

Uncovering genomic regions controlling plant architectural traits in hexaploid wheat using different GWAS models

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Figure S1. Structure analysis of 319 wheat accessions based on unlinked SNP markers.

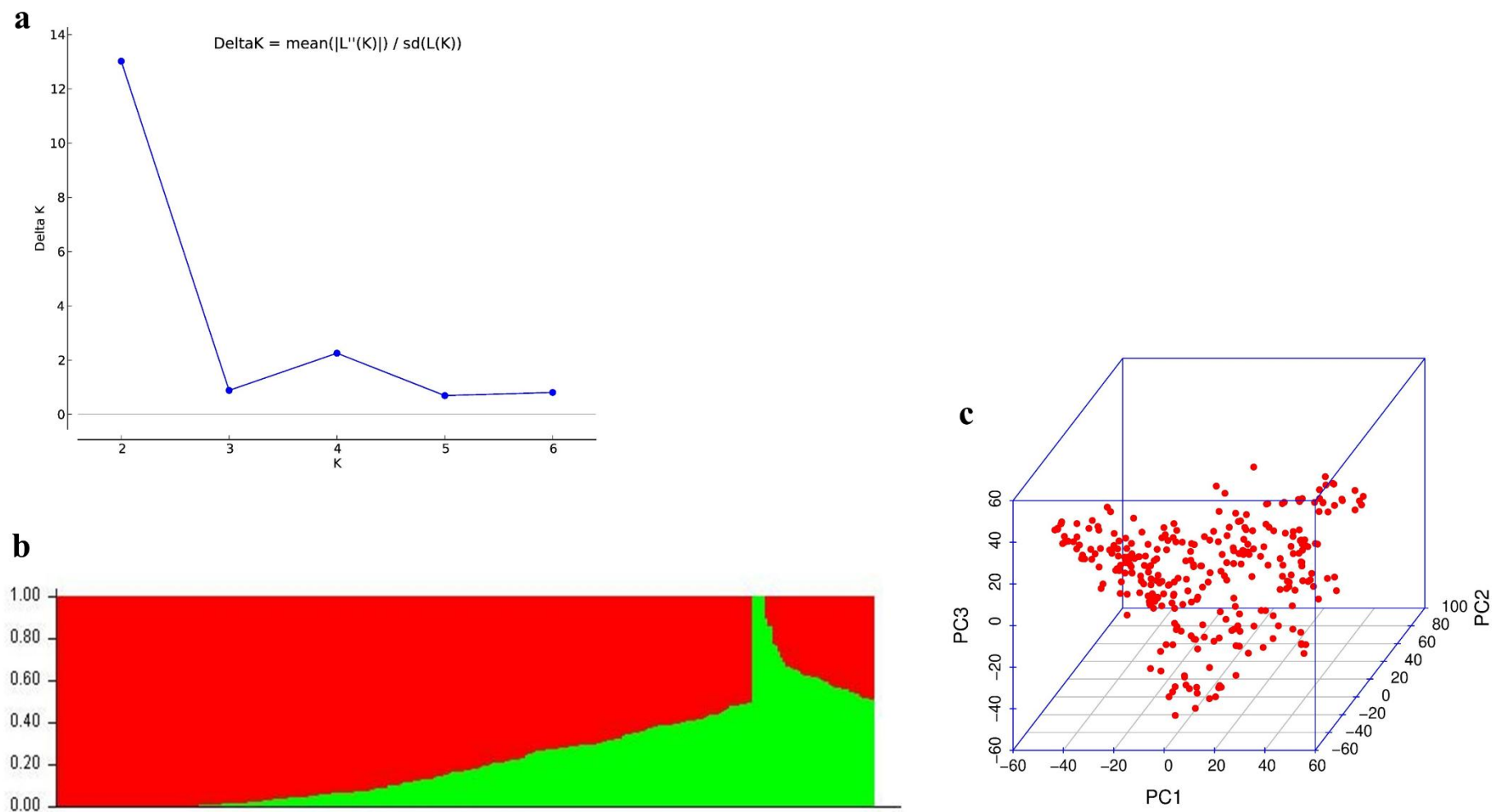


Figure S1. (a) ΔK Plot containing putative K ranging from 2 to 6. **(b)** Plot of subpopulations K=2, represented by two colors i.e. red and green which indicates the proportion of each subpopulation. **(c)** PCA based on standardized covariance of genotypic data.

Fig S2. Linkage disequilibrium (LD) analysis among markers.

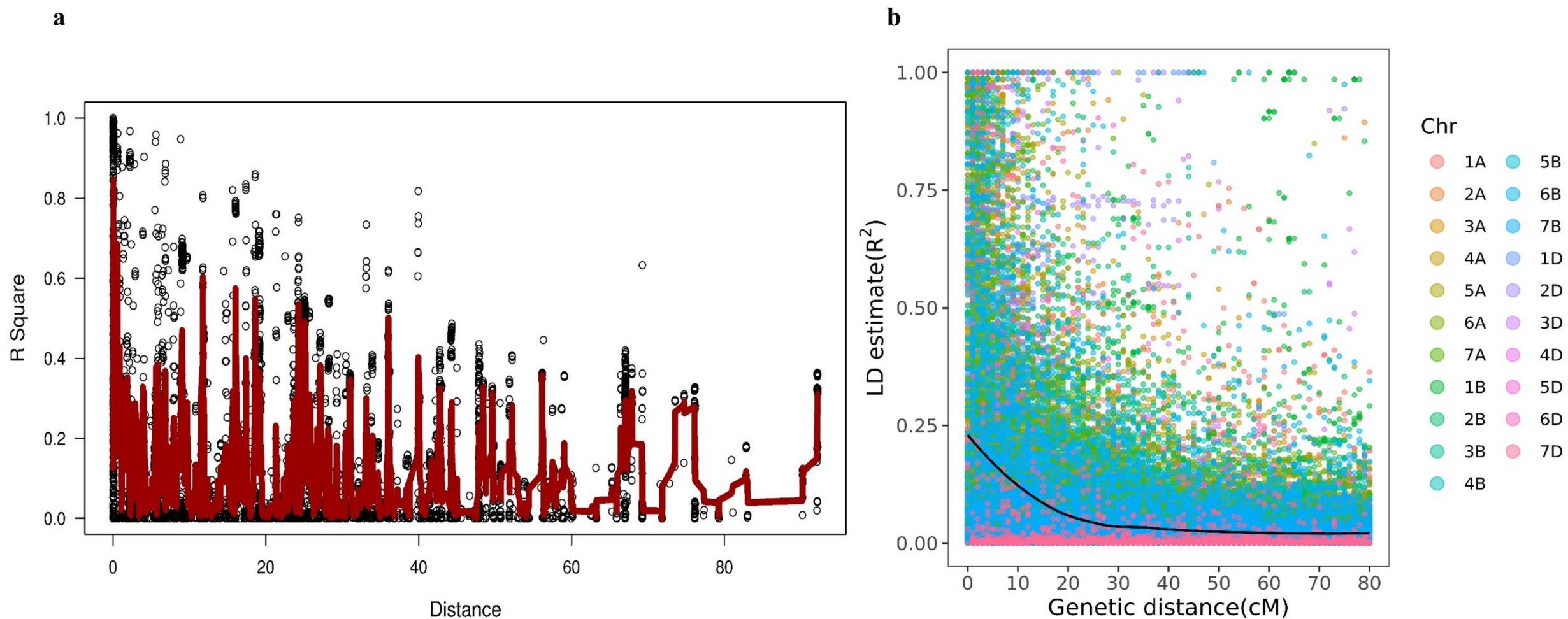
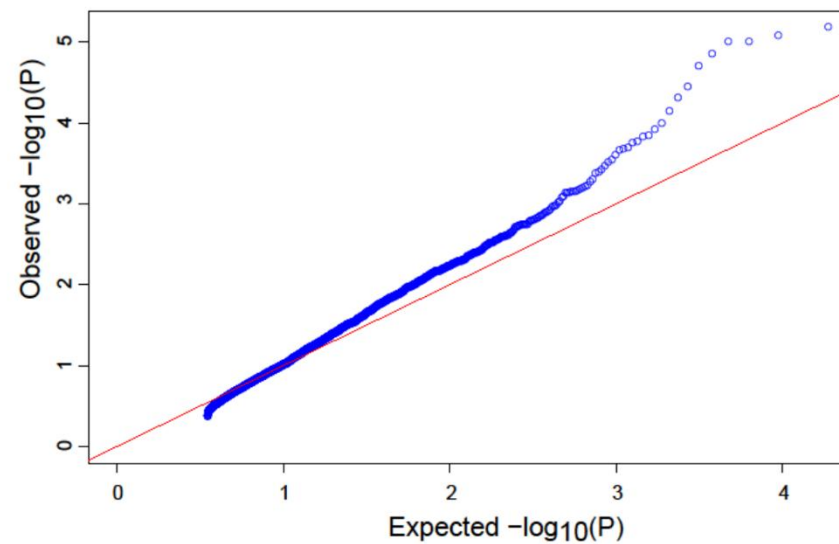
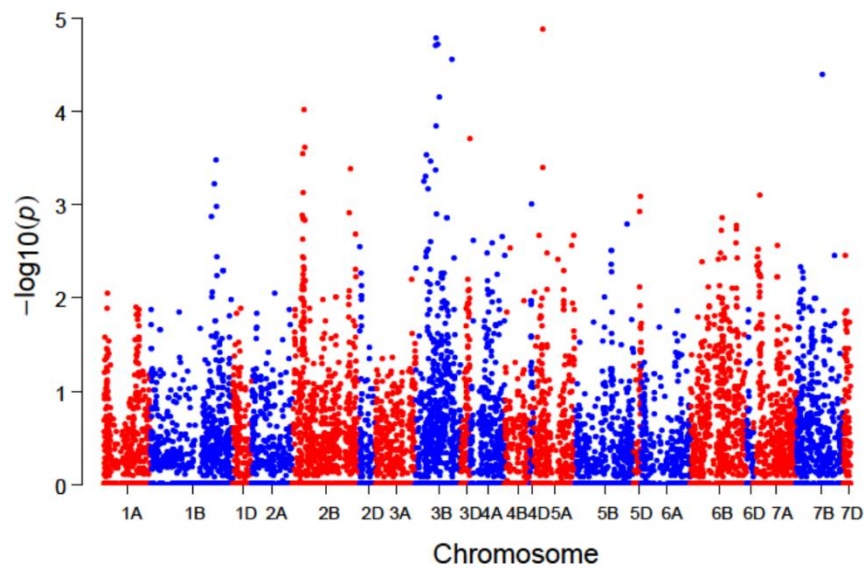


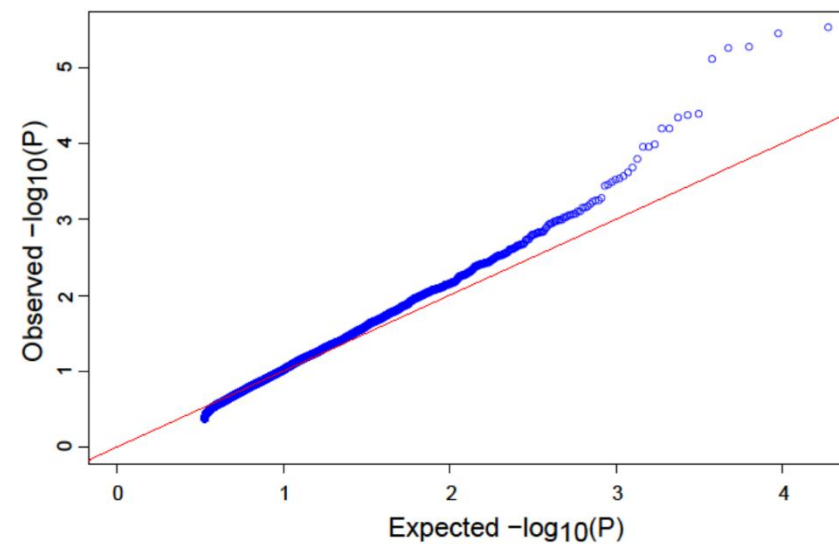
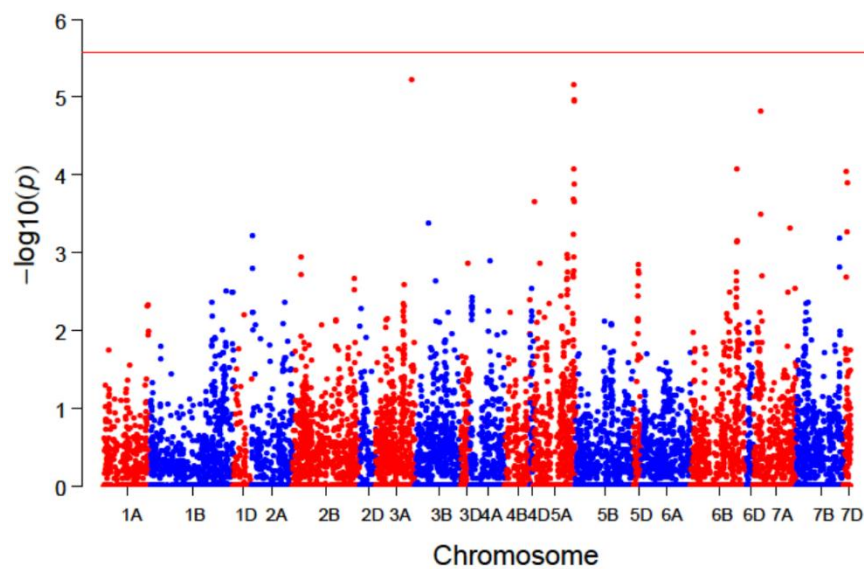
Figure S2. (a) LD decay for whole genome. **(b)**) LD decay for A, B, and D sub-genomes.

Figure S3. Manhattan and quantile-quantile (Q-Q) plots of multi-locus GWAS models for plant height, flag leaf length, flag leaf width, and number of tillers across different environments.

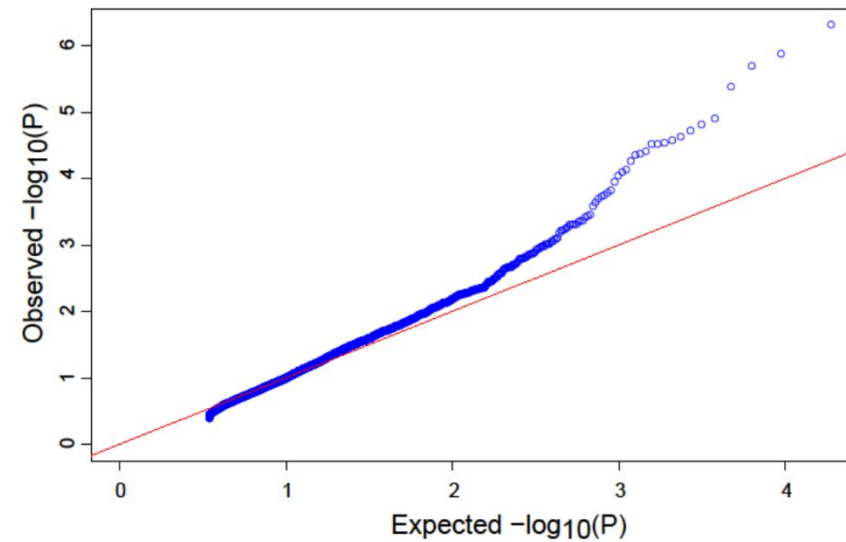
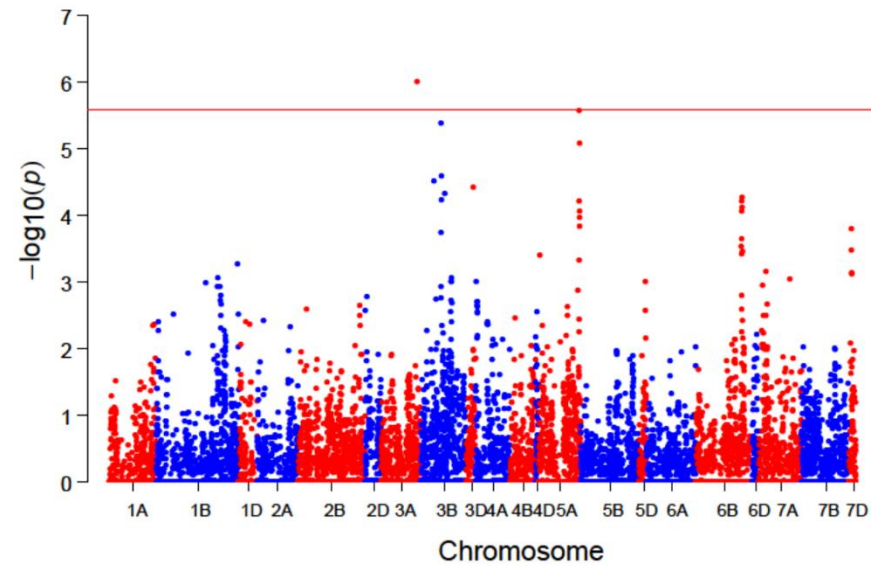
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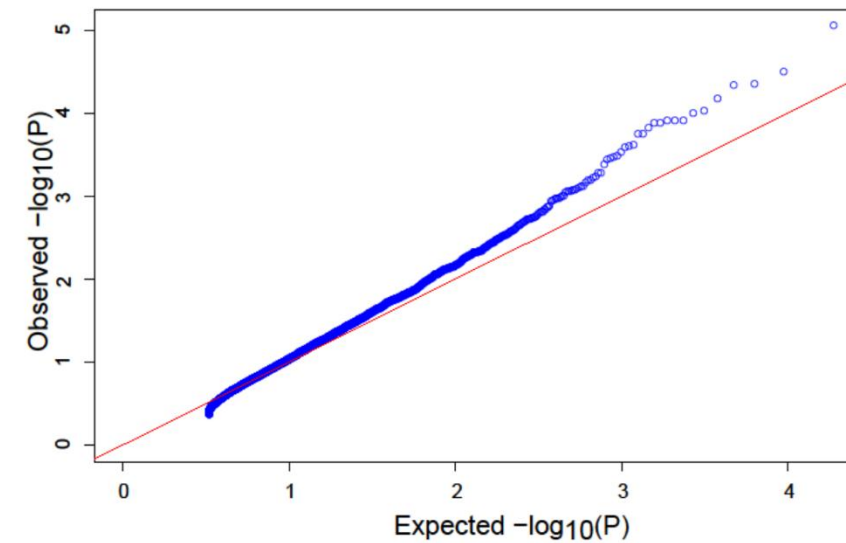
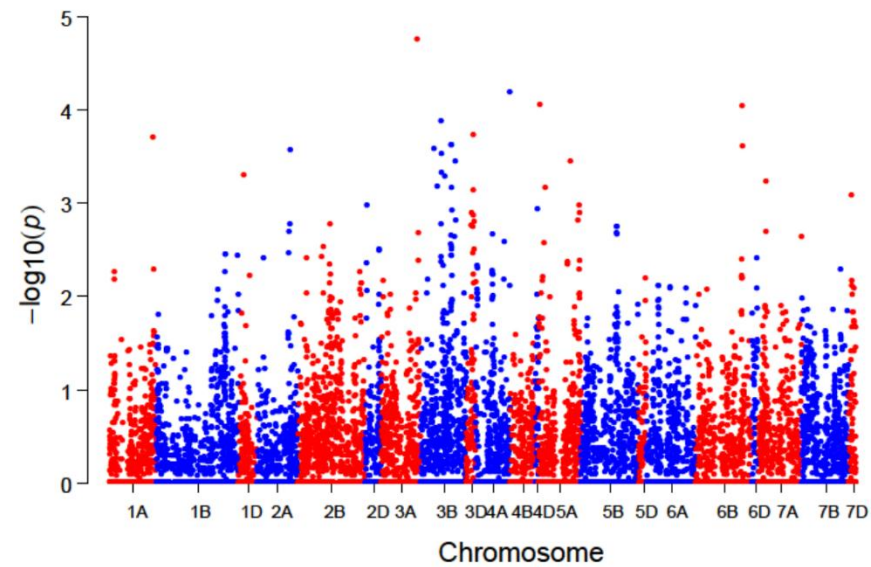
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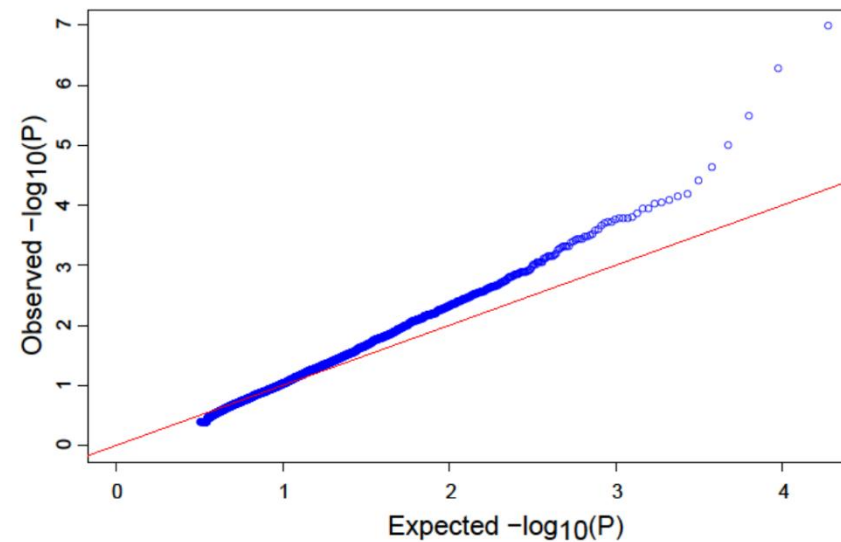
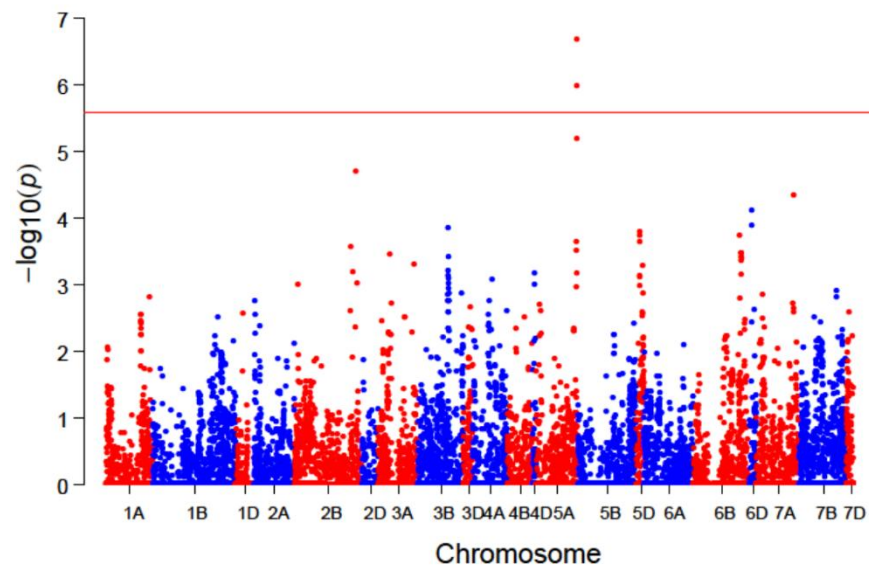
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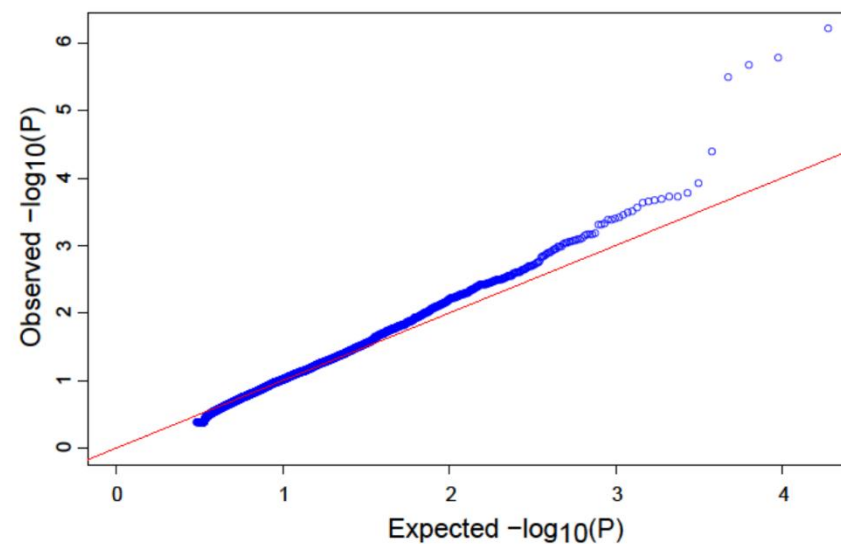
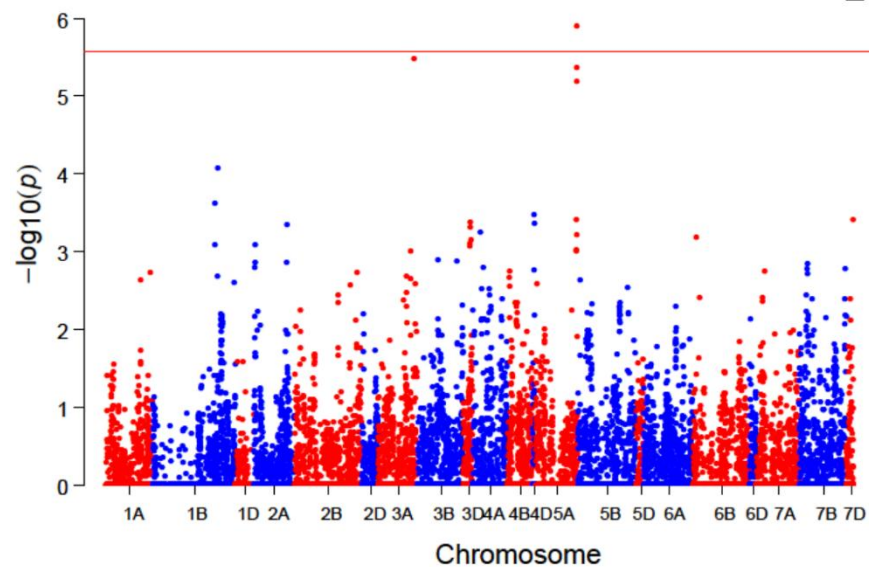
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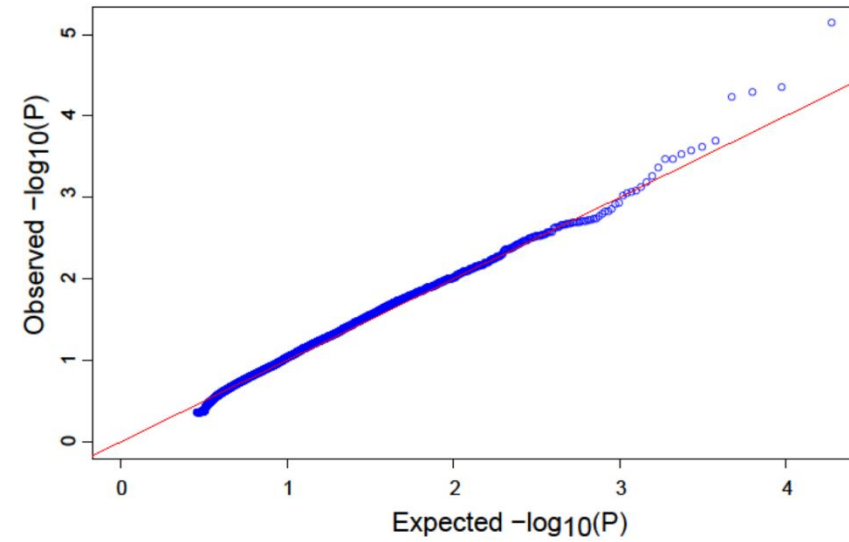
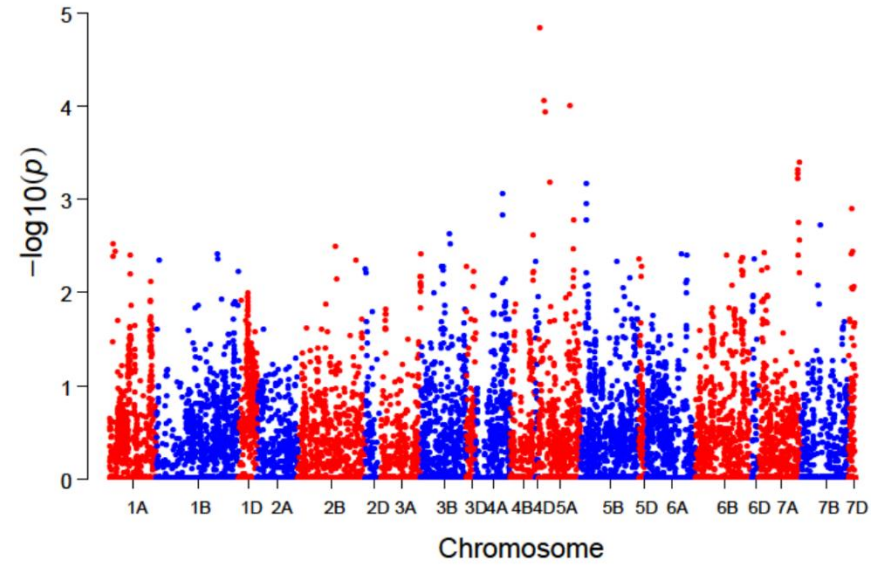
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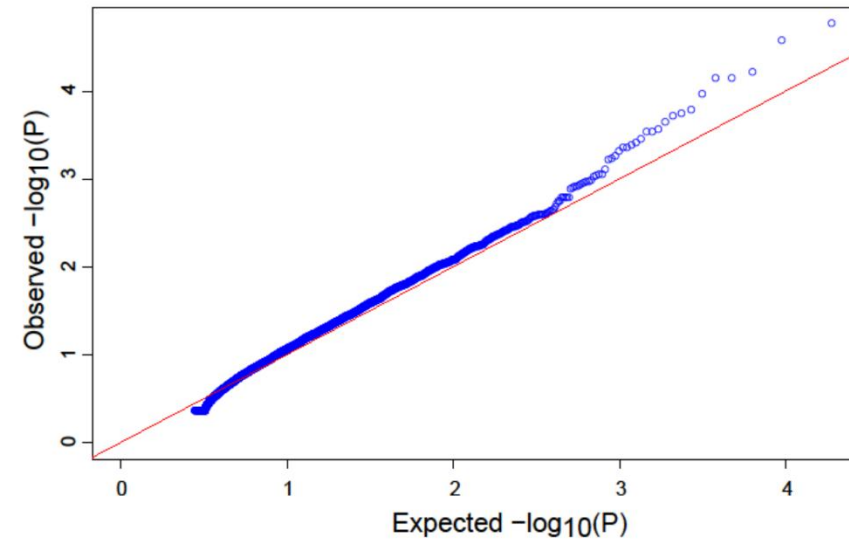
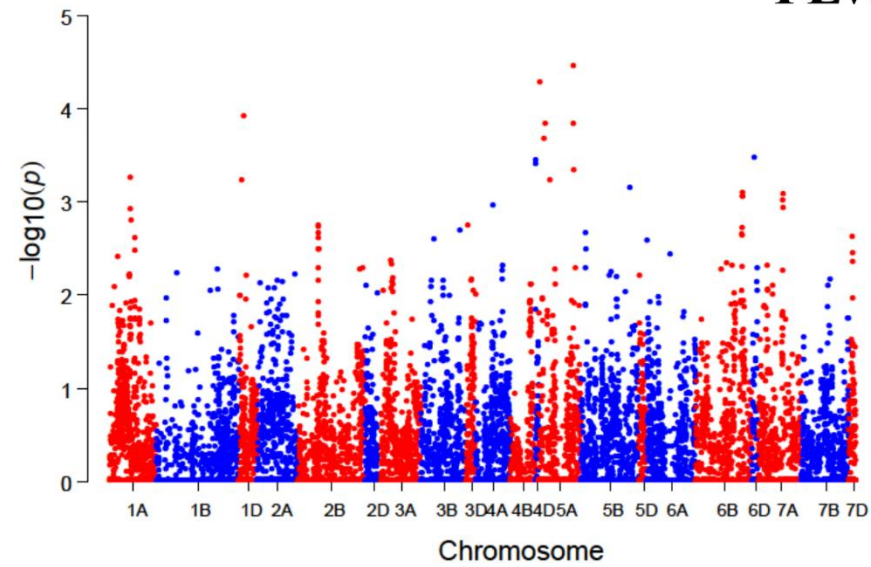
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FLW2017



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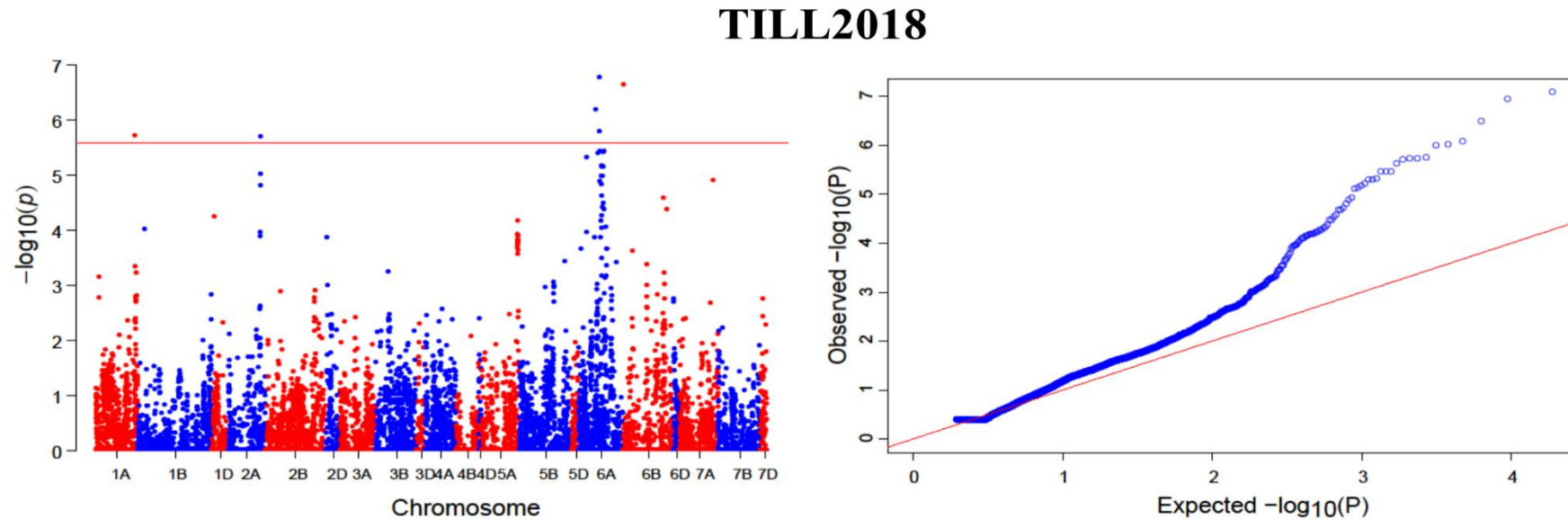
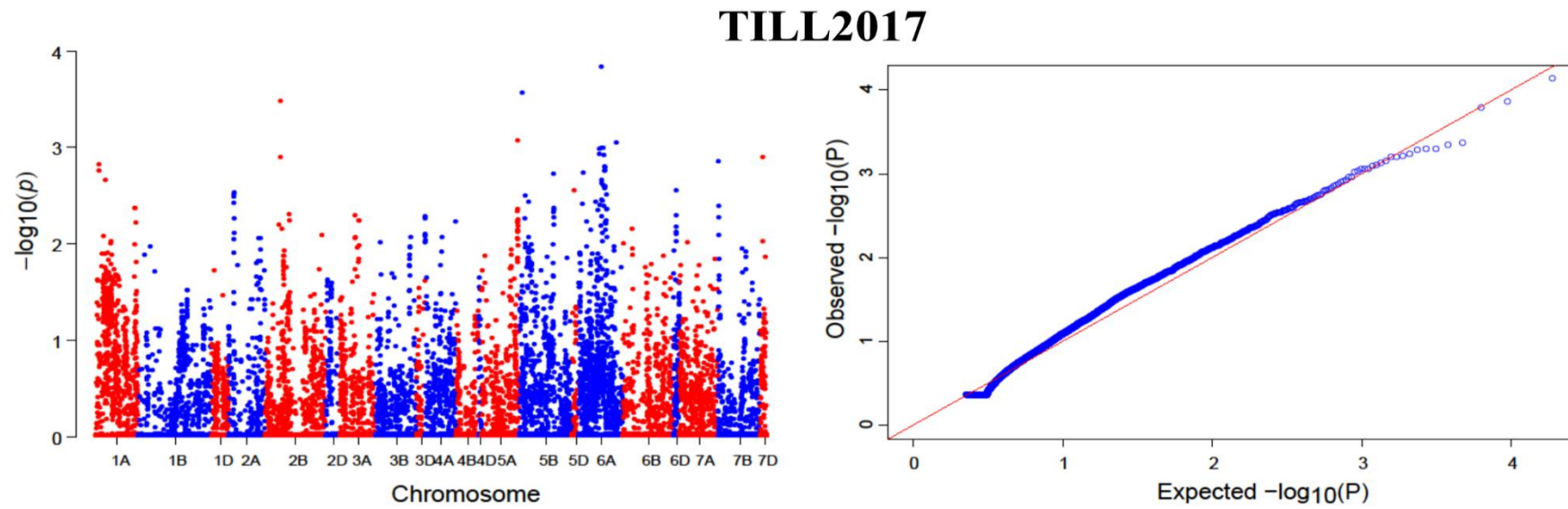
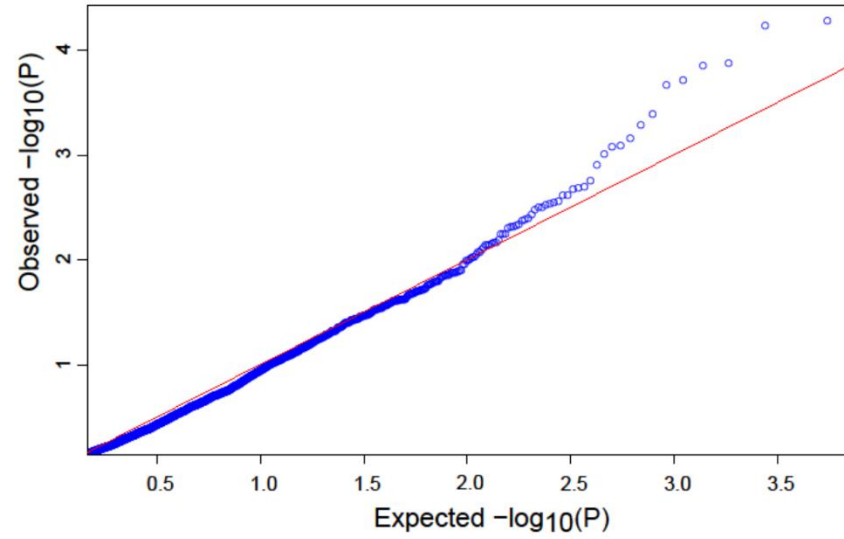
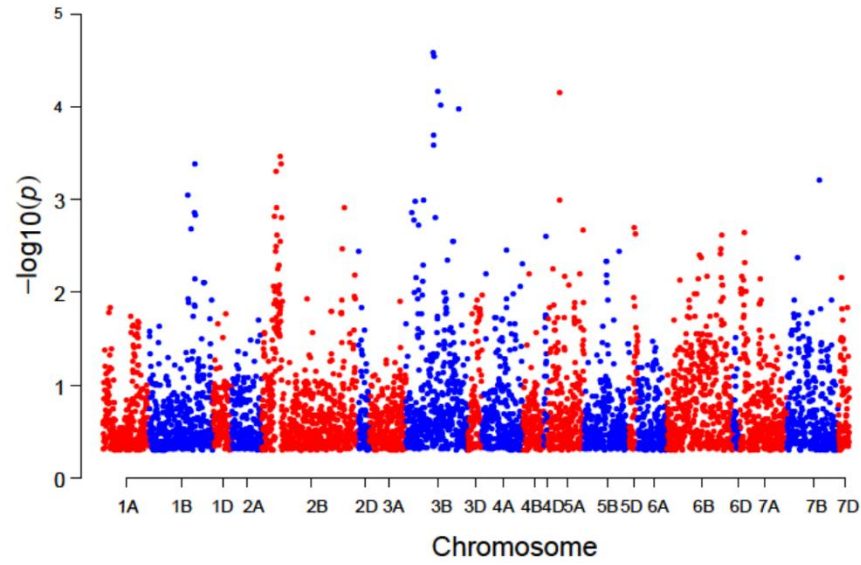
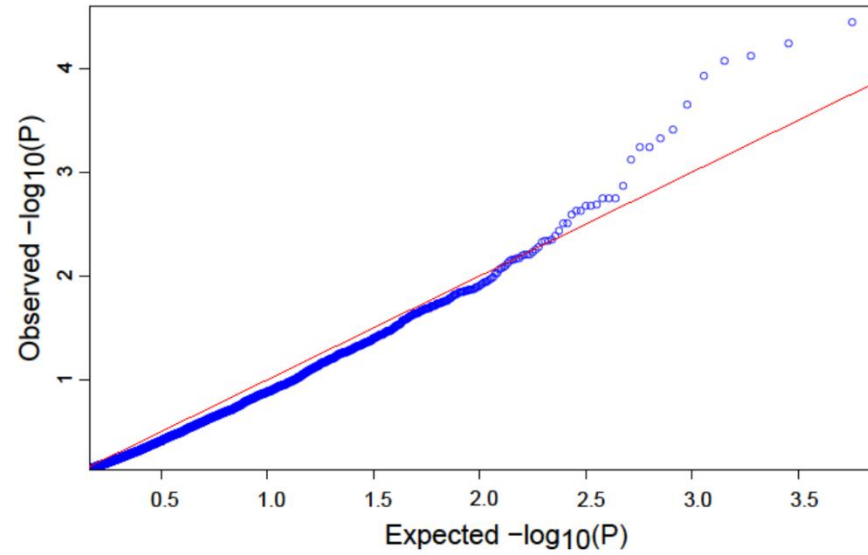
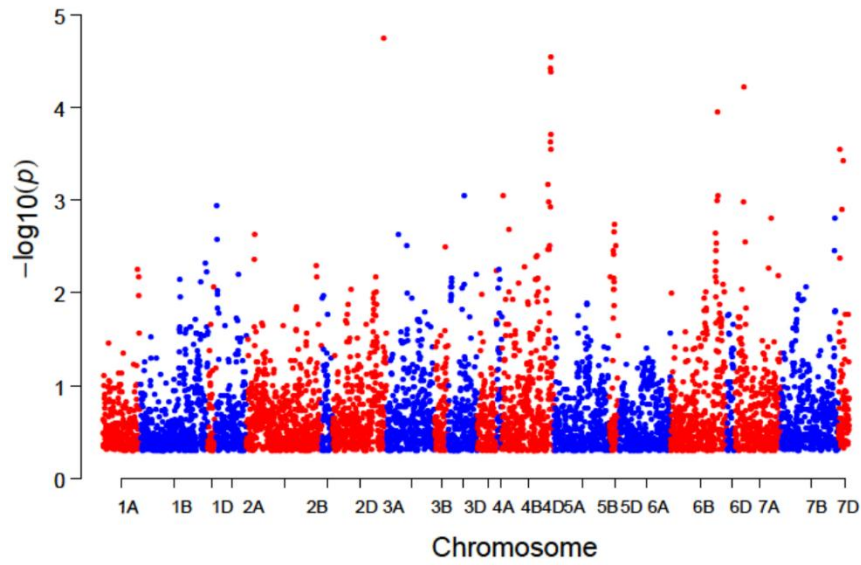


Figure S3a. Manhattan and Q-Q plots of FASTmrMLM model for plant height, flag leaf length, flag leaf width, and number of tillers across different environments.

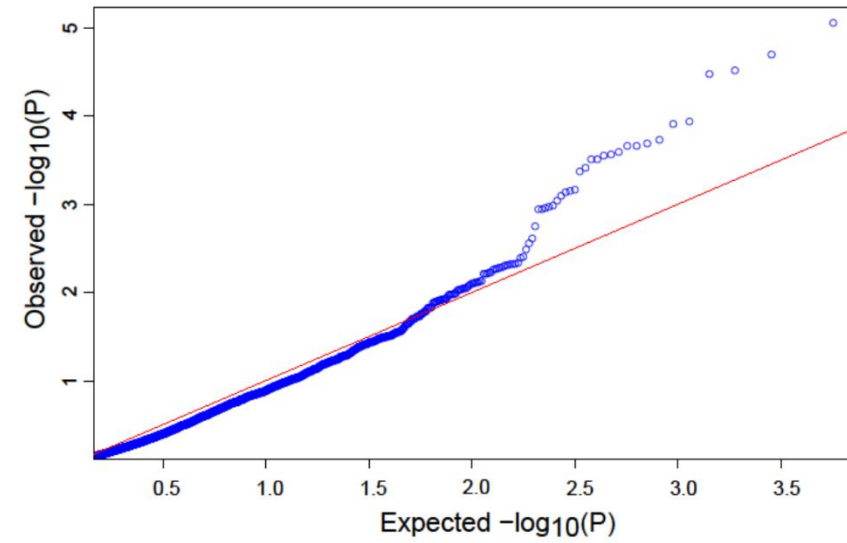
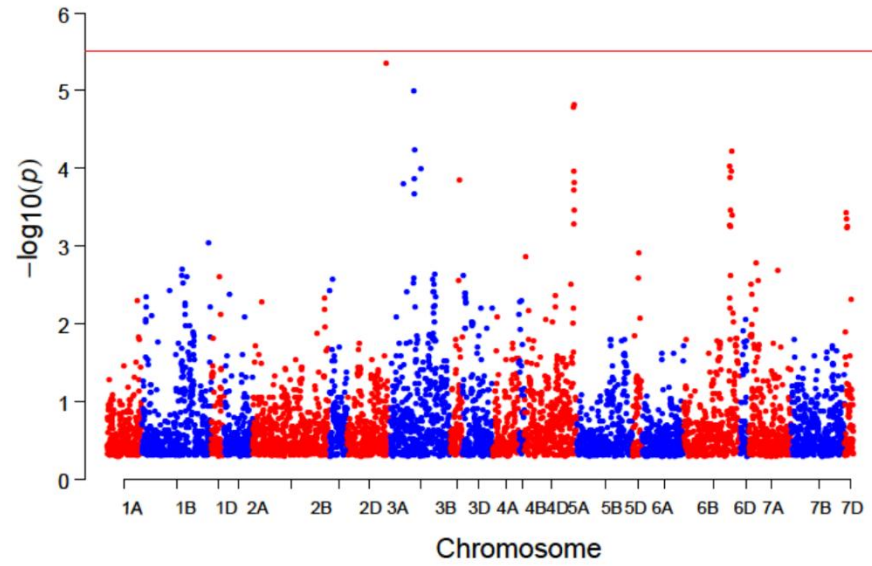
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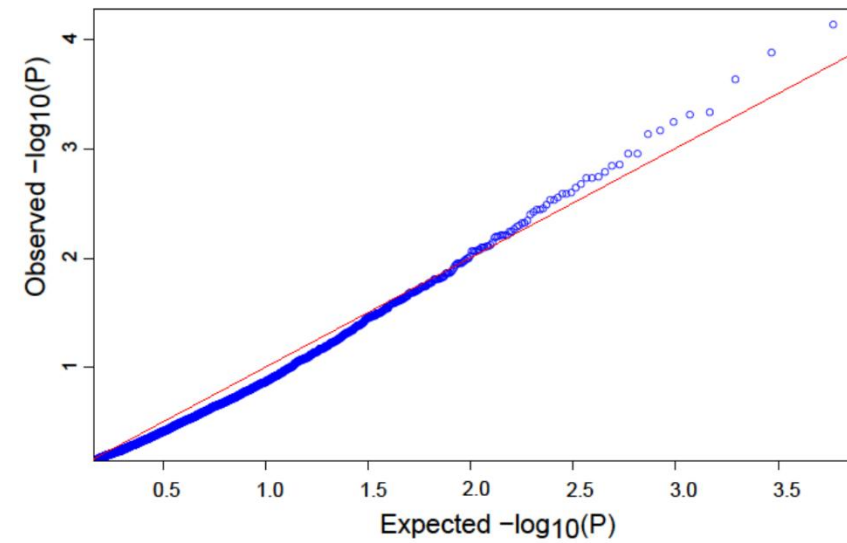
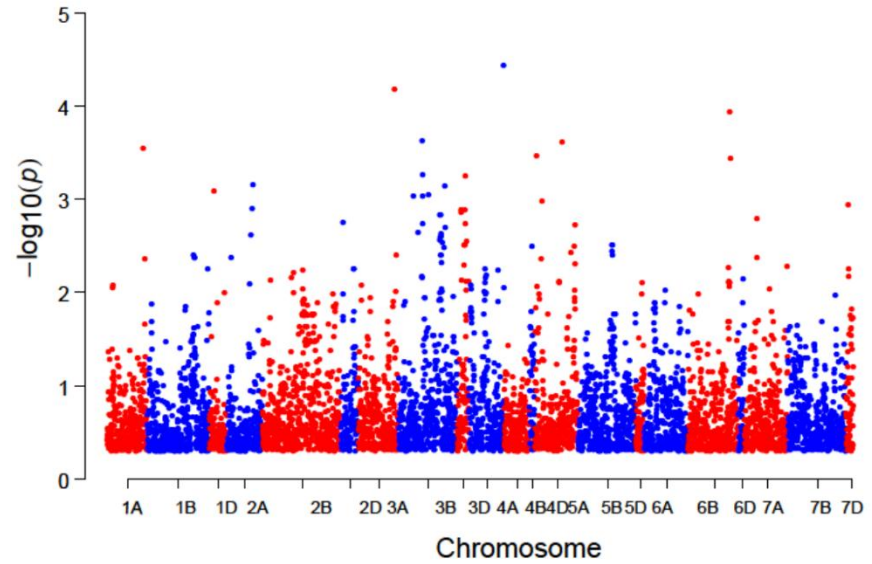
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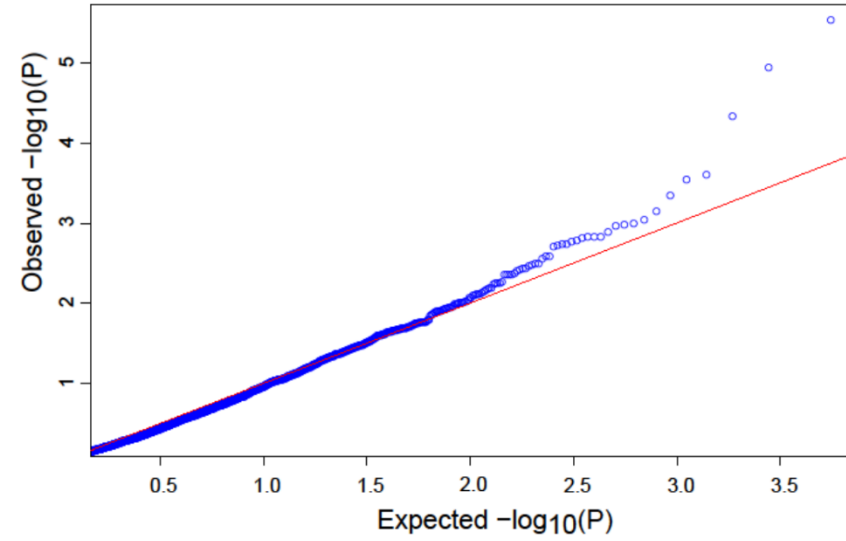
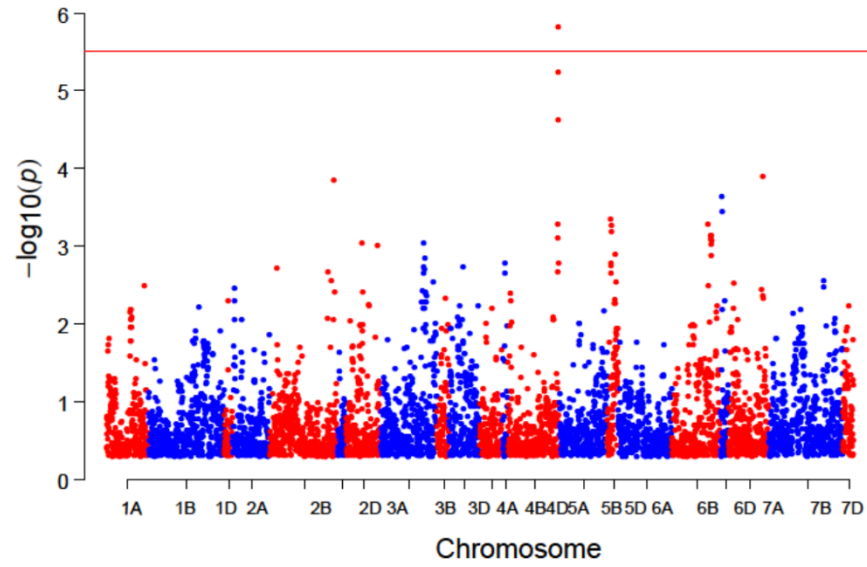
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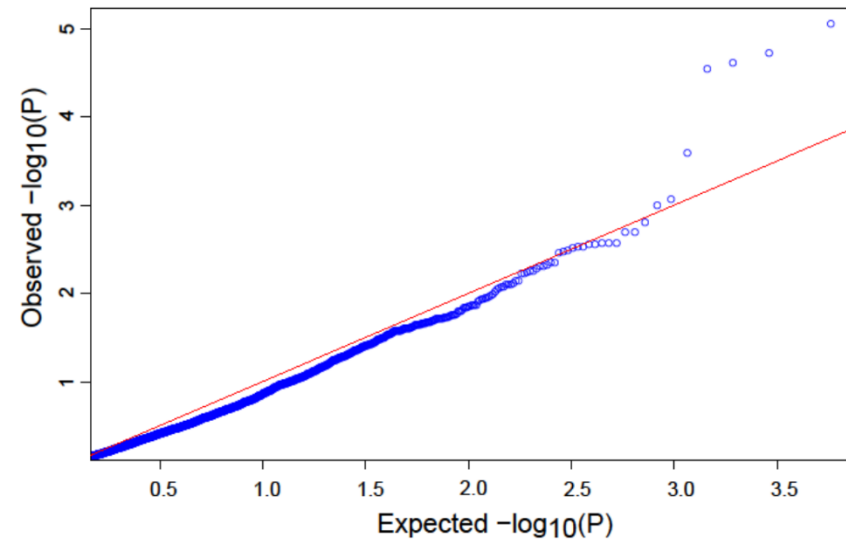
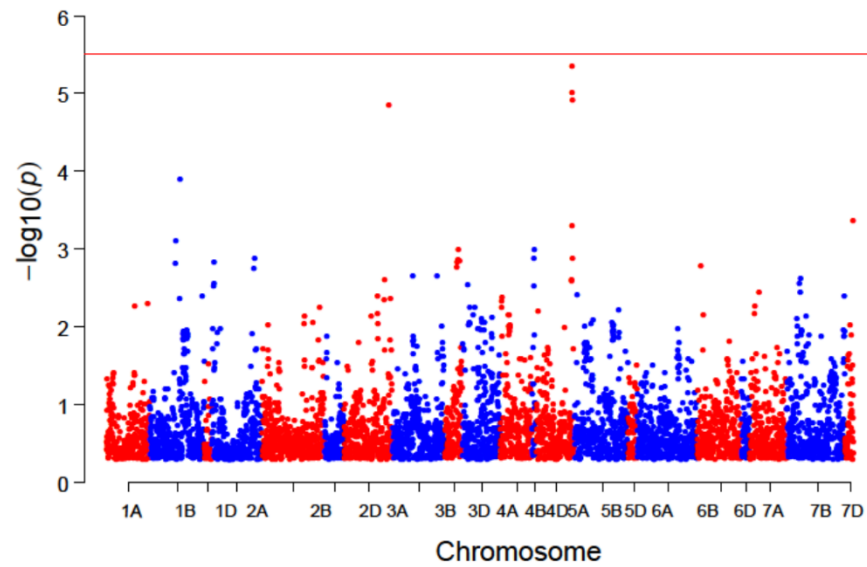
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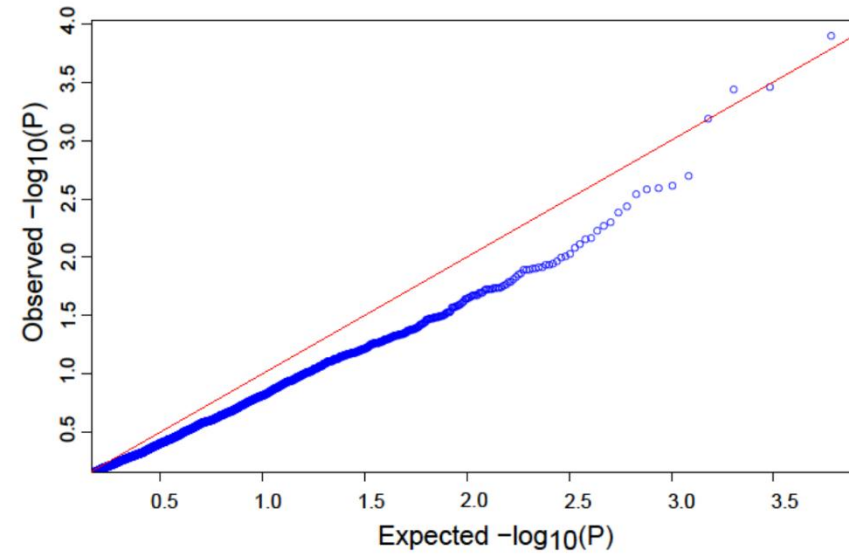
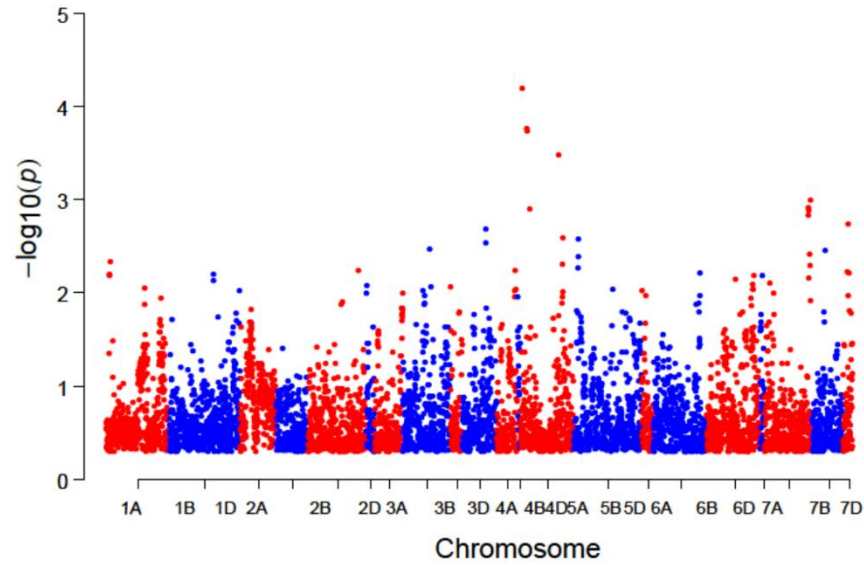
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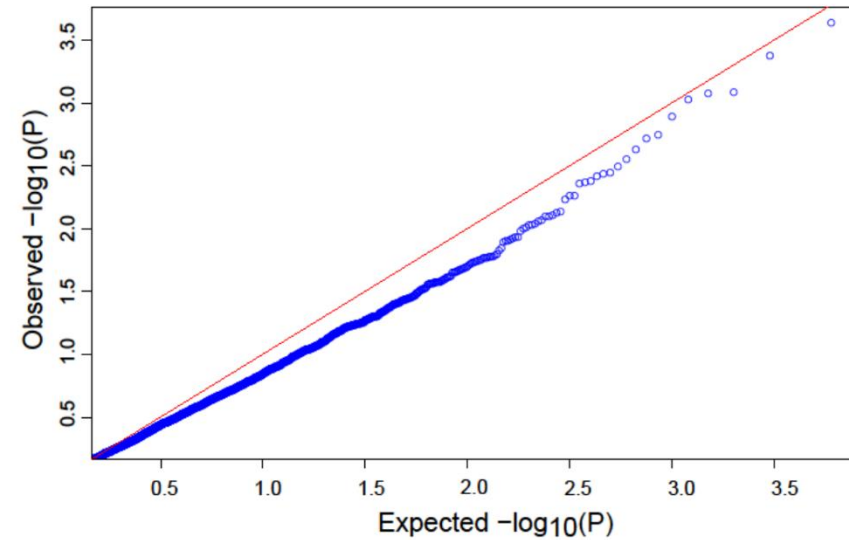
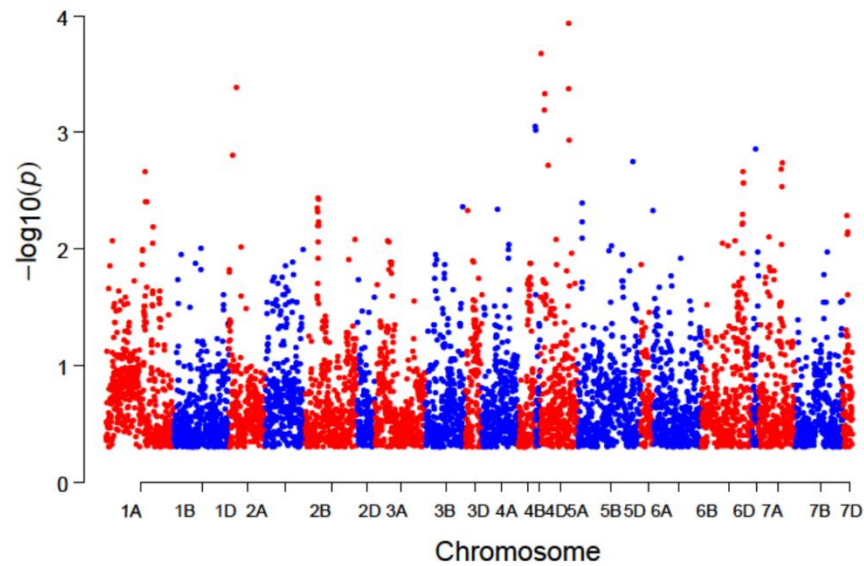
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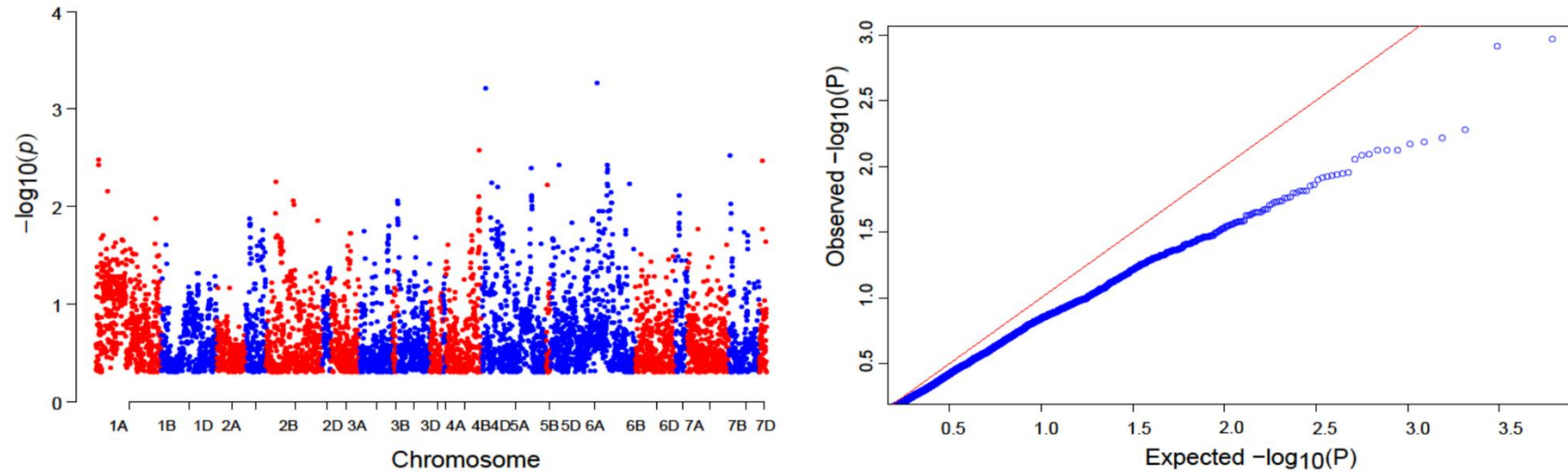
FLW2017



FLW2018



TILL2017



TILL2018

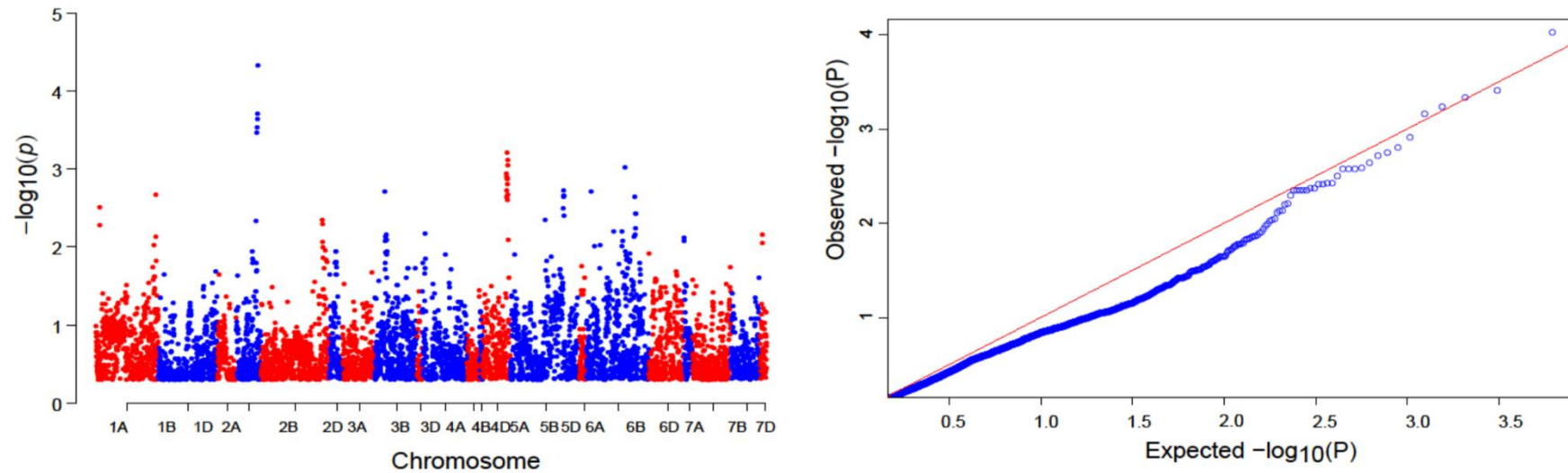
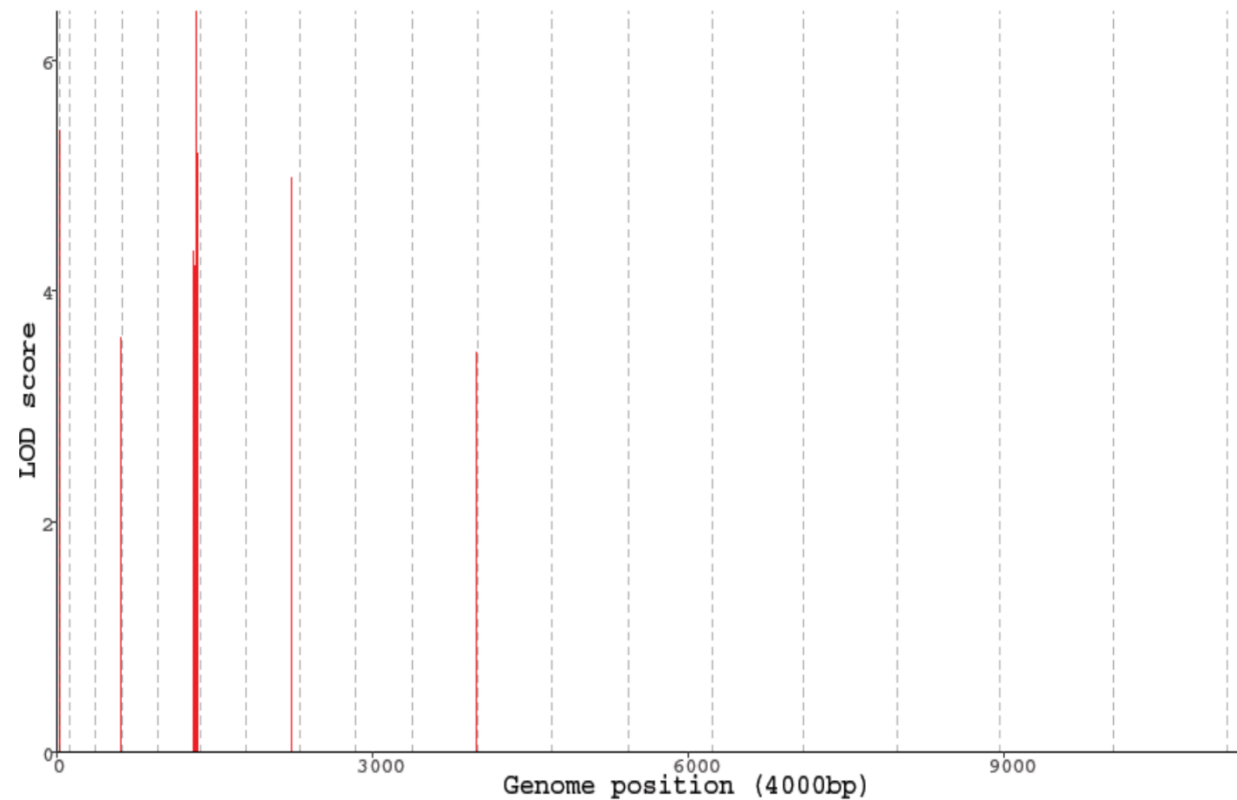
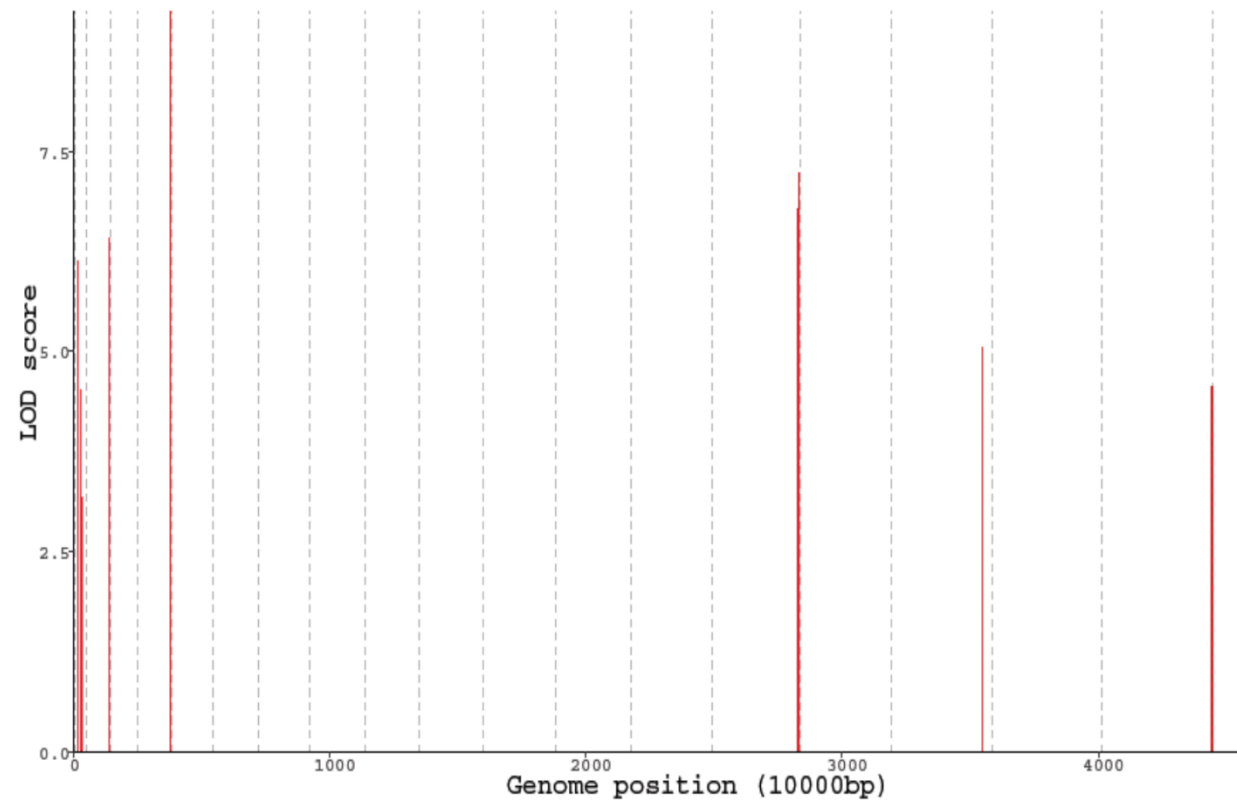


Figure S3b. Manhattan and Q-Q plots of FASTmrEMMA model for plant height, flag leaf length, flag leaf width, and number of tillers across different environments.

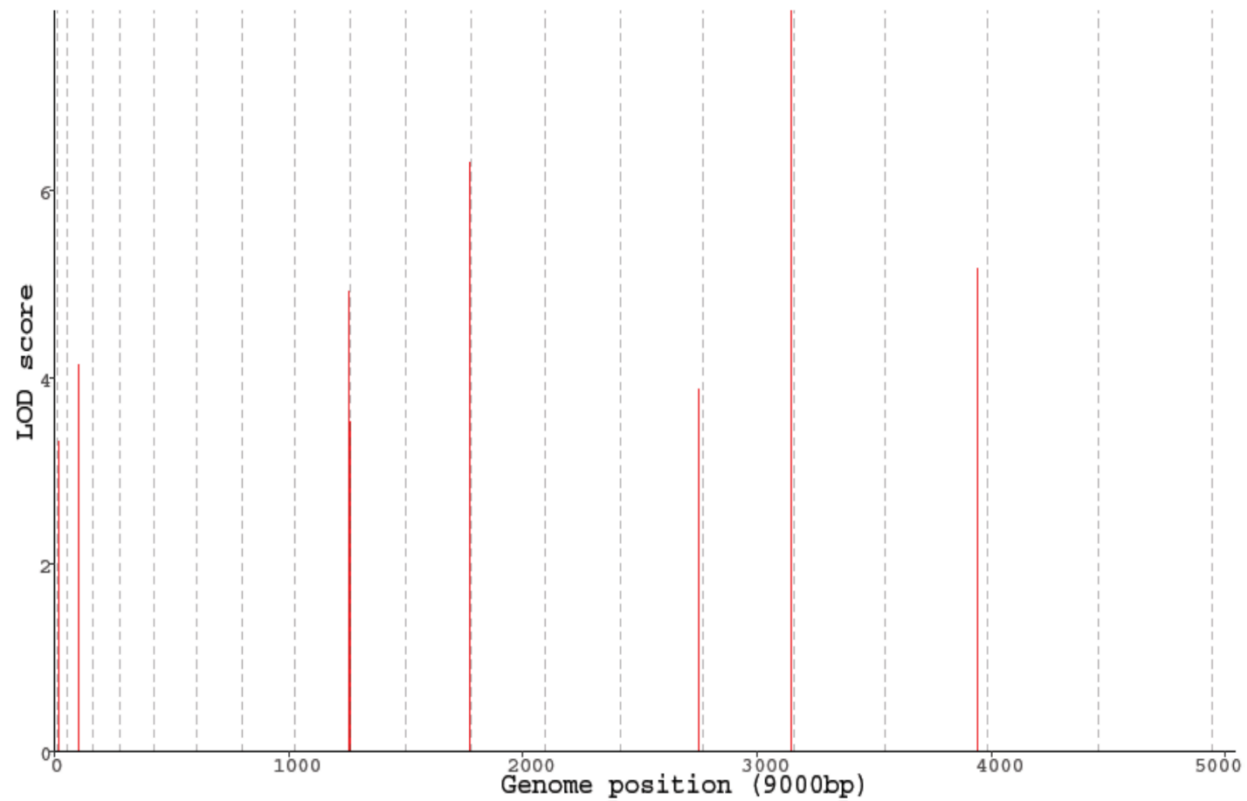
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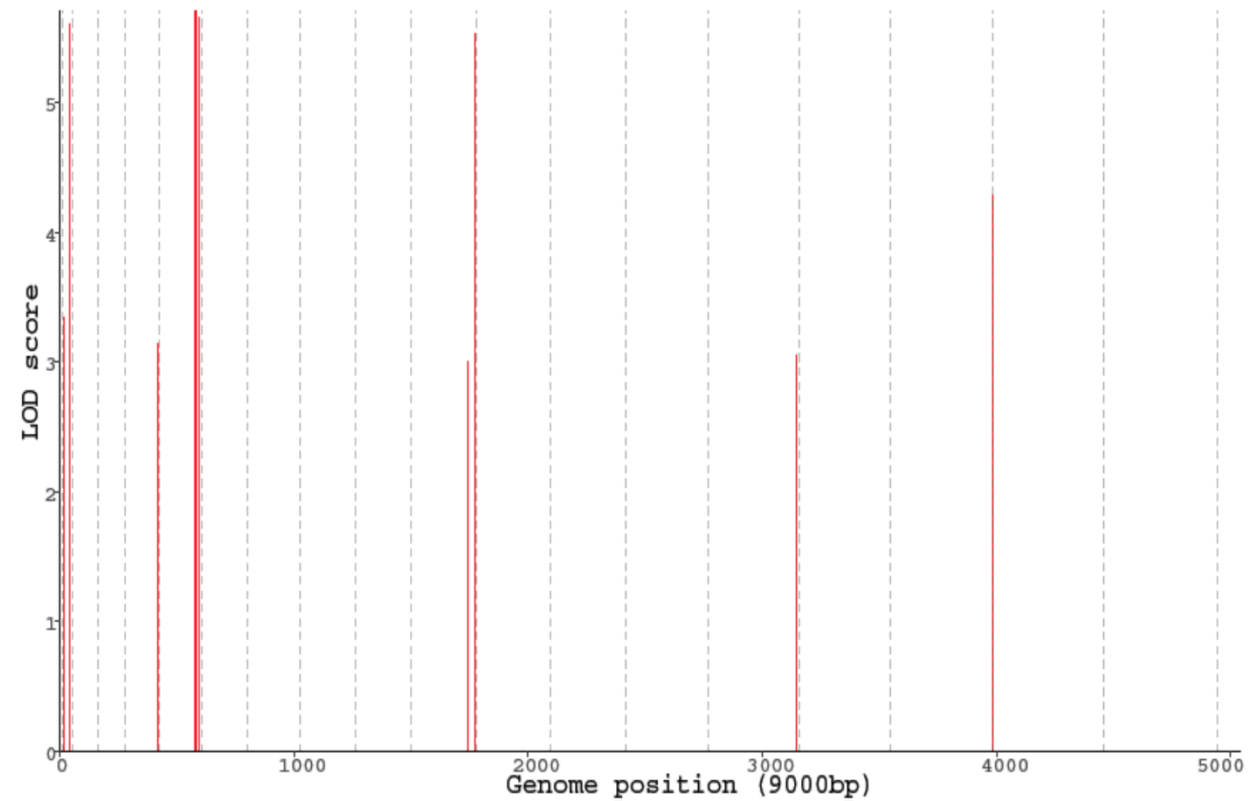
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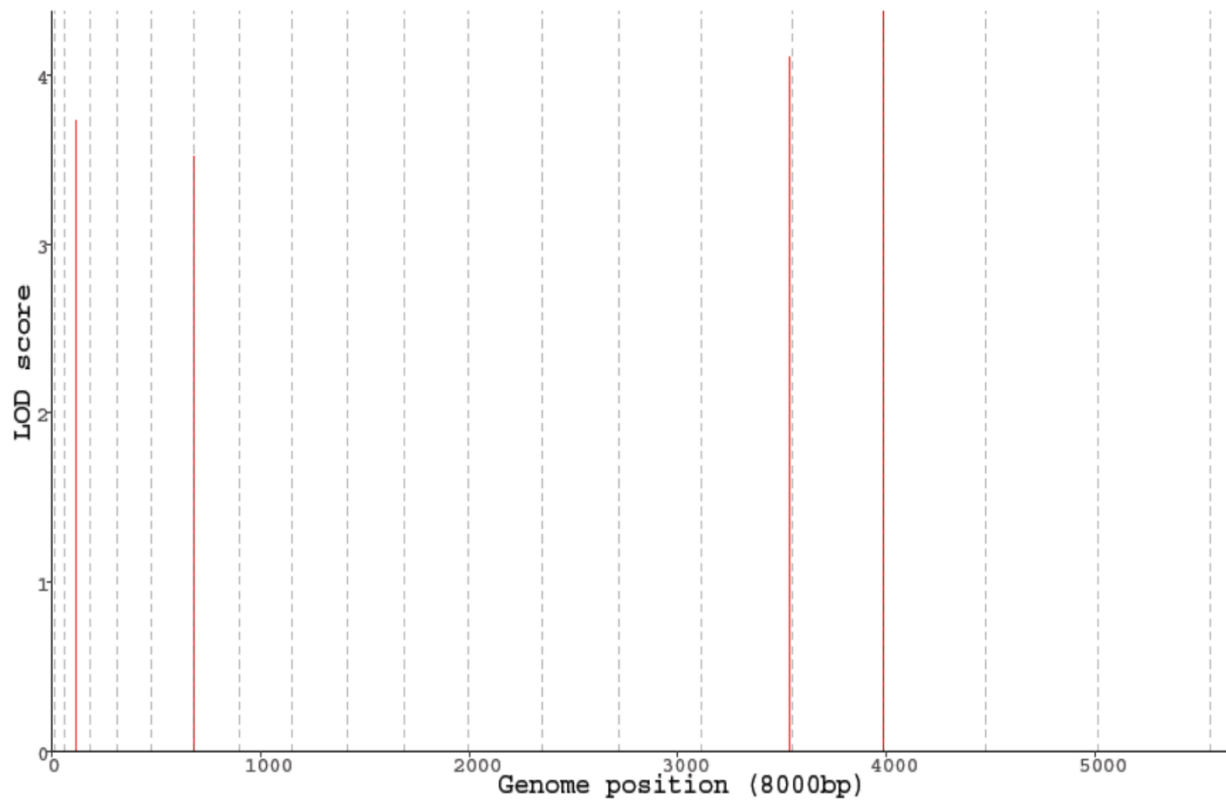
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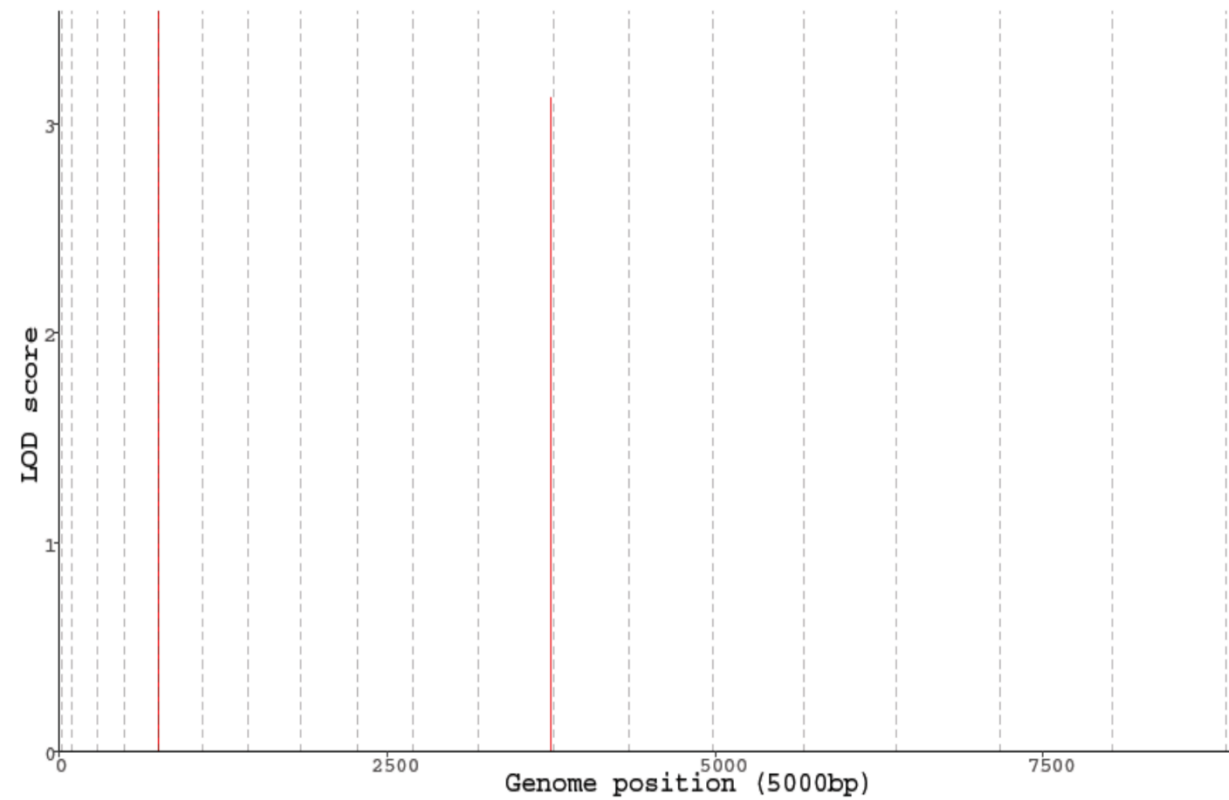
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FLL2017



FLL2018



TILLERS 2017

TILLERS 2018

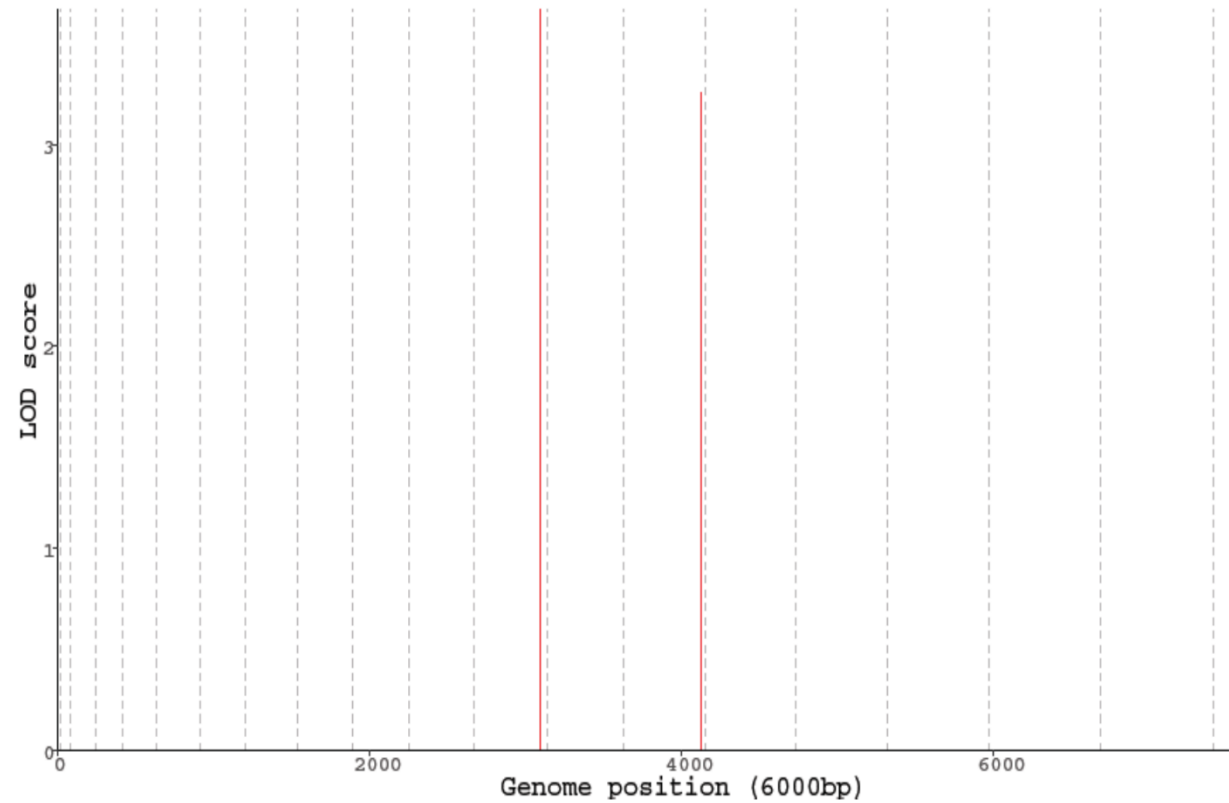
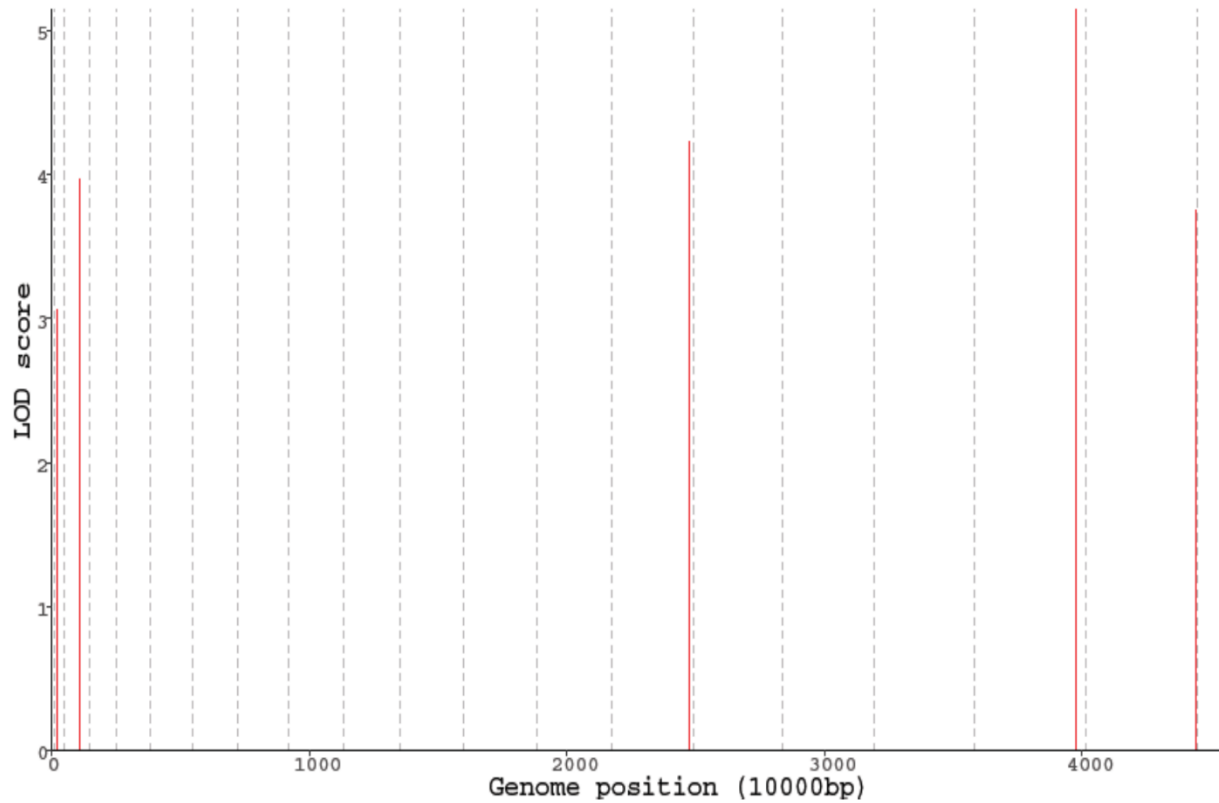
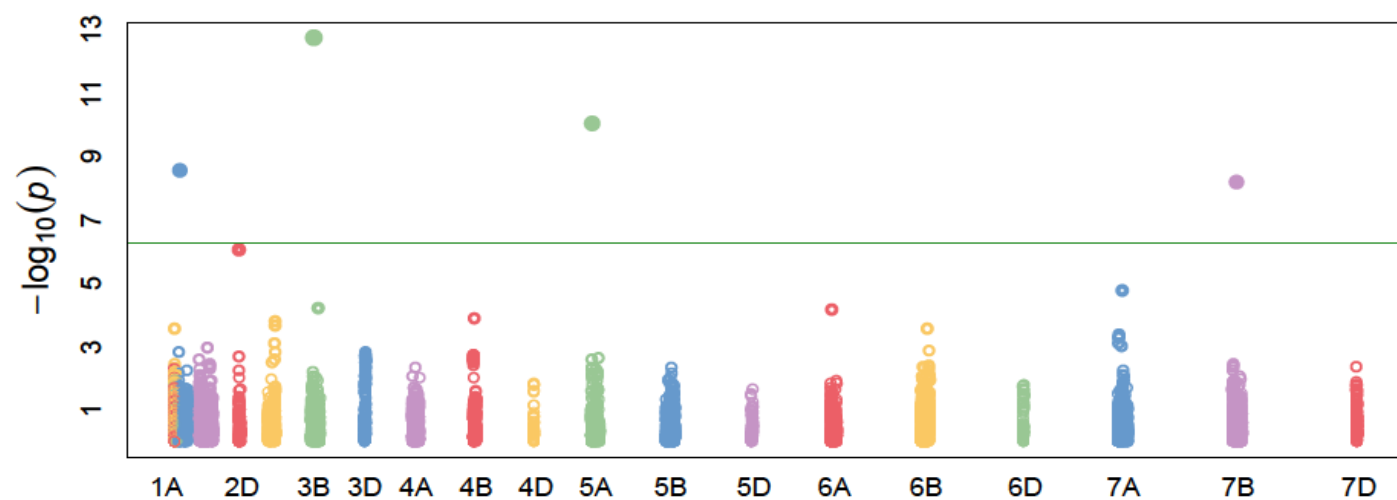


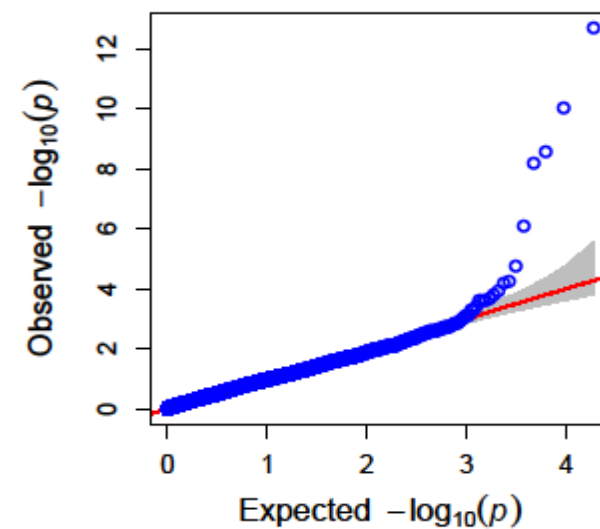
Figure S3c. Manhattan and Q-Q plots of pLARmEB model for plant height, flag leaf length, and number of tillers across different environments.

Figure S4. Manhattan and Q-Q plots of three single locus GWAS models for plant architectural traits (plant height, flag leaf length, flag leaf width, and number of tillers) across different environments.

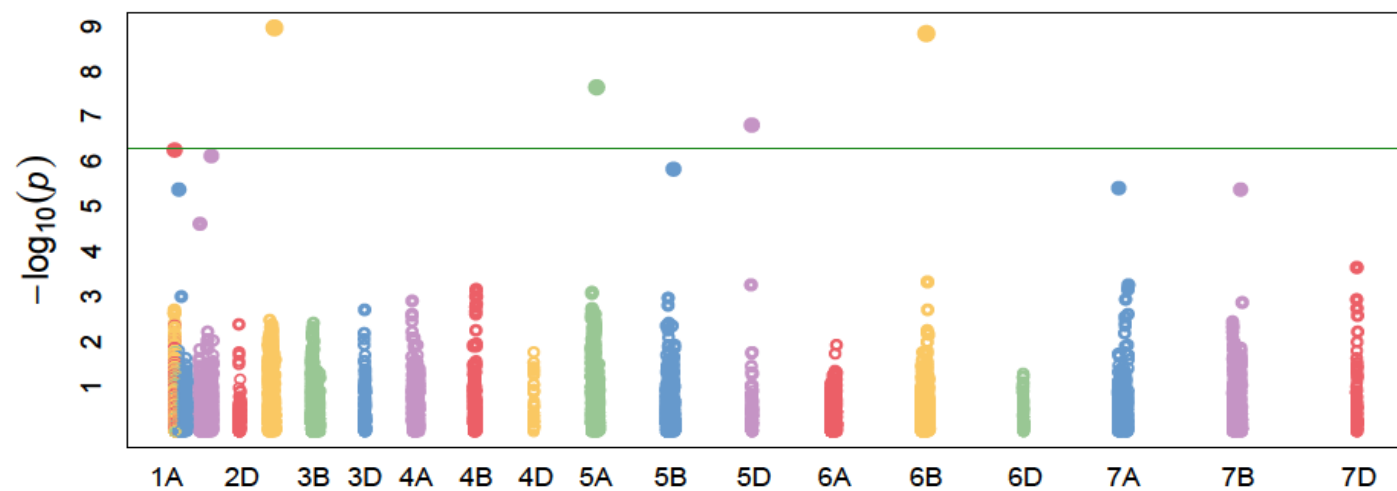
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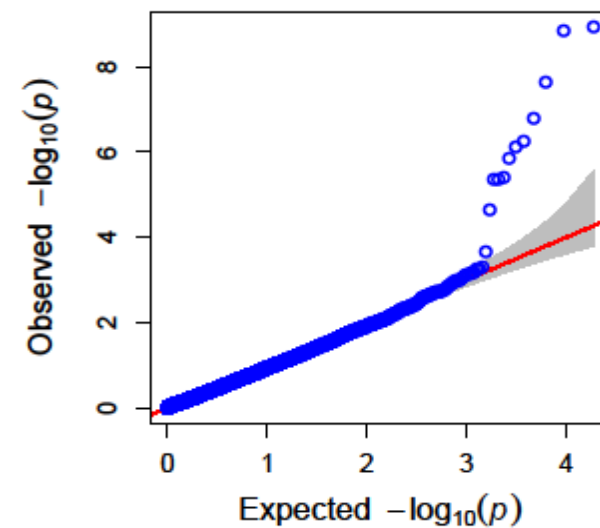
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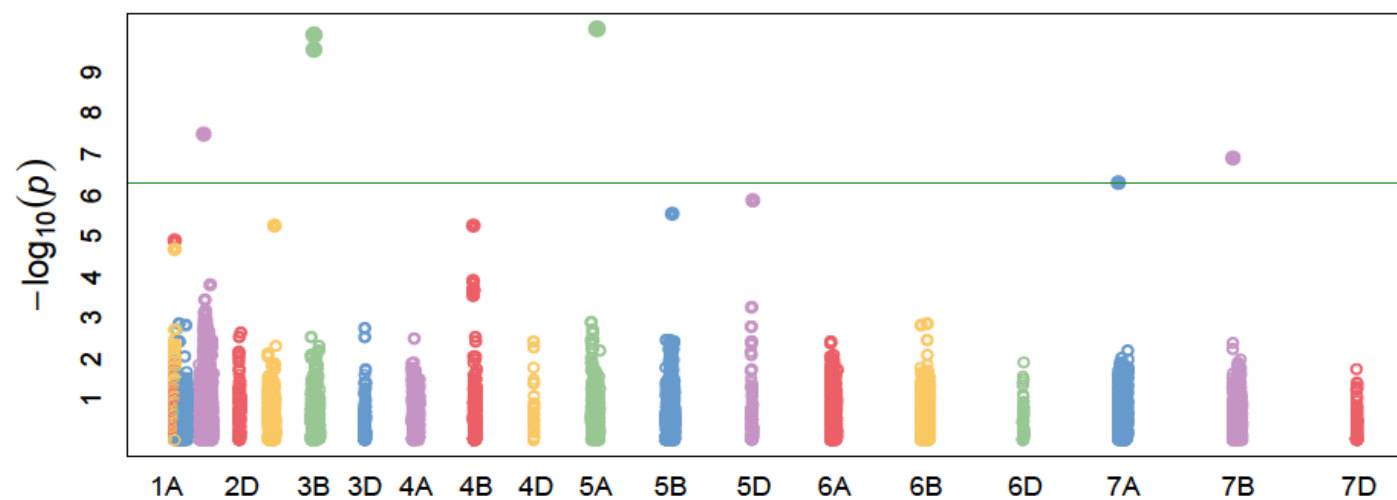
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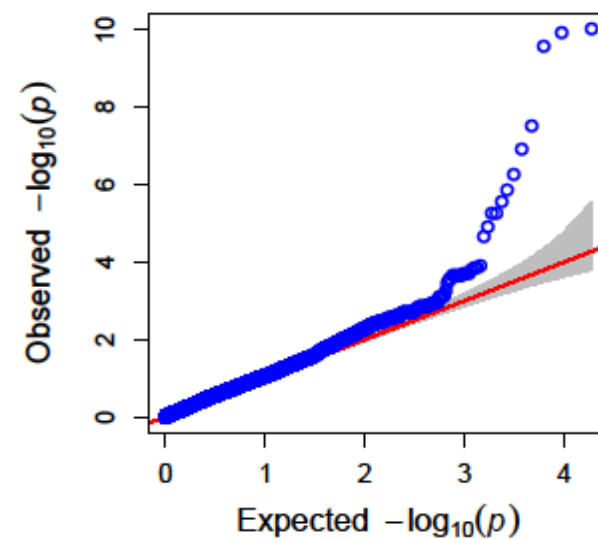
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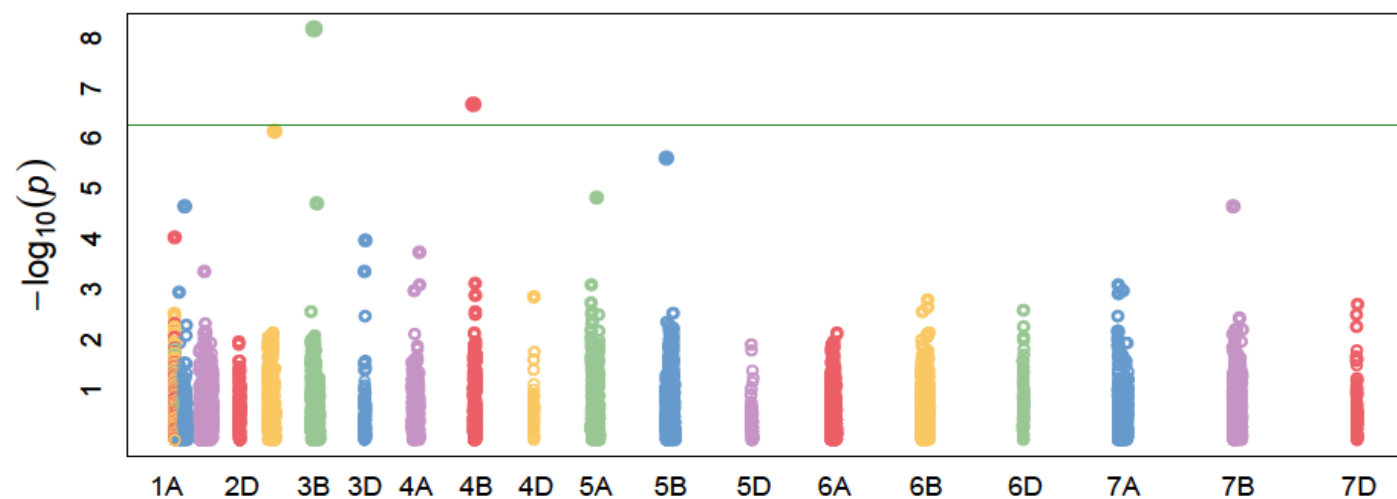
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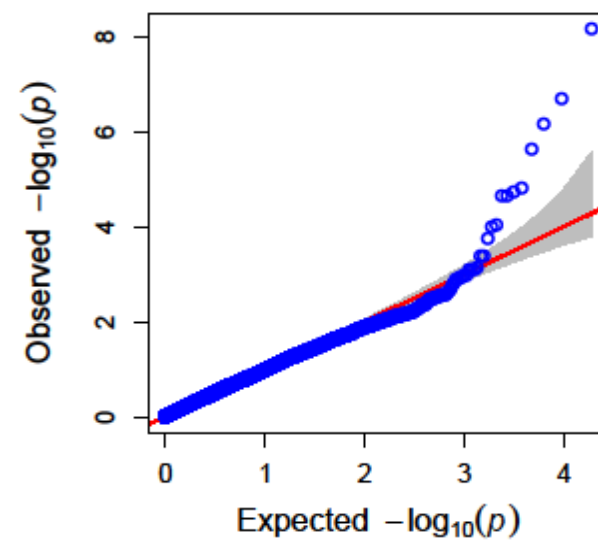
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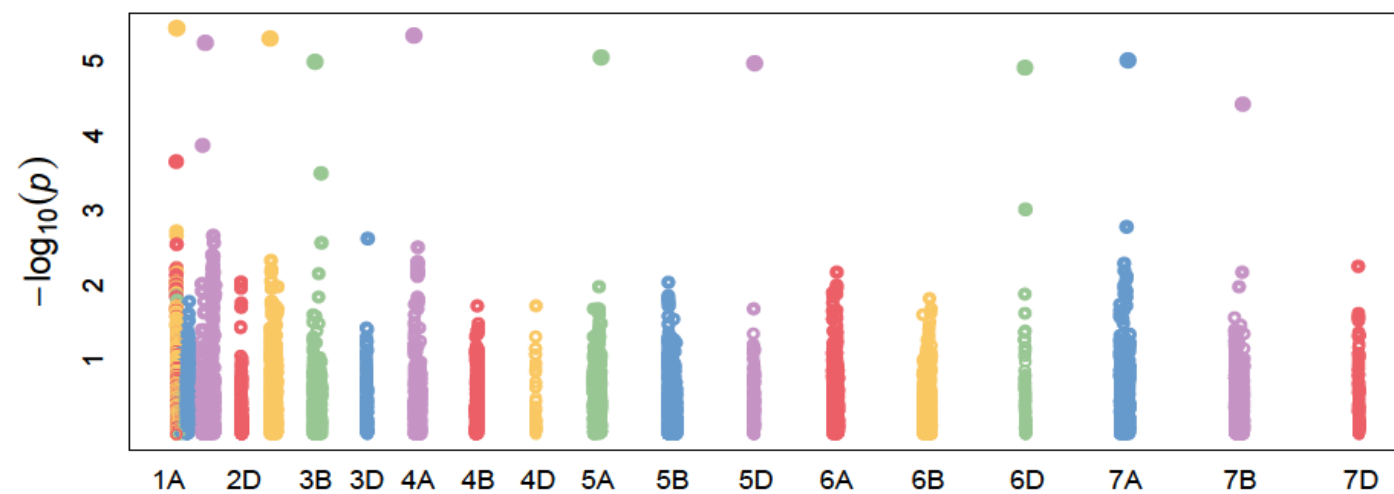
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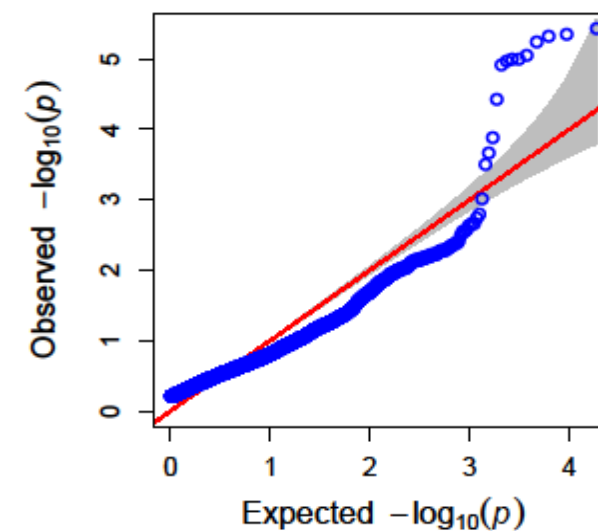
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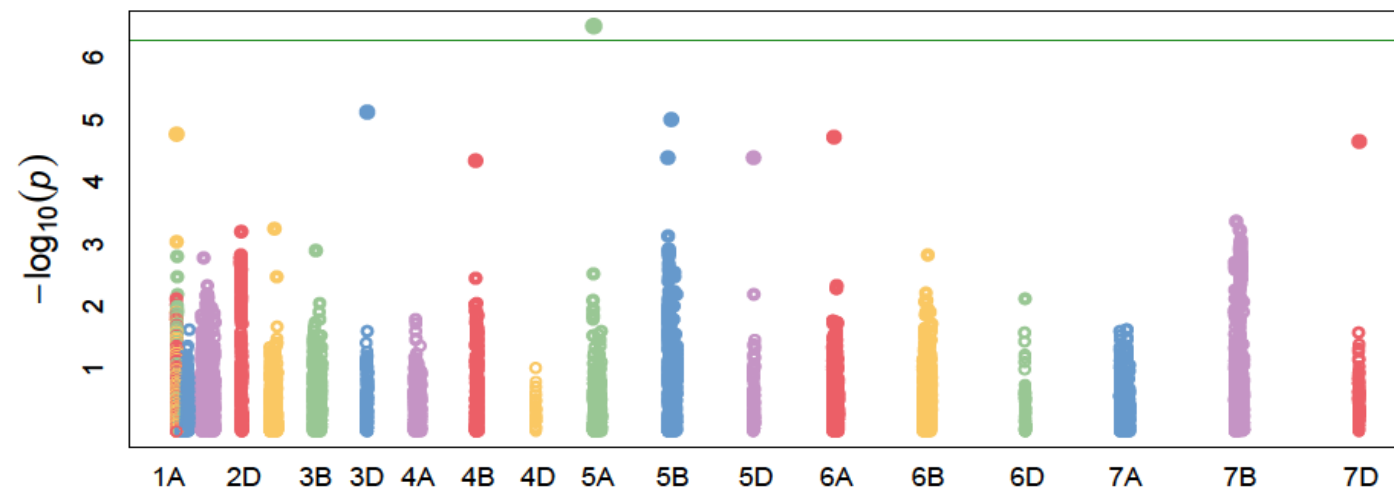
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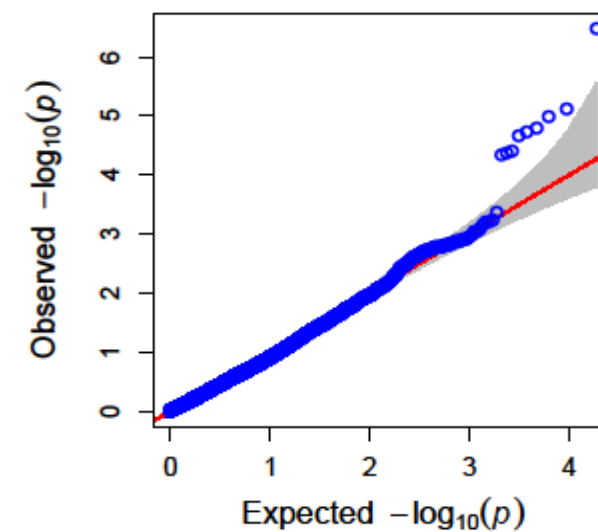
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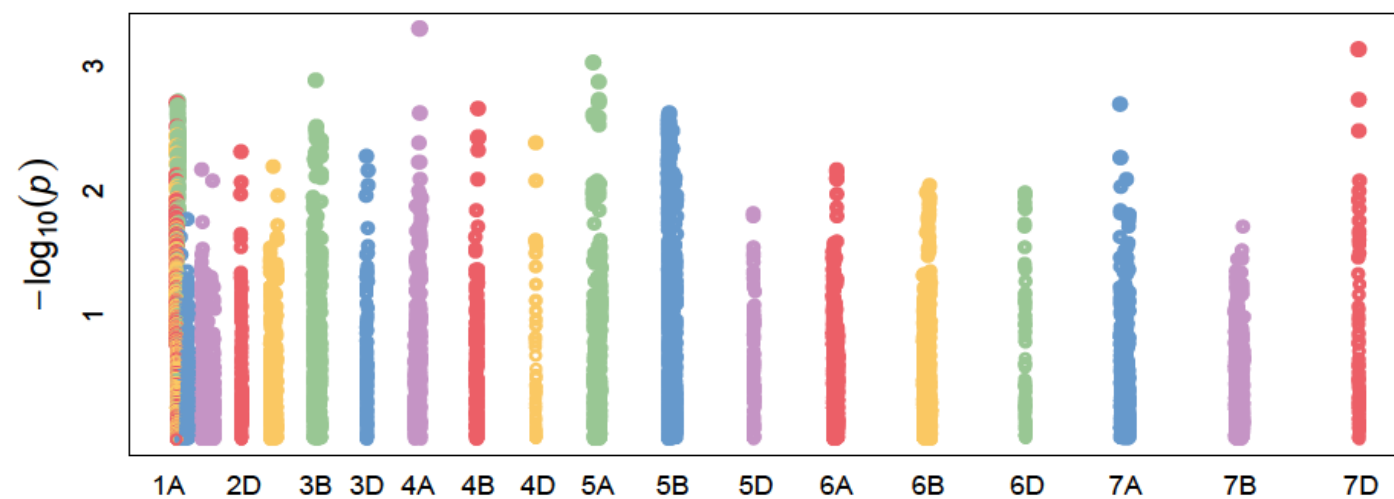
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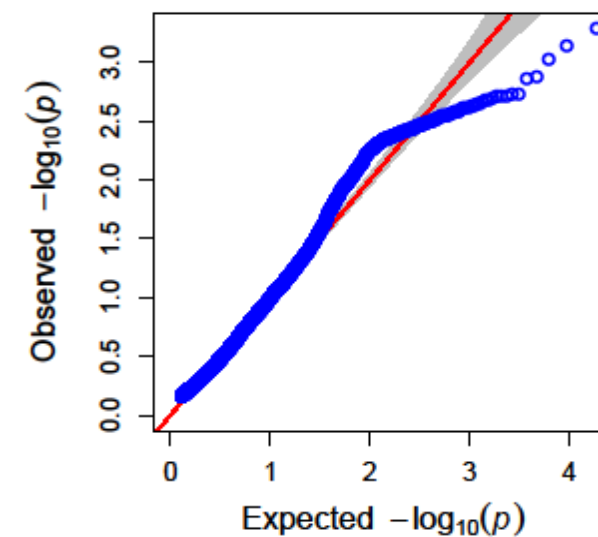
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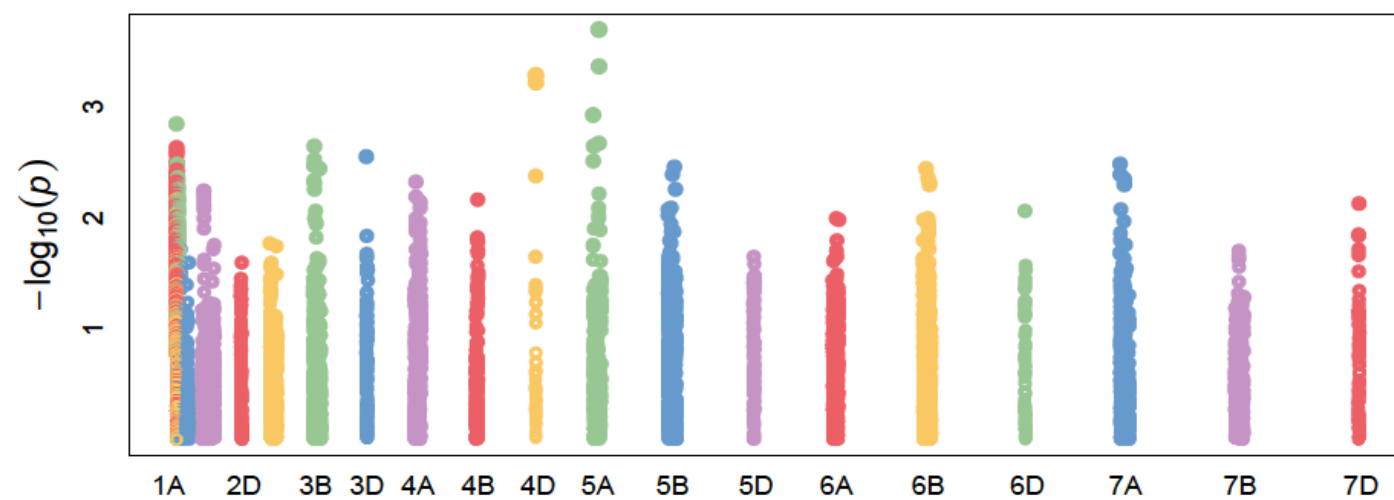
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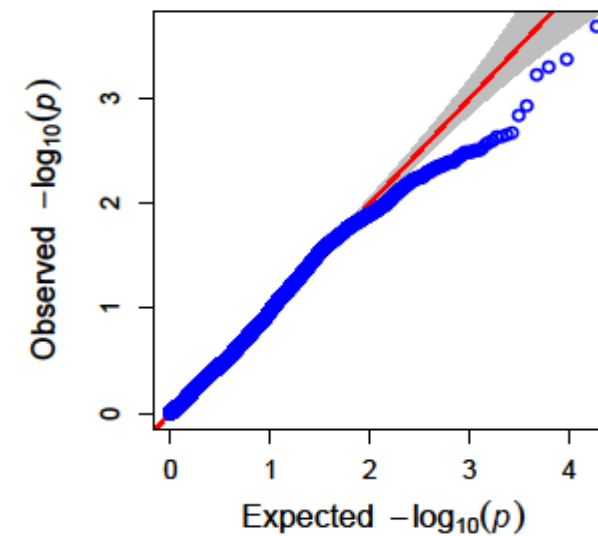
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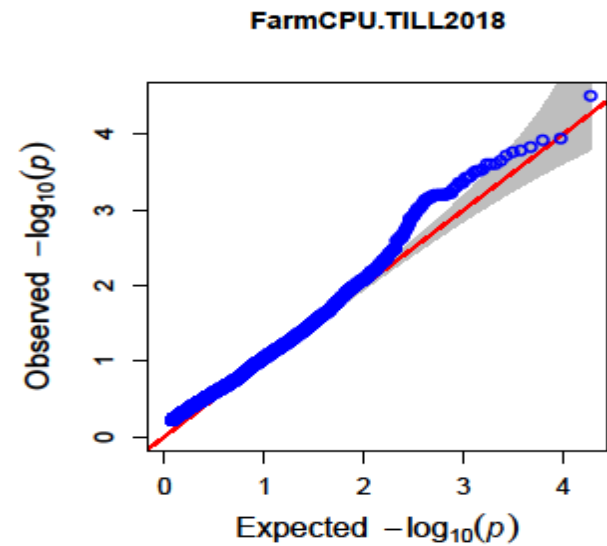
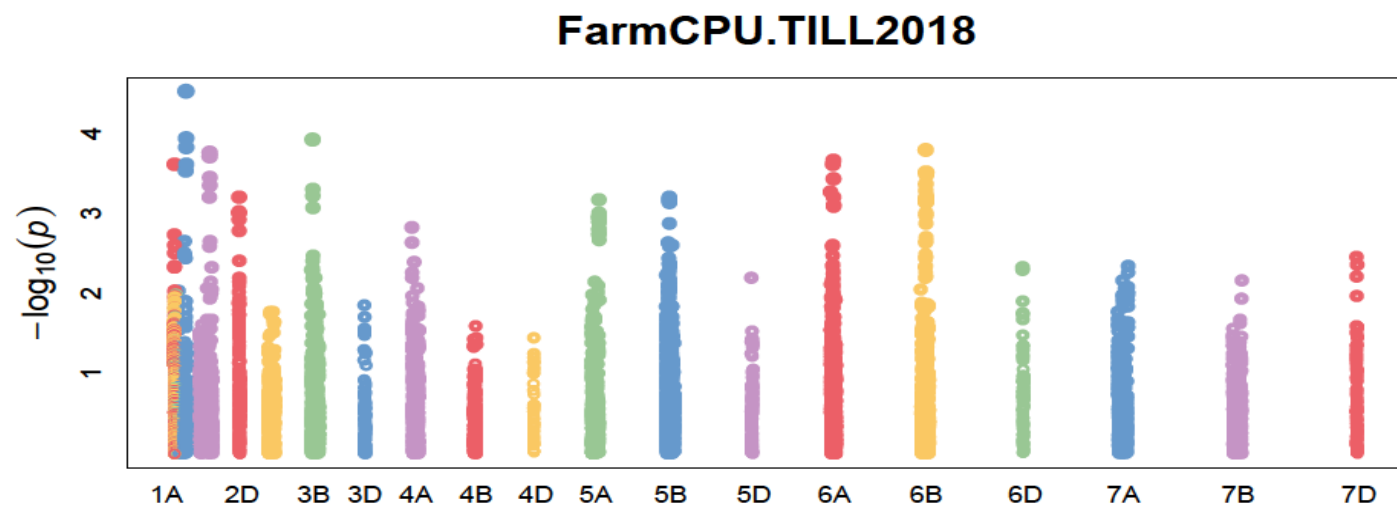
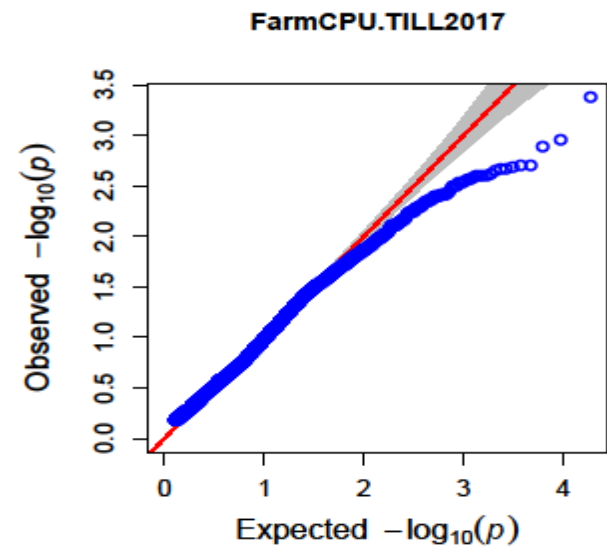
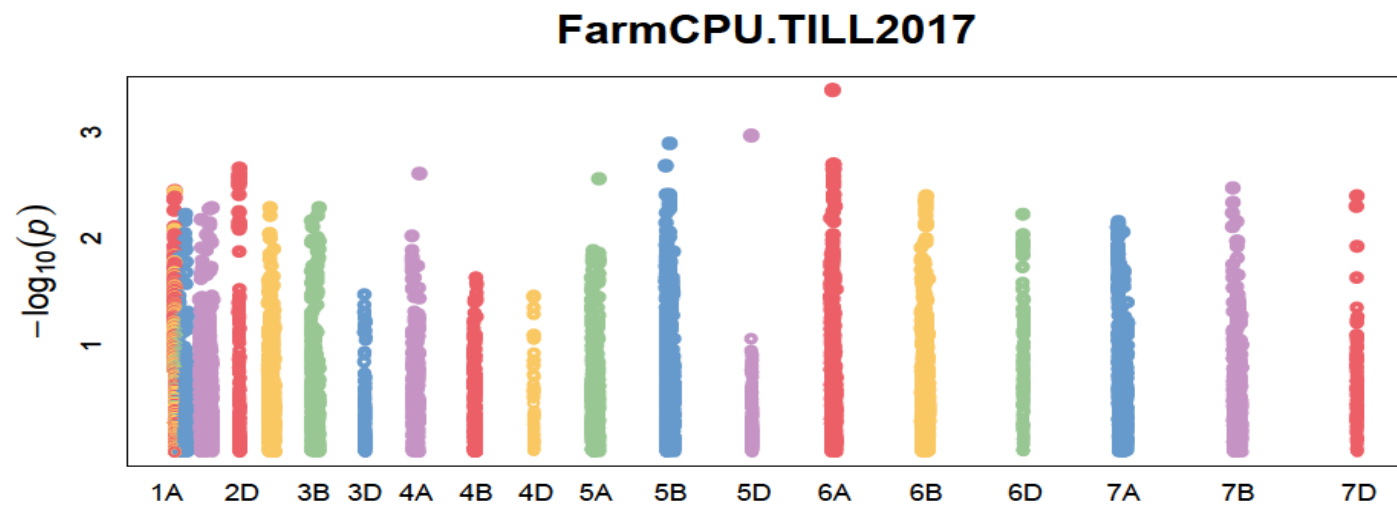
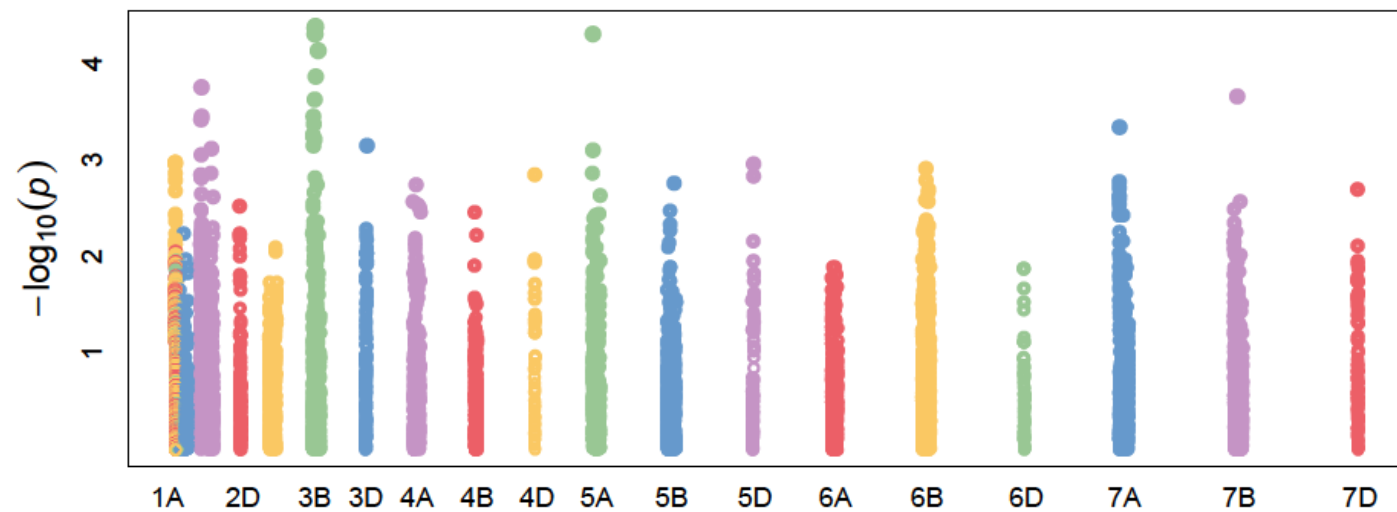
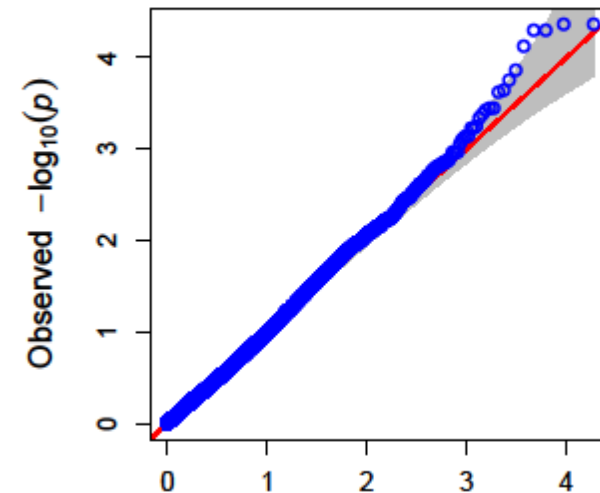


Figure S4a. Manhattan and Q-Q plots of FarmCPU model for plant height, flag leaf length, flag leaf width and number of tillers across different environments.

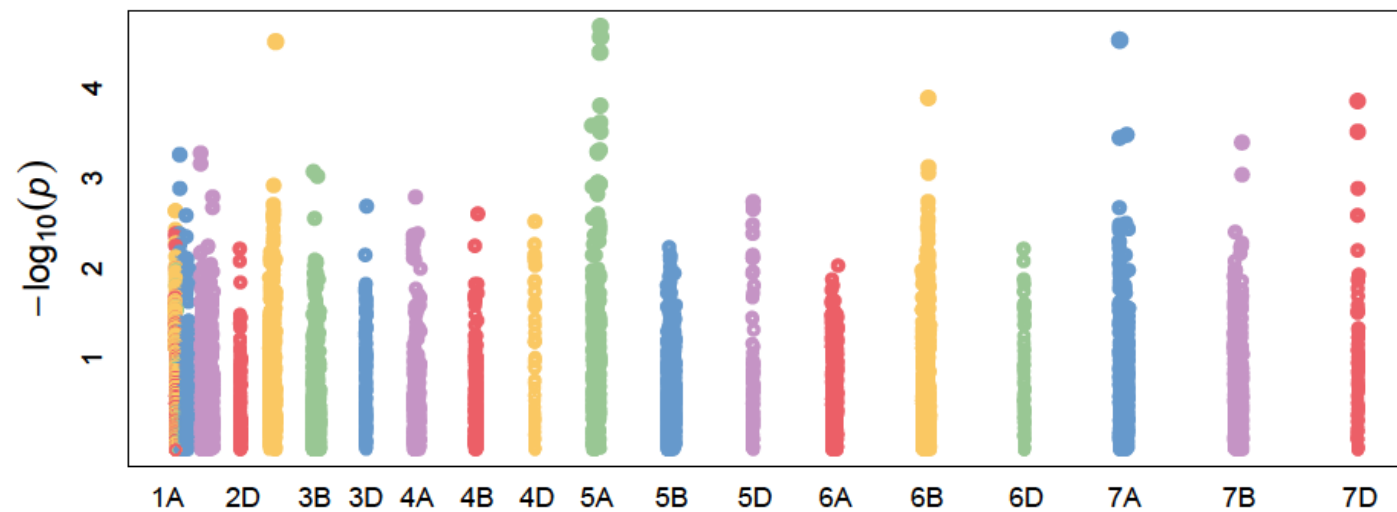
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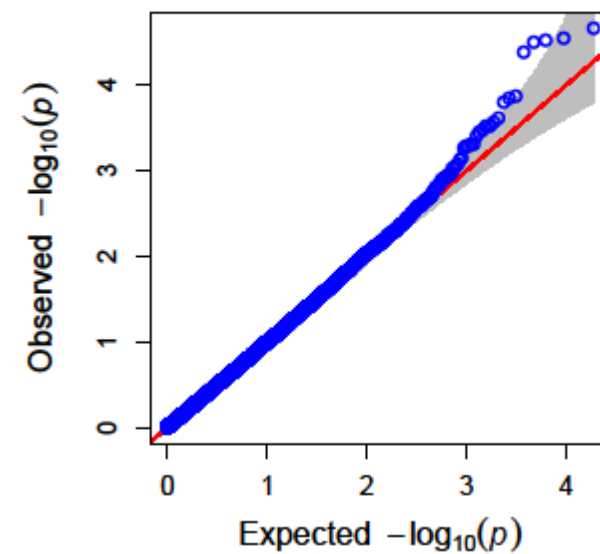
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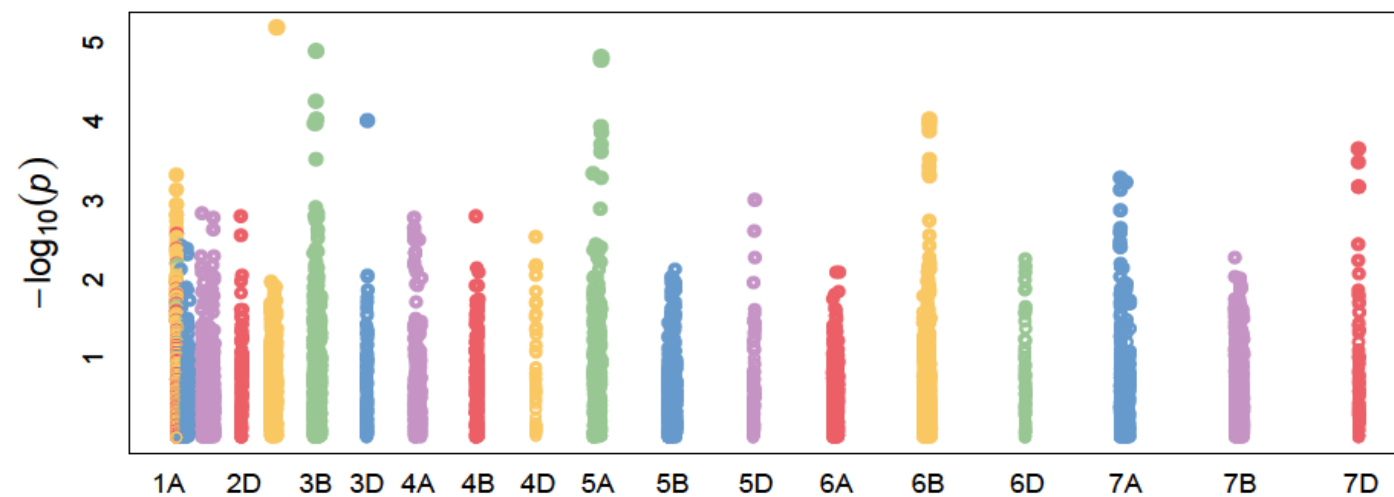
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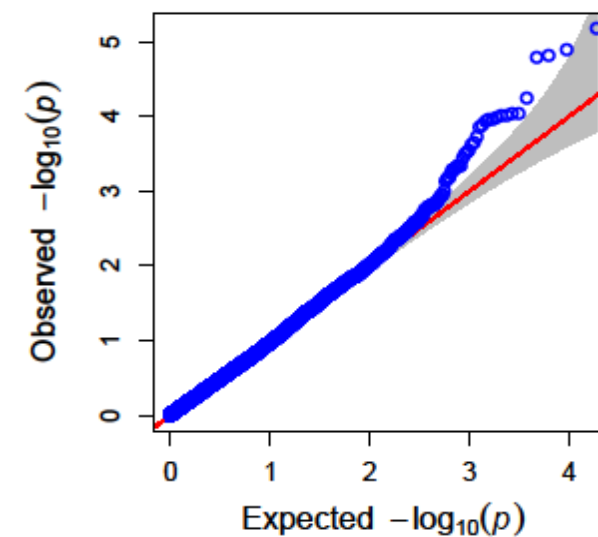
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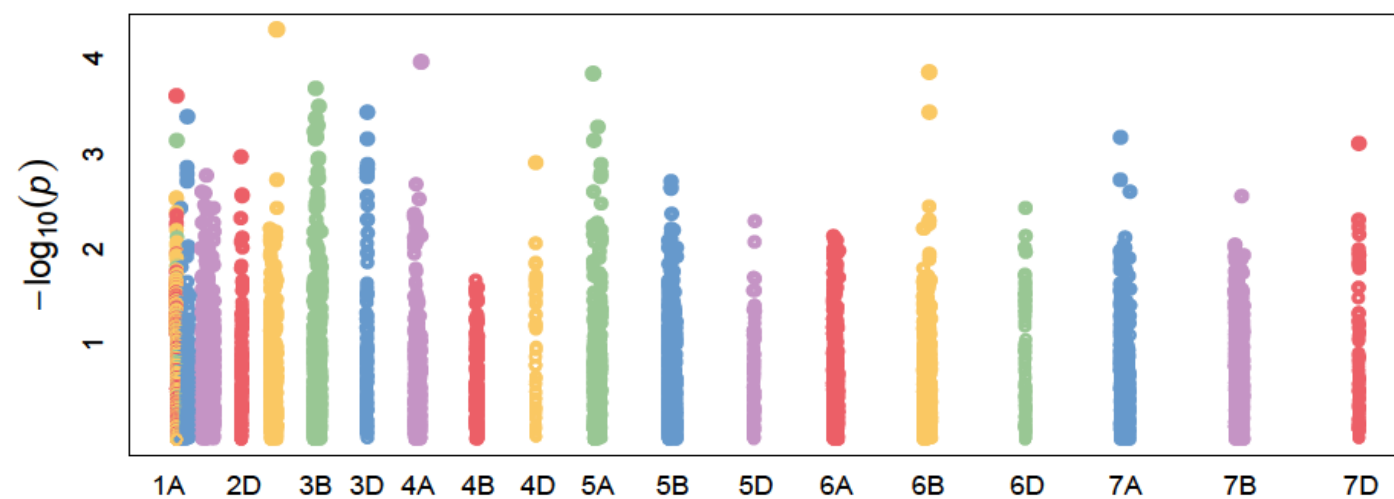
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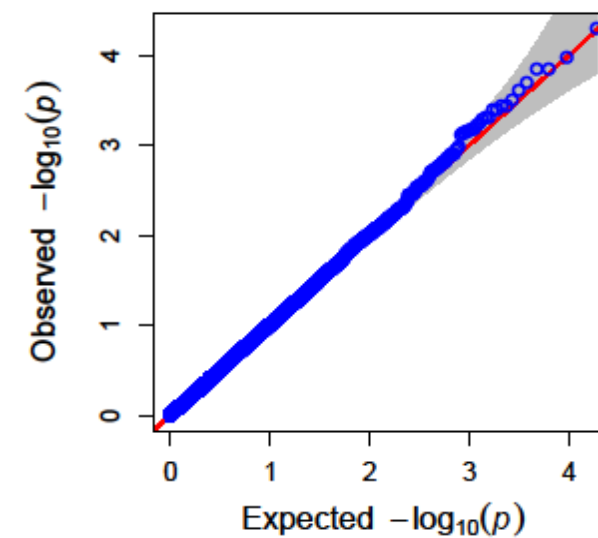
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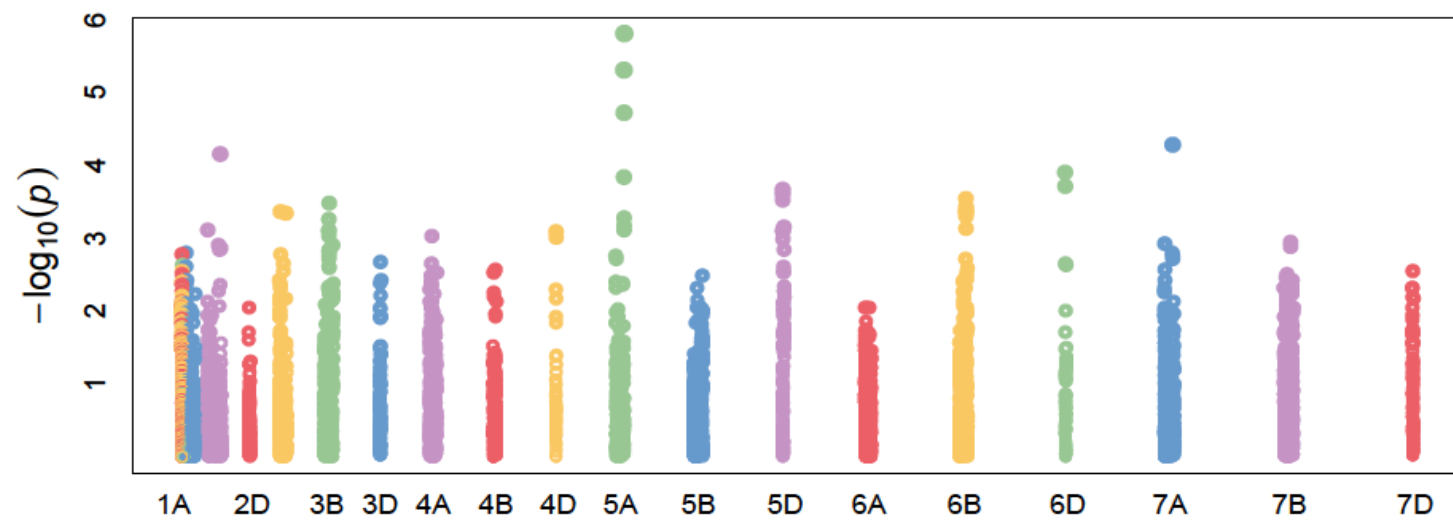
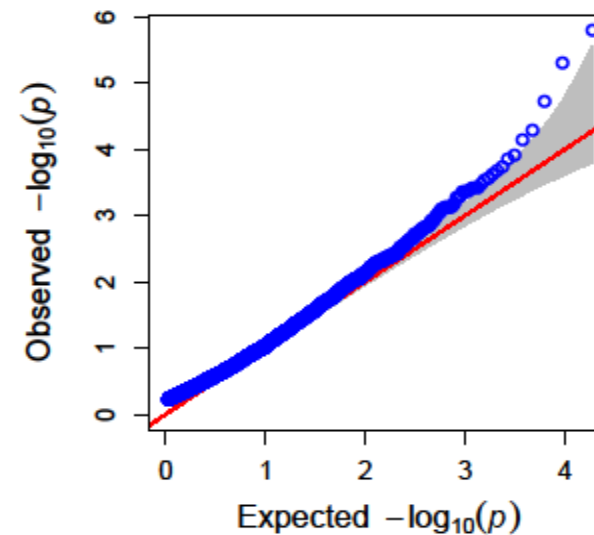
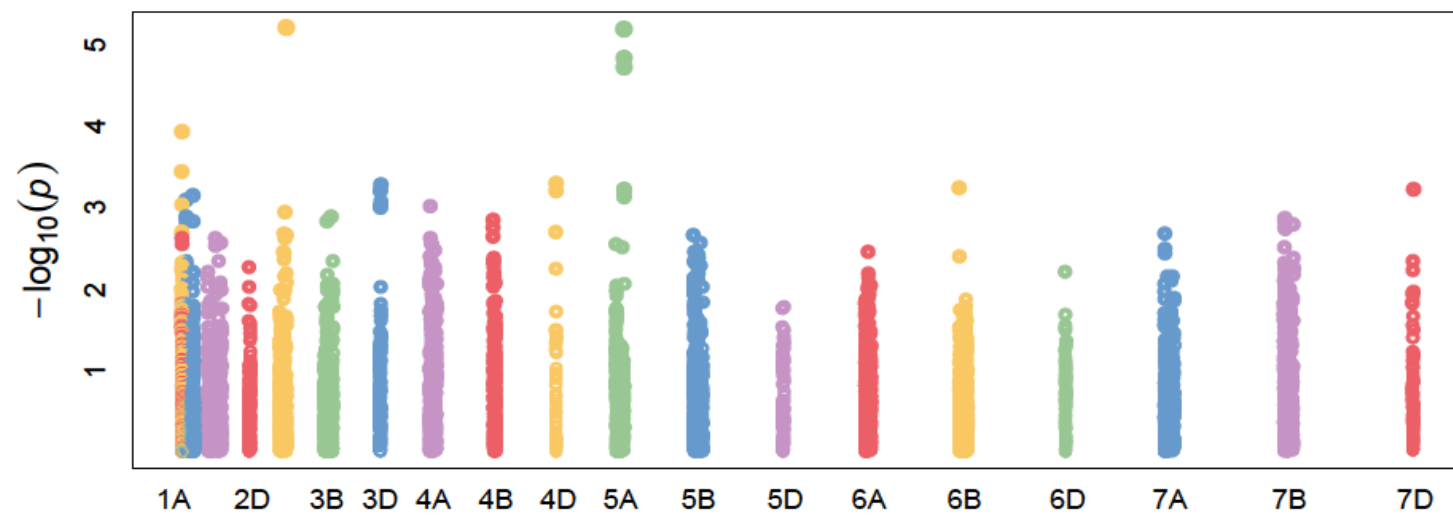
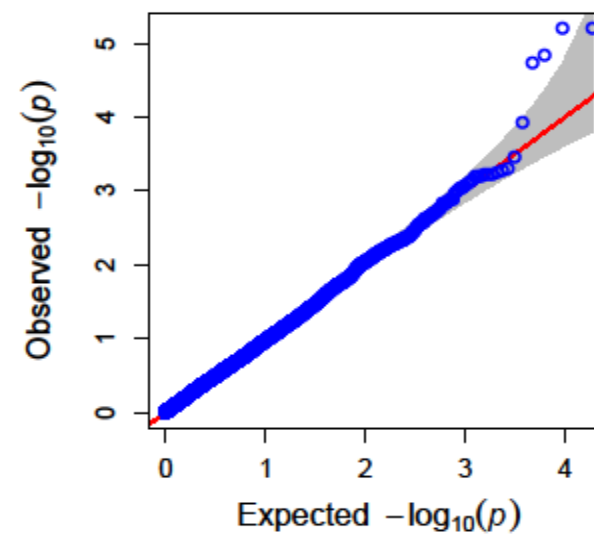


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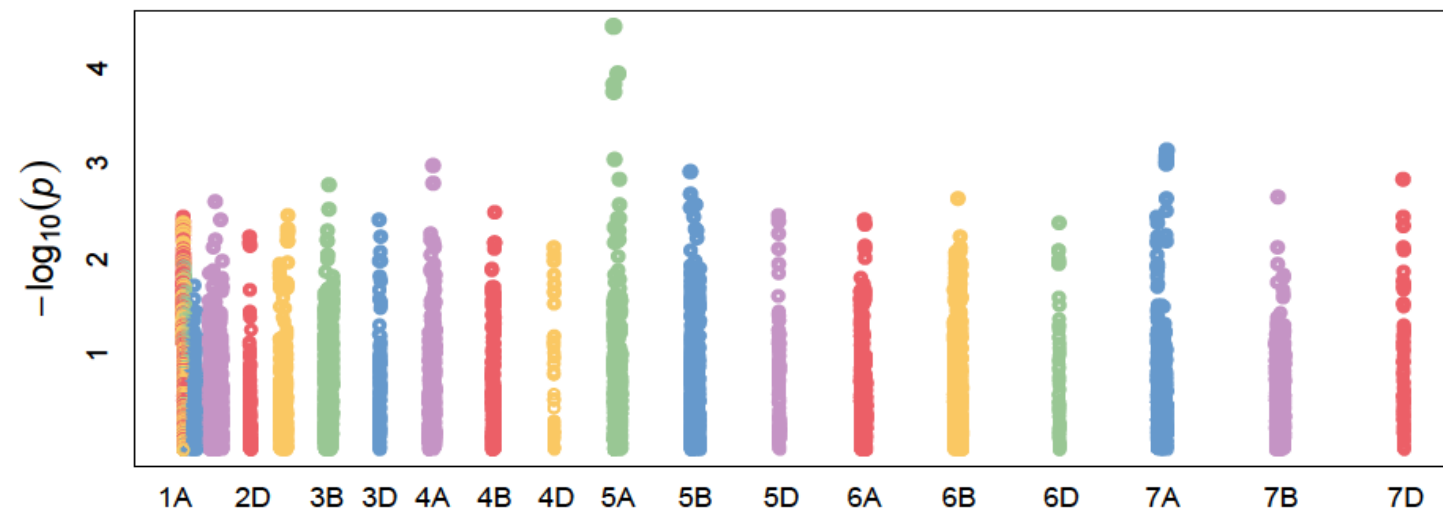


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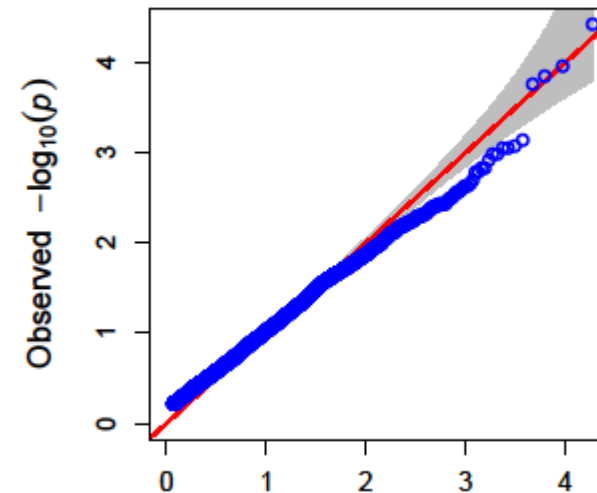


MLM.FLL2017**MLM.FLL2017****MLM.FLL2018****MLM.FLL2018**

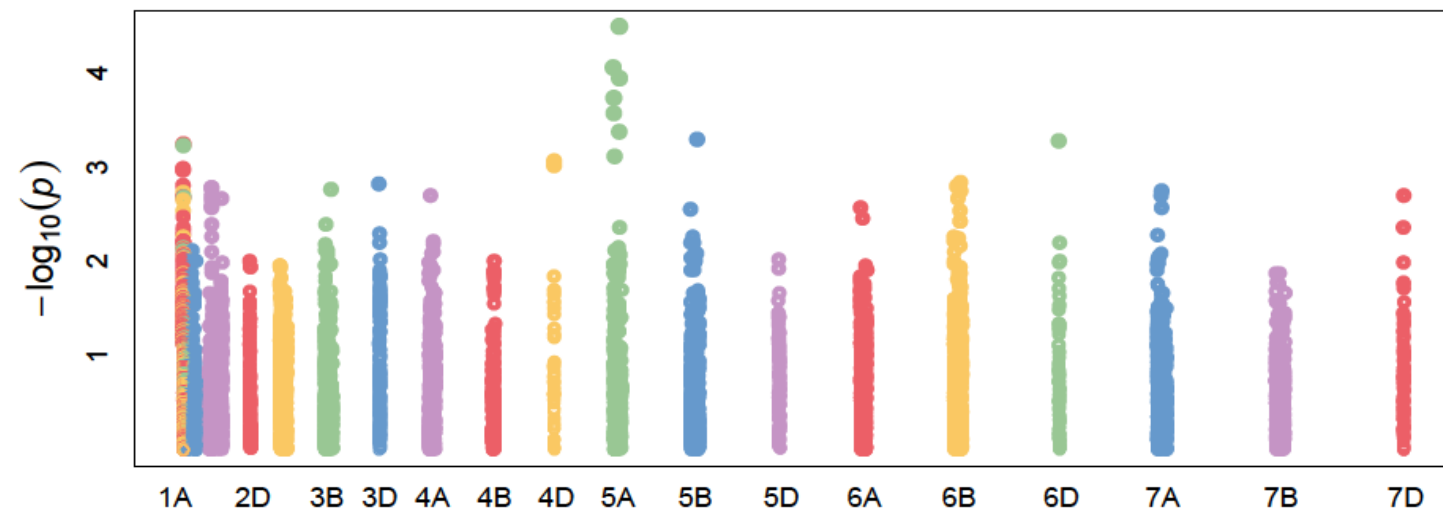
MLM.FLW2017



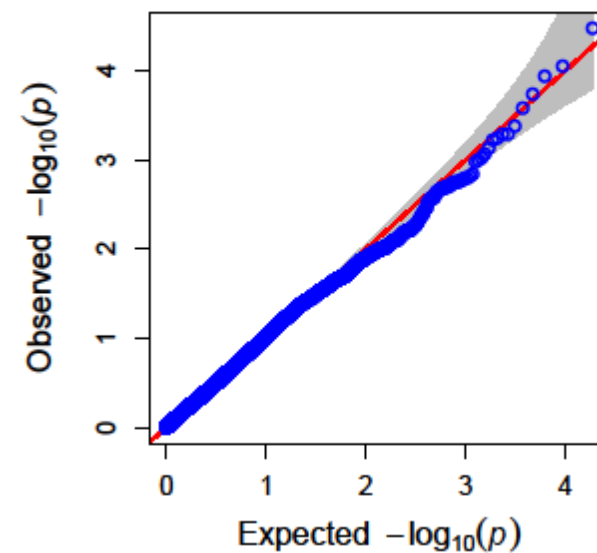
MLM.FLW2017



MLM.FLW2018



MLM.FLW2018



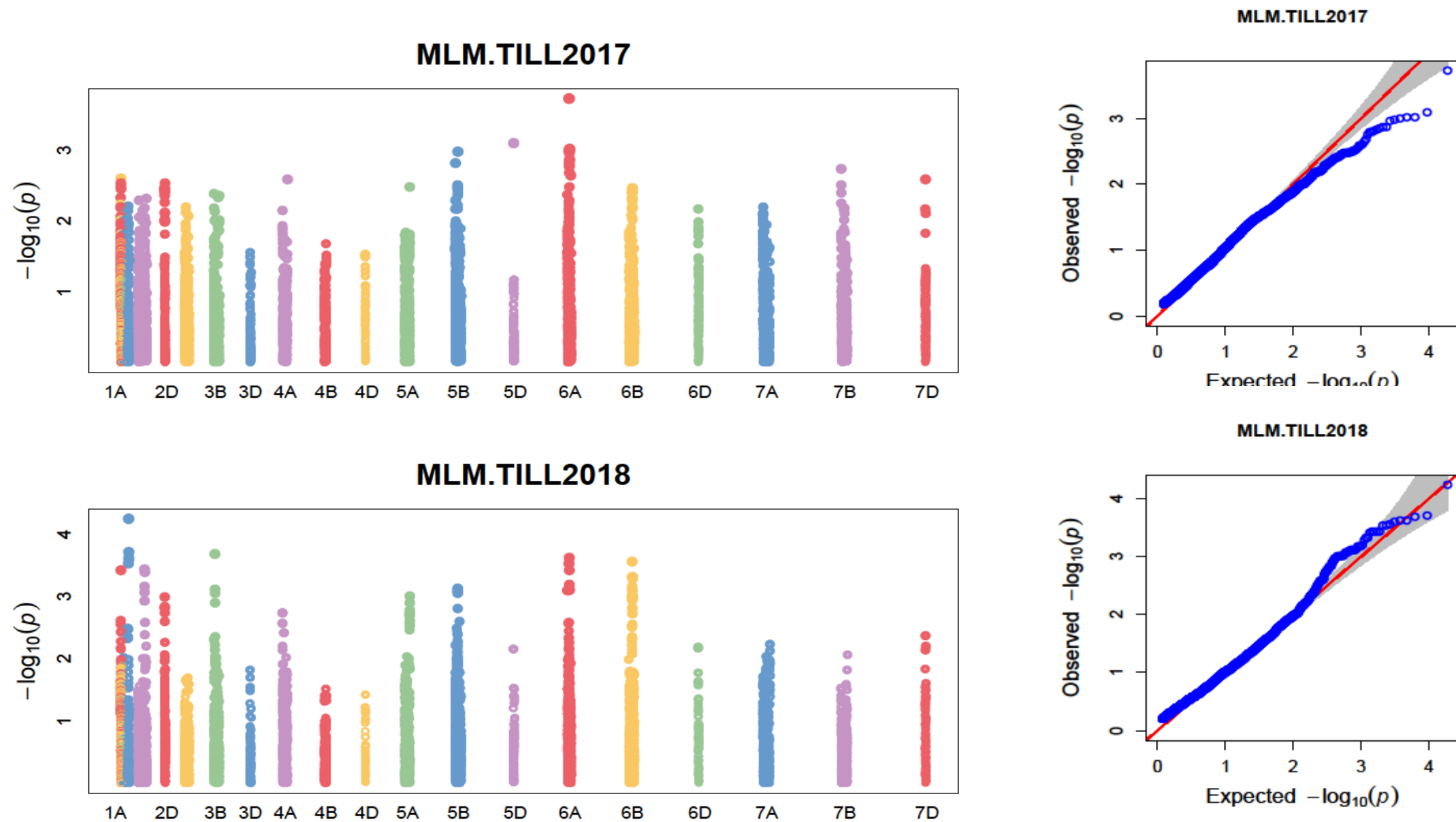
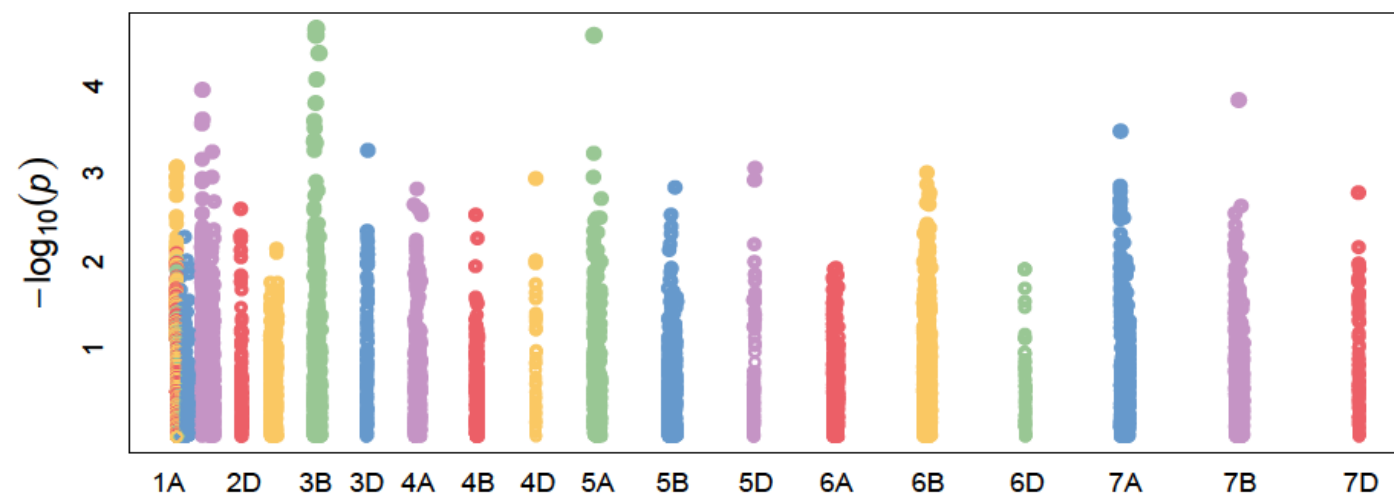
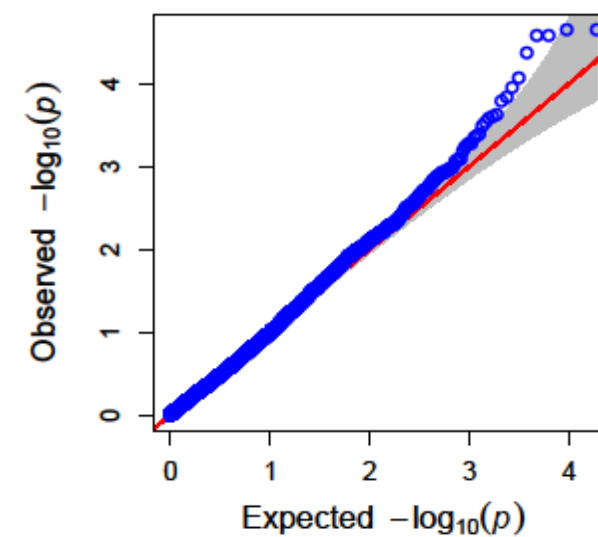


Figure S4b. Manhattan and Q-Q plots of MLM model for plant height, flag leaf length, flag leaf width and number of tillers across different environments.

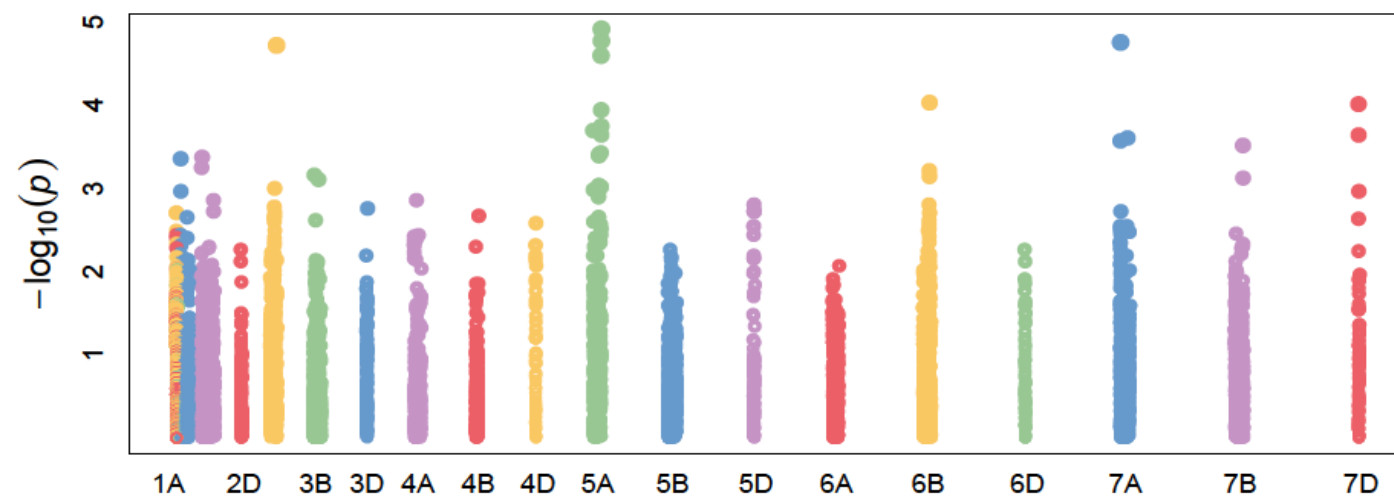
MLMM.PH2015



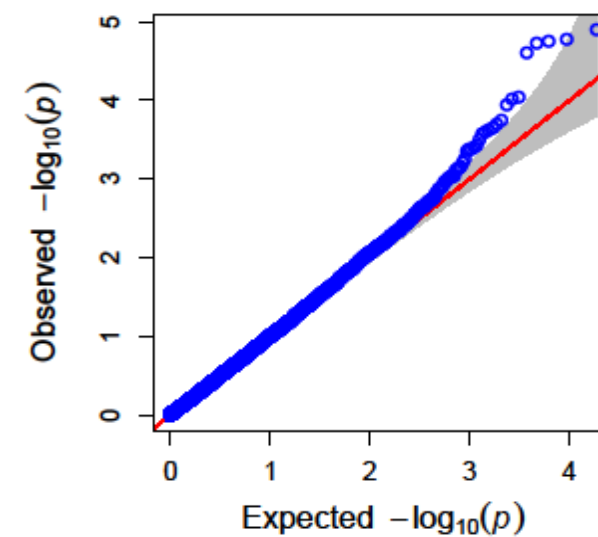
MLMM.PH2015



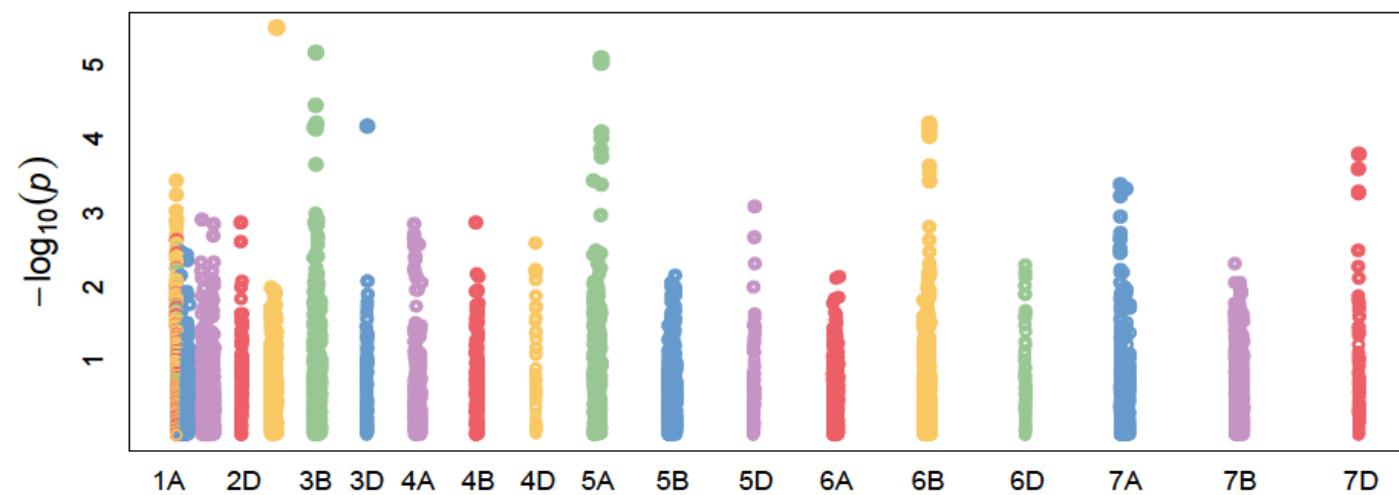
MLMM.PH2016



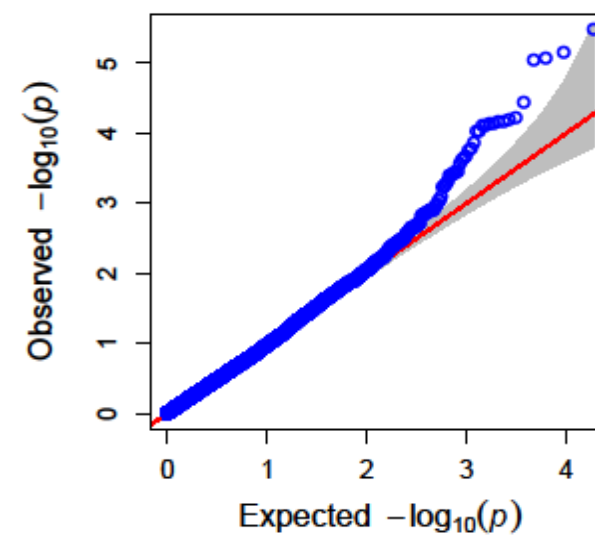
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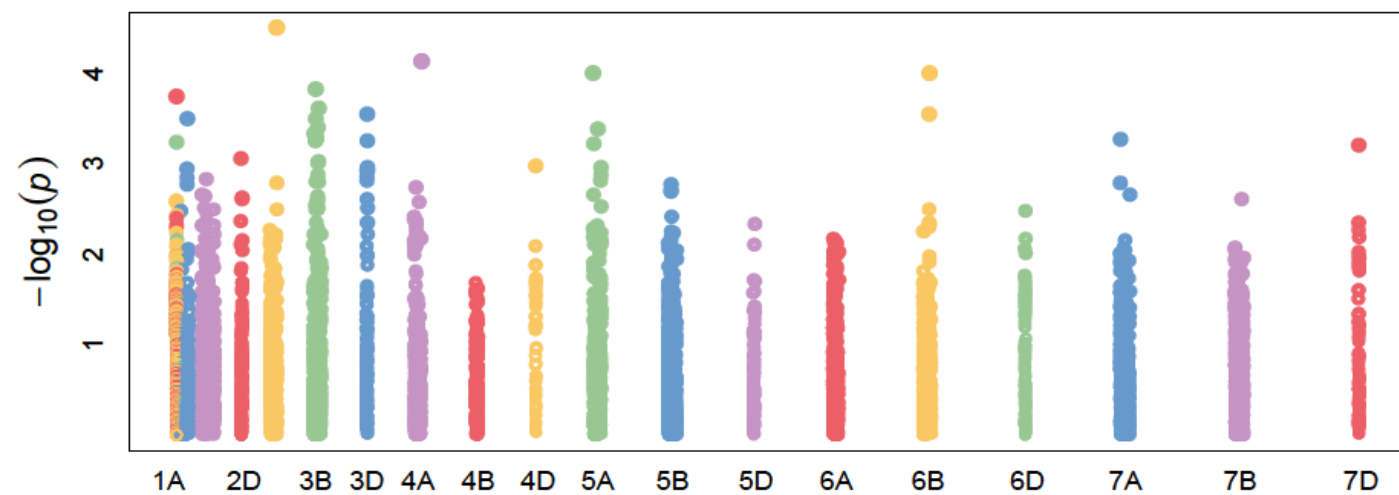
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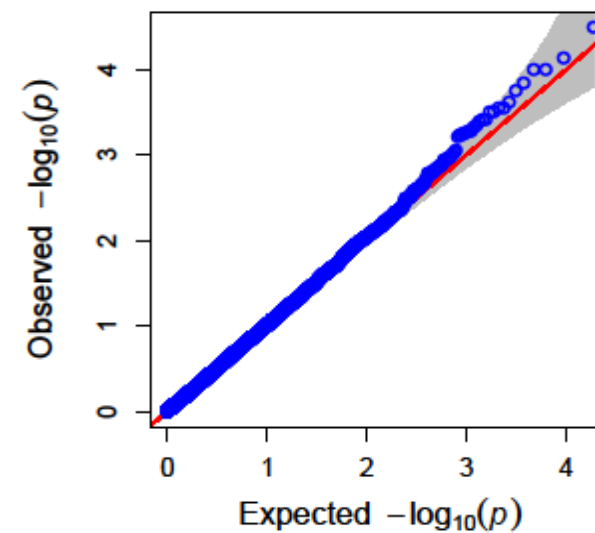
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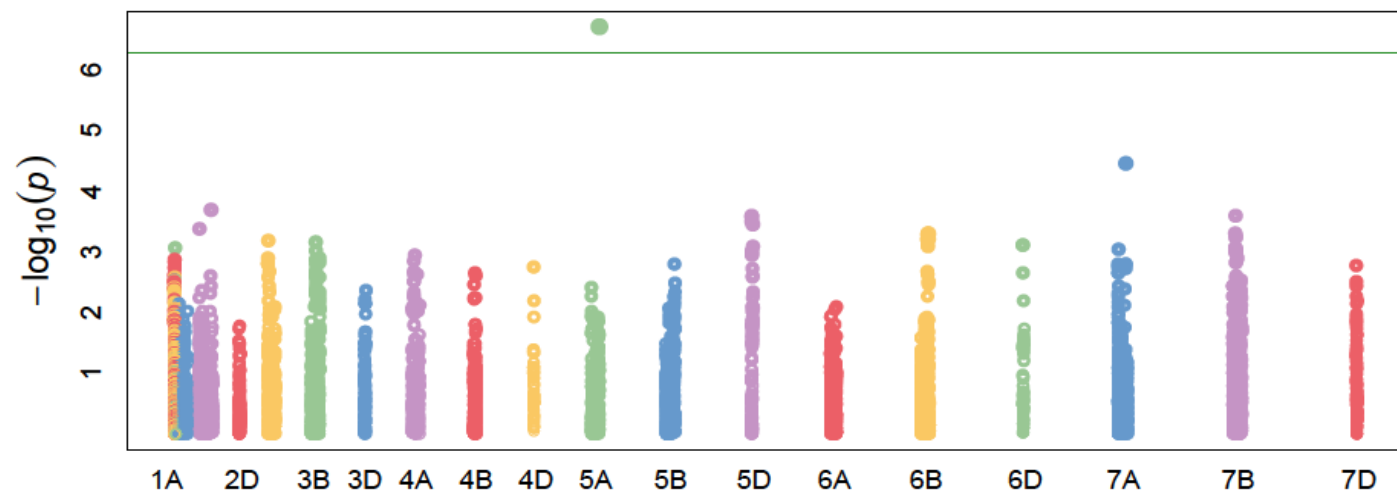
MLMM.PH2018



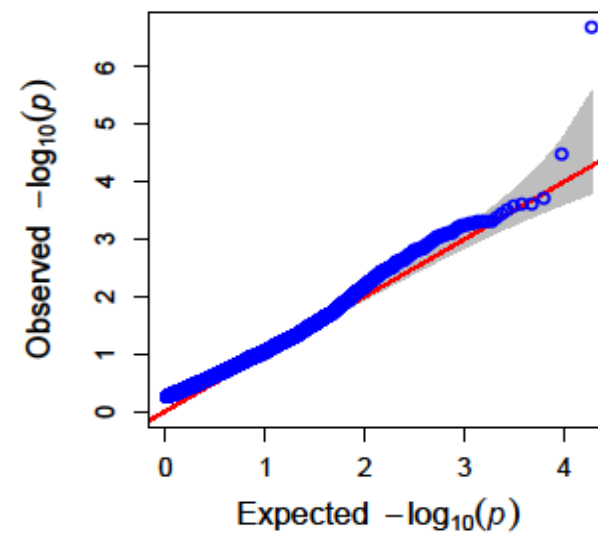
MLMM.PH2018



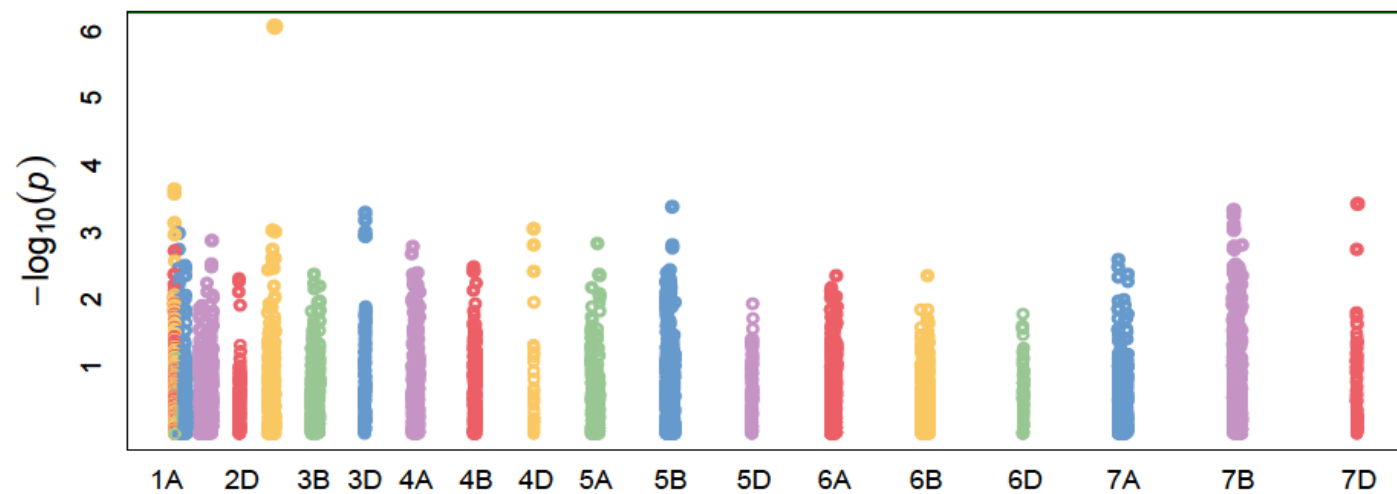
MLMM.FLL2017



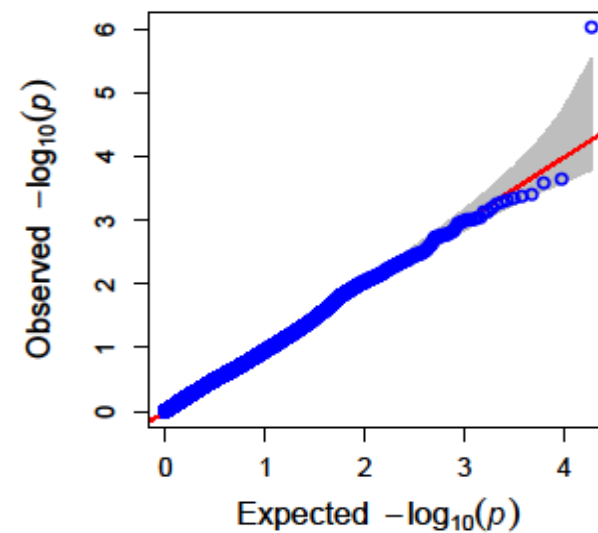
MLMM.FLL2017



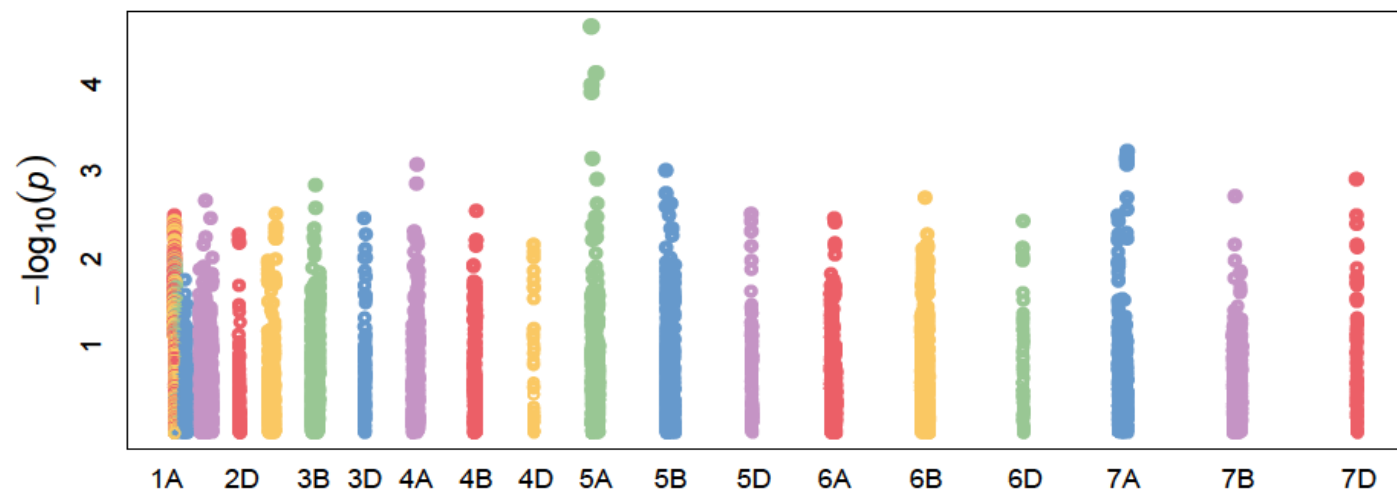
MLMM.FLL2018



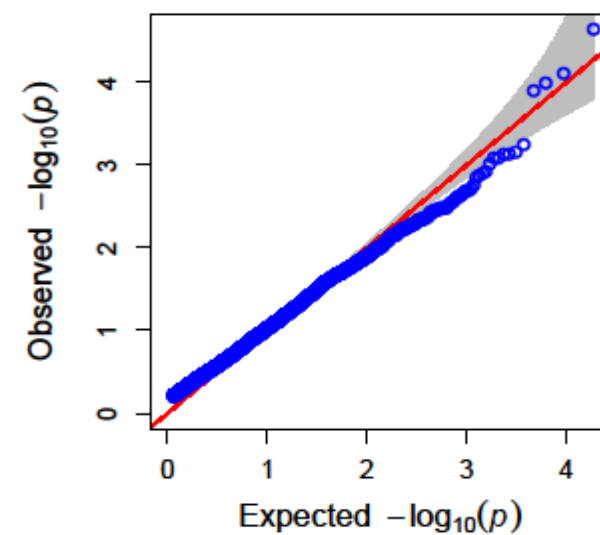
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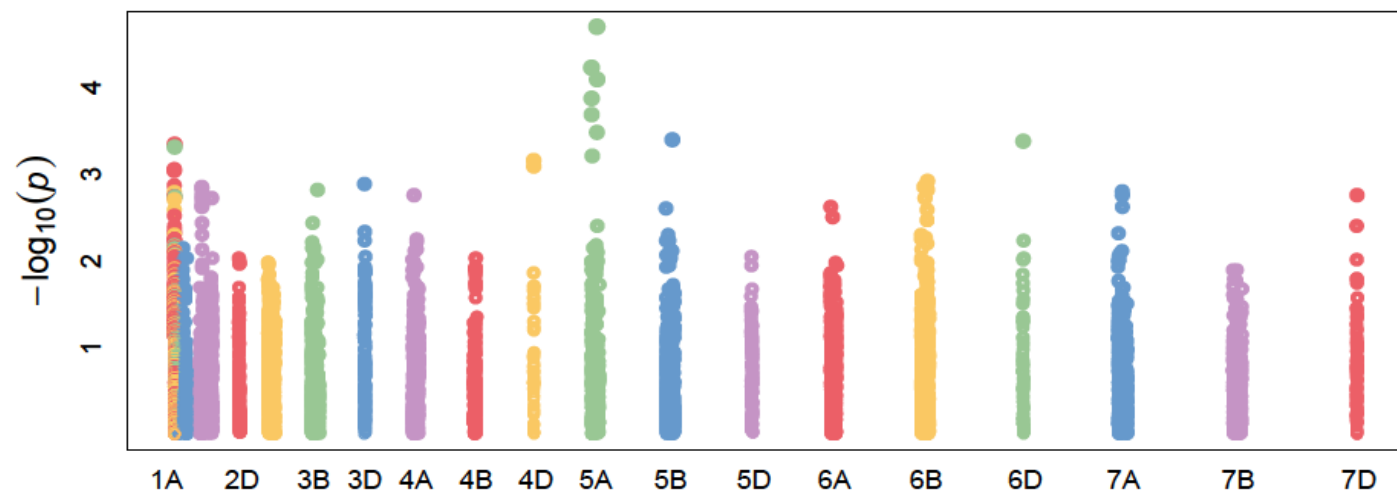
MLMM.FLW2017



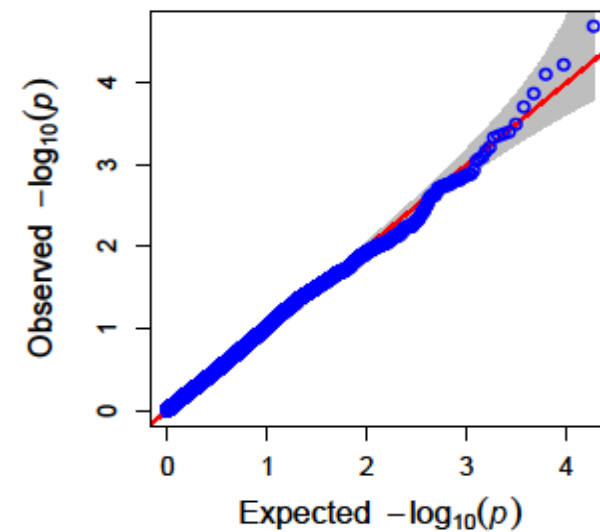
MLMM.FLW2017



MLMM.FLW2018



MLMM.FLW2018



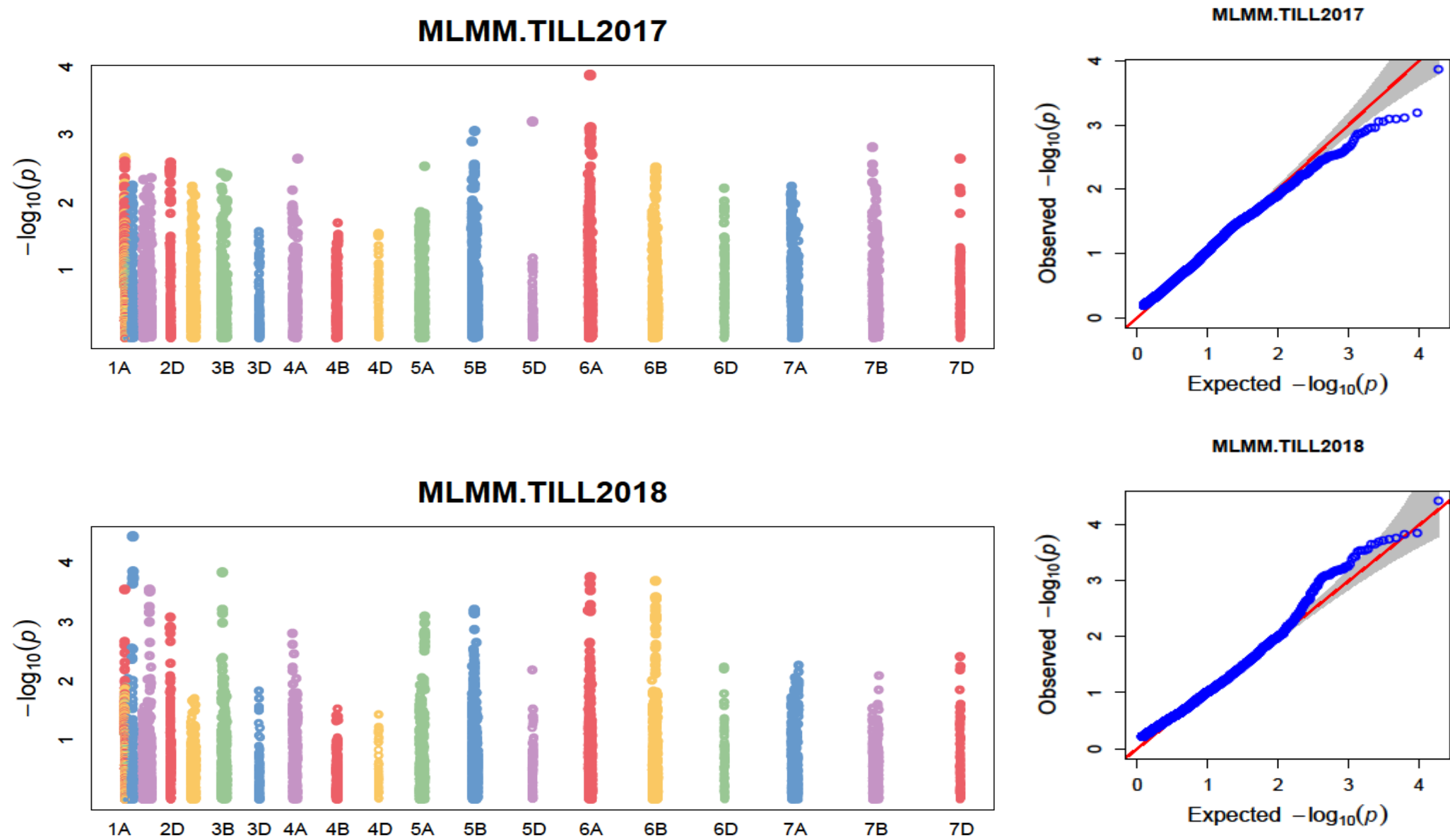


Figure S4c. Manhattan and Q-Q plots of MLMM model for plant height, flag leaf length, flag leaf width and number of tillers across different environments.