

Table S1. Meteorological data of Jiande County, Hangzhou, China during 2019–2021.

| Parameters | Year | Month | | | | | | | | | | | |
|---------------|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. |
| Aver. Temp. | 2019 | 5.85 | 6.13 | 12.41 | 18.13 | 22.11 | 24.96 | 28.20 | 29.37 | 25.09 | 20.06 | 14.52 | 8.70 |
| | 2020 | 7.26 | 9.86 | 13.15 | 16.44 | 23.51 | 26.09 | 26.86 | 31.05 | 23.90 | 19.17 | 15.01 | 13.00 |
| | 2021 | 6.52 | 10.91 | 12.67 | 17.62 | 23.39 | 25.97 | 29.29 | 28.59 | 29.54 | 20.39 | 13.80 | 8.54 |
| Max. Temp. | 2019 | 9.08 | 8.60 | 17.1 | 23.34 | 27.24 | 29.33 | 32.39 | 34.19 | 29.28 | 24.36 | 19.38 | 12.98 |
| | 2020 | 10.06 | 14.37 | 17.55 | 22.06 | 28.64 | 30.15 | 30.85 | 36.01 | 27.79 | 23.03 | 18.83 | 11.12 |
| | 2021 | 11.74 | 15.63 | 17.23 | 21.85 | 28.64 | 30.47 | 33.43 | 32.95 | 27.69 | 24.55 | 18.35 | 13.51 |
| Min. Temp. | 2019 | 3.51 | 4.28 | 9.05 | 14.27 | 17.65 | 21.66 | 24.97 | 25.60 | 21.46 | 16.73 | 10.83 | 5.23 |
| | 2020 | 5.22 | 6.36 | 9.83 | 11.56 | 19.64 | 23.30 | 24.14 | 27.07 | 20.77 | 15.88 | 12.05 | 3.11 |
| | 2021 | 2.66 | 7.88 | 9.75 | 14.17 | 19.48 | 22.66 | 26.27 | 25.31 | 14.18 | 17.16 | 10.16 | 4.74 |
| Rel. Hum. (%) | 2019 | 78.35 | 85.89 | 73.74 | 75.20 | 62.84 | 78.00 | 78.32 | 73.19 | 71.43 | 71.87 | 69.20 | 67.05 |
| | 2020 | 81.00 | 73.55 | 72.32 | 60.07 | 71.68 | 84.79 | 84.68 | 64.52 | 74.60 | 69.71 | 72.20 | 71.21 |
| | 2021 | 58.97 | 7.29 | 76.00 | 68.23 | 47.97 | 78.47 | 74.97 | 77.03 | 60.97 | 52.06 | 44.87 | 37.90 |
| Rainfall (mm) | 2019 | 141.86 | 272.53 | 167.10 | 122.84 | 201.16 | 244.80 | 306.90 | 715.89 | 316.20 | 85.87 | 71.18 | 87.90 |
| | 2020 | 227.60 | 82.40 | 155.10 | 45.70 | 152.30 | 386.68 | 293.14 | 157.62 | 317.57 | 112.45 | 38.88 | 51.03 |
| | 2021 | 71.74 | 174.87 | 298.58 | 127.29 | 319.30 | 393.00 | 830.97 | 703.31 | 765.32 | 243.87 | 145.09 | 40.74 |
| Sunshine(h) | 2019 | 71.40 | 24.30 | 127.10 | 125.00 | 174.70 | 118.50 | 152.50 | 228.50 | 189.70 | 151.10 | 149.20 | 125.70 |
| | 2020 | 73.90 | 108.50 | 109.20 | 197.50 | 124.30 | 60.80 | 102.70 | 258.00 | 122.90 | 134.00 | 131.90 | 105.50 |
| | 2021 | 171.90 | 111.50 | 106.40 | 131.40 | 146.50 | 127.00 | 179.10 | 177.84 | 187.00 | 148.30 | 144.70 | 191.40 |

Temp: Temperature; Aver: Average; Max: Maximum; Min: Minimum; Hum: humidity. Rel: Relative.

Table S2. Effect of different organic and chemical fertilizers on sweet potato fresh weight.

| Treatments (kg/m ²) | above-ground FW (kg) | | | below ground FW (kg) | | | Total FW (kg) | | |
|------------------------------------|----------------------|----------------|--------------|----------------------|---------------|---------------|----------------|----------------|--------------|
| | 2019 | 2020 | 2021 | 2019 | 2020 | 2021 | 2019 | 2020 | 2021 |
| COF (0.45) | 33.72±0.64abc | 36.66±1.26abc | 38.40±0.52c | 36.48±2.68c | 44.38±0.75abc | 50.42±0.25c | 70.20±1.23e | 81.05±1.04ab | 88.82±0.44b |
| COF (0.90) | 33.82±0.26abc | 34.32±0.43e | 36.28±0.51de | 37.48±1.08bc | 43.87±0.88bcd | 55.25±0.53a | 71.30±1.15cde | 79.85±1.57abc | 91.53±2.01a |
| COF (1.35) | 34.15±0.54abc | 35.55±0.09cd | 36.67±0.65de | 37.60±0.59 bc | 45.88±0.48a | 52.30±0.61b | 71.75±0.10bcde | 81.43 ± 0.79 a | 88.97±1.17b |
| COF (1.80) | 34.30±0.84ab | 37.45±0.53a | 37.15±0.98d | 38.87±0.51ab | 42.62±0.42de | 46.60±1.78de | 73.17±0.84ab | 80.07±0.70abc | 83.75±0.95de |
| SM (0.45) | 33.83±0.90abc | 35.89±0.47bcd | 41.80±0.54a | 34.52±0.23 d | 39.93±0.75 f | 46.60±0.23 de | 68.35±0.35f | 75.82±0.74e | 85.07±0.39cd |
| SM (0.75) | 32.83±0.35c | 36.35±0.15 abc | 38.55±0.48c | 37.95±0.78abc | 43.92±0.35bcd | 49.77±1.98c | 70.78±0.28cde | 80.27±1.29abc | 87.98±1.08b |
| SM (1.05) | 34.18±0.63abc | 36.95±0.61 ab | 39.97±0.83b | 38.30±0.48abc | 43.53±1.53cd | 46.91±0.54d | 72.48±0.16abc | 80.48±0.36abc | 86.88±2.39bc |
| SM (1.35) | 33.52±0.84abc | 37.25±0.67a | 39.10±0.92bc | 37.00±1.55bc | 43.23±1.03cd | 46.42±0.13de | 70.52±0.43de | 80.48±1.58abc | 85.52±0.98cd |
| MR (1.50) | 34.85±1.01a | 35.69±0.38bcd | 36.83±0.71de | 37.13±1.25 bc | 40.47±0.54 f | 45.15±0.51 e | 71.98±1.90bcd | 76.16±0.49 de | 81.98±0.28e |
| MR (2.25) | 33.57±0.45abc | 36.87±0.43ab | 35.97±0.44de | 36.52±0.64 c | 41.37±1.02 ef | 46.08±0.83de | 70.08±0.43e | 78.23±1.24cd | 82.05±0.90e |
| MR (3.00) | 33.18±0.75bc | 36.72±1.18abc | 35.81±0.57de | 37.40±0.18bc | 41.45±1.83ef | 46.56±0.49de | 70.58±1.32de | 78.17±1.16cde | 82.37±0.09e |
| MR (3.75) | 34.28±0.16ab | 35.97±0.71bcd | 36.75±0.65de | 37.12±0.90bc | 42.72±0.48cde | 47.28±0.32d | 71.40±1.13cde | 78.68±2.59bc | 84.03±1.41de |
| CCF (0.075) | 34.10±0.92abc | 34.91±0.60de | 35.43±1.94e | 39.88±0.43a | 45.47±0.52ab | 49.27±0.79c | 73.98±0.55a | 80.38±1.91abc | 84.70±2.30cd |
| Control | 31.37±0.95d | 27.45±0.66f | 29.75±0.74f | 29.92±1.38e | 37.98±0.07g | 40.23±0.39f | 61.28±0.40g | 65.43±1.03f | 69.98±1.13f |

COF: commercial organic fertilizer; SM: sheep manure; MR: mushroom residue; CCF: chemical compound fertilizer; FW: fresh weight. Values with different lowercase letters within the same column indicate significant differences ($p < 0.05$).

Table S3. Effect of different organic and chemical fertilizers on the soil pH and organic matter content.

| Treatments (kg/m ²) | pH | | | OMC (g/kg) | | |
|------------------------------------|-------------|------------|------------|-----------------|--------------|--------------|
| | 2019 | 2020 | 2021 | 2019 | 2020 | 2021 |
| COF (0.45) | 4.74±0.11a | 4.75±0.13a | 4.79±0.08a | 14.95±0.55cd | 16.55±0.46f | 21.97±0.33e |
| COF (0.90) | 4.69±0.11a | 4.75±0.10a | 4.81±0.12a | 14.96±0.55cd | 16.26±0.28f | 25.07±0.85ab |
| COF (1.35) | 4.71±0.09 a | 4.74±0.17a | 4.80±0.09a | 15.90±0.56abc | 18.51±0.30de | 25.07±0.91ab |
| COF (1.80) | 4.67±0.16a | 4.73±0.18a | 4.79±0.12a | 16.03±0.70ab | 19.48±0.59cd | 26.00±0.89ab |
| SM (0.45) | 4.68±0.18a | 4.77±0.16a | 4.77±0.07a | 14.80±0.17d | 15.89±0.73f | 21.83±0.42de |
| SM (0.75) | 4.68±0.06a | 4.81±0.06a | 4.81±0.04a | 16.71±0.65a | 20.35±0.62bc | 24.83±0.93b |
| SM (1.05) | 4.67±0.13a | 4.76±0.13a | 4.82±0.09a | 16.50±0.36a | 22.41±0.62a | 26.11±0.21ab |
| SM (1.35) | 4.70±0.07a | 4.75±0.11a | 4.80±0.09a | 15.12±0.43bcd | 20.12±0.72bc | 26.18±0.69a |
| MR (1.50) | 4.60±0.06a | 4.72±0.06a | 4.75±0.04a | 15.40±0.44bcd | 19.64±0.12bc | 22.92±0.33cd |
| MR (2.25) | 4.71±0.08a | 4.74±0.20a | 4.78±0.15a | 13.18±0.41e | 18.52±0.39de | 23.30±0.56c |
| MR (3.00) | 4.66±0.15a | 4.74±0.05a | 4.78±0.11a | 15.27±0.51bcd | 18.38±0.91de | 25.13±0.42ab |
| MR (3.75) | 4.70±0.06a | 4.72±0.26a | 4.81±0.10a | 15.12 ± 0.33bcd | 20.72±0.70b | 25.87±0.80ab |
| CCF (0.075) | 4.67±0.06a | 4.70±0.07a | 4.67±0.03a | 11.32±0.39g | 10.68±0.60g | 11.20±0.96f |
| Control | 4.68±0.05a | 4.77±0.09a | 4.77±0.06a | 12.23±0.66f | 11.13±0.69g | 11.00±0.80f |

COF: commercial organic fertilizer; SM: sheep manure; MR: mushroom residue; CCF: chemical compound fertilizer; OMC: organic matter contents. Values with different lowercase letters within the same column indicate significant differences ($p < 0.05$).

Table S4. Effect of different organic and chemical fertilizers on soil N, P and K nutrients.

| Treatments (kg/m ²) | Total N (g/kg) | | | Available P (mg/kg) | | | Available K (mg/kg) | | |
|------------------------------------|----------------|----------------|-------------|---------------------|--------------|----------------|---------------------|---------------|----------------|
| | 2019 | 2020 | 2021 | 2019 | 2020 | 2021 | 2019 | 2020 | 2021 |
| COF (0.45) | 0.94±0.15ab | 0.93±0.17cde | 1.01±0.12bc | 29.87±0.40a | 26.06±0.84g | 36.30±0.17cde | 469.12±1.92b | 466.89±3.25b | 496.38±1.66b |
| COF (0.90) | 1.07±0.15ab | 1.11±0.14abcd | 1.22±0.14a | 27.33±0.95b | 29.91±0.39e | 37.10±0.46abcd | 467.21±2.37bc | 461.49±0.57c | 486.60±1.77de |
| COF (1.35) | 0.95±0.11ab | 0.98±0.14bcde | 1.21±0.07a | 26.23±0.32c | 30.51±0.15de | 37.17±0.93abcd | 462.57±2.18c | 479.95±1.26a | 494.30±2.55bc |
| COF (1.80) | 1.11±0.09a | 1.16±0.20abc | 1.24±0.10a | 25.50±0.17cd | 33.32±0.17ab | 37.60±0.20ab | 434.22±1.39f | 450.99±3.37e | 479.34±1.79fg |
| SM (0.45) | 1.02±0.16ab | 1.05±0.11abcde | 1.19±0.06ab | 26.13±0.38c | 33.89±0.47a | 35.47±0.40ef | 435.57±2.35f | 447.34±0.63ef | 480.24±1.90fg |
| SM (0.75) | 1.07±0.12ab | 1.11± 0.01abcd | 1.24±0.02a | 24.70±0.46d | 29.83±0.60e | 34.53±1.01fg | 431.46±2.12fg | 445.99±0.11f | 479.09±2.16fg |
| SM (1.05) | 1.10±0.09a | 1.13±0.08abc | 1.22±0.15a | 25.20±0.57d | 29.77±0.64e | 37.37±0.76abc | 456.11±3.32d | 441.36±1.01g | 482.75±5.34ef |
| SM (1.35) | 1.02±0.18ab | 1.14±0.14abc | 1.23±0.08a | 22.30±0.75ef | 32.62±1.45bc | 36.10±0.82de | 426.63±3.01g | 470.52±1.56b | 489.41±1.48cd |
| MR (1.50) | 1.02±0.16ab | 1.10± 0.13abcd | 1.19±0.09ab | 21.87±0.81f | 27.70±0.17f | 34.27±0.29g | 445.98±2.99e | 456.19±2.34d | 471.30±4.79hi |
| MR (2.25) | 1.11±0.07a | 1.15±0.13abc | 1.21±0.04a | 23.10±0.79e | 31.81±1.02c | 36.83±0.50abcd | 420.26±0.26h | 450.51±0.39e | 467.00±3.16 ij |
| MR (3.00) | 1.11±0.09 a | 1.22±0.12ab | 1.27±0.15a | 24.47±0.55d | 32.58±0.33bc | 37.83±0.40a | 427.29±5.67g | 447.89±3.90ef | 471.43±0.42hi |
| MR (3.75) | 1.08±0.08ab | 1.28±0.12a | 1.24±0.06a | 25.13±0.49cd | 31.61±0.33cd | 36.50±0.26bcde | 444.27±3.35e | 457.36±2.06d | 476.15±3.00gh |
| CCF (0.075) | 1.02±0.14ab | 0.86±0.16de | 0.87±0.17cd | 27.90±0.40b | 25.67±0.21g | 36.57±0.97bcde | 481.34±1.83a | 476.88±3.50a | 520.66±4.11a |
| Control | 0.86±0.02b | 0.84±0.15d | 0.74±0.15d | 16.86±0.92g | 11.74±0.74h | 13.00±0.75h | 433.00±2.95f | 432.32±1.74h | 435.50±2.85k |

COF: commercial organic fertilizer; SM: sheep manure; MR: mushroom residue; CCF: chemical compound fertilizer. Values with different lowercase letters within the same column indicate significant differences ($p < 0.05$).

Table S5. Effect of different organic fertilizers on the soil exchangeable Ca and Mg.

| Treatments (kg/m ²) | exchangeable Ca (cmol (1/2 Ca ²⁺)/kg) | | | exchangeable Mg (cmol (1/2 Mg ²⁺)/kg) | | |
|------------------------------------|---|---------------|-------------|---|---------------|---------------|
| | 2019 | 2020 | 2021 | 2019 | 2020 | 2021 |
| COF (0.45) | 5.06±0.12bcdef | 4.98±0.14ef | 3.56±0.50fg | 1.05±0.04bcd | 1.04±0.12abcd | 1.02±0.04bcd |
| COF (0.90) | 4.78±0.07f | 5.41±0.13ef | 3.92±0.58f | 1.01±0.07cde | 1.05±0.04abc | 1.08±0.09abcd |
| COF (1.35) | 4.87±0.22def | 5.38±0.04cd | 6.32±0.59d | 1.12±0.02ab | 1.06±0.06abc | 1.14±0.03a |
| COF (1.80) | 5.00±0.25cdef | 5.98±0.26abc | 8.88±0.34b | 1.20±0.06a | 1.13±0.04ab | 1.13±0.06ab |
| SM (0.45) | 4.96±0.25def | 5.94 ± 0.02a | 5.36±0.32e | 0.94±0.03e | 0.92±0.13cd | 1.13±0.02ab |
| SM (0.75) | 5.26±0.07abcd | 5.51±0.04bcd | 4.05±0.30f | 1.08±0.10bc | 1.03±0.01abcd | 1.01±0.07cd |
| SM (1.05) | 4.97±0.23def | 5.61±0.22abcd | 5.12±0.75e | 1.05±0.04bcd | 1.14±0.02a | 1.09±0.09abcd |
| SM (1.35) | 5.15±0.09bcde | 5.69±0.31d | 8.59±0.50b | 0.96±0.02de | 0.98±0.13bcd | 1.12±0.06abc |
| MR (1.50) | 5.57±0.17a | 5.43±0.11e | 4.99±0.25e | 1.04±0.01bcd | 1.23±0.11ab | 1.10±0.06abcd |
| MR (2.25) | 4.97±0.29def | 5.58±0.13abcd | 5.50±0.74de | 0.93±0.02e | 1.04±0.10abcd | 1.07±0.03abcd |
| MR (3.00) | 5.34±0.08abc | 5.89±0.17cd | 9.97±0.42a | 0.93±0.08e | 0.90±0.05d | 1.08±0.09abcd |
| MR (3.75) | 5.37±0.19ab | 5.85±0.15ab | 7.51±0.10c | 1.02±0.02cde | 1.12±0.04ab | 1.09±0.06abcd |
| CCF (0.075) | 4.80±0.19ef | 4.97±0.25f | 3.38±0.69fg | 1.04±0.09bcd | 1.05±0.10abc | 1.06±0.03abcd |
| Control | 5.02±0.16bcdef | 5.26±0.04ef | 2.74±0.58g | 1.05±0.02bcd | 1.03±0.10abcd | 0.99±0.03d |

COF: commercial organic fertilizer; SM: sheep manure; MR: mushroom residue; CCF: chemical compound fertilizer. Values with different lowercase letters within the same column indicate significant differences ($p < 0.05$).