**Supporting information:**

**Table S1** Averaged microbial PLFA amounts (nmol g-1) across seven years as affected by four land use types and seasons. CL, cropland; FG, forage grassland; EL, economic forest land; NS, natural shrubland. Values are means ± SE. Means in a row (column) followed by different lowercase (uppercase) letters are significantly different by repeated-measures ANOVA (RMANOVA). Different lowercase letters indicate significant differences between different land use types, and different uppercase letters indicate significant differences between seasons.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Microbes | Season | Land use type | | | |
|  |  | CL | FG | EL | NS |
| Total microbial | Dry | 168.2±24.4**b** | 213±24.4**Aa** | 188.8±23.6**ab** | 175.2±23.8**ab** |
|  | Wet | 142.6±11.8 | 173.4±10.3**B** | 170.2±12.2 | 149±19.5 |
| Bacteria | Dry | 149.5±21.9 | 187.4±21.6**A** | 167.1±21.1 | 154.7±21.2 |
|  | Wet | 129.1±10.7 | 153.6±8.8**B** | 152.4±10.7 | 133.4±17.7 |
| Fungi | Dry | 18.7±2.6**b** | 25.6±2.9**Aa** | 21.7±2.6 **ab** | 20.5±2.6 **ab** |
|  | Wet | 13.5±1.2 | 19.8±1.6**B** | 17.9±1.6 | 15.6±2.0 |
| AMF | Dry | 11.5±1.7**b** | 15.7±1.8**Aa** | 13.4±1.7 **ab** | 12.1±1.6 **ab** |
|  | Wet | 8.8±1.0 | 11.7±1.1**B** | 11±1.1 | 9.6±1.4 |

**Table S2** Abundances of nematodes (individuals per 100 g dry soil) across seven years as affected by four land use types and seasons. CL, cropland; FG, forage grassland; EL, economic forest land; NS, natural shrubland. BF, bacterivore; FF, fungivore; PP, plant parasite (herbivore); Om-Pr, omnivore-predator; Total: total nematodes. Values are means ± SE. Means in a row (column) followed by different lowercase (uppercase) letters are significantly different by repeated-measures ANOVA (RMANOVA). Different lowercase letters indicate significant differences between different land use types, and different uppercase letters indicate significant differences between seasons.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Guild | Season | Land use type | | | |
|  |  | CL | FG | EL | NS |
| Total | Dry | 777.2±113.4**b** | 781±103.8**Ab** | 861.9±143.7**b** | 1304.2±167.3**Aa** |
|  | Wet | 461.6±68.8 | 430.1±80**B** | 460.8±87 | 554.3±88.5**B** |
| BF | Dry | 267.1±35.2**Ab** | 251.6±36**Ab** | 304.5±50**Ab** | 465.4±76.4**Aa** |
|  | Wet | 121.1±21.6**B** | 97.4±18.4**B** | 126.6±25**B** | 116.8±14.2**B** |
| FF | Dry | 355.6±66.2 | 344.6±53.9**A** | 345.7±63.3 | 394.5±52.3**A** |
|  | Wet | 131.3±23.6 | 137.5±26.9**B** | 151.9±28.9 | 130.2±23.5**B** |
| PP | Dry | 79.1±18.6**b** | 95.9±25.9**b** | 85.3±23.3**b** | 284.9±49.3**a** |
|  | Wet | 111±28.7 | 103.1±32.9 | 83.2±34.7 | 218.7±50.8 |
| Om | Dry | 47.5±8.5**b** | 63.3±13.4**b** | 87.7±18.2**ab** | 115.4±27.7**a** |
|  | Wet | 64.0±9.8 | 67.3±8.0 | 75.7±10.5 | 88.1±13.8 |
| Pr | Dry | 27.9±10.6 | 25.6±7.0 | 38.8±14.3 | 43.9±13.1 |
|  | Wet | 23.8±5.6 | 23.2±4.1 | 48.4±8.4 | 40.1±7.0 |
| OmPr | Dry | 75.4±17.7**b** | 88.9±19.8**b** | 126.4±30.6**ab** | 159.3±38.2**a** |
|  | Wet | 98.2±19.9 | 92.1±13.5 | 99.2±19.2 | 88.6±12.9 |

**Table S3** Energy fluxes of nematode communities (ug C/100 g soil/day) across seven years as affected by four land use types and seasons. CL, cropland; FG, forage grassland; EL, economic forest land; NS, natural shrubland. BF, bacterivore; FF, fungivore; PP, plant parasites (herbivore); Om-Pr, omnivore-predator; Total: total nematode. Values are means ± SE. Means in a row (column) followed by different lowercase (uppercase) letters are significantly different by repeated-measures ANOVA (RMANOVA). Different lowercase letters indicate significant differences between different land use types, and different uppercase letters indicate significant differences between seasons.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Guild | Season | Land use type | | | |
|  |  | CL | FG | EL | NS |
| Total | Dry | 37.4±6.2**b** | 42.3±7.7**b** | 60.8±13.7**ab** | 82.3±16.3**a** |
|  | Wet | 47±11.8 | 37.2±7.2 | 37±7.1 | 44.9±9.1 |
| BF | Dry | 11.5±2**b** | 12±2.2**Ab** | 17.4±3.8**Aab** | 22.2±4.5**Aa** |
|  | Wet | 7±1.5 | 7.1±1.1**B** | 8.7±1.8**B** | 6.1±0.9**B** |
| FF | Dry | 12.8±2.8 | 11.4±2.8 | 17.3±4.8 | 20±4.9**A** |
|  | Wet | 10±1.5 | 10.2±2 | 11.6±2.2 | 7.5±1.4**B** |
| PP | Dry | 5.7±1.3**Bb** | 7.7±1.7**Bb** | 10.1±3**b** | 27.2±5.6**a** |
|  | Wet | 20.4±7.6**A** | 12.6±2.9**A** | 8.9±2.6 | 23.3±5.9 |
| OmPr | Dry | 6.9±1.5**b** | 8±1.9**b** | 13.5±3.5**ab** | 15.2±4.1**a** |
|  | Wet | 8.9±2.2 | 7.7±1.7 | 8.1±1.8 | 7.9±1.7 |
| Uniformity | Dry | 1.1±0.06 | 1.08±0.06**B** | 1.18±0.05 | 1.1±0.07 |
|  | Wet | 1.06±0.06**ab** | 1.16±0.05**Aab** | 1.22±0.07**a** | 1.02±0.07**b** |

**Table S4** Relationships between nematode diversity and total energy flux of nematode communities in different land use type according to Spearman correlation. CL, cropland; FG, forage grassland; EL, economic forest land; NS, natural shrubland.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Land use type | R2 | *p* |
| Family diversity | CL | 0.11 | 0.054 |
|  | FG | 0.06 | 0.160 |
|  | EL | 0.06 | 0.165 |
|  | NS | 0.09 | 0.099 |
| Function diversity | CL | 0.03 | 0.353 |
|  | FG | 0.10 | 0.071 |
|  | EL | < 0.01 | 0.848 |
|  | NS | 0.02 | 0.492 |
| Family richness index | CL | 0.05 | 0.215 |
|  | FG | 0.11 | 0.055 |
|  | EL | 0.06 | 0.175 |
|  | NS | **0.14** | **0.031** |
| Function richness index | CL | 0.02 | 0.387 |
|  | FG | 0.10 | 0.066 |
|  | EL | 0.03 | 0.315 |
|  | NS | 0.10 | 0.074 |

**Table S5** Relationships between nematode diversity and energy flow uniformity of soil micro-food web in different land use type according to Spearman correlation. CL, cropland; FG, forage grassland; EL, economic forest land; NS, natural shrubland.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Land use type | R2 | *p* |
| Family diversity | CL | 0.09 | 0.087 |
|  | FG | 0.10 | 0.071 |
|  | EL | **0.15** | **0.027** |
|  | NS | **0.30** | **< 0.001** |
| Function diversity | CL | - | - |
|  | FG | 0.04 | 0.292 |
|  | EL | 0.03 | 0.365 |
|  | NS | 0.05 | 0.230 |
| Family richness index | CL | 0.03 | 0.299 |
|  | FG | 0.05 | 0.215 |
|  | EL | **0.30** | **< 0.001** |
|  | NS | **0.28** | **0.002** |
| Function richness index | CL | 0.04 | 0.245 |
|  | FG | 0.02 | 0.397 |
|  | EL | 0.11 | 0.054 |
|  | NS | **0.12** | **0.048** |

**Fig. S1** Network analysis of the relationships between soil microorganisms PLFA amounts (nmol g-1) and nematodes abundance (individuals per 100 g dry soil) under different land use type. The b and f represent bacteria and fungi. Ba, Fu, He, Om, and Pr represent bacterivores, fungivores, herbivore, omnivores, and predators, respectively. CL, cropland; FG, forage grassland; EL, economic forest land; NS, natural shrubland. The circle represents the different bio-indicators. Spearman's rank correlations between two indicators are calculated. Line width represents the relationship strength. Red lines represent positive correlations, only those with significant correlations are shown here.

