# Supplementary material

**Table S1**. Fraction of variations (%) explained by landscape position, farmers’ fields and fertilizer application to grain and stover yield.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Grain yield** | | **Stover yield** | |
| **Factors** | **Model I** | **Model II** | **Model I** | **Model II** |
|  | **NPKS** | | | |
| Fertilizer | 92.0 | 94.3 | 100.0 | 100.0 |
| Farmer fields | 0.0 |  | 0.0 |  |
| Landscape | 7.9 | 5.7 | 0.0 | 0.0 |
| RMSE | 0.83 | 0.74 | 0.92 | 88.0 |
| R² | 0.48 | 0.57 | 0.30 | 0.25 |
|  | **NPZn** | | | |
| Fertilizer | 81.7 | 87.1 | 93.3 | 100.0 |
| Farmer fields | 0 |  | 0.0 |  |
| Landscape | 18.3 | 12.9 | 6.7 | 0.0 |
| RMSE | 0.58 | 0.68 | 0.82 | 1.06 |
| R² | 0.73 | 0.53 | 0.32 | 0.39 |

**Table S2**. Fraction of variations (%) explained by fertilizer, topographic and soil properties of sorghum grain yield within farmers’ fields**.**

|  |  |  |
| --- | --- | --- |
| **Soil properties** | **NPKS** | **NPZn** |
| Fertilizer rate | 79.0 | 81.9 |
| Organic matter | 8.4 | 4.9 |
| Topographic wetness index (TWI) | 4.5 | 0.0 |
| pH | 4.4 | 5.5 |
| Soil type | 2.25 | 7.7 |
| Bulk density (BD) | 1.4 | 0.0 |
| Exchangeable cation capacity (CEC) | 0.0 | 0.0 |
| RMSE | 0.63 | 0.67 |
| R² | 0.65 | 0.58 |

**Figure S1**

Chart

Description automatically generated with medium confidence