

## Tables, Figure Legends and Supplementary data

**Table 1.** Cover crop dry matter, carbon (C) and nitrogen (N) accumulation, and C/N ratio, compared among treatments

*Note:* Data are  $F$ -values from repeated-measures ANOVA.

DM, whole plant dry matter;  $C_{\text{accum}}$ , carbon accumulation;  $N_{\text{accum}}$ , nitrogen accumulation; NT, no tillage; MP, moldboard plow/rotary harrow; RC, rotary cultivator.

Values within each column followed by a different letter (a–c) are significantly different at  $P = 0.05$  based on a Tukey–Kramer test. (\*), (\*\*), and (\*\*\*) represent: significance at  $P < 0.05$ ,  $P < 0.01$  and  $P < 0.001$ , respectively.

**Table 2.** Results of multiple comparison and summary of analysis of variance (ANOVA) for nematode density

*Note:* Data are  $F$ -values from repeated-measures ANOVA.

ALL, total nematode abundance; BAC, bacterial feeders; FFR, fungal feeders + facultative root feeders; PRD, predators; OMN, omnivores; ORF, obligatory root feeders; ORF/non-ORF, abundance ratio of ORF to non-ORF. Values within column followed by a different letter (a–c) are significantly different at  $P = 0.05$  based on a Tukey–Kramer

test. (\*), (\*\*), and (\*\*\*) represent: significance at  $P < 0.05$ ,  $P < 0.01$ , and  $P < 0.001$ , respectively.

**Table 3.** Results of multiple comparison and summary of analysis of variance (ANOVA) for nematode diversity and community indices

*Note.* Data are  $F$ -values from repeated-measures ANOVA. S, species richness (number of taxa observed);  $F/(F + B)$ , abundance ratio of FFR to FFR + BAC; MI, maturity index; CI, channel index; EI, enrichment index; SI, structure index (Ferris et al., 2001). Values within each column followed by a different letter (a–c) are significantly different at  $P = 0.05$  based on a Tukey–Kramer test. (\*), (\*\*), and (\*\*\*) represent: significance at  $P < 0.05$ ,  $P < 0.01$ , and  $P < 0.001$ , respectively.

**Fig. 1.** Monthly temperature (line with markers) and precipitation (columns) at the study site (2010–2011)

**Fig. 2.** Seasonal changes in population densities of each feeding group in no-tillage (NT), moldboard plow (MP), and rotary (RC) plots

*Note.* ALL, total number of nematodes; BAC, bacterial feeders; FFR, fungal feeders +

facultative root feeders; PRD, predators; OMN, omnivores; ORF, obligatory root feeders.

Different letters (a–c) are significantly different at  $P = 0.05$  based on a Tukey–Kramer test.

**Fig. 3.** Seasonal changes in nematode diversity and community indices in no-tillage (NT), moldboard plow (MP), and rotary (RC) plots

*Note.* S, species richness (number of taxa found);  $F/(F + B)$ , abundance ratio of FFR to FFR + BAC; MI, maturity index; CI: channel index; EI, enrichment index; SI, structure index (Ferris et al., 2001). Different letters (a–c) are significantly different at  $P = 0.05$  based on a Tukey–Kramer test.

**Fig. 4.** The effects of tillage systems and cover crop treatments on the degree of soil translocation (DTL)

*Note.* NT, no-tillage; MP, moldboard plow; RC, rotary. Horizontal bars indicate the standard error.

**Fig. 5.** Relationship between the degree of soil translocation (DTL) and total nematode abundance (ALL), bacterial feeders (BAC), omnivores (OMN), and obligatory root

feeders (ORF)

**Fig. 6.** Relationship between the degree of soil translocation (DTL) and total number of nematode species (S), abundance ratio of FFR to FFR + BAC [ $F/(F + B)$ ], and structure index (SI)

**Fig. 7.** Relationship between the abundance of obligatory root feeders (ORF) and the proportion of non-ORF

#### **Appendix A. Supplementary data**

**Table S1.** Nematode taxa found in the study

*Note.* ✓ means observed taxa and × means non-observed taxa.

**Fig. S1.** Radioactive cesium distribution before (May 2011) and after (May 2012) tillage treatment across cover crop management

*Note.* NT, no-tillage; MP, moldboard plow; RC, rotary. Horizontal bars indicate the standard error.

1 **Table 1**

Treatment	2010				2011			
	DM (Mg ha <sup>-1</sup> )	C <sub>accum</sub> (Mg ha <sup>-1</sup> )	N <sub>accum</sub> (kg ha <sup>-1</sup> )	C/N ratio (%)	DM (Mg ha <sup>-1</sup> )	C <sub>accum</sub> (Mg ha <sup>-1</sup> )	N <sub>accum</sub> (kg ha <sup>-1</sup> )	C/N ratio (%)
<b>Tillage</b>								
NT	5.26	2.28	58.3	47.3	4.87 a	2.14 a	50.8	46.8
MP	5.63	2.45	75.8	53.7	3.37 b	1.46 b	40.9	40.2
RC	5.53	2.40	65.9	47.6	3.64 b	1.57 b	41.1	40.0
<b>Cover crop</b>								
Fallow	2.33 c	0.94 c	30.2 b	30.8 b	2.18 b	0.92 b	28.6 b	28.6 b
Hairy vetch	4.04 b	1.73 b	123.5 a	14.9 c	2.67 b	1.15 b	63.5 a	18.6 c
Rye	10.05 a	4.47 a	46.2 b	102.9 a	7.03 a	3.10 a	40.7 b	79.8 a
<b>Manure</b>								
1 Mg ha <sup>-1</sup>	5.40	2.35	63.1	50.3	4.04	1.76	42.4	43.9
0 Mg ha <sup>-1</sup>	5.54	2.40	70.2	48.8	3.88	1.69	46.1	40.8
<i>F</i> -value and significant effect (degree of freedom)								
Tillage (2)	0.228	0.233	2.090	1.441	4.681 *	5.077 **	1.372	2.661
Cover crop (2)	98.962 ***	104.655 ***	67.155 ***	246.030 ***	52.339 ***	55.148 ***	13.256 ***	190.077 ***
Manure (1)	0.092	0.058	1.023	0.195	0.132	0.118	0.423	1.276
Tillage × Cover crop (4)	2.095	2.186	6.549 ***	2.949 *	0.765	0.781	1.233	0.447
Tillage × Manure (2)	0.667	0.609	2.303	1.508	0.182	0.157	0.153	0.332
Cover crop × Manure (2)	1.598	1.406	1.100	0.313	2.070	1.849	0.534	1.399
Tillage × Cover crop × Manure (4)	0.500	0.522	2.658 *	1.241	1.350	1.224	0.361	0.377

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4 **Table 2**

Treatment	Density (Individuals per 20 g of soil)						ORF/non-ORF
	ALL	BAC	FFR	PRD	OMN	ORF	
<b>Tillage</b>							
NT	2673.7 a	1695.3 a	368.7 a	17.2 a	115.0 a	480.5 a	0.289 b
MP	987.8 c	471.7 c	176.3 b	11.3 b	31.5 c	297.8 b	0.509 a
RC	2230.7 b	1254.3 b	466.1 a	5.5 b	82.1 b	424.0 a	0.293 b
<b>Cover crop</b>							
Fallow	1640.5 b	922.4 b	273.8 b	8.5 b	79.8	357.3 b	0.390 ab
Hairy vetch	1985.3 ab	1100.2 ab	295.5 b	10.0 b	73.9	507.4 a	0.459 a
Rye	2106.3 a	1297.9 a	412.6 a	16.0 a	68.4	313.6 b	0.261 b
<b>Manure</b>							
1 Mg ha <sup>-1</sup>	1960.4	1158.9	346.6	7.7 b	68.7	379.8	0.342
0 Mg ha <sup>-1</sup>	1851.8	1040.8	301.3	16.2 a	80.8	415.2	0.411
<b>Season</b>							
Summer	2145.3 a	1283.8 a	368.6 a	14.8 a	83.7 a	397.3	0.350
Autumn	1679.6 b	929.6 b	284.5 b	8.1 b	64.4 b	393.6	0.394
<b>F-value and significant effect (degree of freedom)</b>							
Tillage (2)	48.905 ***	42.755 ***	19.032 ***	8.687 ***	27.065 ***	7.618 ***	8.865 ***
Cover crop (2)	6.226 **	6.339 **	6.976 **	3.183 *	0.214	8.111 ***	4.532 *
Manure (1)	1.178	1.939	1.624	13.970 ***	2.065	0.474	1.120
Season (1)	10.199 **	11.323 **	4.263 *	7.985 **	4.175 *	0.124	1.376
Tillage × Cover crop (4)	2.377	2.743 *	1.437	3.476 **	2.350	0.706	0.622
Tillage × Manure (2)	1.798	2.989	0.505	3.475 *	0.573	0.198	1.019
Tillage × Season (2)	4.492 *	4.397 *	3.879 *	0.430	2.194	4.250 *	1.822
Cover crop × Manure (2)	3.976 *	3.715 *	1.262	0.368	0.154	1.483	0.462
Cover crop × Season (2)	1.438	1.744	0.384	0.283	1.079	3.729 *	1.933
Manure × Season (1)	0.097	0.338	0.128	2.760	0.104	1.053	1.675
Tillage × Cover crop × Manure (4)	1.720	1.346	0.970	4.005 **	0.941	2.541 *	0.916
Tillage × Cover crop × Season (4)	1.570	1.687	0.322	0.565	1.563	1.660	3.794 **
Tillage × Manure × Season (2)	0.933	0.266	0.803	1.320	0.643	2.299	1.757
Cover crop × Manure × Season (2)	0.259	0.054	0.145	1.158	1.720	2.157	0.873
Tillage × Cover crop × Manure × Season (4)	0.436	0.143	0.182	0.658	2.401	3.011 *	0.761

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6 **Table 3**

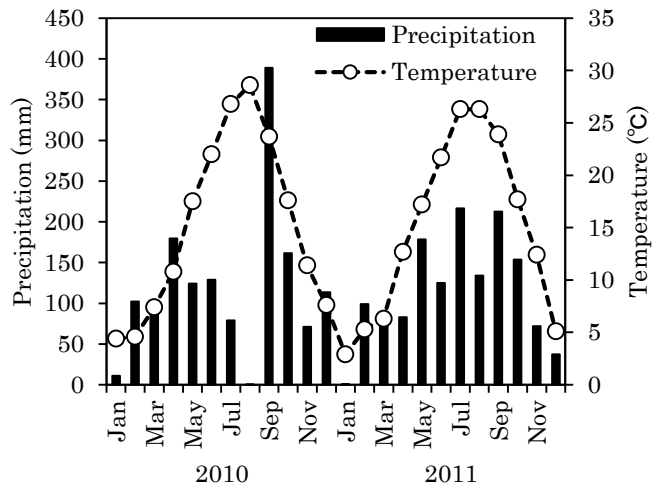
Treatment	S	F/(F+B)	Community Indices			
			MI	CI	EI	SI
<b>Tillage</b>						
NT	27.1 a	0.19 b	1.93 a	27.5	57.4	69.3 a
MP	24.1 b	0.25 a	1.59 b	26.3	58.8	56.6 b
RC	25.3 b	0.26 a	1.67 b	30.3	57.0	47.3 c
<b>Cover crop</b>						
Fallow	25.1 b	0.22 b	1.71 b	28.6	54.3 b	56.8
Hairy vetch	24.4 b	0.21 b	1.61 b	26.1	58.4 ab	56.4
Rye	26.8 a	0.28 a	1.86 a	29.2	60.7 a	60.7
<b>Manure</b>						
1 Mg ha <sup>-1</sup>	24.9 b	0.24	1.75	29.9	56.2 b	57.5
0 Mg ha <sup>-1</sup>	26.1 a	0.23	1.70	25.3	59.9 a	58.5
<b>Season</b>						
Summer	26.0 a	0.24	1.80 a	25.6	60.8 a	62.8 a
Autumn	24.8 b	0.23	1.65 b	30.2	54.9 b	53.0 b
<i>F</i> -value and significant effect (degree of freedom)						
Tillage (2)	14.320 ***	7.603 ***	17.356 ***	0.952	0.226	32.368 ***
Cover crop (2)	6.931 **	5.343 **	7.352 ***	0.677	5.655 **	2.098
Manure (1)	7.743 **	0.015	0.372	2.803	4.032 *	0.400
Season (1)	6.818 *	0.372	8.816 **	3.077	9.722 **	19.021 ***
Tillage × Cover crop (4)	1.223	2.910 *	2.482 *	1.157	2.235	2.220
Tillage × Manure (2)	0.702	0.315	0.153	0.060	0.132	0.499
Tillage × Season (2)	1.340	3.373 *	5.828 **	0.913	1.301	4.007 *
Cover crop × Manure (2)	0.318	0.716	0.135	0.035	1.214	0.280
Cover crop × Season (2)	0.291	0.410	0.895	1.144	1.492	0.854
Manure × Season (1)	0.900	0.001	1.519	0.672	1.744	0.917
Tillage × Cover crop × Manure (4)	0.723	1.588	0.356	1.041	1.565	1.190
Tillage × Cover crop × Season (4)	0.111	0.652	3.785 **	0.203	0.246	0.233
Tillage × Manure × Season (2)	0.356	0.724	0.728	2.479	1.501	0.470
Cover crop × Manure × Season (2)	0.003	0.064	0.843	0.469	0.732	0.234
Tillage × Cover crop × Manure × Season (4)	0.361	0.522	1.322	0.683	0.362	0.333

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10 **Fig. 1**

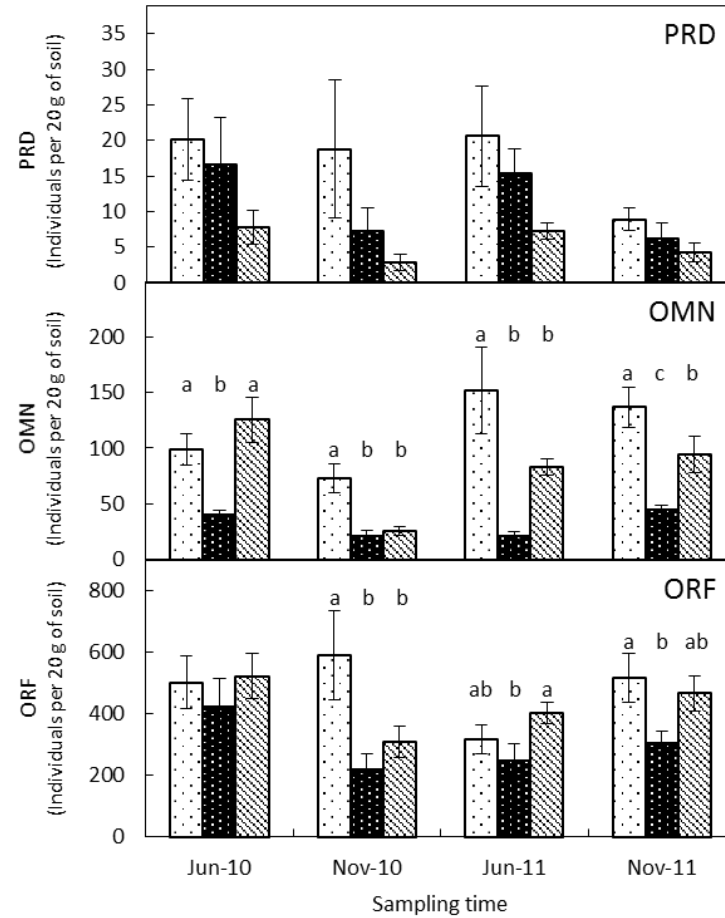
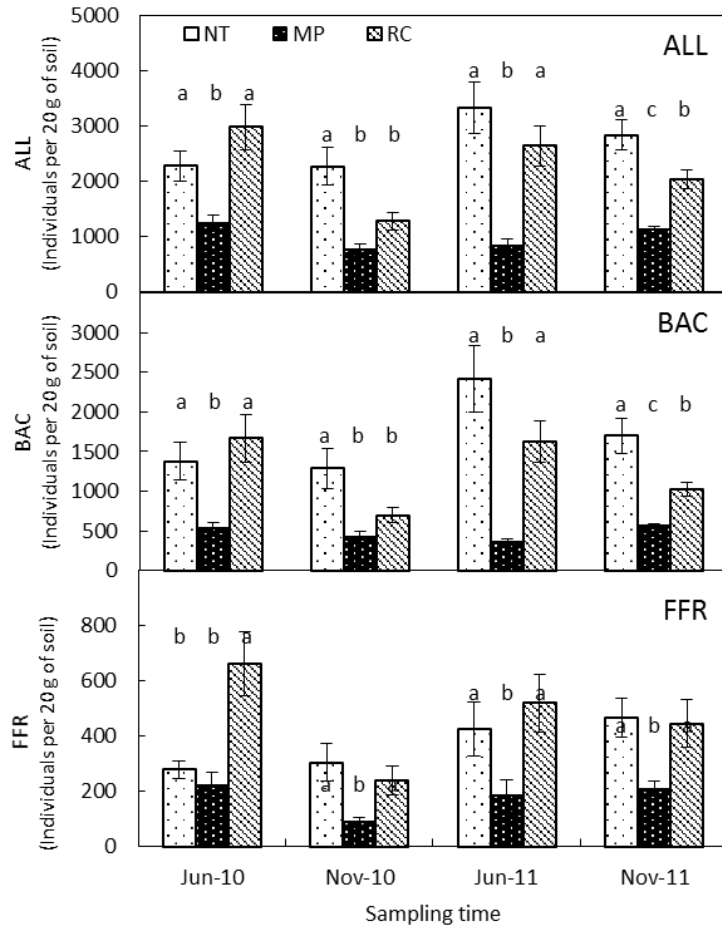


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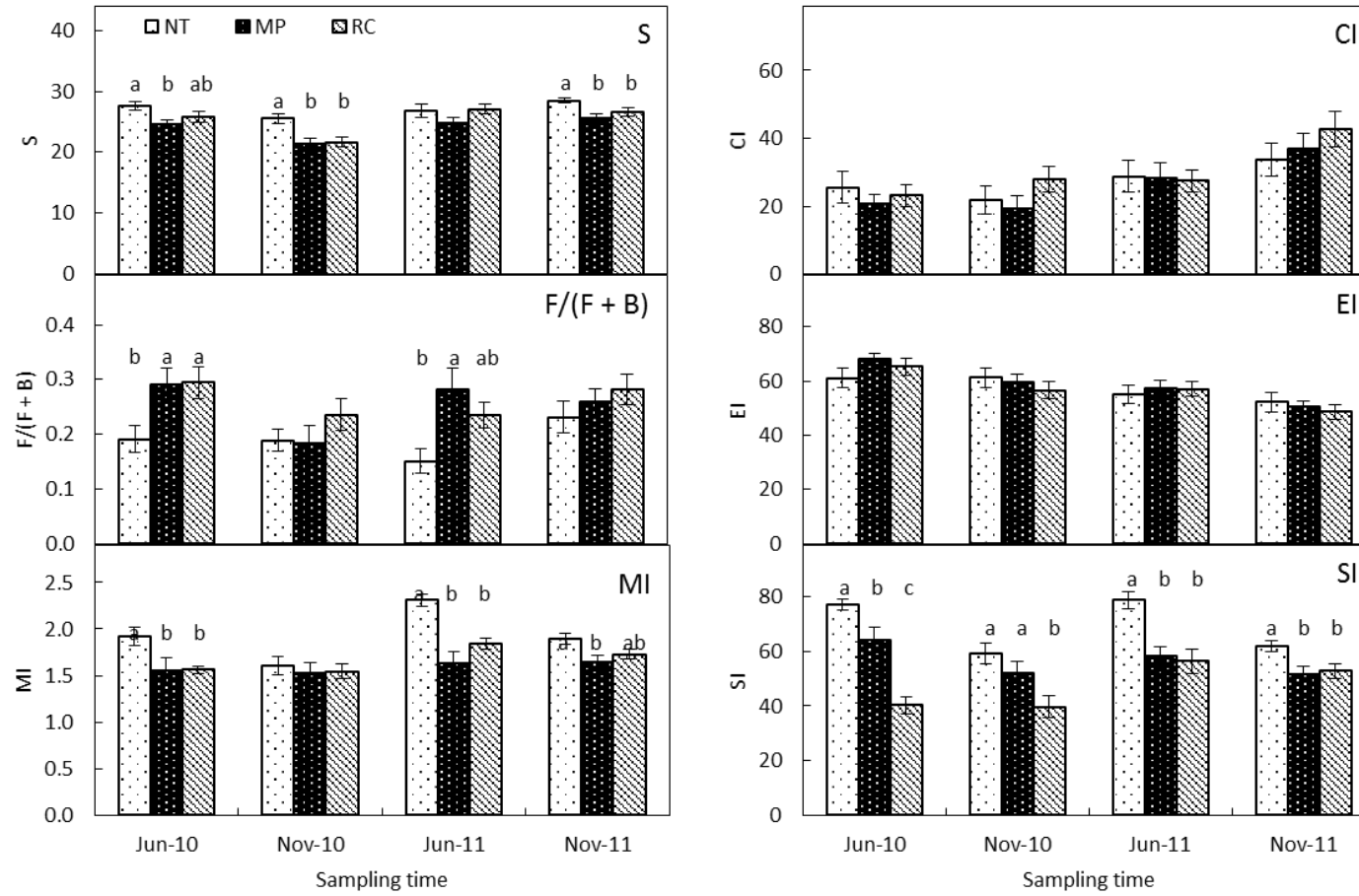
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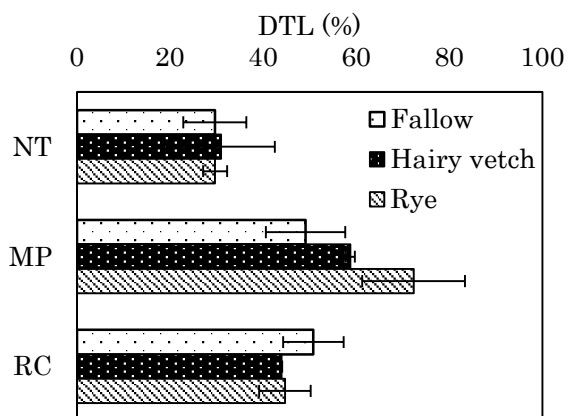
13 Fig. 2



15 Fig. 3

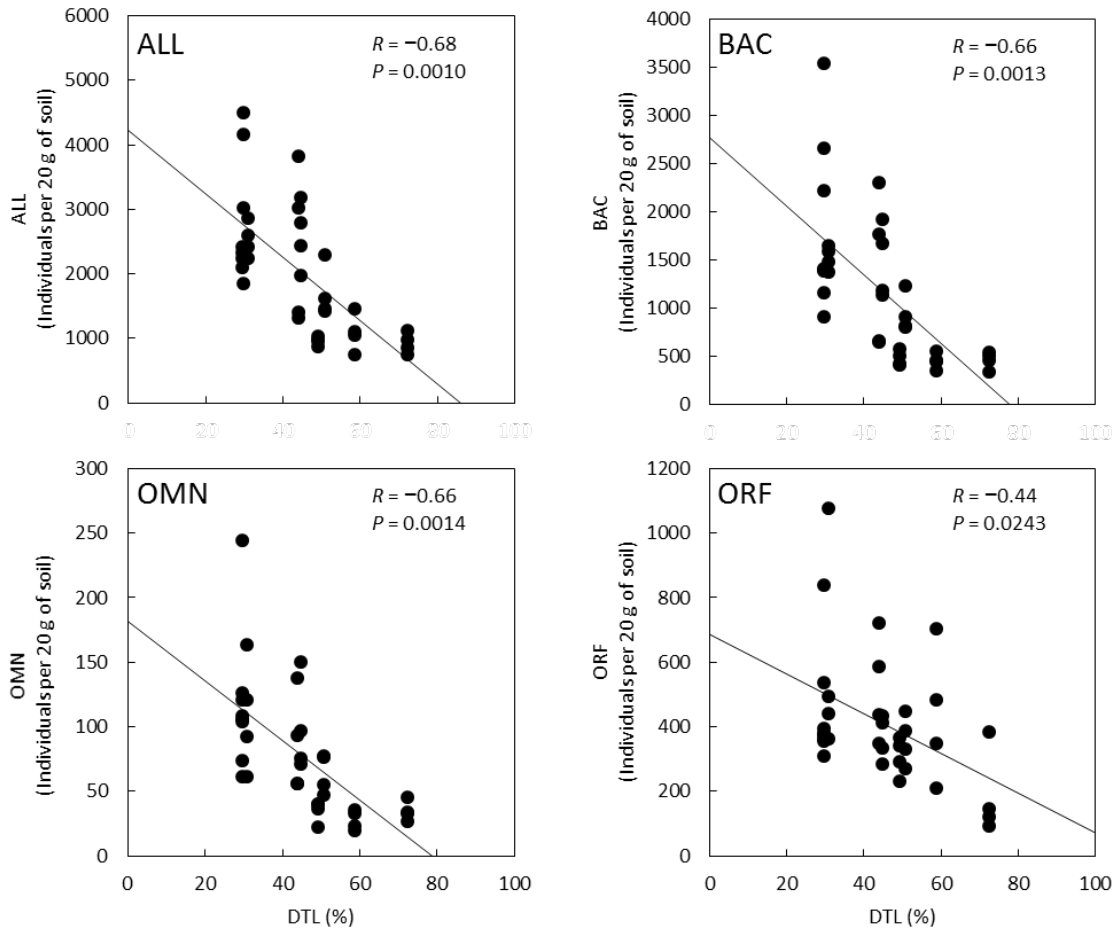


17 **Fig. 4**



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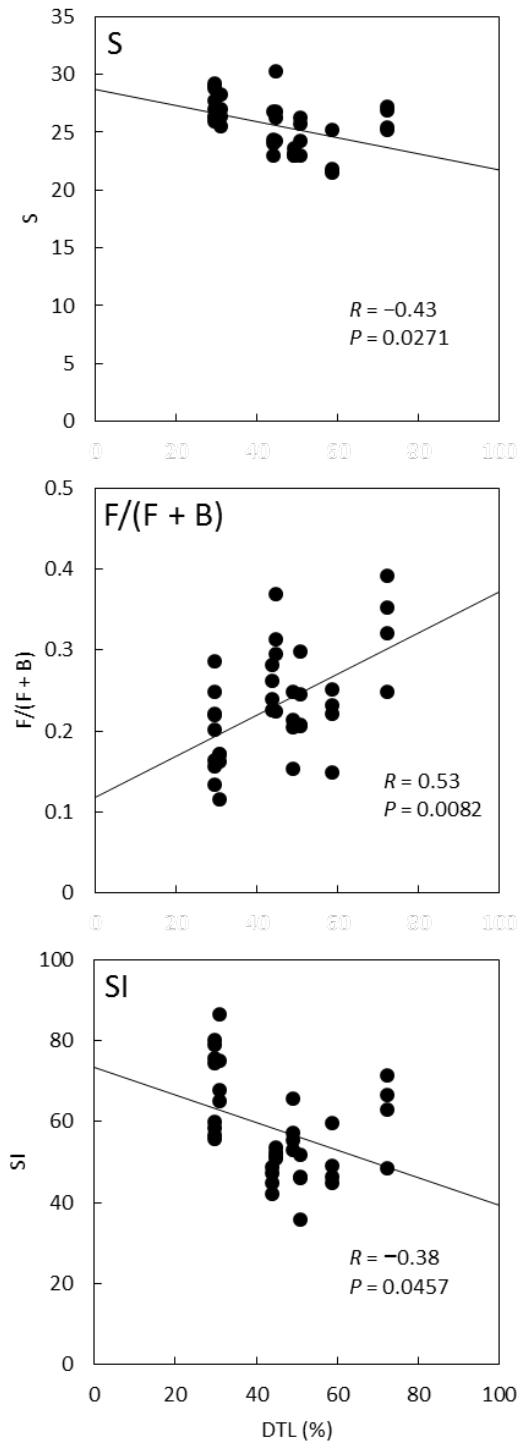
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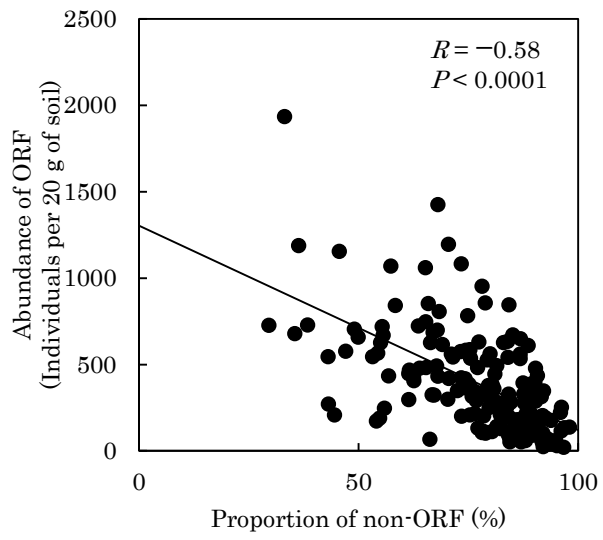
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22 Fig. 6



24 **Fig. 7**



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26 **Table S1.**

Taxon	Family	Cp score	2010		2011	
			Jun	Nov	Jun	Nov
BAC (bacterial feeder)						
<i>Mesorhabditis</i> -like	Rhabditidae	1	✓	✓	✓	✓
<i>Diploscapter</i>	Diploscapteridae	1	✓	✓	✓	✓
<i>Bunonema</i>	Bunonematidae	1	✓	✓	✓	✓
<i>Pristionchus</i>	Neodiplogasteridae	1	✓	✓	✓	✓
<i>Geomonhystera</i>	Monhysteridae	1	✓	✓	✓	✓
<i>Monhystrella</i>	Monhysteridae	1	✓	✓	✓	✓
<i>Cephalobus</i>	Cephalobidae	2	✓	✓	✓	✓
<i>Heterocephalobus</i>	Cephalobidae	2	✓	✓	✓	✓
<i>Acrobeles</i> , <i>Celeborca</i>	Cephalobidae	2	✓	✓	✓	✓
<i>Acrobelloides</i>	Cephalobidae	2	✓	✓	✓	✓
<i>Cervidellus</i>	Cephalobidae	2	✓	✓	✓	✓
<i>Plectus</i> s. str. spp.	Plectidae	2	✓	✓	✓	✓
<i>Plectus</i> ( <i>Ceratoplectus</i> )	Plectidae	2	✓	✓	✓	✓
<i>Tylocephalus</i>	Plectidae	2	✓	×	×	✓
<i>Wilsonema</i>	Plectidae	2	✓	✓	✓	✓
<i>Teratocephalus</i>	Teratocephalidae	3	✓	×	×	×
<i>Cylindrolaimus</i>	Cylindrolaimidae	3	✓	✓	✓	✓
<i>Rhabdolaimus</i>	Rhabdolaimidae	3	✓	✓	✓	✓
<i>Prodesmodora</i>	Desmodoridae	3	✓	✓	✓	✓
<i>Odontolaimus</i>	Odontolaimidae	3	✓	✓	✓	✓
<i>Bastiana</i>	Bastianidae	3	×	×	✓	✓
<i>Prismatolaimus</i>	Prismatolaimidae	3	✓	✓	✓	✓
<i>Alaimus</i>	Alaimidae	4	✓	✓	✓	✓
FFR (fungal feeder + facultative root feeder)						
<i>Filenchus</i>	Tylenchidae	2	✓	✓	✓	✓
<i>Ditylenchus</i>	Anguinidae	2	✓	✓	✓	✓
<i>Safianema</i>	Anguinidae	2	✓	✓	✓	✓
<i>Aphelenchus</i>	Aphelenchidae	2	✓	✓	✓	✓
<i>Aphelenchoides</i>	Aphelenchoididae	2	✓	✓	✓	✓
<i>Diphtherophora</i>	Diphtherophoridae	3	✓	✓	✓	✓
<i>Tylencholaimus</i>	Tylencholaimidae	4	✓	✓	✓	✓
PRD (predators)						
<i>Ironus</i>	Ironidae	4	✓	✓	✓	✓
<i>Mylonchulus</i>	Mononchidae	4	✓	✓	✓	✓
<i>Solididens</i>	Nygolaimidae	5	✓	✓	✓	✓
<i>Discolaimus</i>	Discolaimidae	5	✓	✓	✓	✓
OMN (omnivores)						
<i>Amphidorylaimus</i>	Dorylaimidae	4	✓	×	×	×
<i>Mesodorylaimus</i>	Dorylaimidae	4	✓	✓	✓	×
<i>Eudorylaimus</i>	Qudsianematidae	4	✓	✓	✓	✓
<i>Microdorylaimus</i>	Qudsianematidae	4	✓	✓	✓	✓
<i>Dorylaimoides</i>	Mydonomidae	4	✓	✓	✓	×
<i>Opisthodorylaimus</i>	Thornenematidae	5	✓	✓	✓	✓
<i>Paraxonchium</i>	Aporcelaimidae	5	✓	✓	✓	✓
<i>Aporcelaimus</i>	Aporcelaimidae	5	✓	✓	✓	✓
ORF (obligatory root feeder)						
<i>Tylenchulus</i>	Tylenchulidae	2	×	×	✓	×
<i>Helicotylenchus</i>	Hoplolaimidae	3	×	×	✓	×
<i>Pratylenchus</i>	Pratylenchidae	3	✓	✓	✓	✓
<i>Heterodera</i> ( <i>Heteroderidae</i> )	Heteroderidae	3	✓	✓	✓	×
<i>Criconemella</i>	Criconematidae	3	✓	✓	✓	✓
<i>Longidorella</i>	Nordiidae	4	✓	×	✓	✓
<i>Trichodorus</i>	Trichodoridae	4	✓	✓	×	×
<i>Dorylaimellus</i>	Dorylaimellidae	5	✓	✓	✓	✓

