**Table S1** Effects of year, fertilization treatment, growth period and their interactions on leaves nutrient content and pear tree growth

| | Leaf N content | Leaf P content | Leaf K content | Leaf SPAD | New shoot length | New shoot thickness |
|---|---|---|---|---|---|---|
| Treatment(T) | 0.85 | 0.98 | 0.00 | 0.12 | 0.02 | 0.55 |
| Year(Y) | 0.02 | 0.89 | 0.40 | 0.02 | 0.17 | 0.52 |
| Growth Period(G) | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| T*Y | 0.83 | 0.66 | 0.53 | 0.88 | 0.77 | 0.02 |
| T*G | 0.66 | 0.47 | 0.03 | 0.18 | 0.58 | 0.28 |
| Y*G | 0.09 | 0.74 | 0.89 | 0.40 | 0.16 | 0.60 |
| T*Y*G | 0.78 | 0.25 | 0.51 | 0.56 | 0.03 | 0.76 |

**Table S2** Environmental explanation of the changes in soil bacterial community by RDA analysis. SOM, soil organic matter; TP, total phosphate; AN, alkali-hydrolysable N; AP, available phosphate; AK, available potassium.

| Environmental factors | 0-20cm | | 20-40cm | |
|---|---|---|---|---|
| | Contributions | P | Contributions | P |
| $NaHCO_3$-Pi | 46.8 | 0.002 | 53.7 | 0.002 |
| C.HCl-Pi | 18.7 | 0.004 | 6.3 | 0.01 |
| $H_2O$-P | 15.1 | 0.002 | 4.8 | 0.008 |
| SOC | 8.0 | 0.01 | 26.7 | 0.002 |
| pH | 3.5 | 0.052 | 0.5 | 0.342 |
| C.HCl-Po | 2.1 | 0.106 | 0.9 | 0.15 |
| AK | 1.3 | 0.26 | 0.5 | 0.342 |
| AN | 1.2 | 0.26 | 0.7 | 0.22 |
| NaOH-Po | 1.0 | 0.244 | 0.4 | 0.346 |
| D.HCl-Pi | 1.3 | 0.218 | 1.7 | 0.054 |
| NaOH-Pi | 1.4 | 0.276 | 0.2 | 0.526 |
| Residual-Pt | 0.4 | 0.526 | 3.1 | 0.032 |
| $NaHCO_3$-Po | <0.1 | 0.852 | <0.1 | 0.854 |

**Table S3** The leaf P content, SPAD, new shoot length and new shoot thickness of the NG and MF treatment in 2022 and 2023. N.S. means no data.

| Year | Month | Treatment | Leaf P content | Leaf SPAD | New shoot length | New shoot thickness |
|---|---|---|---|---|---|---|
| 2022 | April | NG | 0.37±0.69a | 34.77±2.85a | 16.33±4.71a | 5.56±0.99a |
| | | MF | 0.34±0.40a | 34.27±4.43a | 16.57±2.94a | 5.62±1.67a |
| | May | NG | 0.19±0.02a | 47.11±3.35a | 51.42±13.41a | 5.85±1.07a |
| | | MF | 0.21±0.05a | 48.84±3.04a | 64.05±12.12a | 6.48±1.11a |
| | June | NG | 0.18±0.02a | 53.07±4.34a | 68.77±11.56a | 6.35±1.44a |
| | | MF | 0.17±0.01a | 55.18±3.30a | 66.88±6.39a | 6.74±1.32a |
| | July | NG | 0.15±0.02a | 55.59±3.02a | N.S. | N.S. |
| | | MF | 0.16±0.02a | 55.32±3.45a | N.S. | N.S. |
| 2023 | April | NG | 0.32±0.03a | 34.22±1.83a | 15.36±4.68a | 5.89±1.25a |
| | | MF | 0.36±0.03a | 33.32±2.85a | 16.05±4.29a | 5.21±1.29b |
| | May | NG | 0.20±0.02a | 47.42±3.25a | 65.49±13.31a | 6.91±1.96a |
| | | MF | 0.22±0.02a | 47.09±2.80a | 59.90±9.33a | 5.50±1.04b |
| | June | NG | 0.20±0.01a | 49.52±4.22b | 64.19±13.99a | 7.10±1.52a |
| | | MF | 0.17±0.01b | 52.87±2.70a | 72.94±11.14a | 6.89±0.94a |
| | July | NG | 0.16±0.02a | 53.87±4.52a | N.S. | N.S. |
| | | MF | 0.16±0.02a | 55.52±2.72a | N.S. | N.S. |