**Table S5.** Simple and partial correlations between energy use and N fertilizer application rates.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Simple correlationsb | Partial correlations | |
| Rotation length (yr) | Crop phasea | rEcErot | rEcNc | prEcErot.Nc |
| 2 | m | 0.95\*\*\*c | 0.53\*\* | 0.94\*\*\* |
| 2 | sb | 0.57\*\* | 0.21 | 0.58\*\* |
| 3 | m | 0.90\*\*\* | 0.82\*\*\* | 0.81\*\*\* |
| 3 | sb | 0.44\*\* | 0.14 | 0.37\* |
| 3 | sg | 0.69\*\*\* | 0.46\*\* | 0.01 |
| 4 | m | 0.79\*\*\* | 0.71\*\*\* | 0.70\*\*\* |
| 4 | sb | 0.70\*\*\* | 0.35\* | 0.54\*\* |
| 4 | sg | 0.71\*\*\* | 0.49\*\* | 0.66\*\*\* |
| 4 | a | 0.46\*\* | -0.03 | 0.08 |

a Abbreviations for crop phase: m = maize, sb = soybean, sg = small grain (triticale in 2003-2005, oat in 2006-2011), a = alfalfa.

b Abbreviations for correlations: Ec = energy use within a crop phase, Erot = mean rotation energy use, Nc = N application rate within a given crop phase. The term prEcErot.Nc denotes the partial correlation between Ec and Erot, partialling out variation due to Nc.

c The symbols \*, \*\* and \*\*\* denote significant correlations at P < 0.01, 0.001 and 0.0001, respectively.