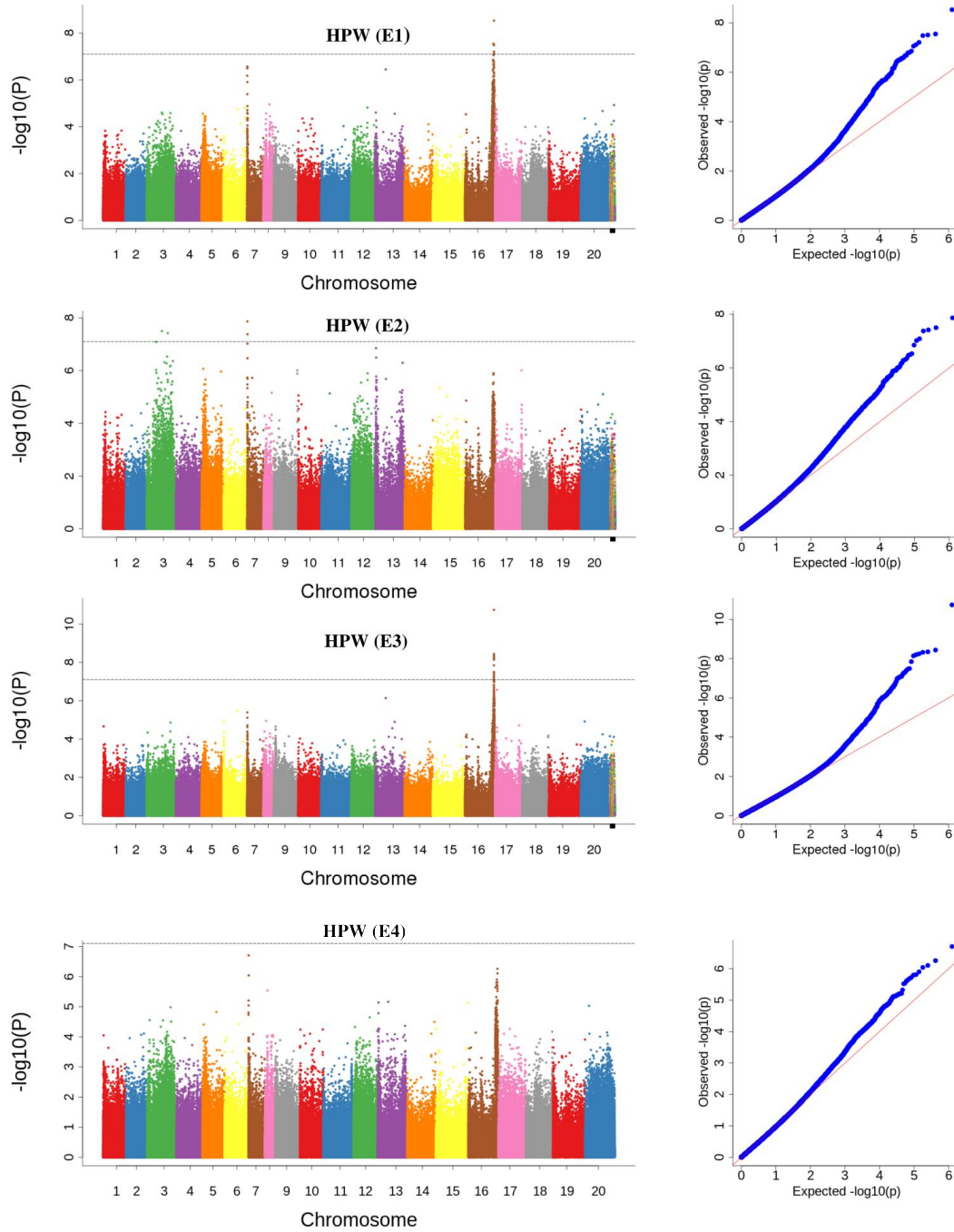
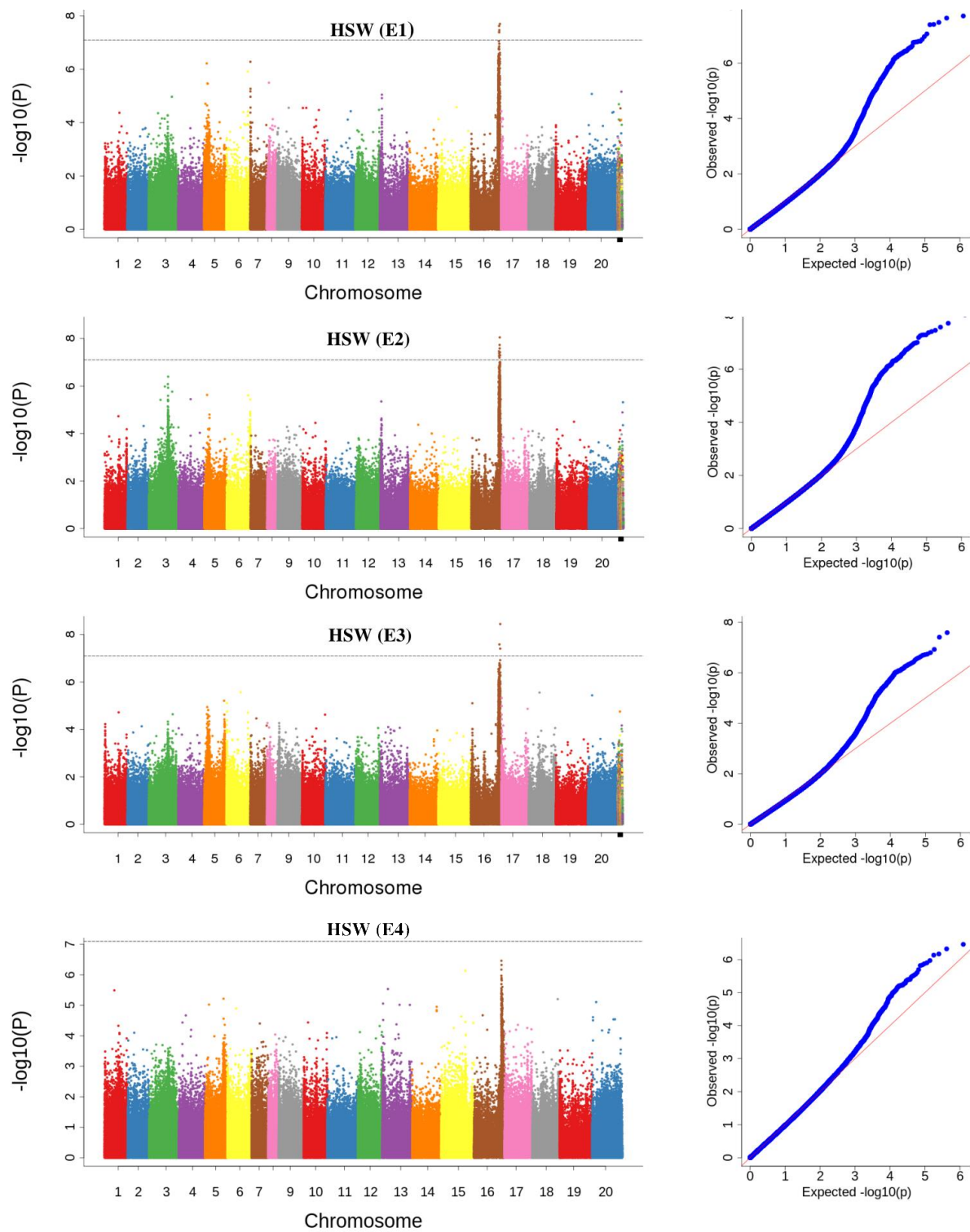


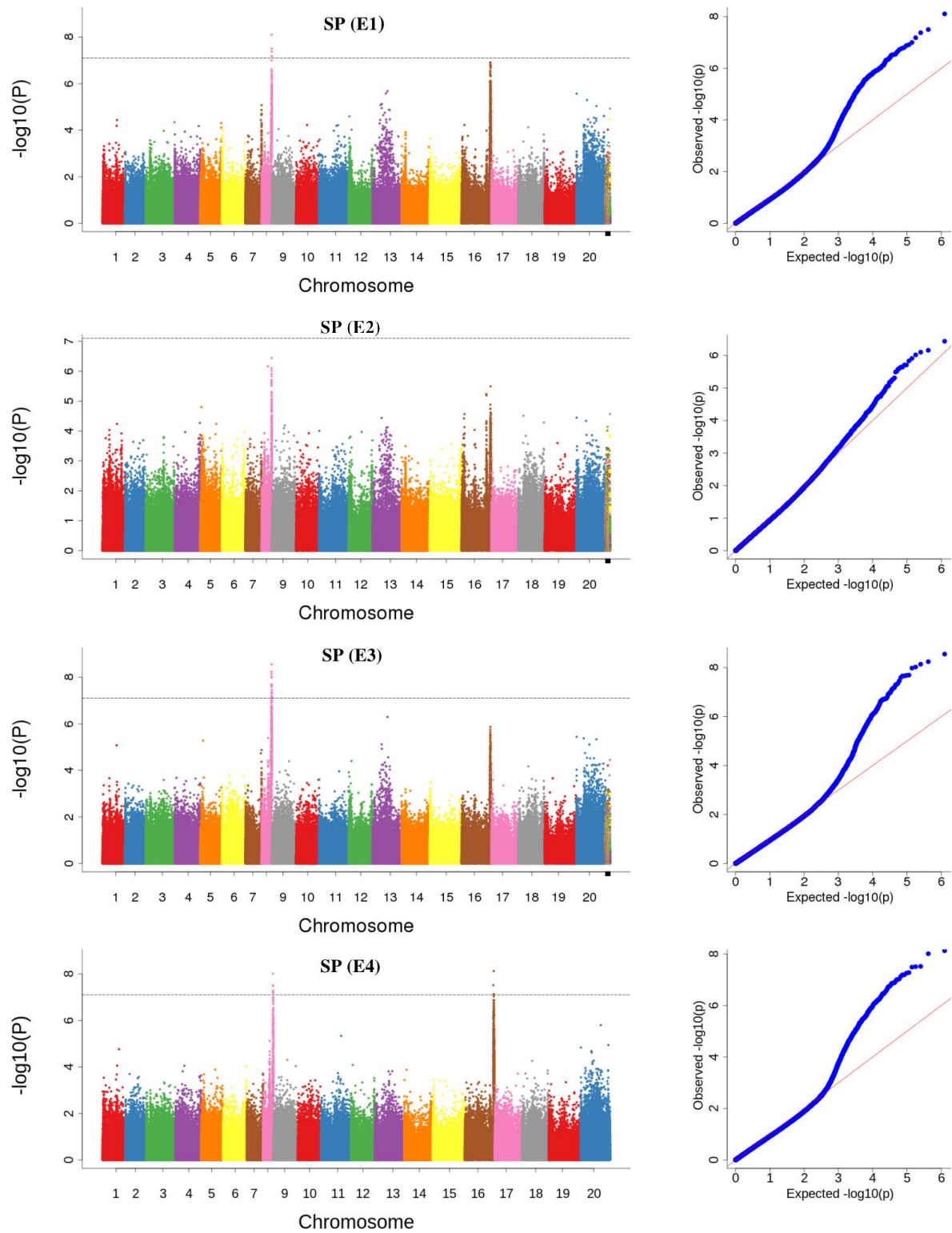
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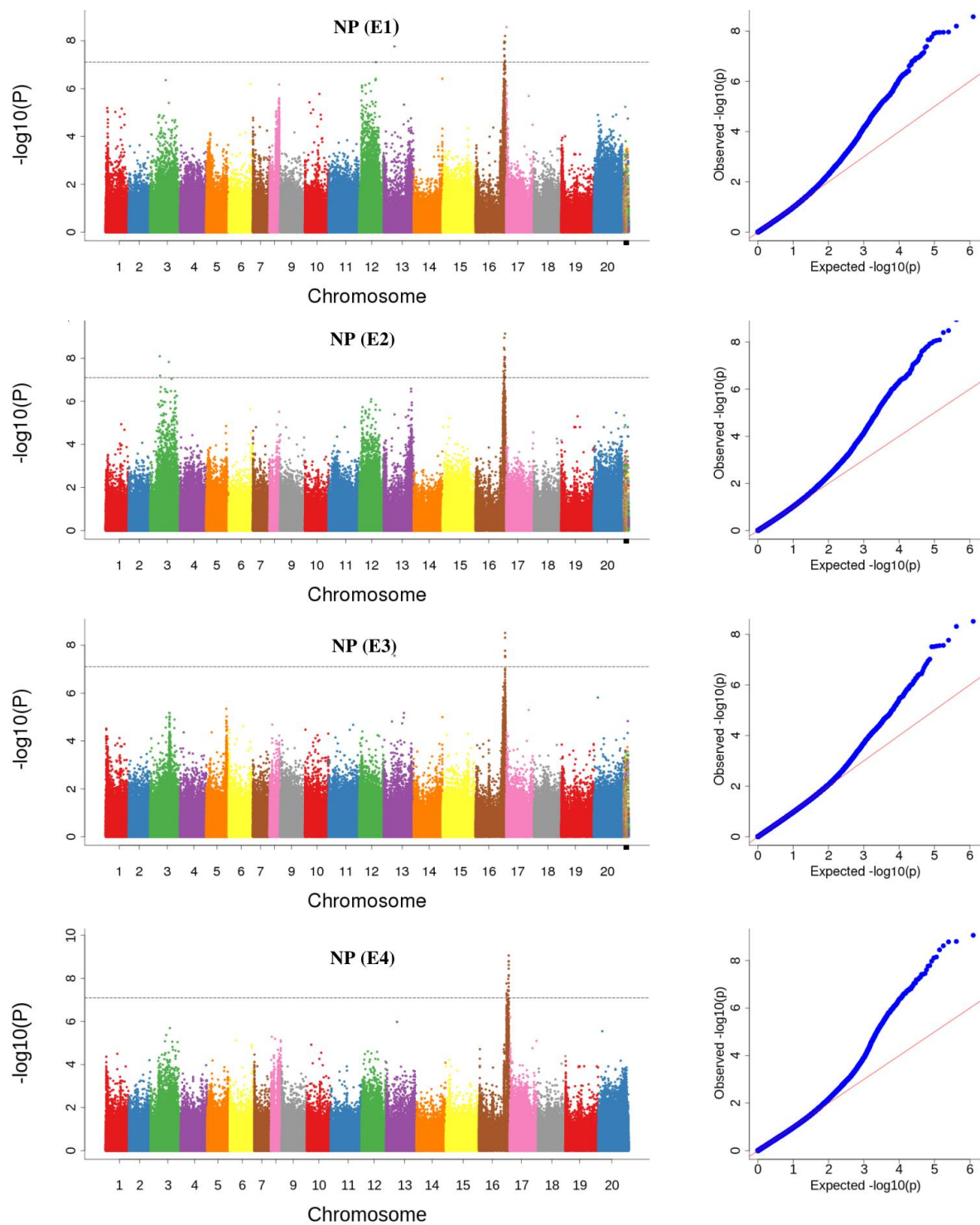
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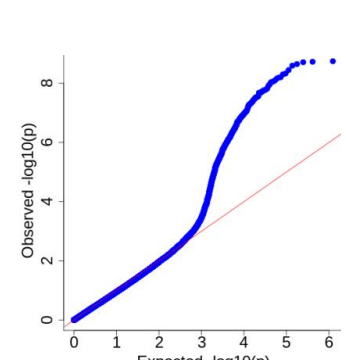
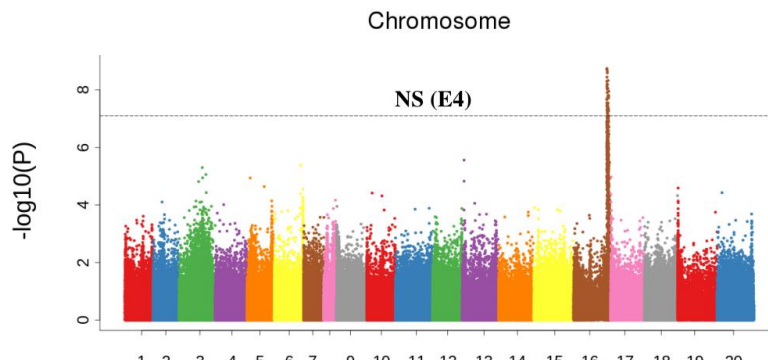
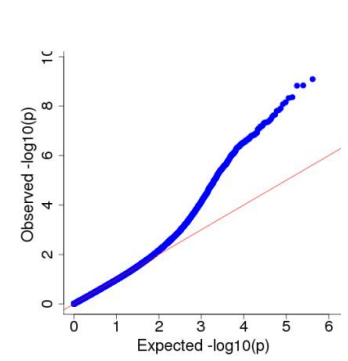
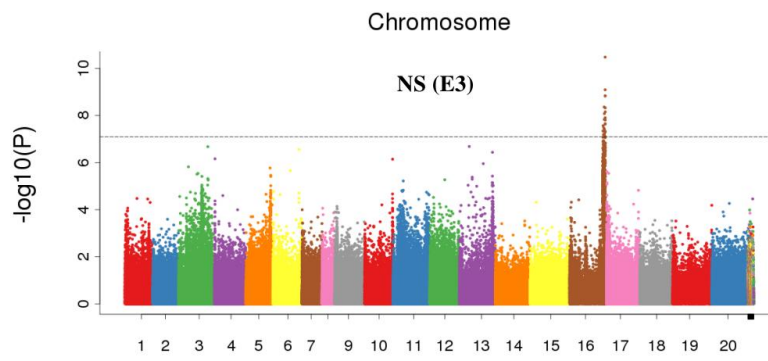
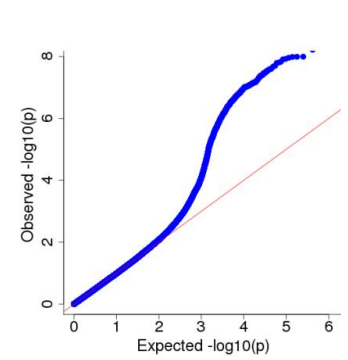
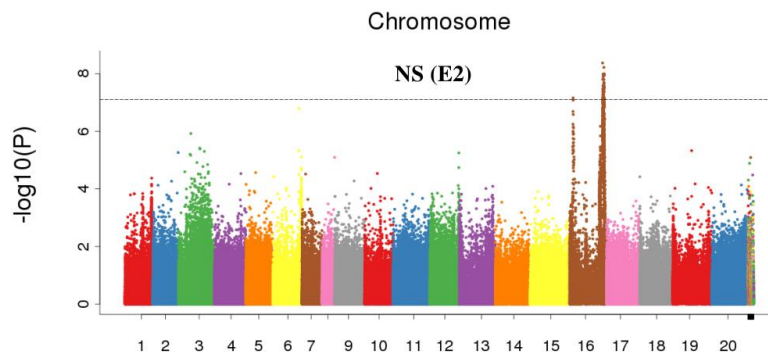
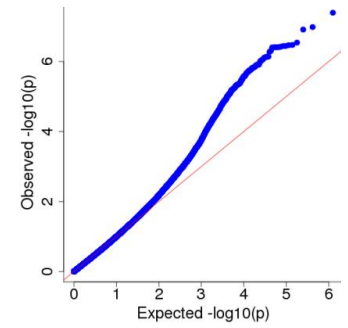
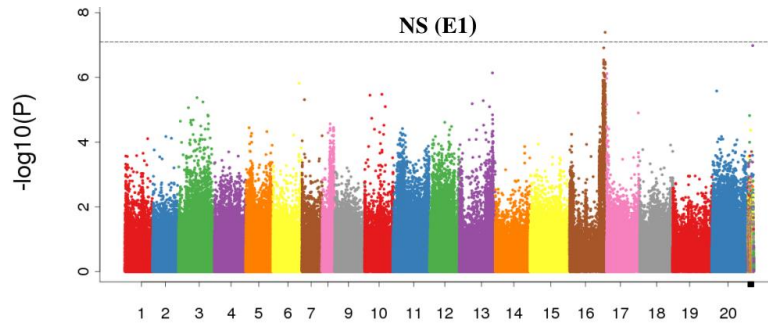
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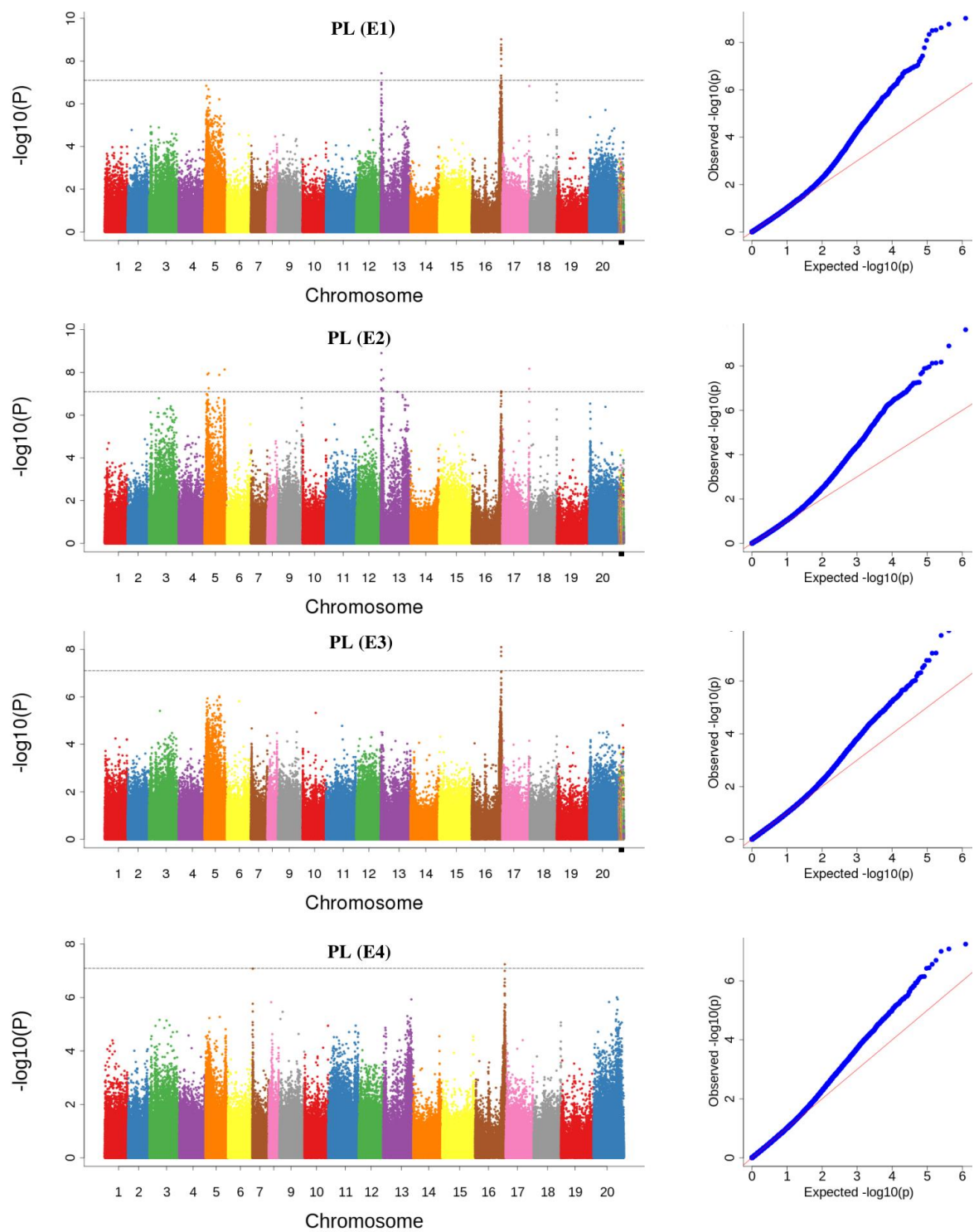
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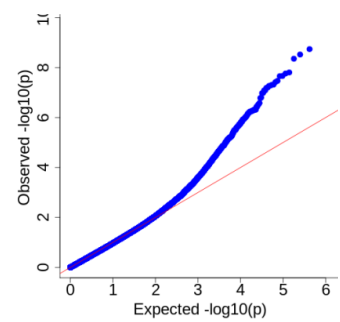
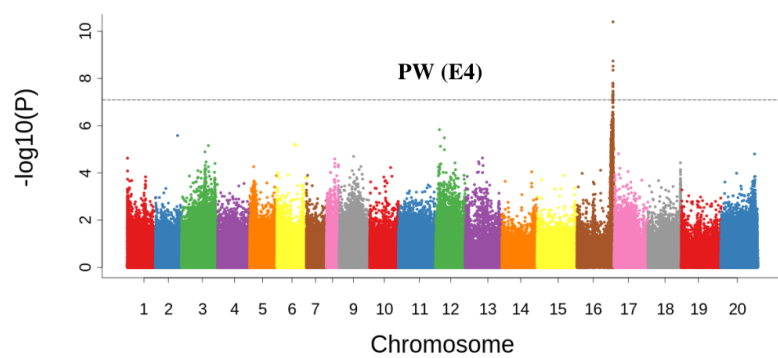
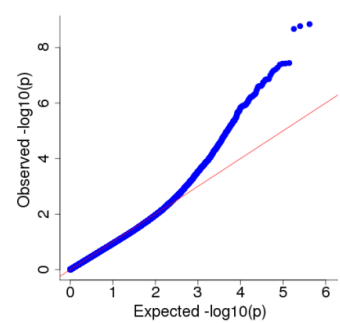
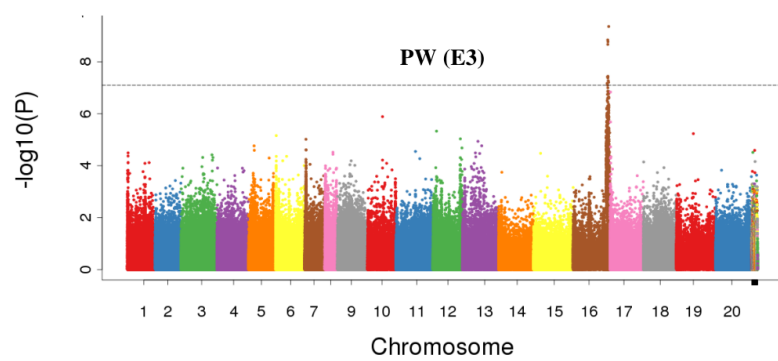
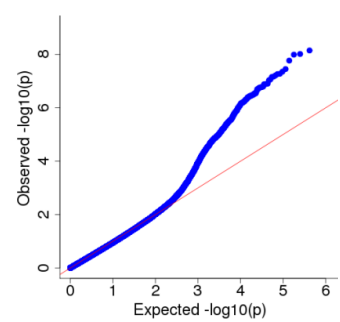
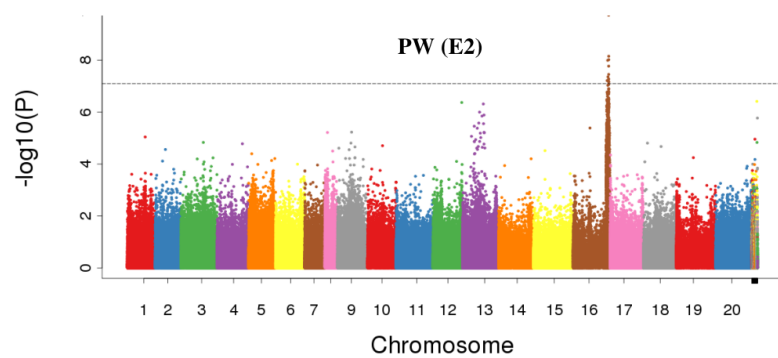
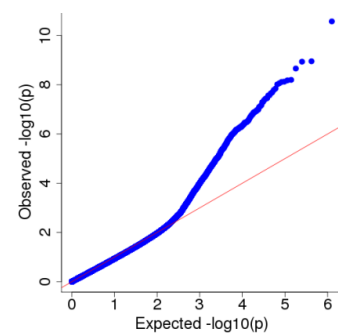
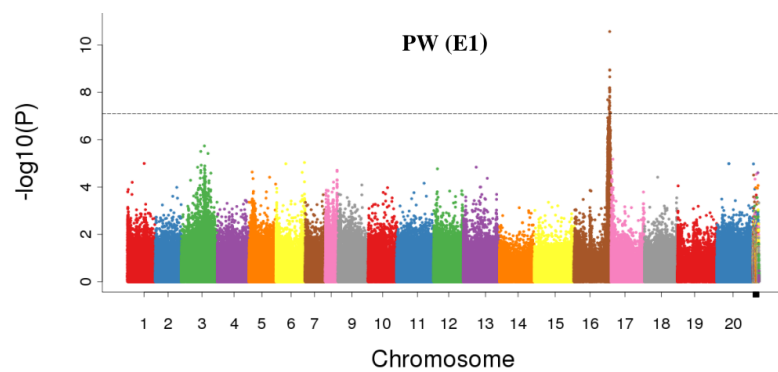
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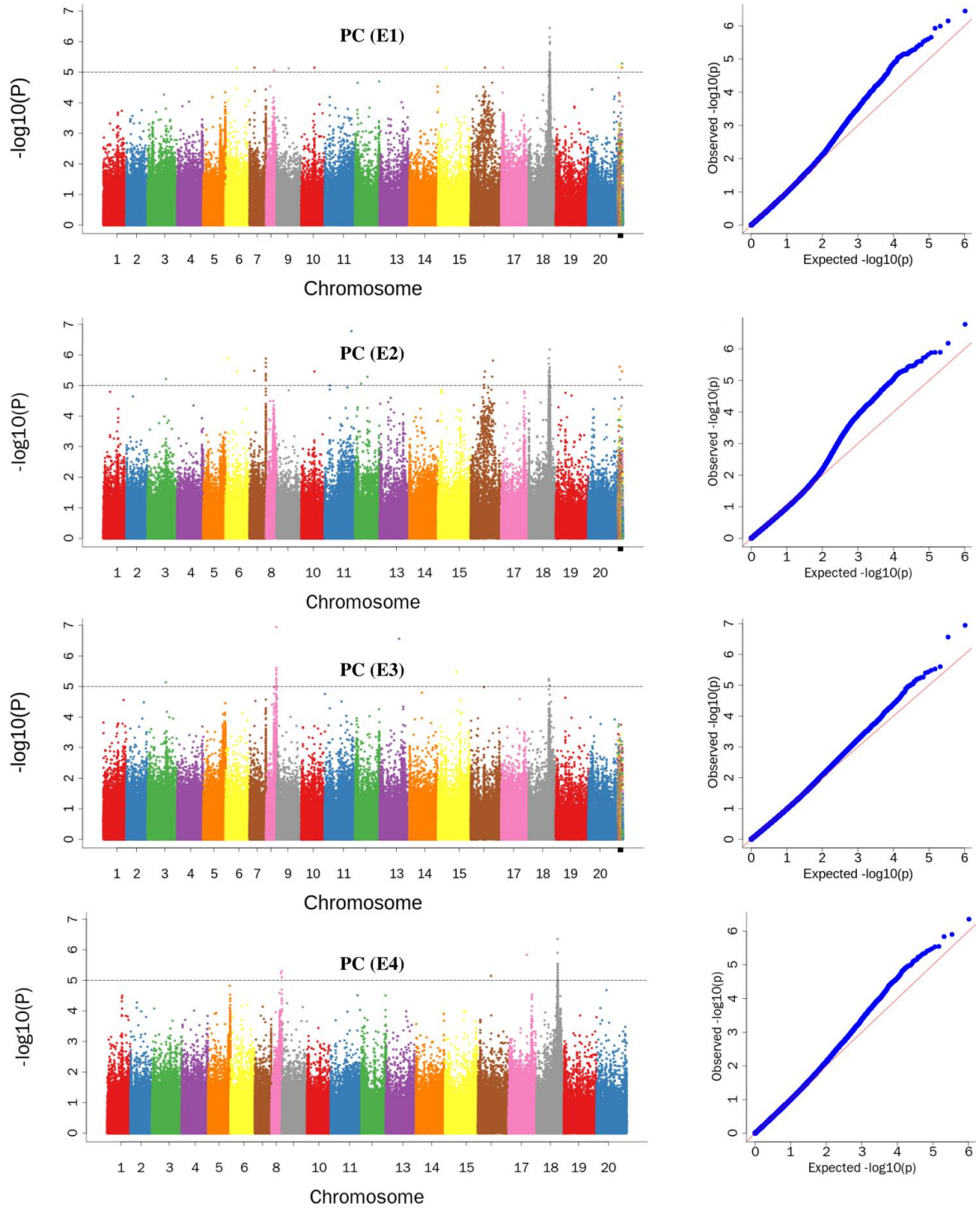
F



G



H



I

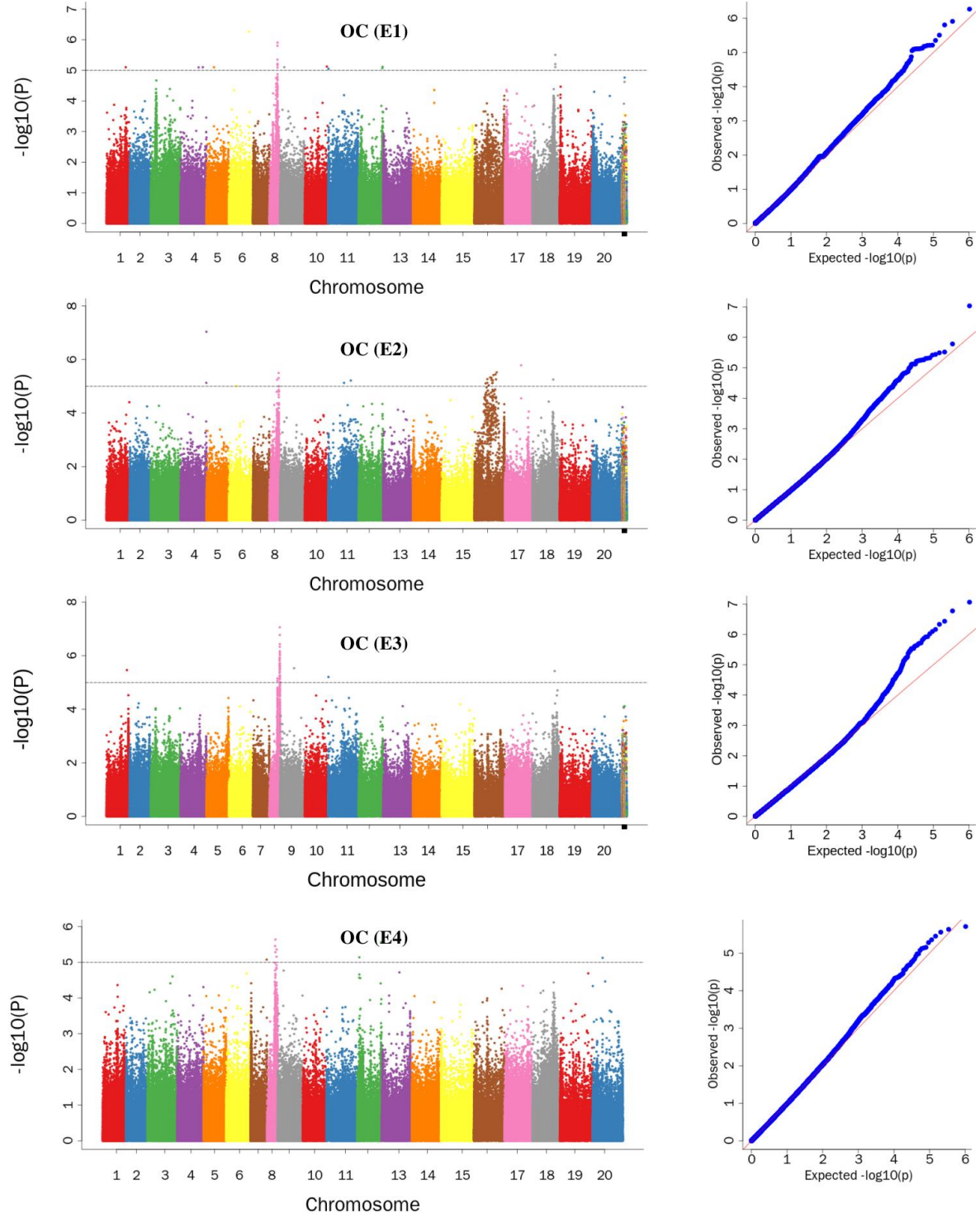


Fig. S3. Manhattan plot and quantile-quantile plot for yield and quality traits in four environments. A.

Manhattan plot and quantile-quantile plot for HPW in four environments; B. Manhattan plot and quantile-quantile plot for HSW in four environments; C. Manhattan plot and quantile-quantile plot for SP in four environments; D. Manhattan plot and quantile-quantile plot for NP in four environments; E. Manhattan plot and quantile-quantile plot for NS in four environments; F. Manhattan plot and quantile-quantile plot for PL in four environments; G. Manhattan plot and quantile-quantile plot for PW in four environments; H. Manhattan plot and quantile-quantile plot for PC in four environments; I. Manhattan plot and quantile-quantile plot for OC in four environments. The significance threshold of $-\log_{10}(P)$ value is noted with the horizontal line. HPW, hundred-pod weight; HSW, hundred-seed weight; SP, shelling percentage; NP, total number of 500 grams of pods; NS, total number of 250 grams of seeds; PL, pod length; PW, pod width; PC, protein content; OC, oil content.; E1, Kaifeng in 2019; E2, Xinyang in 2019; E3, Kaifeng in 2020; E4, Kaifeng in 2021.