**Supplementary files**

**Extracellular enzymes of soils under different tillage: predicted functional potential and actual activity**

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**Figure S1.** Comparison of the functional potential of soil microbiomes in the organic and conventional cropping systems based on identified COG functional categories. The x-axis shows the count of reads.



**Figure S2.** Relative abundances of COG related with Carbohydrate transport and metabolism. The difference between the two crop systems was expressed quantitatively as a log2 fold change value.



**Figure S3.** The heatmap of abundance of the genes involved in P,N,S-cycles. A comparison of the ability of soil microbiomes to transform nitrogen, phosphorus, and sulfur in organic and conventional farming systems, based on specific genes identified.

Table S1. General soil chemical and physical properties of the organic and conventional cropping systems.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Farming  | Depth(cm) | рН KCl | рН Н2О | Glay % | Silt% | Sand % | TCg kg-1 | SOCg kg-1 | IOCg kg-1 | TNg kg-1 | TC:TN | APg kg-1 | EOCg kg-1 | EONg kg-1 |
| Organic | 0–5 | 7.22±0.14 | 7.82±0.43 | 33.6 | 64.0 | 2.4 | 32.1±5.31 | 31.4±11.4 | 0.7 | 4.2±1.17 | 7.9 | 74.6±2.2 | 2.38±0.51 | 0.56±0.30 |
| Traditional | 6.97±0.30 | 7.65±0.22 | 34.4 | 62.9 | 2.70 | 29.6±4.53 | 27.1±10.1 | 2.5 | 4.14±0.94 | 7.5 | 15.98±3.5 | 2.80±1.59 | 2.77±2.31 |
| *p*-value |  | 0.02 | 0.21 |  |  |  | 0.36 | 0.61 |  | 0.84 | 0.63 | < 0.001 | 0.61 | 0.005 |
| Organic | 5–10 | 7.31±0.34 | 7.91±0.14 | 33.3 | 64.4 | 2.3 | 29.5±3.75 | 28.1±3.11 | 1.4 | 4.17±1.34 | 7.6 | 67.1±1.1 | 1.21±0.29 | 0.37±0.27 |
| Traditional | 7.02±0.37 | 7.76±0.26 | 35.1 | 62.4 | 2.50 | 47.4±4.04 | 27.8±3.45 | 19.6 | 14.4±4.06 | 4.2 | 13.8±1.87 | 1.43±0.22 | 1.49±1.25 |
| *p*-value |  | 1.08 | 0.14 |  |  |  | 0.04 | 0.07 |  | 0.01 | 0.01 | < 0.001 | 0.07 | 0.003 |
| TC, Total soil carbon; SOC, Soil organic carbon; IOC, Inorganic carbon; TN, Total soil nitrogen; AP, soil available phosphorous; EOC, extractable organic carbon; EON, extractable organic nitrogen. |

Table S2. Two-way PERMANOVA based on Bray-Curtis similarity output of the effects of cropping systems, sampling depth and their interactions on enzymatic activity of soils

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| Enzymatic activity |
| Source | Sum of sqrs | df | Mean square | F | *p* |
| Sampling depth | 0.763278 | 1 | 0.76328 | 14.978 | 0.0009 |
| Cropping systems | 0.489619 | 1 | 0.48962 | 9.6079 | 0.0056 |
| Interaction | 0.206771 | 1 | 0.20677 | 4.0575 | 0.0439 |
| Residual | 0.611522 | 12 | 0.05096 |  |  |
| Total | 2.0712 | 15 |  |  |  |