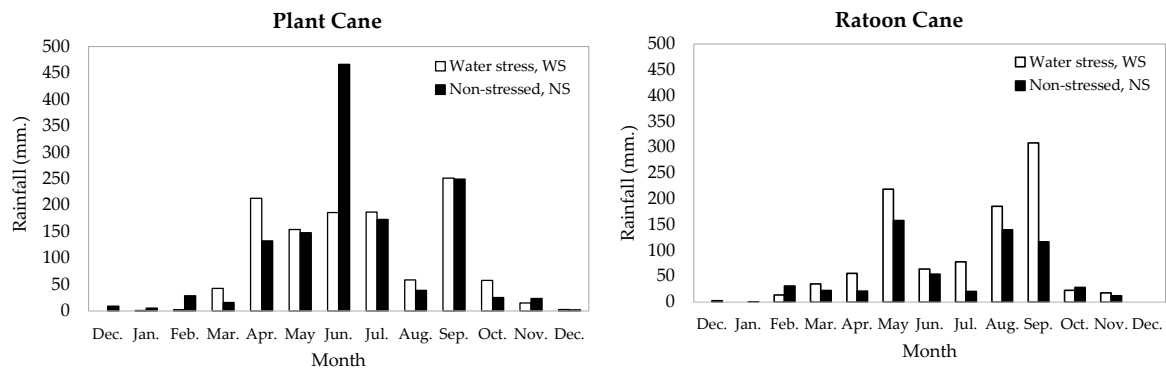
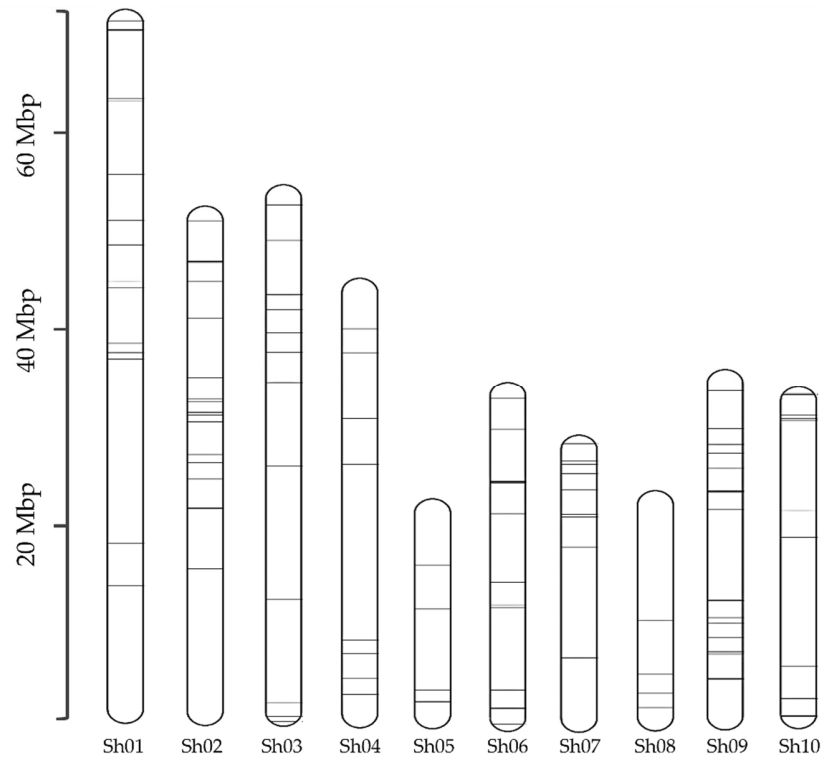


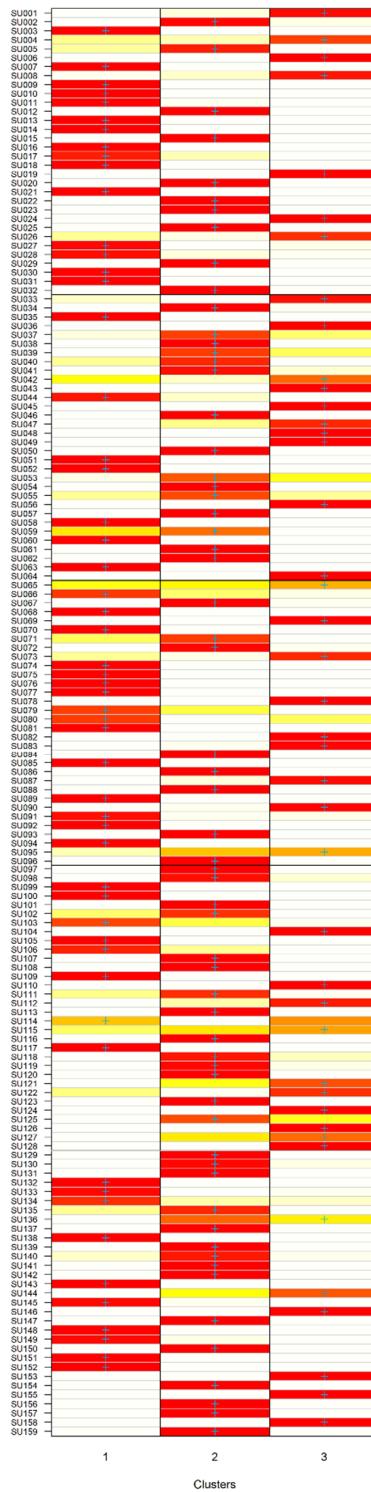
**Figure S1.** The accumulated monthly rainfall in two growing seasons of an irrigated (non-stressed, NS) and a rainfed (water stress, WS) field experiments



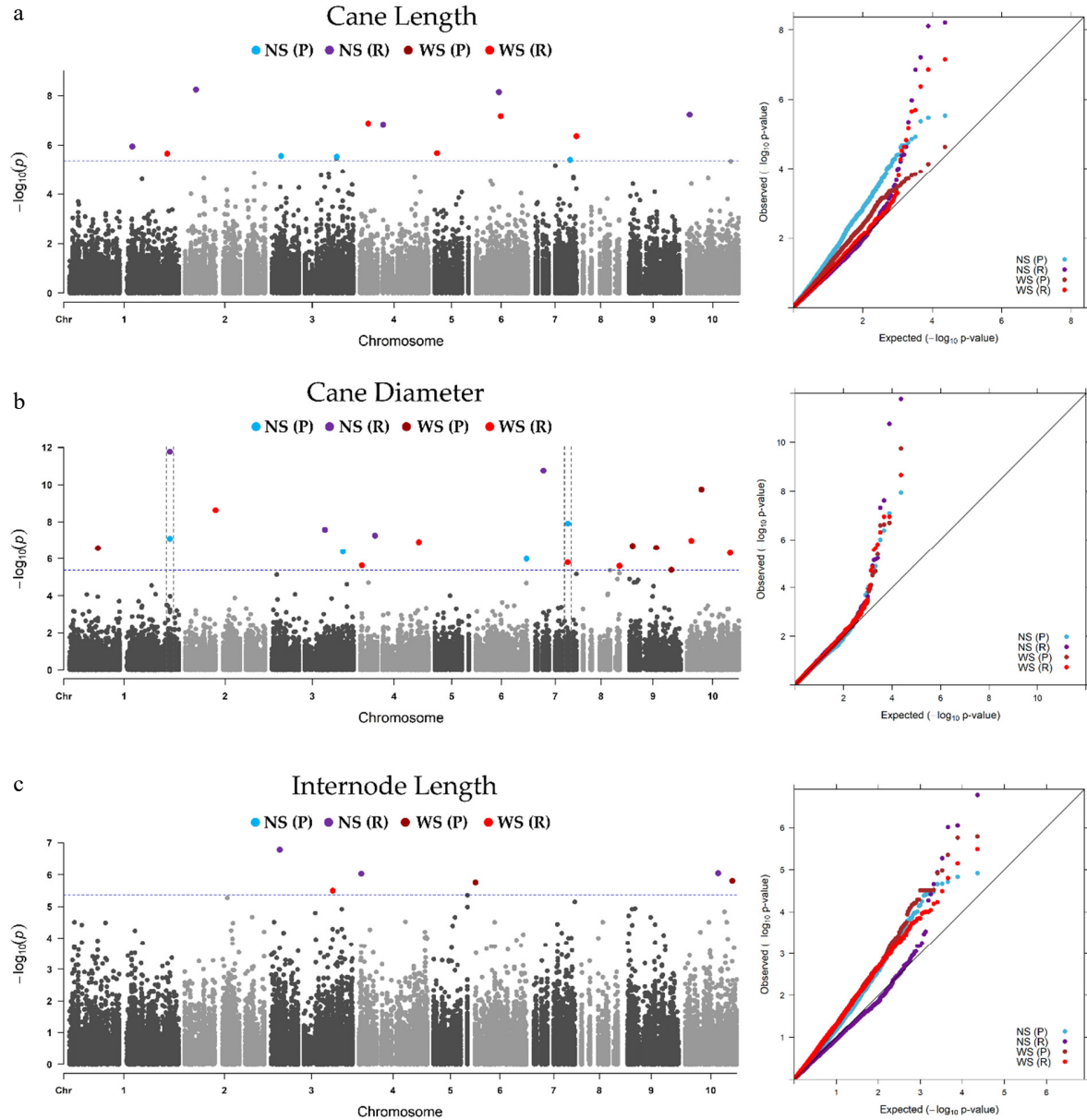
**Figure S2.** Chromosomal locations of 5,053 polymorphic SNP for population structure analysis. The 10 sugarcane chromosomes (Sh01-Sh10) are shown as vertical bars and each horizontal line on the bar represents SNP. The scale on left side represents physical map positions in Mbp.

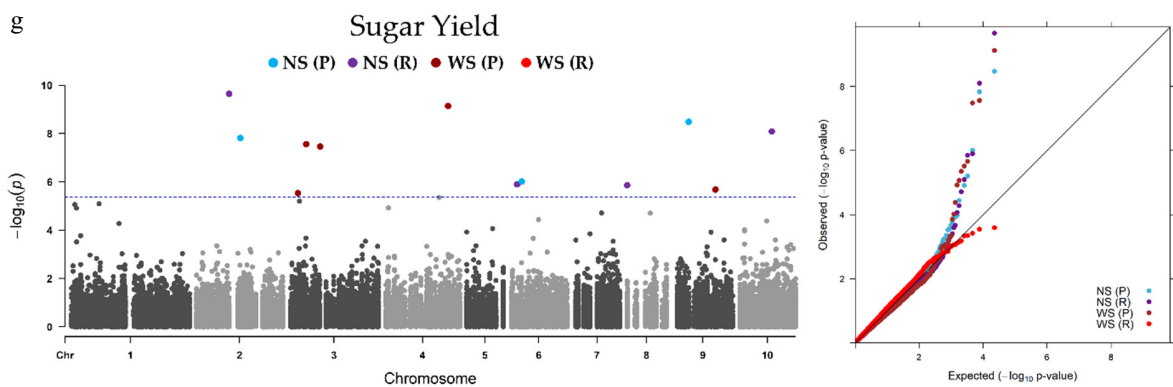
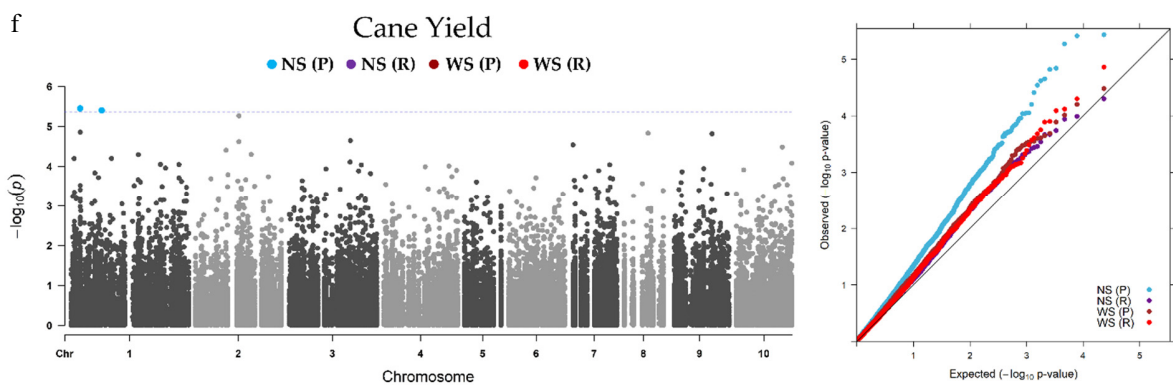
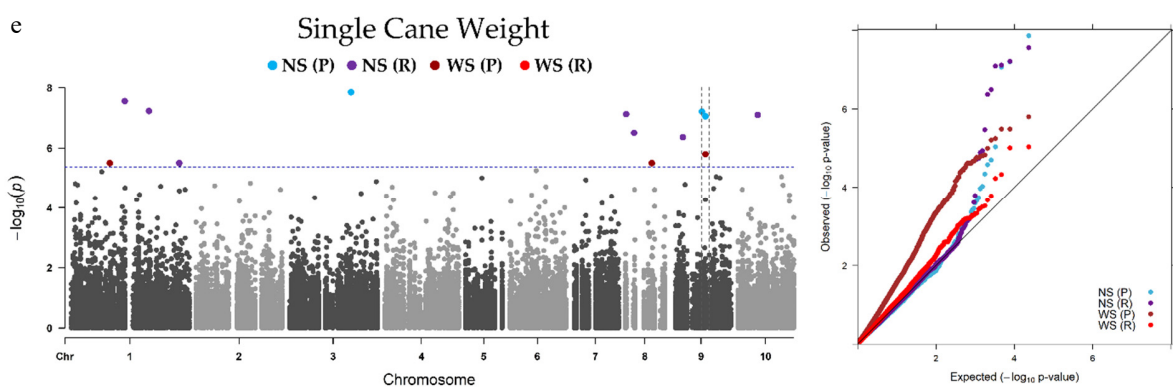
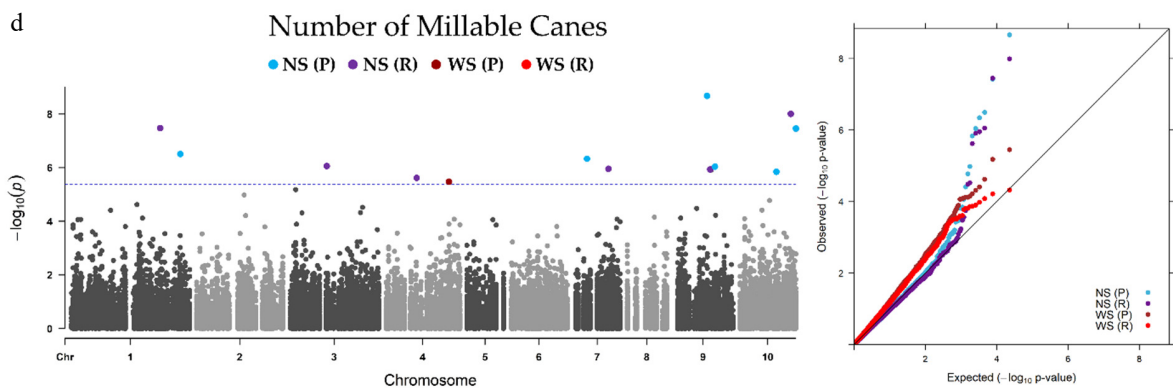


**Figure S3.** Distribution of 159 sugarcane accessions into 3 subpopulations obtained through the DAPC. The heat colors inside the columns indicate the set of accessions grouped in the corresponding subpopulation according to the membership probabilities (red =1 and white=0) based on DAPC and blue crosses represent the prior cluster provided to DAPC through k-mean method.

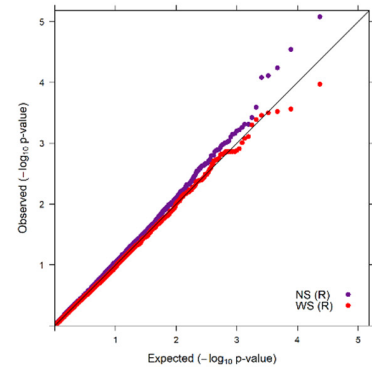
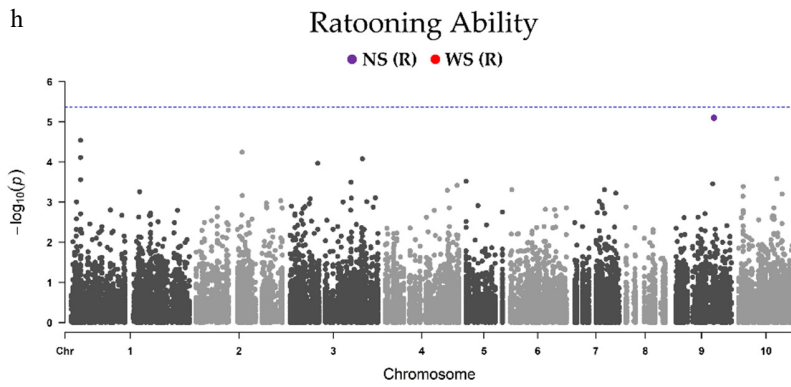


**Figure S4.** Manhattan plots and quantile-quantile (QQ) plots of MTAs for each agronomic trait of plant cane (P) and ratoon cane (R) evaluated under non-stressed (NS) and water-stressed (WS) conditions, in a panel of the 159 accessions using FarmCPU. The blue dotted line marks the threshold to declare a significant association based on Bonferroni-corrected significance threshold  $\alpha=0.05$  ( $p\text{-value} \leq 4.26 \times 10^{-6}$ ). (a) cane length (CL), (b) cane diameter (CD), (c) internode length (IL), (d) number of millable canes (NMC), (e) single cane weight (SCW), (f) cane yield (CY), (g) sugar yield (SY), (h) ratooning ability (RA), (i) brix (BR), (j) commercial cane sugar (CCS), (k) polarization (PO), (l) purity (PU) and (m) fiber (FB)

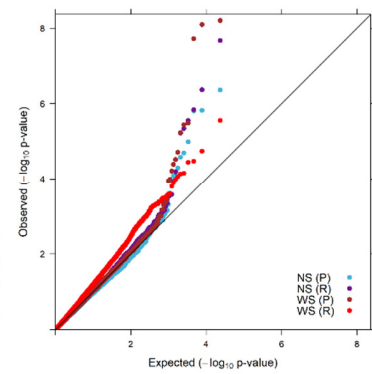
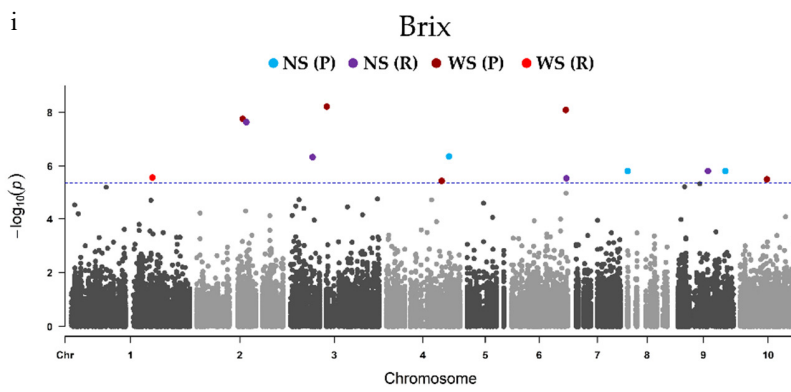




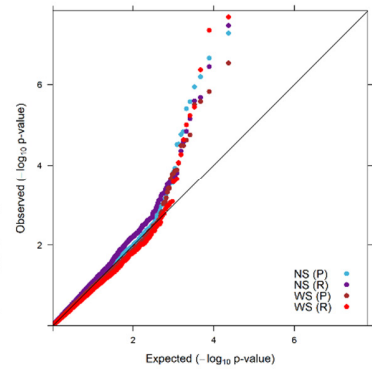
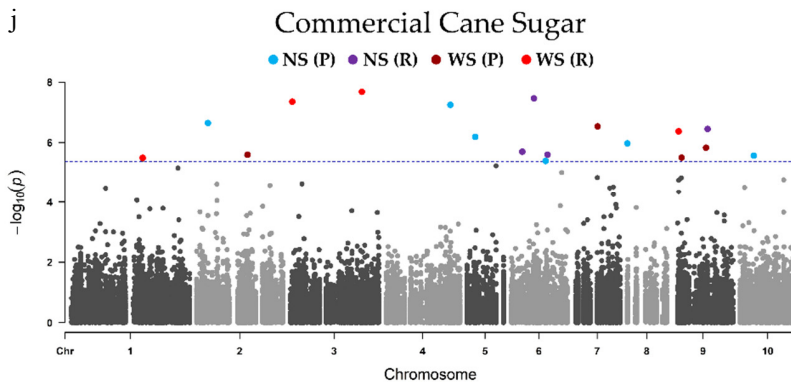
h



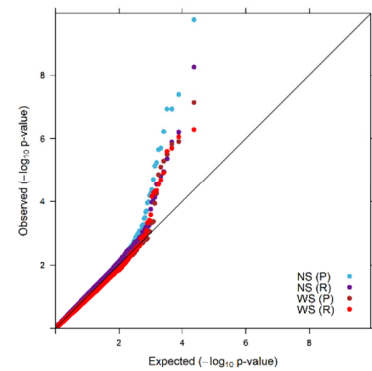
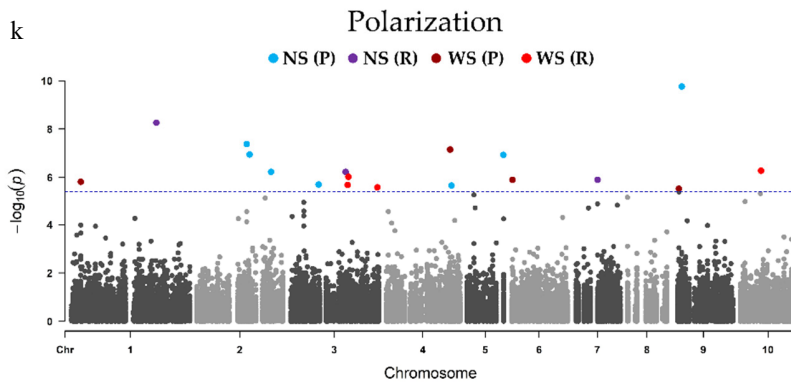
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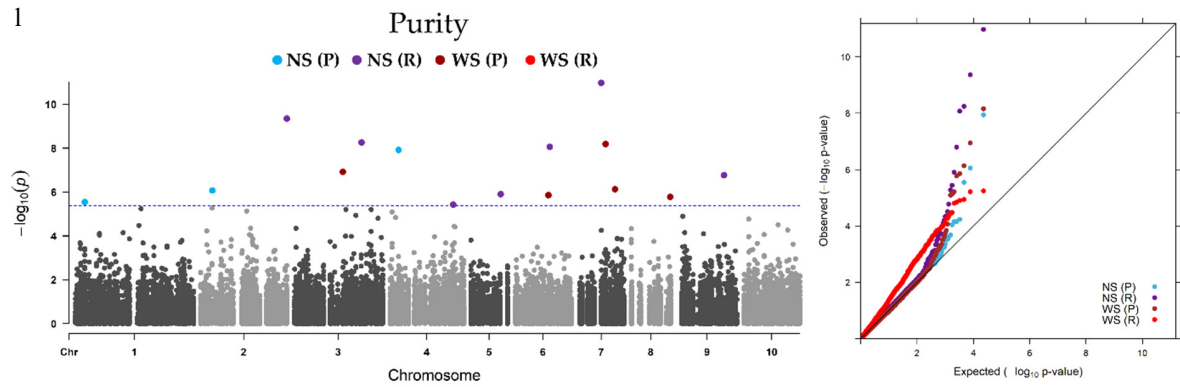
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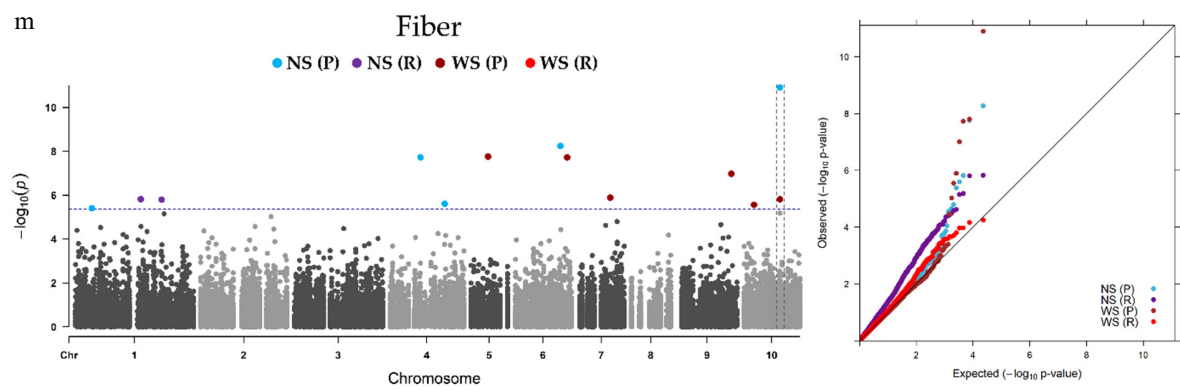
k



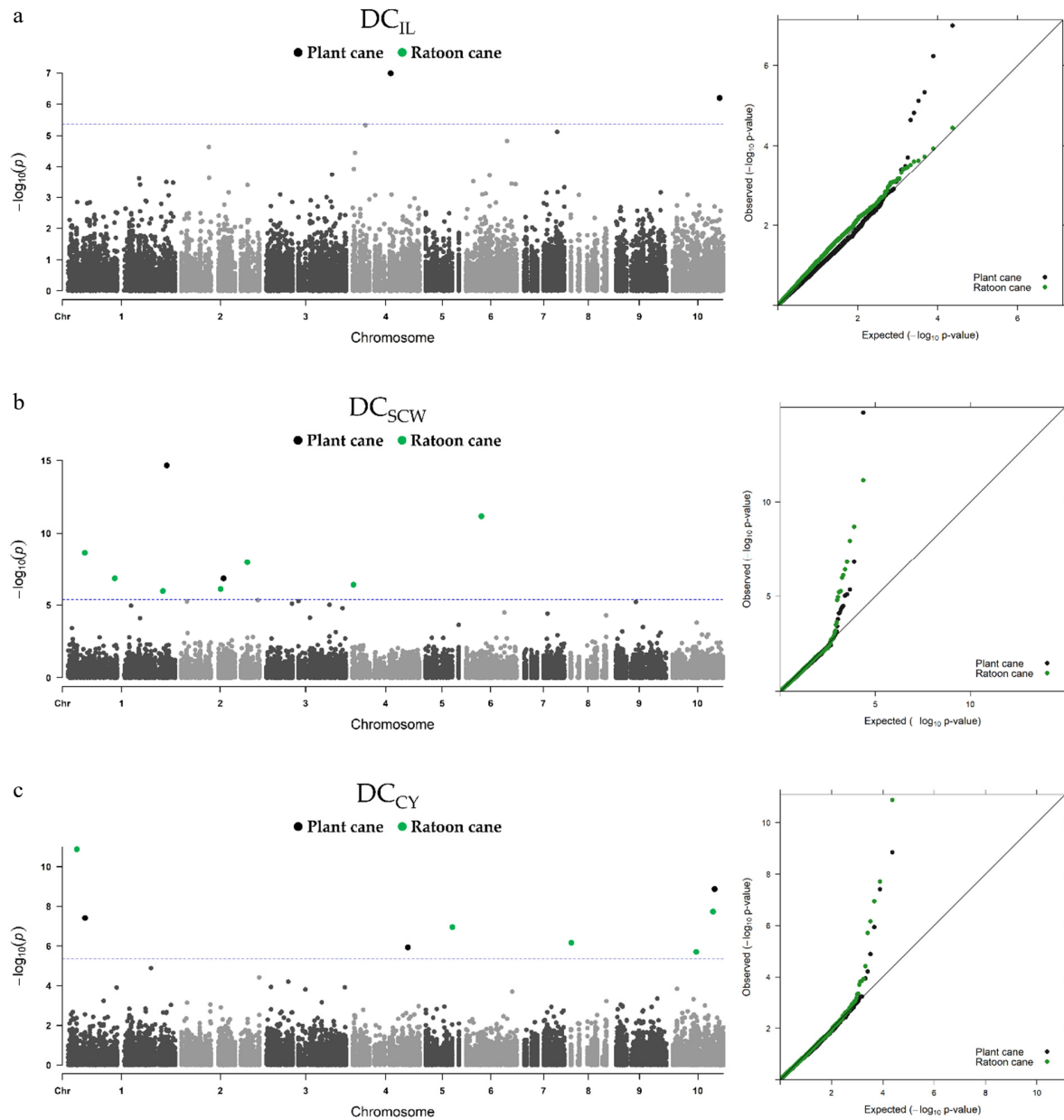
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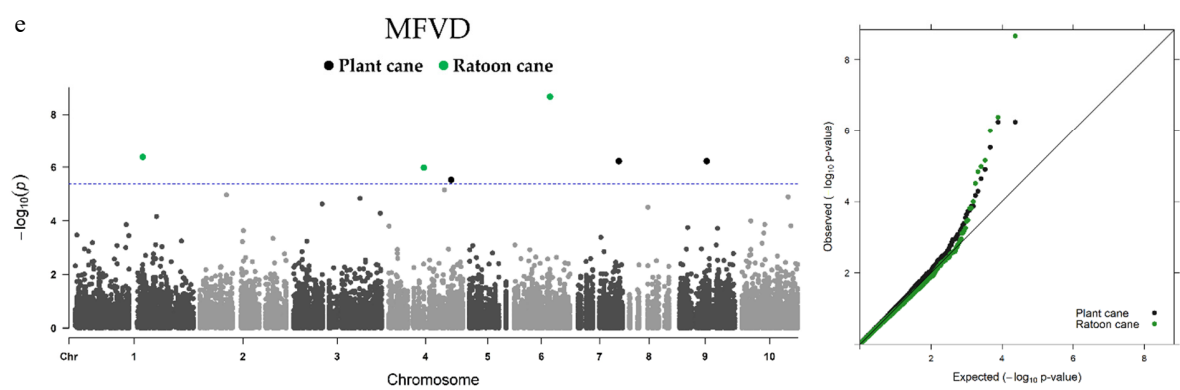
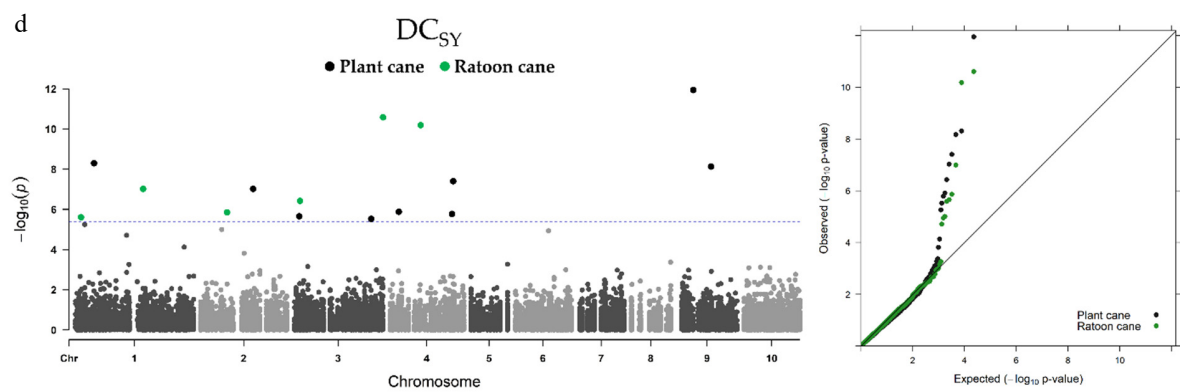
m



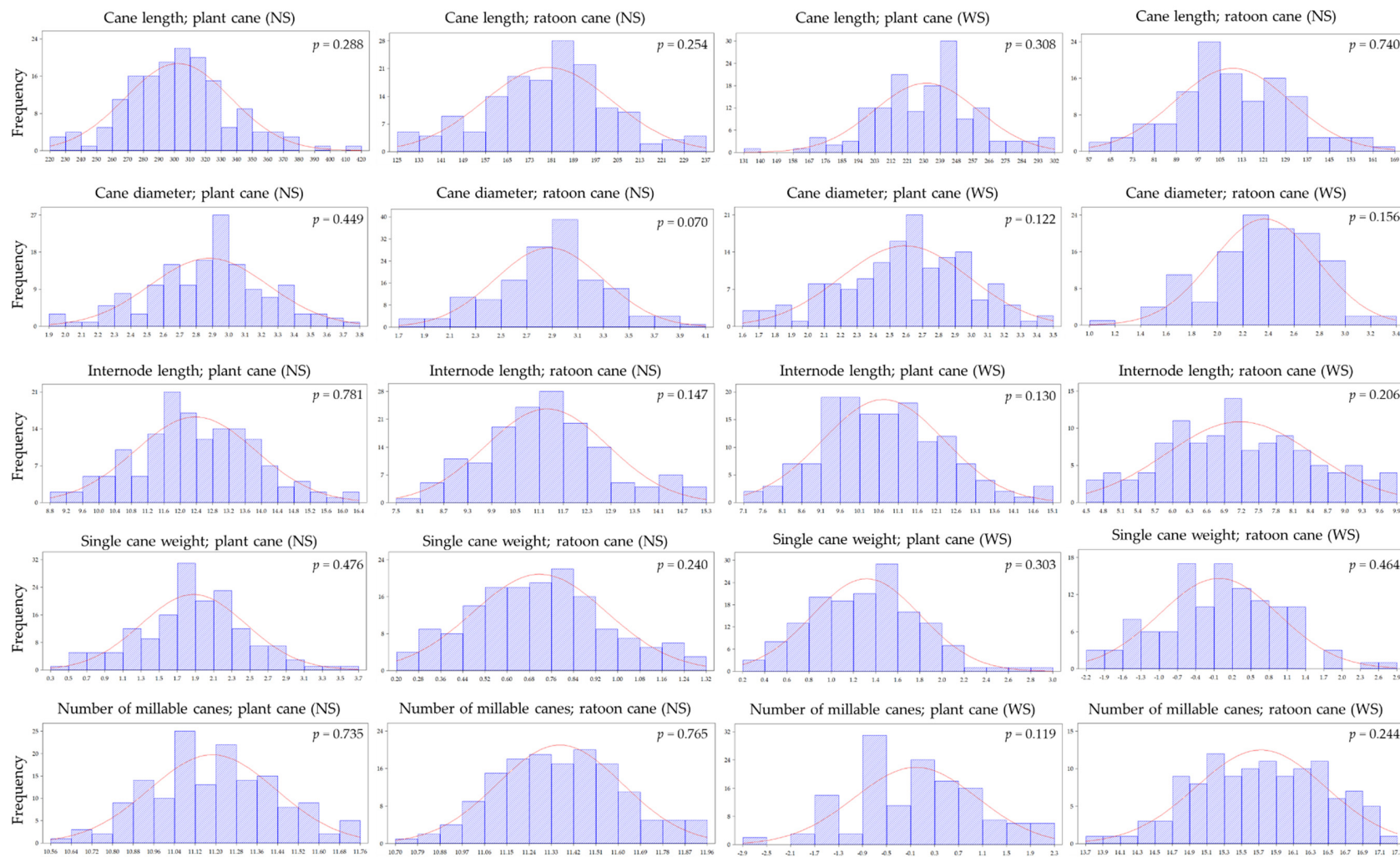
**Figure S5.** Manhattan plots and quantile-quantile (QQ) plots of MTAs for the drought-tolerant coefficient (DC) and the membership function value of drought tolerance (MFVD), in a panel of the 159 accessions using FarmCPU. The blue dotted line marks the threshold to declare a significant association based on Bonferroni-corrected significance threshold  $\alpha=0.05$  ( $p\text{-value} \leq 4.26 \times 10^{-6}$ ). The drought-tolerant coefficient of (a) internode length ( $DC_{IL}$ ), (b) single cane weight ( $DC_{SCW}$ ), (c) cane yield ( $DC_{CY}$ ), (d) sugar yield ( $DC_{SY}$ ), and (e) the MFVD.

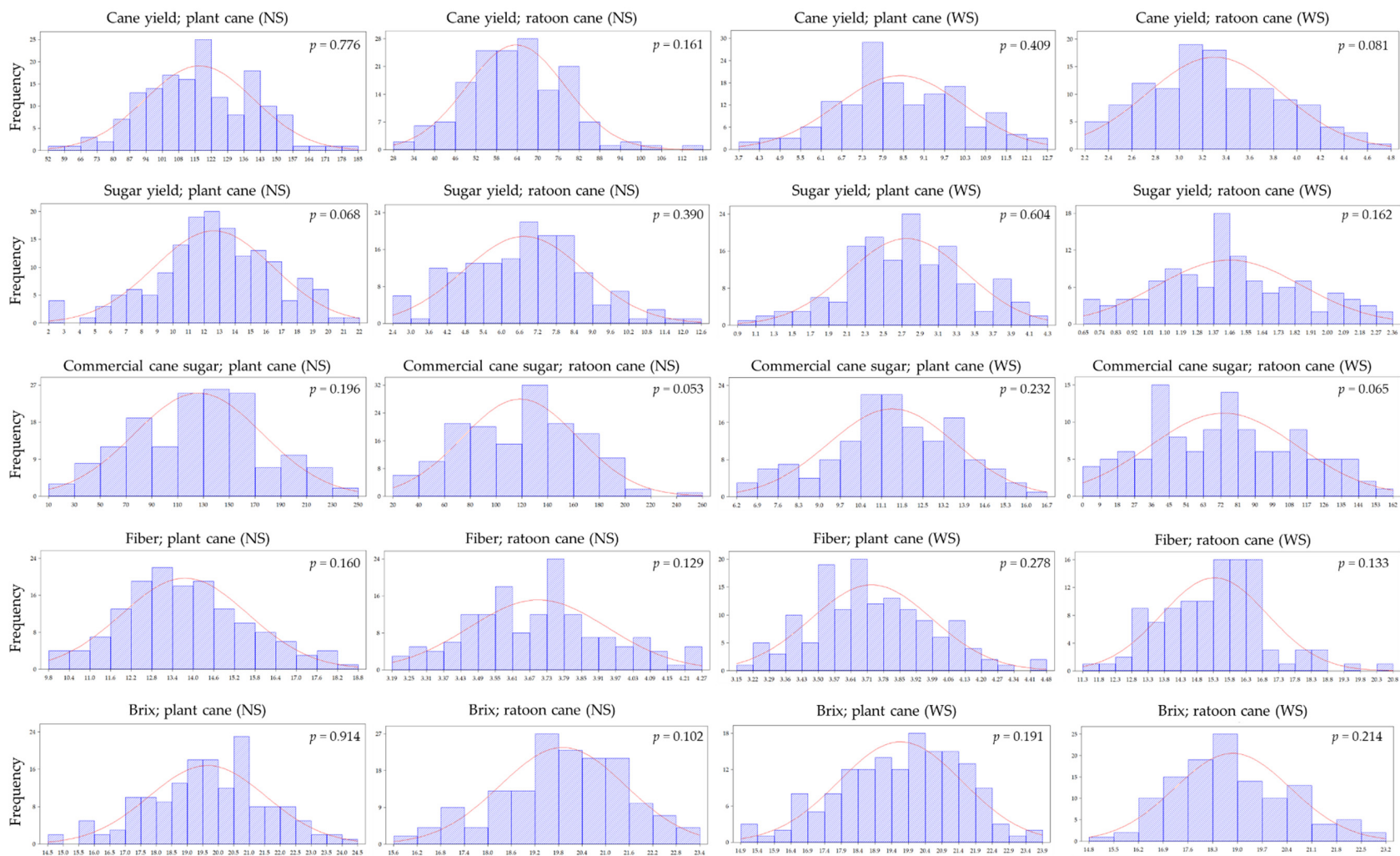


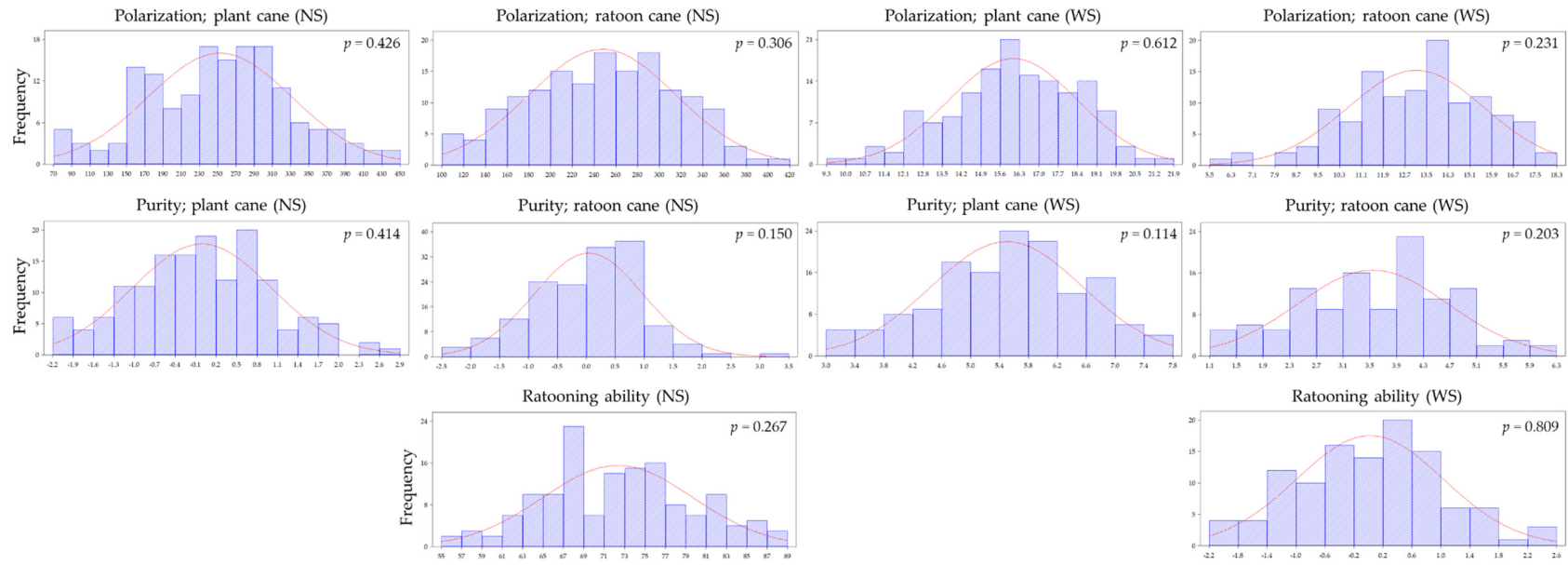




**Figure S6.** The distribution of yield-related traits and sugar-related traits of plant cane and ratoon cane under non-stressed (NS) and water-stressed (WS) conditions, in a panel of the 159 accessions. Each trait was tested for normality using Shapiro-Wilks ( $p < 0.05$ ).









**Figure S7.** The distribution of the drought-tolerant coefficient (DC) and the membership function value of drought tolerance (MFVD), in a panel of the 159 accessions of plant cane and ratoon cane. Each trait was tested for normality using Shapiro-Wilks ( $p < 0.05$ ). DC = Drought-tolerant coefficient of each yield traits; MFVD = the average value of the membership function of all the traits

