

Fig. S1 Chao1 and Shannon soil fungal diversity indices the conventional tillage (CT), weed cover (WC) and Siratro cover (SC) treatments in 2018, 2019 and 2020. \*, \*\*, \*\*\* is for P ≤ 0.05, 0.01 and 0.001, respectively.



Fig. S2 Soil fungal community composition in 2018, 2019 and 2020 with conventional tillage (CT), weed cover (WC) and Siratro cover (SC) treatments.



Fig. S3 Funguild predictions of functional fungal guild ASV richness of the conventional tillage (CT), weed cover (WC) and Siratro cover (SC) treatments in the furrow in 2018 (A), 2019 (B) and 2020 (C). Means within the same year followed by the same letters are not significantly different at P = 0.05 according to a protected LSD test.

Table S1 Sample DNA quantity, DNA quality and number of analyzed sequences (i.e., having sufficient quality for sequence analysis).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Area | Treatmentscode | Replication | SRA accession | UV concentration(ng/μl) | OD260/280 | OD260/230 | Analyzed sequences |
| 2017 |  | BF | 1 | SRR22044417 | 10.40 | 1.98 | 0.37 | 39772 |
| 2017 |  | BF | 2 | SRR22044416 | 11.30 | 1.98 | 0.41 | 47000 |
| 2017 |  | BF | 3 | SRR22044405 | 13.80 | 1.37 | 0.27 | 42411 |
| 2017 |  | BF | 4 | SRR22044394 | 11.30 | 1.94 | 0.39 | 36961 |
| 2018 | Furrow | CT | 1 | SRR22044383 | 10.10 | 1.82 | 0.31 | 43220 |
| 2018 | Furrow | CT | 2 | SRR22044372 | 12.40 | 1.84 | 0.37 | 42681 |
| 2018 | Furrow | CT | 3 | SRR22044361 | 14.40 | 1.84 | 0.39 | 41060 |
| 2018 | Furrow | WC | 1 | SRR22044351 | 9.20 | 1.92 | 0.34 | 46840 |
| 2018 | Furrow | WC | 2 | SRR22044350 | 13.00 | 1.91 | 0.45 | 38380 |
| 2018 | Furrow | WC | 3 | SRR22044349 | 6.20 | 1.87 | 0.24 | 41115 |
| 2018 | Furrow | SC | 1 | SRR22044415 | 8.70 | 1.97 | 0.35 | 38536 |
| 2018 | Furrow | SC | 2 | SRR22044414 | 13.70 | 1.72 | 0.44 | 35375 |
| 2018 | Furrow | SC | 3 | SRR22044413 | 6.60 | 2.01 | 0.27 | 38077 |
| 2018 | Intercropping | CT | 1 | SRR22044412 | 9.70 | 2.06 | 0.37 | 48958 |
| 2018 | Intercropping | CT | 2 | SRR22044411 | 9.70 | 1.93 | 0.37 | 49026 |
| 2018 | Intercropping | CT | 3 | SRR22044410 | 9.80 | 1.84 | 0.34 | 45020 |
| 2018 | Intercropping | WC | 1 | SRR22044409 | 7.20 | 1.98 | 0.24 | 38658 |
| 2018 | Intercropping | WC | 2 | SRR22044408 | 11.30 | 1.91 | 0.38 | 39662 |
| 2018 | Intercropping | WC | 3 | SRR22044407 | 12.20 | 1.79 | 0.40 | 40378 |
| 2018 | Intercropping | SC | 1 | SRR22044406 | 8.60 | 1.90 | 0.30 | 40766 |
| 2018 | Intercropping | SC | 2 | SRR22044404 | 7.20 | 1.94 | 0.28 | 37483 |
| 2018 | Intercropping | SC | 3 | SRR22044403 | 8.10 | 1.96 | 0.32 | 39216 |
| 2019 | Furrow | CT | 1 | SRR22044402 | 8.37 | 1.96 | 0.23 | 30662 |
| 2019 | Furrow | CT | 2 | SRR22044401 | 9.30 | 1.84 | 0.26 | 28871 |
| 2019 | Furrow | CT | 3 | SRR22044400 | 8.30 | 1.89 | 0.24 | 33864 |
| 2019 | Furrow | WC | 1 | SRR22044399 | 9.77 | 1.87 | 0.27 | 36514 |
| 2019 | Furrow | WC | 2 | SRR22044398 | 9.73 | 1.93 | 0.29 | 33463 |
| 2019 | Furrow | WC | 3 | SRR22044397 | 8.90 | 1.94 | 0.27 | 34300 |
| 2019 | Furrow | WC | 4 | SRR22044396 | 9.73 | 1.96 | 0.28 | 34039 |
| 2019 | Furrow | SC | 1 | SRR22044395 | 9.13 | 1.99 | 0.24 | 42831 |
| 2019 | Furrow | SC | 2 | SRR22044393 | 11.40 | 1.87 | 0.30 | 38989 |
| 2019 | Furrow | SC | 3 | SRR22044392 | 10.83 | 1.86 | 0.29 | 31283 |
| 2019 | Furrow | SC | 4 | SRR22044391 | 10.40 | 1.89 | 0.28 | 40442 |
| 2019 | Intercropping | CT | 1 | SRR22044390 | 7.77 | 1.97 | 0.21 | 34675 |
| 2019 | Intercropping | CT | 2 | SRR22044389 | 11.87 | 1.95 | 0.31 | 66130 |
| 2019 | Intercropping | CT | 3 | SRR22044388 | 10.10 | 1.86 | 0.27 | 41689 |
| 2019 | Intercropping | CT | 4 | SRR22044387 | 10.60 | 2.00 | 0.29 | 34834 |
| 2019 | Intercropping | WC | 1 | SRR22044386 | 8.53 | 1.94 | 0.22 | 32331 |
| 2019 | Intercropping | WC | 2 | SRR22044385 | 9.97 | 1.88 | 0.25 | 34696 |
| 2019 | Intercropping | WC | 3 | SRR22044384 | 9.43 | 1.96 | 0.24 | 36285 |
| 2019 | Intercropping | WC | 4 | SRR22044382 | 10.40 | 1.94 | 0.27 | 37131 |
| 2019 | Intercropping | SC | 1 | SRR22044381 | 11.37 | 1.91 | 0.29 | 40588 |
| 2019 | Intercropping | SC | 2 | SRR22044380 | 9.80 | 1.92 | 0.25 | 32050 |
| 2019 | Intercropping | SC | 3 | SRR22044379 | 14.00 | 1.93 | 0.34 | 35161 |
| 2019 | Intercropping | SC | 4 | SRR22044378 | 13.00 | 1.91 | 0.34 | 32612 |
| 2020 | Furrow | CT | 1 | SRR22044377 | 3.73 | 2.13 | 0.09 | 41617 |
| 2020 | Furrow | CT | 2 | SRR22044376 | 5.63 | 2.12 | 0.14 | 82393 |
| 2020 | Furrow | CT | 3 | SRR22044375 | 5.50 | 2.08 | 0.14 | 61989 |
| 2020 | Furrow | CT | 4 | SRR22044374 | 5.90 | 2.04 | 0.15 | 58094 |
| 2020 | Furrow | WC | 1 | SRR22044373 | 5.90 | 2.01 | 0.13 | 50690 |
| 2020 | Furrow | WC | 2 | SRR22044371 | 6.87 | 2.11 | 0.17 | 57231 |
| 2020 | Furrow | WC | 3 | SRR22044370 | 4.57 | 2.05 | 0.11 | 55138 |
| 2020 | Furrow | WC | 4 | SRR22044369 | 6.50 | 1.90 | 0.16 | 53660 |
| 2020 | Furrow | SC | 1 | SRR22044368 | 8.07 | 1.91 | 0.18 | 55488 |
| 2020 | Furrow | SC | 2 | SRR22044367 | 8.50 | 2.02 | 0.20 | 62173 |
| 2020 | Furrow | SC | 3 | SRR22044366 | 11.50 | 1.86 | 0.26 | 51395 |
| 2020 | Furrow | SC | 4 | SRR22044365 | 10.30 | 1.85 | 0.23 | 44925 |
| 2020 | Intercropping | CT | 1 | SRR22044364 | 2.63 | 2.06 | 0.06 | 47311 |
| 2020 | Intercropping | CT | 2 | SRR22044363 | 3.80 | 2.09 | 0.09 | 46421 |
| 2020 | Intercropping | CT | 3 | SRR22044362 | 5.67 | 2.09 | 0.13 | 53275 |
| 2020 | Intercropping | CT | 4 | SRR22044360 | 3.30 | 2.04 | 0.08 | 56862 |
| 2020 | Intercropping | WC | 1 | SRR22044359 | 4.60 | 2.06 | 0.11 | 50841 |
| 2020 | Intercropping | WC | 2 | SRR22044358 | 3.80 | 1.88 | 0.09 | 45971 |
| 2020 | Intercropping | WC | 3 | SRR22044357 | 3.57 | 2.06 | 0.09 | 59204 |
| 2020 | Intercropping | WC | 4 | SRR22044356 | 4.97 | 2.07 | 0.13 | 57517 |
| 2020 | Intercropping | SC | 1 | SRR22044355 | 6.90 | 1.87 | 0.16 | 53291 |
| 2020 | Intercropping | SC | 2 | SRR22044354 | 7.80 | 1.89 | 0.18 | 51611 |
| 2020 | Intercropping | SC | 3 | SRR22044353 | 7.03 | 1.97 | 0.17 | 50552 |
| 2020 | Intercropping | SC | 4 | SRR22044352 | 10.20 | 1.87 | 0.24 | 54654 |

Table S2 The quality of the sequence of each sample

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | Area | Treatmentscode | Replication | Quality filtered reads | NGS reads | SE/PE reads |
| 2017 |  | BF | 1 | 40025 | 86938 | 21344370 |
| 2017 |  | BF | 2 | 47706 | 106068 | 25880699 |
| 2017 |  | BF | 3 | 42997 | 98998 | 23995373 |
| 2017 |  | BF | 4 | 37970 | 88252 | 21404684 |
| 2018 | Furrow | CT | 1 | 43926 | 65910 | 18825235 |
| 2018 | Furrow | CT | 2 | 43244 | 62862 | 18140532 |
| 2018 | Furrow | CT | 3 | 41428 | 75292 | 21669775 |
| 2018 | Furrow | WC | 1 | 48992 | 81594 | 22905950 |
| 2018 | Furrow | WC | 2 | 39344 | 72898 | 20532167 |
| 2018 | Furrow | WC | 3 | 42719 | 72744 | 21061828 |
| 2018 | Furrow | SC | 1 | 39341 | 76580 | 21904970 |
| 2018 | Furrow | SC | 2 | 36672 | 89668 | 26233954 |
| 2018 | Furrow | SC | 3 | 38463 | 81776 | 23144533 |
| 2018 | Intercropping | CT | 1 | 49506 | 65964 | 18738744 |
| 2018 | Intercropping | CT | 2 | 49794 | 87904 | 24390061 |
| 2018 | Intercropping | CT | 3 | 45660 | 75604 | 20854553 |
| 2018 | Intercropping | WC | 1 | 39077 | 144880 | 40787480 |
| 2018 | Intercropping | WC | 2 | 40713 | 88776 | 23554406 |
| 2018 | Intercropping | WC | 3 | 41734 | 75490 | 20639769 |
| 2018 | Intercropping | SC | 1 | 41346 | 69910 | 19106439 |
| 2018 | Intercropping | SC | 2 | 38086 | 74294 | 20894530 |
| 2018 | Intercropping | SC | 3 | 39904 | 77302 | 21340802 |
| 2019 | Furrow | CT | 1 | 30828 | 82270 | 23101173 |
| 2019 | Furrow | CT | 2 | 29070 | 87906 | 23961701 |
| 2019 | Furrow | CT | 3 | 34177 | 70030 | 19293891 |
| 2019 | Furrow | WC | 1 | 37957 | 78476 | 21503504 |
| 2019 | Furrow | WC | 2 | 33672 | 71350 | 19752038 |
| 2019 | Furrow | WC | 3 | 34465 | 98512 | 24189842 |
| 2019 | Furrow | WC | 4 | 35042 | 95166 | 23338040 |
| 2019 | Furrow | SC | 1 | 42945 | 90650 | 22259663 |
| 2019 | Furrow | SC | 2 | 39175 | 107990 | 26518577 |
| 2019 | Furrow | SC | 3 | 31404 | 87512 | 21530493 |
| 2019 | Furrow | SC | 4 | 41278 | 94448 | 23249398 |
| 2019 | Intercropping | CT | 1 | 35168 | 88358 | 21645958 |
| 2019 | Intercropping | CT | 2 | 67406 | 78904 | 19387326 |
| 2019 | Intercropping | CT | 3 | 42497 | 83862 | 20602935 |
| 2019 | Intercropping | CT | 4 | 35280 | 106590 | 26192404 |
| 2019 | Intercropping | WC | 1 | 32734 | 108930 | 26449627 |
| 2019 | Intercropping | WC | 2 | 35169 | 105252 | 25351619 |
| 2019 | Intercropping | WC | 3 | 37069 | 94660 | 22661114 |
| 2019 | Intercropping | WC | 4 | 39353 | 88652 | 21768012 |
| 2019 | Intercropping | SC | 1 | 41122 | 91764 | 22434625 |
| 2019 | Intercropping | SC | 2 | 32686 | 92564 | 22562991 |
| 2019 | Intercropping | SC | 3 | 35952 | 82922 | 20410514 |
| 2019 | Intercropping | SC | 4 | 33389 | 87356 | 21453100 |
| 2020 | Furrow | CT | 1 | 55008 | 116260 | 31253829 |
| 2020 | Furrow | CT | 2 | 50705 | 110466 | 29540376 |
| 2020 | Furrow | CT | 3 | 66644 | 139914 | 36329710 |
| 2020 | Furrow | CT | 4 | 63080 | 134878 | 35317591 |
| 2020 | Furrow | WC | 1 | 42234 | 89482 | 24037858 |
| 2020 | Furrow | WC | 2 | 86677 | 185738 | 47814070 |
| 2020 | Furrow | WC | 3 | 65951 | 138936 | 36084303 |
| 2020 | Furrow | WC | 4 | 58404 | 122348 | 32752412 |
| 2020 | Furrow | SC | 1 | 53163 | 112262 | 30051491 |
| 2020 | Furrow | SC | 2 | 58945 | 122968 | 32253595 |
| 2020 | Furrow | SC | 3 | 58700 | 122008 | 32121723 |
| 2020 | Furrow | SC | 4 | 57033 | 119810 | 32433508 |
| 2020 | Intercropping | CT | 1 | 51772 | 110450 | 29382580 |
| 2020 | Intercropping | CT | 2 | 50376 | 109576 | 28313798 |
| 2020 | Intercropping | CT | 3 | 57044 | 121926 | 31085964 |
| 2020 | Intercropping | CT | 4 | 59125 | 126348 | 33273302 |
| 2020 | Intercropping | WC | 1 | 57263 | 122234 | 33573149 |
| 2020 | Intercropping | WC | 2 | 57161 | 121124 | 32430953 |
| 2020 | Intercropping | WC | 3 | 53206 | 112732 | 30612800 |
| 2020 | Intercropping | WC | 4 | 58142 | 124650 | 33782422 |
| 2020 | Intercropping | SC | 1 | 58155 | 122266 | 32589642 |
| 2020 | Intercropping | SC | 2 | 66468 | 142246 | 36371465 |
| 2020 | Intercropping | SC | 3 | 53664 | 136618 | 36924667 |
| 2020 | Intercropping | SC | 4 | 47410 | 147246 | 38242074 |

Table S3 The 30 most abundant fungal genera with conventional tillage (CT), weed cover (WC) and Siratro cover (SC) treatments in the intercropping area in 2020.

|  |  |  |  |
| --- | --- | --- | --- |
| Genus | CT | WC | SC |
| *Fusarium* | 18.63±4.62a | 33.6±7.64a | 20.16±1.75a |
| *Mortierella* | 0.99±0.47b | 1.5±0.46b | 18.44±11.75a |
| *Humicola* | 3.54±1.39a | 6.27±1.77a | 4.28±1.23a |
| *Fusicolla* | 0.43±0.11b | 12.3±5.2a | 0.58±0.11b |
| *Acremonium* | 2.03±1.94ab | 0.11±0.05b | 5.42±1.69a |
| *Alternaria* | 4.75±2.14a | 0.41±0.13a | 1.45±1.06a |
| *Penicillium* | 1.54±0.78a | 1.57±0.23a | 1.58±1.14a |
| *Myrothecium* | 2.9±2.06a | 0.74±0.66a | 0±0b |
| *Exserohilum* | 2.58±1.54a | 0.52±0.25ab | 0.01±0.01b |
| *Aspergillus* | 0.76±0.44a | 0.69±0.28a | 1.22±0.81a |
| *Chaetomium* | 0.41±0.19a | 0.64±0.4a | 1.57±0.76a |
| *Plectosphaerella* | 0.11±0.11b | 0.18±0.12b | 2.18±0.67a |
| *Trechispora* | 1.89±1.11a | 0±0b | 0.49±0.43ab |
| *Naganishia* | 0.4±0.19a | 0.96±0.71a | 0.48±0.36a |
| *Neurospora* | 0.41±0.39a | 1.1±1.03a | 0.1±0.04a |
| *Mycosphaerella* | 0.79±0.17a | 0.21±0.11b | 0.61±0.24ab |
| *Metarhizium* | 0±0b | 1.09±0.82a | 0.49±0.4a |
| *Micropsalliota* | 0.08±0.04b | 1.06±0.45a | 0.04±0.02b |
| *Nigrospora* | 0.19±0.05b | 0.71±0.12a | 0.25±0.08b |
| *Staphylotrichum* | 0.12±0.12a | 0.68±0.37a | 0.24±0.14a |
| *Acrocalymma* | 0.49±0.27ab | 0.06±0.02b | 0.49±0.12a |
| *Pyrenochaetopsis* | 0.42±0.28ab | 0.57±0.33a | 0.03±0.01b |
| *Corynascella* | 0.15±0.05ab | 0.74±0.42a | 0.01±0.01b |
| *Poaceascoma* | 0.15±0.12ab | 0.68±0.25a | 0.03±0.02b |
| *Dokmaia* | 0.06±0.04b | 0.46±0.13a | 0.3±0.11ab |
| *Sagenomella* | 0.41±0.24a | 0.23±0.06a | 0.16±0.09a |
| *Trichoderma* | 0.29±0.2a | 0.21±0.1a | 0.21±0.07a |
| *Pseudallescheria* | 0.22±0.12a | 0.36±0.32a | 0.03±0.03a |
| *Saitozyma* | 0.19±0.15a | 0.29±0.25ab | 0.01±0b |
| *Lasiodiplodia* | 0.19±0.11a | 0.15±0.1a | 0.11±0.05a |

Same letters in the rows indicates no significant difference at P = 0.05 between treatments according to the Kruskal-Wallis rank sum test.

Table S4 The 30 most abundant fungal genera with conventional tillage (CT), weed cover (WC) and Siratro cover (SC) treatments in the furrow in 2020.

|  |  |  |  |
| --- | --- | --- | --- |
| Genus | CT | WC | SC |
| *Fusarium* | 21.44±4.16a | 29.62±5.17a | 24.29±2.45a |
| *Trechispora* | 1.5±0.74b | 3.14±1.81b | 25.57±7.93a |
| *Penicillium* | 8.66±6.9a | 3.03±1.01a | 11.12±5.06a |
| *Acremonium* | 5.09±1.26a | 1.6±0.5a | 3.1±0.99a |
| *Acrocalymma* | 4.6±3.65a | 0.62±0.23ab | 0.29±0.05b |
| *Trichoderma* | 0.92±0.21a | 2.67±1.87a | 1.53±0.51a |
| *Micropsalliota* | 0.54±0.29b | 4.18±3.7a | 0.03±0.03ab |
| *Humicola* | 0.82±0.16a | 1.73±0.8a | 0.89±0.2a |
| *Mortierella* | 2.37±1.38a | 0.77±0.25a | 0.17±0.1a |
| *Alternaria* | 0.73±0.48a | 0.37±0.16a | 1.08±0.56a |
| *Chrysosporium* | 0.24±0.17a | 1.16±0.96a | 0.33±0.27a |
| *Pyrenochaetopsis* | 0.79±0.25a | 0.35±0.04a | 0.44±0.18a |
| *Cladorrhinum* | 0.07±0.06a | 0.02±0.02a | 1.44±1.44a |
| *Chaetomium* | 0.13±0.04a | 0.88±0.29a | 0.14±0.03a |
| *Aspergillus* | 0.54±0.17a | 0.44±0.21a | 0.15±0.02a |
| *Mycosphaerella* | 0.32±0.15a | 0.16±0.06a | 0.61±0.21a |
| *Fusicolla* | 0.19±0.08b | 0.56±0.08a | 0.07±0.02b |
| *Lasiodiplodia* | 0.06±0.03a | 0.71±0.69a | 0.01±0a |
| *Nigrospora* | 0.36±0.18a | 0.21±0.1ab | 0.06±0.02b |
| *Purpureocillium* | 0.13±0.11a | 0.1±0.03a | 0.4±0.31a |
| *Sagenomella* | 0.19±0.08a | 0.22±0.04a | 0.2±0.13a |
| *Plectosphaerella* | 0.3±0.1a | 0.08±0.04a | 0.17±0.08a |
| *Naganishia* | 0.11±0.06a | 0.24±0.09a | 0.15±0.12a |
| *Arthrographis* | 0.01±0.01a | 0.01±0a | 0.46±0.43a |
| *Metarhizium* | 0.03±0.03ab | 0.39±0.29a | 0±0.01b |
| *Exidia* | 0.24±0.24a | 0.03±0.03a | 0.05±0.03a |
| *Dokmaia* | 0.14±0.08a | 0.07±0.03a | 0.08±0.04a |
| *Papiliotrema* | 0.11±0.05a | 0.02±0.01a | 0.1±0.03a |
| *Idriella* | 0.09±0.04a | 0.06±0.03a | 0.07±0.03a |
| *Podospora* | 0.16±0.07a | 0.03±0.02ab | 0.01±0.01b |

Same letters in the rows indicates no significant difference at P = 0.05 between treatments according to the Kruskal-Wallis rank sum test.

Table S5 PERMANOVA of the conventional tillage (CT), weed cover (WC) and Siratro cover (SC) treatments in the intercropping area and furrow in 2018, 2019 and 2020 to determine suitability for co-occurrence network analysis.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Location |  Comparison | F.Model | R2 | Pr (>F) |
| 2018 | Intercropping area | CT-WC-SC | 1.14 | 0.28 | 0.25 |
| CT-WC | 0.69 | 0.15 | 0.90 |
| CT-SC | 1.60 | 0.29 | 0.10 |
| WC-SC | 1.22 | 0.23 | 0.20 |
| Furrow  | CT-WC-SC | 1.27 | 0.30 | 0.13 |
| CT-WC | 1.60 | 0.29 | 0.20 |
| CT-SC | 1.16 | 0.22 | 0.40 |
| WC-SC | 1.08 | 0.21 | 0.40 |
| 2019 | Intercropping area | CT-WC-SC | 1.41 | 0.24 | 0.001 |
| CT-WC | 1.12 | 0.16 | 0.11 |
| CT-SC | 1.47 | 0.20 | 0.03 |
| WC-SC | 1.66 | 0.22 | 0.03 |
| Furrow  | CT-WC-SC | 0.91 | 0.18 | 0.52 |
| CT-WC | 0.68 | 0.12 | 0.69 |
| CT-SC | 1.00 | 0.17 | 0.39 |
| WC-SC | 1.00 | 0.14 | 0.51 |
| 2020 | Intercropping area | CT-WC-SC | 2.56 | 0.36 | 0.001 |
| CT-WC | 2.94 | 0.33 | 0.03 |
| CT-SC | 1.97 | 0.25 | 0.04 |
| WC-SC | 2.80 | 0.32 | 0.03 |
| Furrow  | CT-WC-SC | 2.32 | 0.34 | 0.004 |
| CT-WC | 1.05 | 0.15 | 0.41 |
| CT-SC | 2.73 | 0.31 | 0.03 |
| WC-SC | 3.00 | 0.31 | 0.03 |