

## Supplementary material

**Table S4.** Soil chemical properties under mineral and organic fertilizers and after crop harvesting (October 2022)

Treatments	pH	C <sub>org</sub> (%)	Humus (%)	Nt (%)
Mixture of perennial grasses and leguminous				
V1 - Control	5.87 ± 0.10 b (cv)	1.88 ± 0.07 d (cv)	3.24 ± 0.11 c (cv)	0.191 ± 0.01 d (cv)
V2 - NPK	5.59 ± 0.14 d (oo)	1.95 ± 0.07 d (ns)	3.36 ± 0.13 c (ns)	0.201 ± 0.02 c (ns)
V3 – 15 t/ha MC	5.70 ± 0.07 c (ns)	1.97 ± 0.06 d (ns)	3.40 ± 0.12 c (ns)	0.190 ± 0.02 d (ns)
V4 – 15 t/ha MC + NPK	5.69 ± 0.07 c (ns)	2.13 ± 0.11 b (**)	3.67 ± 0.19 b (**)	0.214 ± 0.01 b (ns)
V5 – 30 t/ha MC	5.92 ± 0.06 b (ns)	2.07 ± 0.07 c (*)	3.57 ± 0.11 b (**)	0.203 ± 0.01 c (ns)
V6 – 30 t/ha MC + NPK	6.06 ± 0.11 a (*)	2.26 ± 0.07 a (***)	3.90 ± 0.13 a (***)	0.230 ± 0.03 a (*)
V7 – 60 t/ha MC	5.85 ± 0.04 b (ns)	2.17 ± 0.06 b (**)	3.74 ± 0.03 b (**)	0.212 ± 0.02 b (ns)
V8 – 60 t/ha MC + NPK	5.81 ± 0.08 b (ns)	2.11 ± 0.04 c (**)	3.64 ± 0.08 b (**)	0.213 ± 0.01 b (ns)
LSD	LSD 5% - 0.182 LSD 1% - 0.276 LSD 0.1% - 0.443	LSD 5% - 0.134% LSD 1% - 0.202% LSD 0.1% - 0.325%	LSD 5% - 0.210% LSD 1% - 0.317% LSD 0.1% - 0.510%	LSD 5% - 0.032% LSD 1% - 0.048% LSD 0.1% - 0.077%
Treatments	pH	C <sub>org</sub> (%)	Humus (%)	Nt (%)
Winter wheat crop				
V1 - Control	6.00 ± 0.09 a (cv)	2.05 ± 0.19 c (cv)	3.53 ± 0.33 c (cv)	0.204 ± 0.009 c (cv)
V2 - NPK	5.79 ± 0.06 b (o)	2.07 ± 0.19 c (ns)	3.57 ± 0.34 c (ns)	0.212 ± 0.006 c (ns)
V3 – 15 t/ha MC	5.93 ± 0.08 a (ns)	2.10 ± 0.09 c (ns)	3.62 ± 0.15 c (ns)	0.211 ± 0.012 c (ns)
V4 – 15 t/ha MC + NPK	5.69 ± 0.10 c (oo)	2.28 ± 0.15 b (ns)	3.93 ± 0.25 b (ns)	0.222 ± 0.008 b (ns)
V5 – 30 t/ha MC	5.95 ± 0.08 a (ns)	2.26 ± 0.13 b (ns)	3.90 ± 0.21 b (ns)	0.224 ± 0.009 b (ns)
V6 – 30 t/ha MC + NPK	5.78 ± 0.09 b (o)	2.14 ± 0.17 c (ns)	3.69 ± 0.29 c (ns)	0.210 ± 0.011 c (ns)
V7 – 60 t/ha MC	5.95 ± 0.06 a (ns)	2.23 ± 0.14 b (ns)	3.84 ± 0.25 b (ns)	0.220 ± 0.042 b (ns)
V8 – 60 t/ha MC + NPK	5.85 ± 0.10 a (ns)	2.50 ± 0.09 a (**)	4.31 ± 0.16 a (**)	0.240 ± 0.007 a (*)
LSD	LSD 5% - 0.146 LSD 1% - 0.222 LSD 0.1% - 0.356	LSD 5% - 0.238% LSD 1% - 0.360% LSD 0.1% - 0.579%	LSD 5% - 0.406% LSD 1% - 0.615% LSD 0.1% - 0.987%	LSD 5% - 0.029% LSD 1% - 0.044% LSD 0.1% - 0.071%

Treatments	pH	C <sub>org</sub> (%)	Humus (%)	Nt (%)
Maize crop				
V1 - Control	5.76 ± 0.14 a (cv)	2.04 ± 0.07 c (cv)	3.52 ± 0.12 d (cv)	0.197 ± 0.012 c (cv)
V2 - NPK	5.54 ± 0.14 b (o)	2.06 ± 0.06 c (ns)	3.55 ± 0.11 d (ns)	0.200 ± 0.011 c (ns)
V3 – 15 t/ha MC	5.55 ± 0.14 a (o)	2.14 ± 0.04 c (ns)	3.69 ± 0.06 d (ns)	0.203 ± 0.008 c (ns)
V4 – 15 t/ha MC + NPK	5.51 ± 0.11 b (o)	2.13 ± 0.10 c (ns)	3.67 ± 0.16 d (ns)	0.201 ± 0.008 c (ns)
V5 – 30 t/ha MC	5.63 ± 0.11 a (ns)	2.19 ± 0.07 a (*)	3.78 ± 0.11 c (*)	0.211 ± 0.006 c (ns)
V6 – 30 t/ha MC + NPK	5.55 ± 0.06 b (o)	2.37 ± 0.08 b (***)	4.09 ± 0.13 a (***)	0.231 ± 0.006 a (**)
V7 – 60 t/ha MC	5.51 ± 0.04 b (o)	2.26 ± 0.09 b (ns)	3.90 ± 0.13 b (**)	0.221 ± 0.010 a (*)
V8 – 60 t/ha MC + NPK	5.58 ± 0.09 a (ns)	2.30 ± 0.06 c (**)	3.97 ± 0.09 b (**)	0.222 ± 0.008 a (**)
LSD	LSD 5% - 0.198 LSD 1% - 0.300 LSD 0.1% - 0.481	LSD 5% - 0.132% LSD 1% - 0.199% LSD 0.1% - 0.320%	LSD 5% - 0.215% LSD 1% - 0.325% LSD 0.1% - 0.522%	LSD 5% - 0.016% LSD 1% - 0.025% LSD 0.1% - 0.040%
Treatments	pH	C <sub>org</sub> (%)	Humus (%)	Nt (%)
Soybean crop				
V1 - Control	5.96 ± 0.11 b (cv)	2.06 ± 0.05 c (cv)	3.55 ± 0.08 d (cv)	0.207 ± 0.008 c (cv)
V2 - NPK	6.02 ± 0.06 b (ns)	2.16 ± 0.07 c (ns)	3.72 ± 0.12 c (ns)	0.210 ± 0.007 c (ns)
V3 – 15 t/ha MC	6.27 ± 0.05 a (**)	2.14 ± 0.13 c (ns)	3.69 ± 0.22 c (ns)	0.212 ± 0.008 c (ns)
V4 – 15 t/ha MC + NPK	5.84 ± 0.13 b (ns)	2.37 ± 0.03 a (***)	4.09 ± 0.04 a (***)	0.230 ± 0.005 a (**)
V5 – 30 t/ha MC	5.87 ± 0.11 b (ns)	2.06 ± 0.09 c (ns)	3.55 ± 0.15 d (ns)	0.200 ± 0.010 c (ns)
V6 – 30 t/ha MC + NPK	5.70 ± 0.06 d (oo)	2.39 ± 0.06 a (***)	4.12 ± 0.10 a (***)	0.231 ± 0.009 a (**)
V7 – 60 t/ha MC	5.76 ± 0.06 c (o)	2.14 ± 0.04 c (ns)	3.69 ± 0.06 c (ns)	0.214 ± 0.008 c (ns)
V8 – 60 t/ha MC + NPK	6.29 ± 0.09 a (**)	2.28 ± 0.06 b (**)	3.93 ± 0.11 b (**)	0.222 ± 0.006 b (*)
LSD	LSD 5% - 0.151 LSD 1% - 0.228 LSD 0.1% - 0.367	LSD 5% - 0.120% LSD 1% - 0.181% LSD 0.1% - 0.291%	LSD 5% - 0.206% LSD 1% - 0.312% LSD 0.1% - 0.501%	LSD 5% - 0.013% LSD 1% - 0.020% LSD 0.1% - 0.033%

Significant differences between treatments are indicated by different lowercase letters (Duncan's test;  $p < 0.05$ ; mean  $\pm$  SD,  $n = 4$ ). Means followed by the same letter are not significantly different (ns); \*\*\*, \*\*, and \* indicate significant differences at LSD 5%, LSD 1%, and LSD 0.1% respectively; ns—non-significant; ooo, oo and o, indicate negative significant differences compared to the control, cv – control variant.

Abbreviations: manure compost (MC); chemical fertilisers only (NPK); least significant differences (LSD); organic carbon (C<sub>org</sub>); total nitrogen (Nt)

