**Table S1** The initial and treated basic soil chemical properties under different fertilization treatments during experiment periods

| Time | Treatments | pH | Soil organic matter (g kg⁻¹) | Soil total nitrogen (g kg⁻¹) | Soil total phosphorus (g kg⁻¹) | Soil total potassium (g kg⁻¹) | Soil available phosphorus (mg kg⁻¹) | Soil available potassium (mg kg⁻¹) |
|---|---|---|---|---|---|---|---|---|
| 2020 | Initial soil | 7.90±0.31 | 22.14±3.70 | 1.18±0.29 | 0.71±0.10 | 22.53±5.57 | 51.52±7.02 | 179.18±30.41 |
| 2021 | CK | 7.88±0.44 | 20.48±2.97 | 1.10±0.31 | / | / | 48.77±11.52 | 184.04±25.47 |
| | NPK | 7.48±0.61 | 23.41±2.96 | 1.21±0.24 | / | / | 53.87±6.27 | 171.84±40.26 |
| | N+PKT | 7.51±0.34 | 22.48±4.10 | 1.23±0.18 | / | / | 52.77±5.79 | 188.84±26.64 |
| | 0.9N+PKT | 7.52±0.87 | 22.17±0.94 | 1.19±0.21 | / | / | 59.18±10.69 | 179.29±30.58 |
| | 0.8N+PKT | 7.69±0.48 | 22.27±2.87 | 1.20±0.22 | / | / | 58.48±9.57 | 169.94±29.37 |
| | 0.7N+PKT | 7.76±0.41 | 21.09±3.97 | 1.14±0.36 | / | / | 54.57±8.47 | 173.29±32.71 |
| | PKT | 7.71±0.51 | 21.67±3.88 | 1.08±0.46 | / | / | 50.66±14.98 | 161.08±17.65 |
| 2022 | CK | 7.79±0.70 | 19.01±5.47 | 1.12±0.24 | / | / | 48.91±6.78 | 163.81±18.95 |
| | NPK | 7.53±0.15 | 23.88±2.17 | 1.22±0.15 | / | / | 56.87±7.69 | 182.51±40.20 |
| | N+PKT | 7.57±0.42 | 23.08±3.14 | 1.21±0.24 | / | / | 55.57±10.28 | 179.26±30.48 |
| | 0.9N+PKT | 7.56±0.26 | 23.91±1.69 | 1.23±0.24 | / | / | 57.33±4.90 | 173.26±16.54 |
| | 0.8N+PKT | 7.66±0.18 | 23.42±2.75 | 1.14±0.11 | / | / | 57.61±10.22 | 177.40±19.64 |
| | 0.7N+PKT | 7.66±0.20 | 21.68±2.00 | 1.09±0.21 | / | / | 53.21±1.97 | 170.25±8.23 |
| | PKT | 7.71±0.26 | 21.00±3.41 | 1.09±0.34 | / | / | 55.58±8.21 | 155.48±17.09 |

The results show means $\pm$ standard deviations (n = 3).

**Table S2** Soil basic properties after 3-year different fertilization

| Treatment | pH | Soil C:N ratio | Soil available phosphorus (mg kg⁻¹) | Soil available potassium (mg kg⁻¹) |
|---|---|---|---|---|
| CK | 7.72±0.069 a | 9.01±0.46 b | 46.74±1.23 b | 155.49±9.53 a |
| NPK | 7.54±0.087 a | 11.29±0.051 a | 57.92±5.19 ab | 178.00±32.97 a |
| N+PKT | 7.59±0.026 a | 10.80±0.21 a | 58.83±10.03 ab | 172.49±5.77 a |
| 0.9N+PKT | 7.5±0.050 a | 10.87±0.28 a | 61.12±13.92 a | 177.34±27.91 a |
| 0.8N+PKT | 7.49±0.036 a | 11.10±0.24 a | 58.62±6.70 ab | 172.56±12.53 a |
| 0.7N+PKT | 7.58±0.020 a | 10.97±0.25 a | 59.94±1.47 ab | 165.46±9.05 a |
| PKT | 7.51±0.026 a | 11.86±0.58 a | 46.82±1.26 b | 145.30±3.59 a |

The results show means $\pm$ standard deviations (n = 3). Different lowercase letters after values indicate a significant difference under different treatments, $P < 0.05$.

**Table S3** Maize physiological traits after 3-year different fertilization

| Treatment | Ear rows number | Kernel number | Ear length (cm) | Spike-stalk width (cm) | Thousand kernel weight (g) |
|---|---|---|---|---|---|
| CK | 14.67±0.58 bc | 38.33±0.58 d | 19.35±0.87 c | 46.17±0.04 e | 269.08±3.35 e |
| NPK | 15.67±0.58 ab | 42.33±0.58 ab | 21.32±0.75 ab | 50.48±0.06 ab | 344.87±10.66 b |
| N+PKT | 16.33±0.58 a | 42.00±1.00 ab | 21.10±1.25 ab | 49.54±0.07 c | 355.00±0.09 a |
| 0.9N+PKT | 16.33±0.58 a | 41.33±0.58 bc | 20.79±0.37 abc | 50.79±0.10 a | 337.82±4.02 bc |
| 0.8N+PKT | 15.33±0.58 abc | 40.67±0.58 c | 20.49±0.04 bc | 49.95±0.08 bc | 338.25±2.67 bc |
| 0.7N+PKT | 15.33±0.58 abc | 42.67±0.58 a | 22.11±0.12 a | 48.67±0.85 d | 330.83±2.67 c |
| PKT | 14.33±0.58 c | 38.33±0.58 d | 20.11±1.25 bc | 48.56±0.60 d | 285.41±5.61 d |

The results show means ± standard deviations (n = 3). Different lowercase letters after values indicate a significant difference under different treatments, $P < 0.05$.