Table S1. The correlation (Pearson's correlation coefficients) between organic matter (SOM), N, P, K, Ca, Mg, Fe, Cu, Mn, Zn, and Si in soil and grain yield (GY) and protein content in grain of spelt, maze and soybean.

| | SOM | N | P | K | Ca | Mg | Fe | Cu | Mn | Zn | Si |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Spelt | | | | | |
| GY | -0.504* | -0.598* | -0.536* | 0.756* | 0.939* | -0.577* | 0.112 | -0.722* | 0.173 | -0.323 | -0.689* |
| Prot. | -0.235 | -0.131 | -0.991* | 0.917* | 0.475* | -0.678* | -0.500* | -0.105 | 0.676* | 0.343 | -0.632* |
| | | | | | | Maize | | | | | |
| GY | -0.058 | -0.195 | -0.580* | -0.026 | 0.581* | -0.386 | -0.338 | -0.392 | -0.311 | -0.74*2 | -0.397 |
| Prot. | 0.092 | -0.223 | -0.477* | 0.734* | 0.413* | -0.662 | 0.049 | 0.183 | 0.604* | 0.190 | -0.035 |
| | | | | | | Soybean | | | | | |
| GY | -0.609* | 0.386 | 0.323 | 0.127 | 0.017 | 0.059 | 0.554* | -0.705* | -0.317 | -0.777* | -0.820* |
| Prot. | -0.106 | 0.363 | 0.273 | 0.037 | 0.665* | -0.669* | -0.975* | 0.332 | 0.551* | 0.119 | 0.260 |

*Significant at 5% probability level.

Table S2. The correlation (Pearson's correlation coefficients) between organic matter (SOM) and N content in soil and concentration of P, K, Ca, Mg, Fe, Cu, Mn, Zn, and Si in grain of spelt, maze and soybean.

| | P | K | Ca | Mg | Fe | Cu | Mn | Zn | Si |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Spelt | | | | |
| SOM | -0.340 | -0.292 | -0.311 | -0.048 | -0.215 | 0.832* | -0.437* | -0.212 | -0.427* |
| N | 0.405* | -0.605* | 0.500* | 0.668* | 0.566* | 0.494* | -0.465* | 0.337 | -0.359 |
| | | | | | Maize | | | | |
| SOM | -0.909* | 0.589* | -0.301 | -0.572* | -0.585* | 0.976* | 0.323 | -0.449* | -0.035 |
| N | 0.808* | -0.583* | 0.493 | 0.791* | 0.824* | -0.941* | -0.055 | 0.670* | 0.138 |
| | | | | | Soybean | | | | |
| SOM | 0.851* | -0.659* | 0.149 | 0.504* | 0.458* | 0.015 | 0.322 | 0.690* | 0.536* |
| N | 0.237 | -0.318 | 0.270 | 0.030 | -0.058 | -0.658* | 0.501* | -0.056 | -0.011 |

*Significant at 5% probability level.

Table S3. The correlation (Pearson's correlation coefficients) between concentrations of P, K Ca, Mg, Fe, Cu, Mn, Zn, and Si in soil and grain of spelt, maze and soybean.

| | P | K | Ca | Mg | Fe | Cu | Mn | Zn | Si |
|---|---|---|---|---|---|---|---|---|---|
| Spelt | -0.038 | -0.046 | -0.281 | 0.049 | 0.378 | 0.851* | 0.043 | 0.030 | 0.857* |
| Maize | 0.630* | -0.595* | -0.192 | 0.460* | 0.535* | 0.339 | -0.800* | 0.447* | 0.913* |
| Soybean | 0.427* | -0.341 | -0.110 | 0.568* | 0.107 | 0.049 | 0.793* | 0.524* | 0.772* |

*Significant at 5% probability level.