

Effects of Five-Year Inorganic and Organic Fertilization on Soil Phosphorus Availability and Phosphorus Resupply for Plant P Uptake during Maize Growth

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Supplement Material (SM)

Materials and Method SM 2.1

The pH (material: water, 1: 2.5) was determined by a Thunder pH meter (INESA, Shanghai, China). Total C and total N were directly measured by using a Vario Max CN elemental analyzer (Elementar, Langenselbold, Germany). Total P, K, Fe, Al, Ca, Mg was digested with $\text{H}_2\text{SO}_4\text{--H}_2\text{O}_2$ and determined by inductively coupled plasma–mass spectrometry (ICP–MS) following digestion of the materials [1].

The available N was mainly extracted with 1M NaOH and then determined by the acidometer titration. The available P was extracted with 0.5M NaHCO_3 (pH 8.5) and quantified by molybdate colorimetry at 800 nm using a spectrophotometer. The available K was extracted with 0.1 M NH_4COOH and then determined by the ICP–MS. The details of these methods and the process about the determination of the available N, P and K can be found in the Lu, et al (2020) [2].

[1] Thomas, R.L., Sheard, R.W., Moyer, J.R., 1967. Comparison of conventional and automated procedures for nitrogen, phosphorus, and potassium analysis of plant material using a single digest. *Agron. J.* 59, 240–243.

[2] Lu, R.K., 2000. Analysis method of soil agricultural chemistry, China Agricultural Science and Technology, Beijing.”

Supplement Figures (Figures S1–S2)

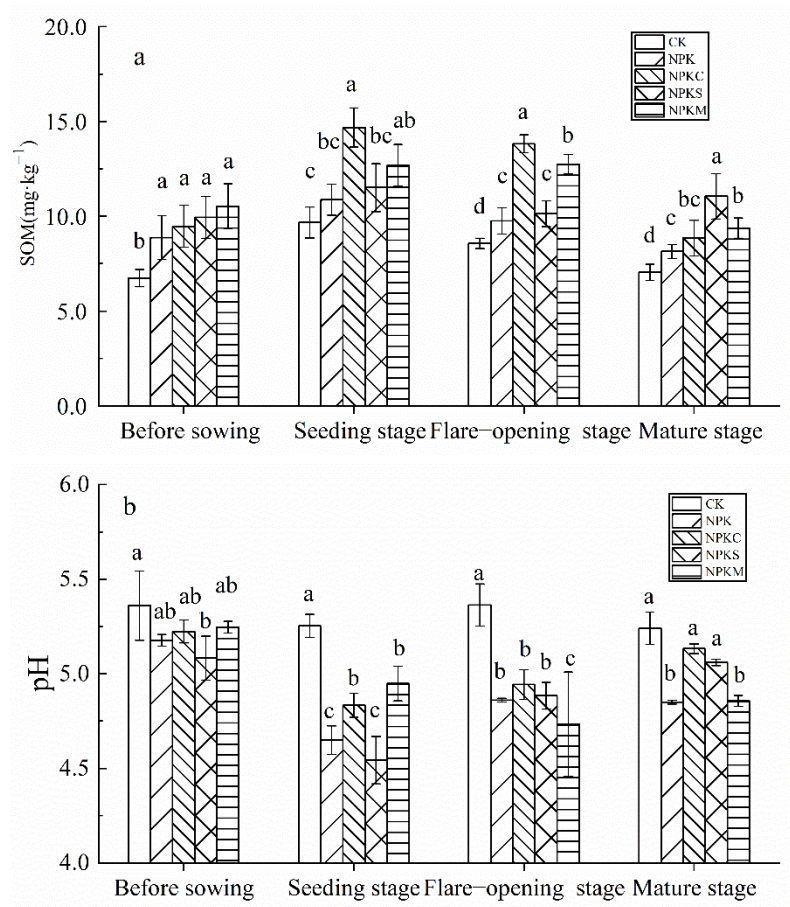


Figure S1 Effects of fertilizer application on a) SOM and b) pH at different growth stages. Error bars refer to \pm SD. Different letters listed in a stage indicate significant differences between treatments at *p* < 0.05.

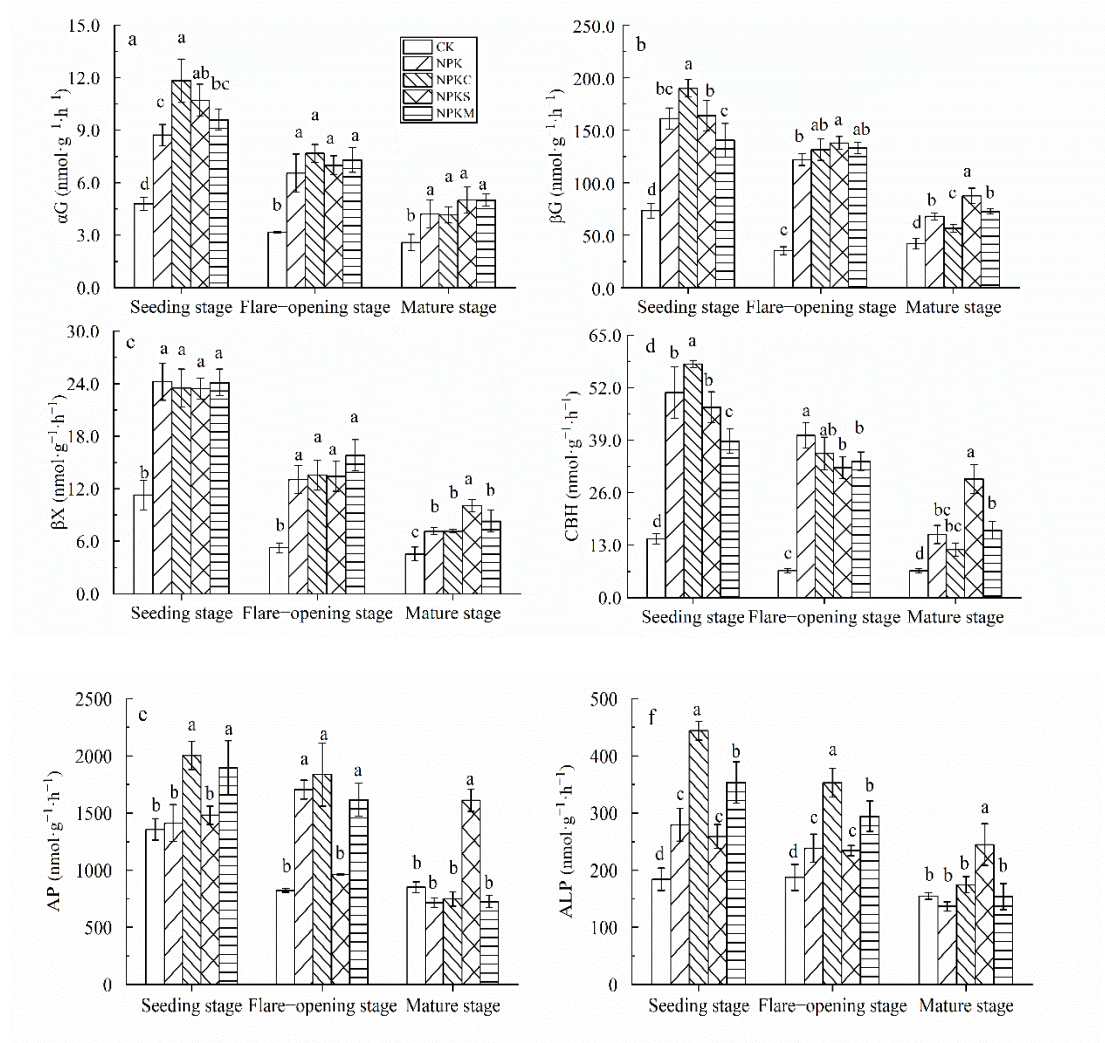


Figure S2 Effects of fertilizer application on soil enzyme activities at different growth stages. a): α -1,4-glucosidase (α G); b): β -1,4-glucosidase (β G); c) β -1,4-xylosidase (β X); d): cellobiohydrolase (CBH); e) acid phosphatase (ACP); f): alkaline phosphatase (ALP). Error bars refer to \pm SD. Different letters listed in a stage indicate significant differences between treatments at $p < 0.05$.

Supplement Tables (Table S1)

Table S1 Relationship between the P decrease and soil properties using Pearson's method.

	pH	SOM	DPS	Fe _{ox}	Al _{ox}	Fe _{PP}	Al _{PP}
ΔFe-P ^a	-.783**	0.428	0.587	-0.456	-0.033	0.413	0.611
ΔAl-P ^b	-.656**	0.607	.809**	-0.392	0.030	.869**	0.328
ΔT-P ^c	-.816**	0.529	.718*	-0.478	-0.015	0.606	0.574

^a The amount of the decrement of soil Fe-P between maize growth stages.

^b The amount of the decrement of soil Al-P between maize growth stages.

^c The total amount of the decrement of soil Fe-P and Al-P between maize growth stages.