|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Group | pH | EC (ms/cm) | OM (g/kg) | AN(mg/kg) | P(mg/kg) | K(mg/kg) | Ca(mg/kg) |
| SPa | 4.86±0.00\*\* | 0.040±0.006\*\* | 17.74±0.10\*\* | 83.93±1.00\*\* | 130.17±1.26\*\* | 191.57±1.82\*\* | 451.64±0.23\*\* |
| SPb | 4.66±0.06\*\* | 0.056±0.006\*\* | 24.23±0.17\*\* | 94.72±0.99\*\* | 224.67±2.47\*\* | 177.01±0.61\*\* | 378.88±0.54\*\* |
| ITb | 4.84±0.00\*\* | 0.056±0.006\* | 24.66±0.06\*\* | 99.67±0.65\*\* | 350.33±1.89\*\* | 305.58±0.79\*\* | 443.17±1.52\*\* |
| IGb | 4.87±0.06\*\* | 0.076±0.006\*\* | 26.44±0.06\*\* | 113.06±0.99\*\* | 339.67±0.76\*\* | 438.65±1.07\*\* | 393.00±4.74\*\* |

**Supplementary** **TABLE S1** Significance analysis of soil physical and chemical results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Group | Mg(mg/kg) | Cu(mg/kg) | Zn(mg/kg) | Fe(mg/kg) | Mo(mg/kg) | B(mg/kg) |
| SPa | 42.45±0.30\*\* | 1.67±0.00\*\* | 4.28±0.08\*\* | 104.75±0.18\*\* | 25.11±0.44\*\* | 0.215±0.002\*\* |
| SPb | 44.81±0.78\*\* | 1.69±0.01\*\* | 5.15±0.02\*\* | 97.71±0.20\*\* | 30.91±0.37\* | 0.327±0.003\*\* |
| ITb | 52.46±0.29\*\* | 1.49±0.01\*\* | 6.28±0.13\*\* | 80.95±0.37\*\* | 29.81±0.11\* | 0.324±0.002\* |
| IGb | 58.44±0.09\*\* | 1.44±0.01\*\* | 4.92±0.08\* | 73.57±0.20\*\* | 44.55±0.34\* | 0.369±0.001\*\* |

Asterisks indicate statistically significant differences between pairs of values (∗P < 0.05, ∗∗P < 0.01).

These measured indicators include PH , P: available potassium, AK: available potassium, Ca: exchangeable Ca, EC: electrical conductivity, Cu: available Cu, Zn: available zinc, EB: effective boron, OM: organic matter, AN: alkali-hydrolyzable nitrogen, EMg: effective magnesium, EI: effective iron, EMo: effective manganese, Protease, Phosphatase, Dehydrogenase and Urease

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**Supplementary Figure S1 |** Differences among the soil microbial colonies when the various planting modes were applied.

\*\*\*\*: P < 0.0001, \*\*\*: 0.0001 < P < 0.005, \*\*: 0.005 < P < 0.01, \*: 0.01 < P < 0.05, and ns; no significant difference.

SPa: cropping with patchouli for one year, SPb: continuous cropping with patchouli over a number of years, ITb: continuous cropping with patchouli and intercropping with turmeric, and IGb: continuous cropping with patchouli and intercropping with ginger.

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**Supplementary Figure S2** | Differences in soil bacterial and fungal diversity when the various planting modes were applied.

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**Supplementary Figure S3 |** Relative abundances of the top 10 microorganisms in soils

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**Supplementary Figure S4 |** Mantel test between species and environmental factors.