



**Figure S1.** QQ plots of the GWAS results of phenotypic values of the six soybean P-efficiency-related traits at maturity under NP and LP conditions in E1 and E2. PH (cm): Plant height; NN: Node number of the main shoot; BN: Branch number of the main shoot; PN: Pod number per plant; 100SW (g): 100-seed weight; SY (g): Seed yield per plant; NP (normal phosphorus): Soil available P = 20 mg/kg; LP (low phosphorus): Soil available P < 10 mg/kg.