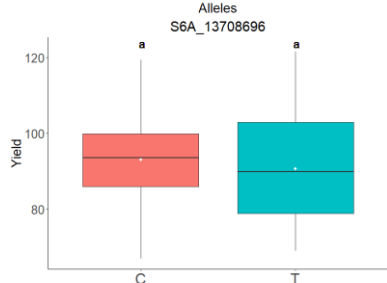
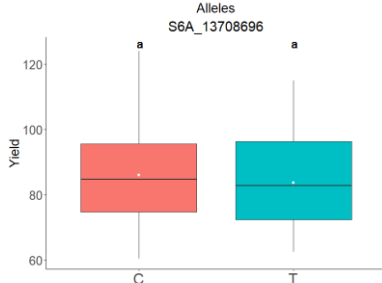
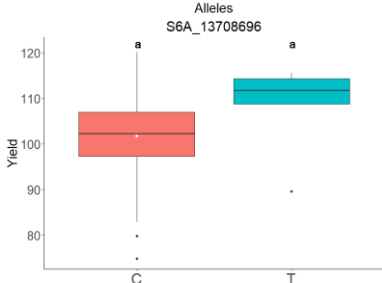
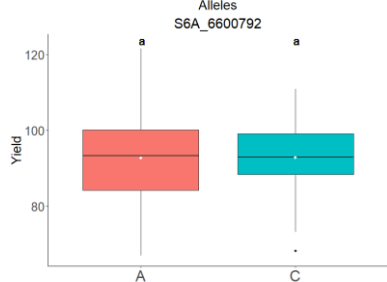
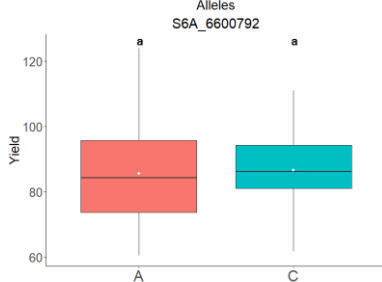
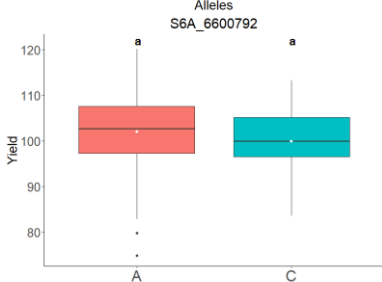
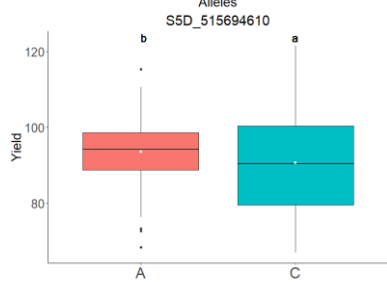
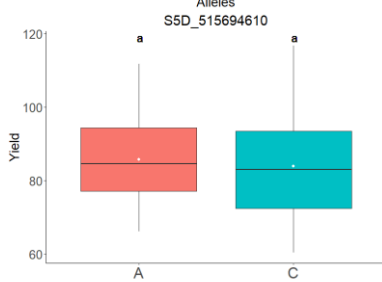
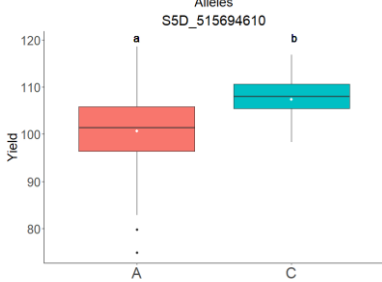
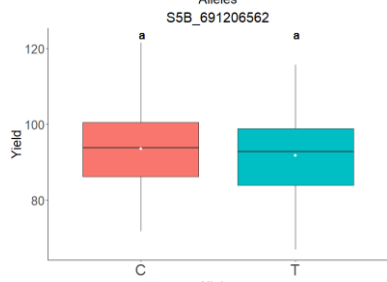
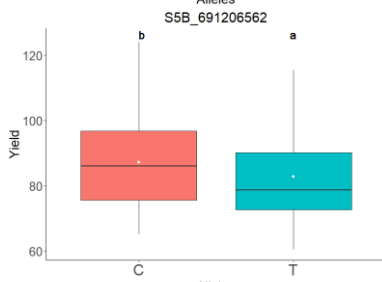
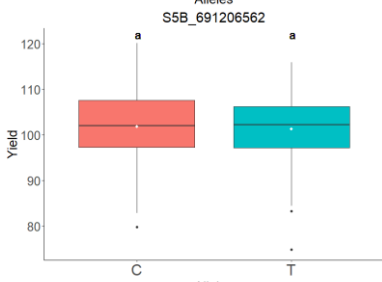
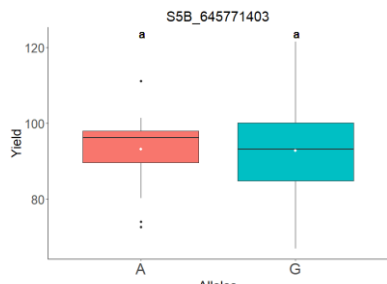
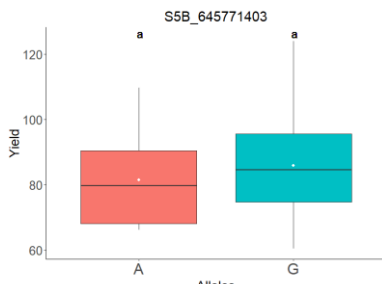
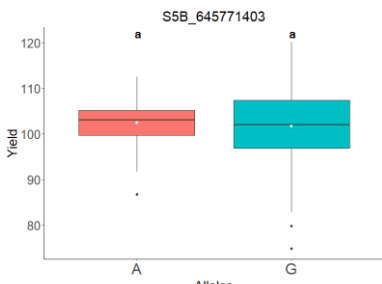


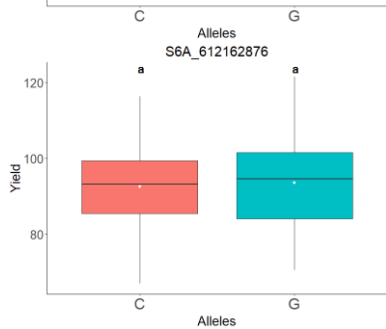
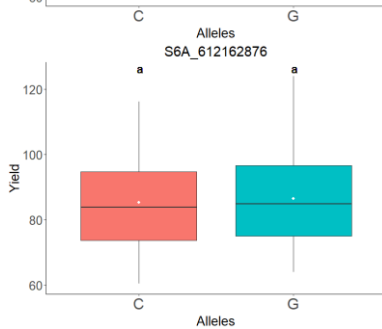
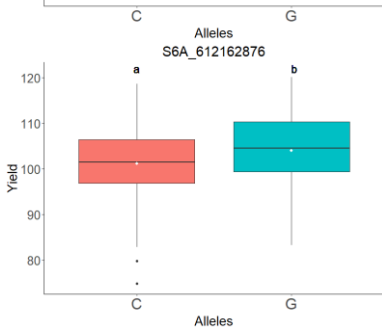
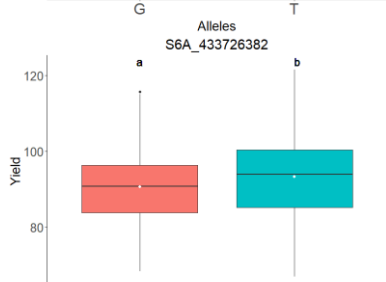
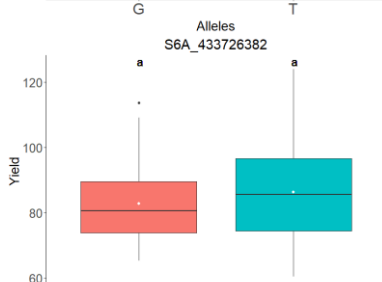
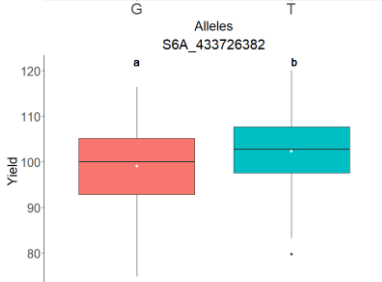
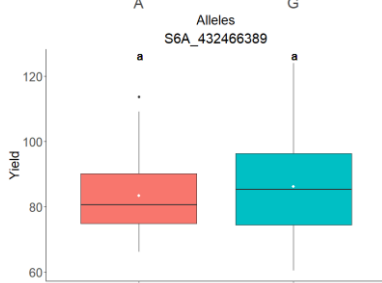
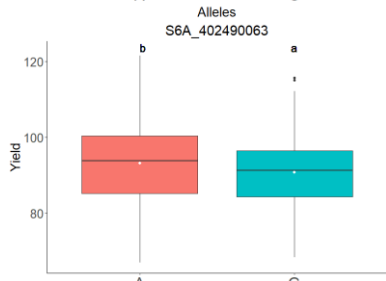
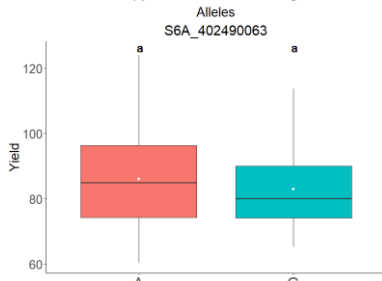
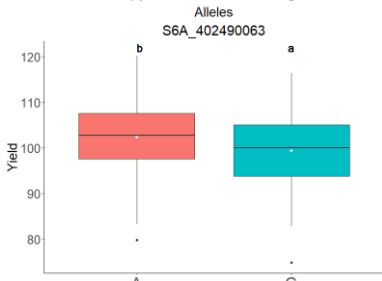
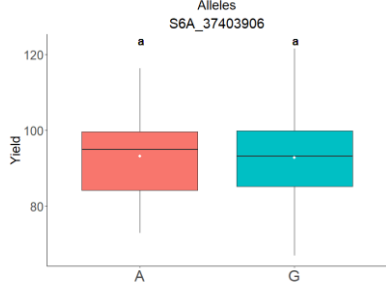
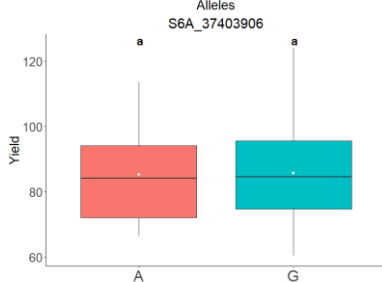
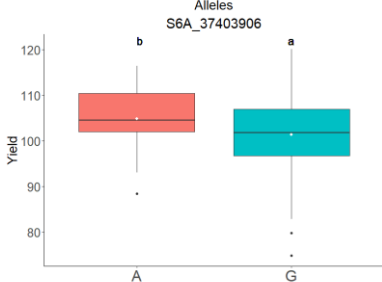
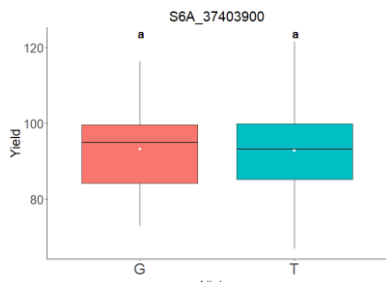
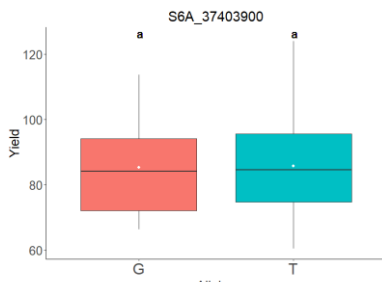
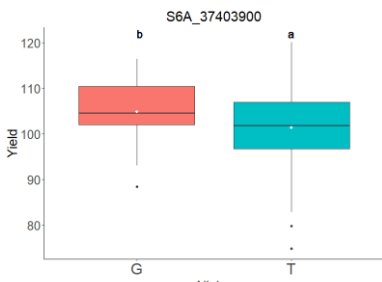


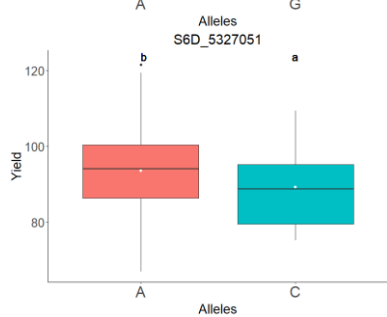
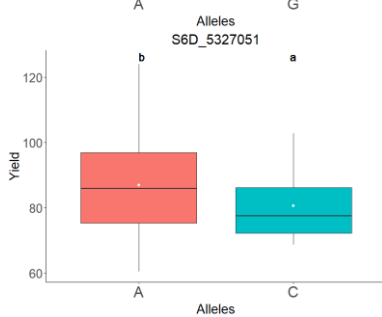
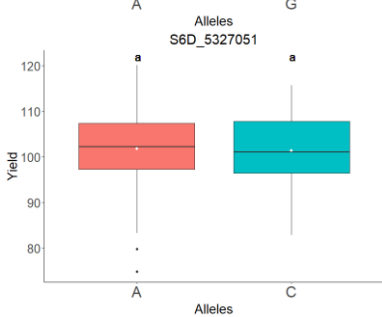
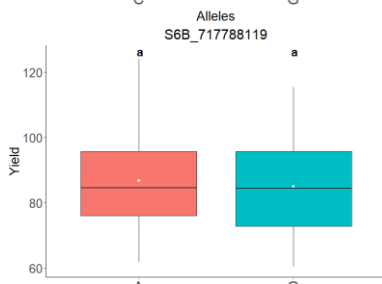
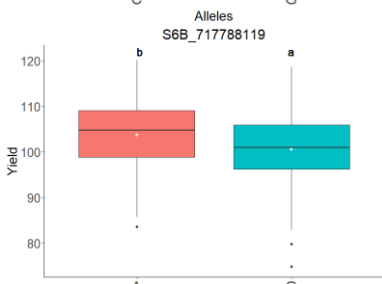
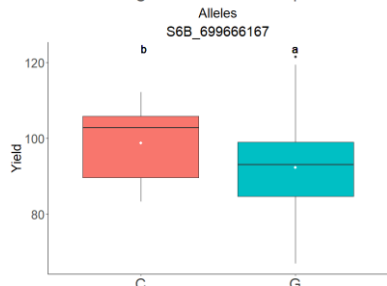
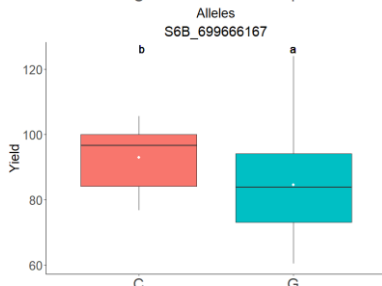
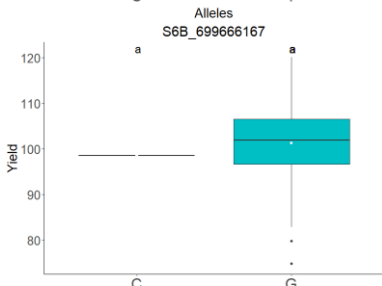
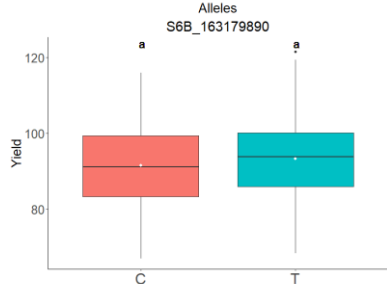
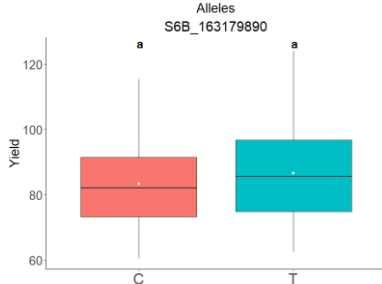
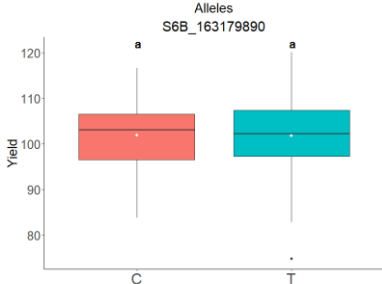
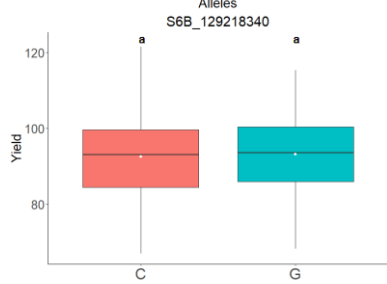
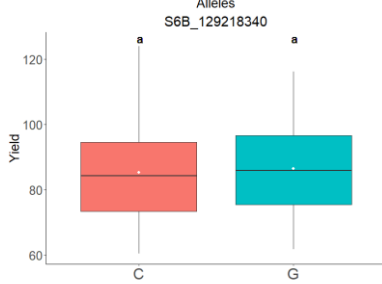
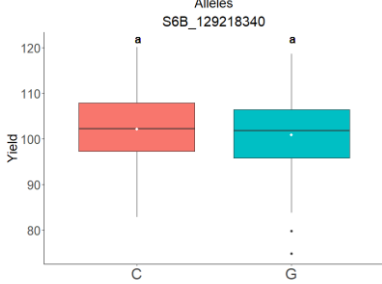
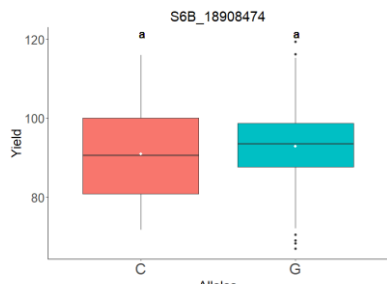
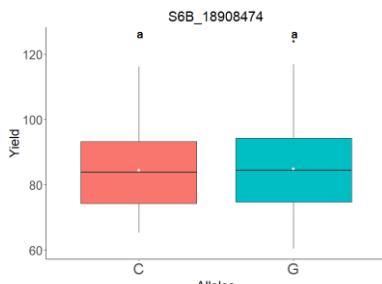
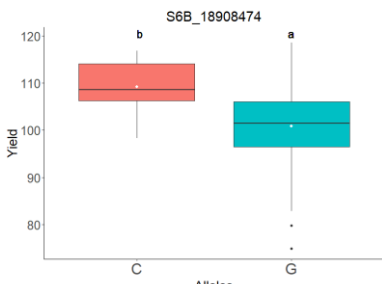


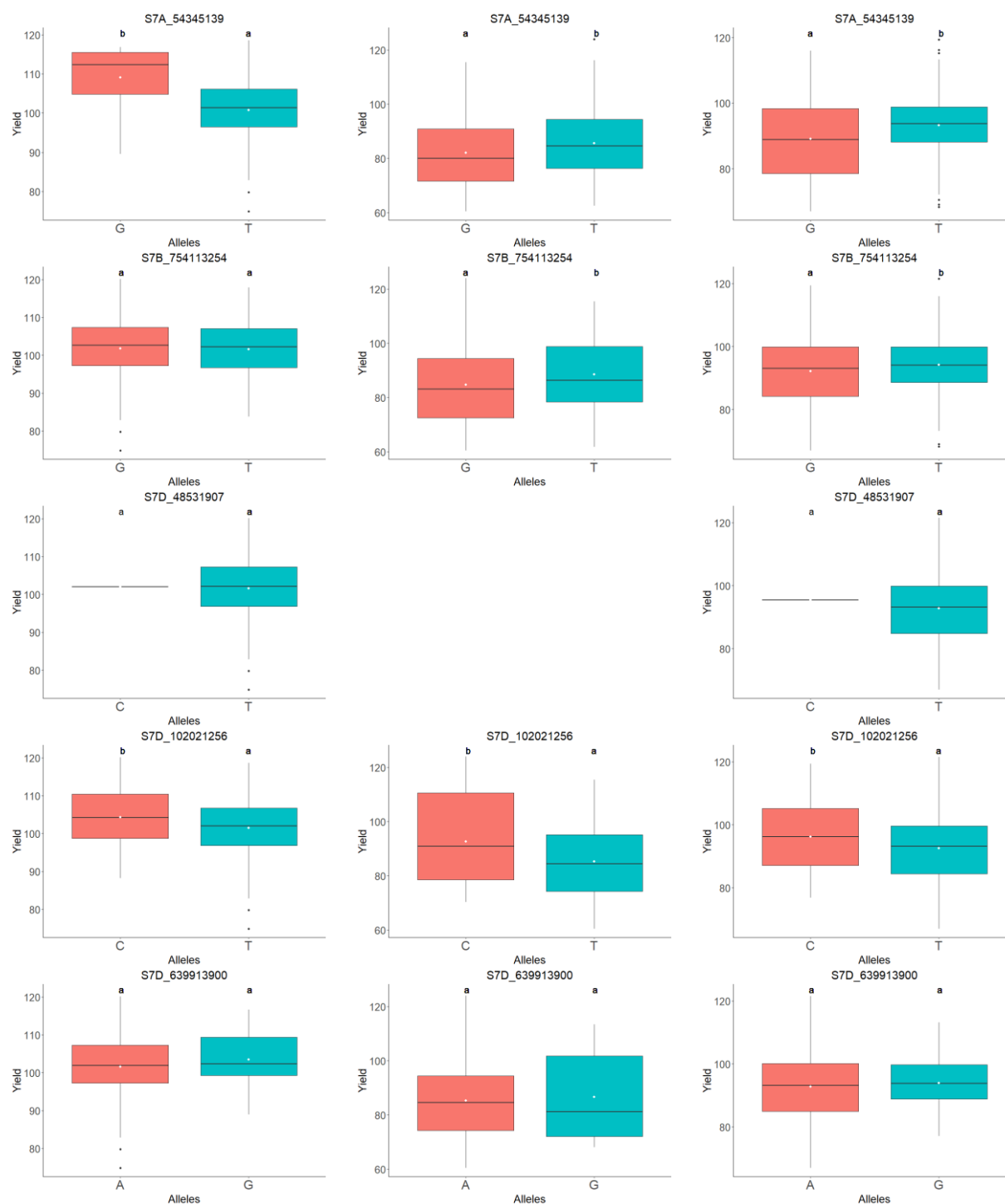












Supplementary Figure 4.5. Boxplots of mapped significant marker trait associations from grain yield and vegetation indices showing comparison between allelic effects (at the homozygous state) in average grain yield among the genotypes in the 2022 trial and 2023 trials independently, and combined trials.