

1 **Supporting information**

2 **Appendix A**

3 Application rates (kg ha<sup>-1</sup>) of mineral fertilizers and crop incorporation with different  
4 treatments

Treatments	Rice season		Wheat season	
	Mineral fertilizers	Wheat straw	Mineral fertilizers	Rice straw
	N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O		N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O	
- NPK (no mineral fertilizer application)				
Straw removal (-S, Control 1)	0	0	0	0
Straw incorporation (+S)	0	6000	0	6000
+ NPK (mineral fertilizer application)				
Straw removal (-S, Control 2)	150:90:90	0	120:75:60	0
Straw incorporation (+S)	150:90:90	6000	120:75:60	6000

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15 **Appendix B**

16 Soil physicochemical properties (mean  $\pm$ SE,  $n=4$ ) between straw removal (-S) and straw incorporation (+S) under non-fertilized (-NPK) and fertilized  
 17 (+NPK) conditions at the sampling of May and October<sup>1)</sup>

Fertilization	Sampling time	Straw	pH	SOC (g kg <sup>-1</sup> )	AN (mg kg <sup>-1</sup> )	NH <sub>4</sub> <sup>+</sup> -N (mg kg <sup>-1</sup> )	NO <sub>3</sub> <sup>-</sup> -N (mg kg <sup>-1</sup> )	AP (mg kg <sup>-1</sup> )	AK (mg kg <sup>-1</sup> )	Yield (t ha <sup>-1</sup> )
-NPK	May	-S	7.19 $\pm$ 0.03 a	12.46 $\pm$ 0.25 a	86.96 $\pm$ 0.44 a	2.60 $\pm$ 0.13 a	2.71 $\pm$ 0.49 a	4.07 $\pm$ 0.30 a	67.08 $\pm$ 2.96 a	2.18 $\pm$ 0.10 a
		+S	7.43 $\pm$ 0.03 b	14.42 $\pm$ 0.82 b	108.89 $\pm$ 6.85 b	3.34 $\pm$ 0.41 a	3.09 $\pm$ 0.40 a	5.45 $\pm$ 0.91 a	78.93 $\pm$ 2.84 b	2.60 $\pm$ 0.11 b
			<i>P</i> <0.001	<i>P</i> <0.10	<i>P</i> <0.05	<i>P</i> <0.10	ns	ns	<i>P</i> <0.05	<i>P</i> <0.05
	October	-S	7.42 $\pm$ 0.04 a	11.90 $\pm$ 0.45 a	84.26 $\pm$ 2.41 a	0.58 $\pm$ 0.03 a	4.79 $\pm$ 0.25 a	2.72 $\pm$ 0.41 a	63.38 $\pm$ 1.74 a	5.05 $\pm$ 0.09 a
		+S	7.50 $\pm$ 0.02 a	13.40 $\pm$ 0.19 b	104.25 $\pm$ 2.41 b	0.70 $\pm$ 0.03 b	5.12 $\pm$ 0.25 a	4.98 $\pm$ 0.77 b	76.36 $\pm$ 1.74 b	5.68 $\pm$ 0.28 b
			ns	<i>P</i> <0.05	<i>P</i> <0.001	<i>P</i> <0.05	ns	<i>P</i> <0.05	<i>P</i> <0.01	<i>P</i> <0.10
+NPK	May	-S	7.24 $\pm$ 0.01 a	13.56 $\pm$ 0.61 a	101.87 $\pm$ 3.71 a	2.97 $\pm$ 0.06 a	5.09 $\pm$ 0.89 a	37.30 $\pm$ 2.24 b	67.80 $\pm$ 1.95 a	3.29 $\pm$ 0.36 a
		+S	7.33 $\pm$ 0.01 a	15.43 $\pm$ 0.56 b	105.65 $\pm$ 2.18 b	3.06 $\pm$ 0.16 b	3.33 $\pm$ 0.25 a	33.40 $\pm$ 1.51 a	76.95 $\pm$ 2.55 b	3.87 $\pm$ 0.056 b
			ns	<i>P</i> <0.05	<i>P</i> <0.001	<i>P</i> <0.05	ns	<i>P</i> <0.05	<i>P</i> <0.01	<i>P</i> <0.10
	October	-S	7.49 $\pm$ 0.07 a	13.16 $\pm$ 0.76 a	96.25 $\pm$ 6.60 a	0.68 $\pm$ 0.03 a	5.54 $\pm$ 0.33 a	34.30 $\pm$ 0.46 a	65.95 $\pm$ 1.67 a	8.53 $\pm$ 0.12 a
		+S	7.47 $\pm$ 0.02 a	15.73 $\pm$ 0.08 b	121.96 $\pm$ 2.50 b	0.63 $\pm$ 0.03 a	6.31 $\pm$ 0.28 a	35.92 $\pm$ 1.82 a	74.42 $\pm$ 0.63 b	9.49 $\pm$ 0.17 b
			ns	<i>P</i> <0.05	<i>P</i> <0.05	ns	ns	ns	<i>P</i> <0.01	<i>P</i> <0.01

18 <sup>1)</sup>SOC, soil organic carbon; AN, available nitrogen; AP, available phosphorus; AK, available potassium.

19 Values within a column followed by different letters are significantly different at *P*<0.10. ns, no significance, *P*>0.10.

20 **Appendix C**

21 Abundances (individual 100g<sup>-1</sup> dry soil) of total nematodes and trophic groups  
 22 (mean±SE, n=4) between straw removal (-S) and straw incorporation (+S) under  
 23 non-fertilized (-NPK) and fertilized (+NPK) soils at the sampling of May and  
 24 October<sup>1)</sup>

Fertilization	Sampling time	Straw	TN	BF	FF	PP	OP
-NPK	May	-S	971.32±84.63 a	276.52±33.67 a	230.14±81.41 a	445.86±66.25 a	18.80±4.75 a
		+S	1751.29±151.94 b	562.34±49.96 b	197.91±62.94 a	912.88±136.67 b	78.16±21.10 b
			<i>P</i> <0.01	<i>P</i> <0.01	ns	<i>P</i> <0.01	<i>P</i> <0.01
	October	-S	283.79±87.45 a	89.23±24.20 a	48.10±13.87 a	136.73±45.93 a	9.73±7.88 a
		+S	420.82±22.44 a	130.01±11.07 a	47.27±17.54 a	225.00±20.05 a	20.05±5.30 a
			ns	ns	ns	ns	ns
+NPK	May	-S	1481.13±270.84 a	369.52±67.73 a	302.19±79.10 a	778.52±148.49 a	30.90±9.32 a
		+S	1584.66±78.55 a	366.10±27.77 a	279.52±33.02 a	863.83±54.56 a	75.18±8.94 a
			ns	ns	ns	ns	<i>P</i> <0.05
	October	-S	472.81±54.82 a	108.65±17.97 a	62.96±7.39 b	291.77±46.85 a	9.44±3.45 a
		+S	686.39±160.05 a	122.71±34.07 a	131.54±17.55 a	409.95±111.99 a	22.20±10.93 a
			ns	ns	<i>P</i> <0.05	ns	ns

25 <sup>1)</sup>TN, total nematode; BF, bacterivores; FF, fungivores; PP, plant-parasites; OP,  
 26 omnivores-predators.

27 Values within a column followed by different letters are significantly different at  
 28 *P*<0.10. ns, no significance, *P*>0.10.

29 **Appendix D**

30 Relative abundances (%) (mean  $\pm$  SE,  $n=4$ ) of nematode genera and trophic groups between straw removal (- S) and straw incorporation (+ S)  
 31 under non-fertilized (-NPK) and fertilized (+NPK) soils at the sampling of May and October<sup>†‡</sup>

Genus/functional Groups <sup>†‡</sup>	Abbr.	-NPK						+ NPK					
		May			October			May			October		
		-S	+S		-S	+S		-S	+S		-S	+S	
<i>Acrobeloides</i>	<i>Acr</i>	2.99 $\pm$ 1.12 a	5.65 $\pm$ 1.59 a	ns	0.38 $\pm$ 0.38 a	3.15 $\pm$ 1.37 a	ns	3.79 $\pm$ 2.00 a	0.23 $\pm$ 0.23 a	ns	4.11 $\pm$ 1.17 a	2.03 $\pm$ 0.52 a	ns
<i>Anaplectus</i>	<i>Ana</i>	0.00 $\pm$ 0.00 a	0.50 $\pm$ 0.50 a	ns	2.96 $\pm$ 1.61 a	0.68 $\pm$ 0.23 a	ns	2.94 $\pm$ 1.08 a	4.74 $\pm$ 0.94 a	ns	0.72 $\pm$ 0.24 a	0.42 $\pm$ 0.42 a	ns
<i>Heterocephalobus</i>	<i>Het</i>	0.00 $\pm$ 0.00	0.00 $\pm$ 0.00	-	2.11 $\pm$ 0.82 a	1.11 $\pm$ 0.56 a	ns	3.89 $\pm$ 1.53 a	7.84 $\pm$ 1.21 b	$P < 0.10$	1.23 $\pm$ 0.64 a	0.48 $\pm$ 0.48 a	ns
<i>Microlaimus</i>	<i>Mic</i>	3.47 $\pm$ 1.32 a	3.27 $\pm$ 1.08 a	ns	0.67 $\pm$ 0.45 a	0.65 $\pm$ 0.65 a	ns	1.44 $\pm$ 0.48 a	0.24 $\pm$ 0.24 b	$P < 0.10$	0.48 $\pm$ 0.28 a	0.00 $\pm$ 0.00 a	ns
<i>Panagrellus</i>	<i>Pan</i>	1.40 $\pm$ 1.40 a	0.26 $\pm$ 0.26 a	ns	5.51 $\pm$ 3.65 a	3.36 $\pm$ 0.55 a	ns	0.00 $\pm$ 0.00	0.00 $\pm$ 0.00	-	1.67 $\pm$ 0.58 a	1.32 $\pm$ 0.71 a	ns
<i>Plectus</i>	<i>Ple</i>	1.20 $\pm$ 0.93 a	2.02 $\pm$ 0.69 a	ns	1.35 $\pm$ 0.84 a	0.92 $\pm$ 0.38 a	ns	1.47 $\pm$ 0.83 a	1.42 $\pm$ 0.26 a	ns	1.88 $\pm$ 0.97 a	0.66 $\pm$ 0.22 a	ns
<i>Prismatolaimus</i>	<i>Pri</i>	2.78 $\pm$ 0.99 a	4.07 $\pm$ 1.08 a	ns	1.25 $\pm$ 0.50 a	2.46 $\pm$ 1.04 a	ns	3.22 $\pm$ 1.47 a	3.31 $\pm$ 0.80 a	ns	3.71 $\pm$ 1.40 a	2.59 $\pm$ 0.89 a	ns
<i>Pseudoaulolaimus</i>	<i>Pse</i>	2.48 $\pm$ 1.21 a	3.03 $\pm$ 0.68 a	ns	4.43 $\pm$ 1.64 a	8.70 $\pm$ 3.12 a	ns	0.26 $\pm$ 0.26 a	0.48 $\pm$ 0.48 a	ns	0.00 $\pm$ 0.00 a	1.20 $\pm$ 1.20 a	ns
<i>Rhabdolaimus</i>	<i>Rha</i>	4.74 $\pm$ 0.94 a	5.82 $\pm$ 1.47 a	ns	16.16 $\pm$ 1.03 b	8.50 $\pm$ 2.55 a	$P < 0.05$	1.74 $\pm$ 0.90 a	0.45 $\pm$ 0.45 a	ns	8.41 $\pm$ 2.89 b	5.79 $\pm$ 1.66 a	$P < 0.05$
Bacterivore		28.53 $\pm$ 2.65 a	32.98 $\pm$ 4.38 a	ns	36.08 $\pm$ 5.06 a	31.10 $\pm$ 2.95 a	ns	25.68 $\pm$ 2.60 a	23.22 $\pm$ 1.83 a	ns	23.65 $\pm$ 3.76 a	18.43 $\pm$ 2.89 a	ns
<i>Aphelenchoides</i>	<i>Aph</i>	5.08 $\pm$ 2.09 a	1.27 $\pm$ 0.24 a	ns	1.71 $\pm$ 0.59 b	0.00 $\pm$ 0.00 a	$< 0.05$	0.24 $\pm$ 0.24 a	0.00 $\pm$ 0.00 a	ns	0.25 $\pm$ 0.25 a	1.12 $\pm$ 0.44 a	ns
<i>Dorylaimoides</i>	<i>Dor</i>	4.07 $\pm$ 1.77 a	2.32 $\pm$ 0.79 a	ns	6.10 $\pm$ 0.96 a	5.78 $\pm$ 2.82 a	ns	7.25 $\pm$ 1.33 a	6.64 $\pm$ 1.35 a	ns	6.28 $\pm$ 1.21 a	8.31 $\pm$ 0.48 a	ns
<i>Filenchus</i>	<i>Fil</i>	14.03 $\pm$ 3.88 a	7.13 $\pm$ 1.80 a	ns	7.75 $\pm$ 0.70 a	4.94 $\pm$ 1.32 a	ns	12.48 $\pm$ 2.27 a	10.91 $\pm$ 2.83 a	ns	6.28 $\pm$ 0.78 a	7.74 $\pm$ 1.42 a	ns

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Fungivore		23.18±7.22 a	10.71±2.28 a	ns	19.30±2.77 a	10.95±3.86 a	ns	19.98±2.63 a	17.55±1.55 a	ns	13.31±0.14 a	21.18±2.95 b	P<0.05
<i>Aglenchus</i>	<i>Agl</i>	0.00±0.00	0.00±0.00	-	1.82±1.27 a	0.90±0.02 a	ns	0.00±0.00	0.00±0.00	-	6.44±1.91 a	6.22±0.94 a	ns
<i>Amplimerlinius</i>	<i>Amp</i>	3.32±0.92 a	5.59±1.89 a	ns	5.66±1.92 a	19.77±5.88 b	P<0.10	4.01±1.06 b	0.00±0.00 a	P<0.01	24.01±2.60 a	20.32±3.42 a	ns
<i>Basiria</i>	<i>Bas</i>	8.41±3.51 a	13.29±2.57 a	ns	10.56±3.19 a	7.84±1.28 a	ns	9.57±1.02 a	9.06±1.72 a	ns	16.07±2.98 a	12.08±3.06 a	ns
<i>Coslenchus</i>	<i>Cos</i>	0.00±0.00 a	3.09±0.97 b	P<0.05	3.66±1.42 a	4.30±1.34 a	ns	8.33±3.48 a	9.65±2.67 a	ns	3.96±1.25 a	6.55±1.04 a	ns
<i>Merlinius</i>	<i>Mer</i>	2.12±0.68 b	0.51±0.29 a	P<0.10	2.23±1.00 a	2.45±1.00 a	ns	2.79±1.12 a	7.98±1.86 b	P<0.10	1.70±1.70 a	3.85±1.99 a	ns
<i>Neopsilenchus</i>	<i>Neo</i>	0.00±0.00 a	2.08±1.43 a	ns	6.65±0.79 a	4.08±1.11 a	ns	4.54±1.37 a	4.33±1.39 a	ns	1.97±0.43 a	2.31±1.26 a	ns
<i>Ottolenchus</i>	<i>Ott</i>	0.00±0.00 a	1.51±1.19 a	ns	0.00±0.00	0.00±0.00	-	4.99±1.56 a	4.05±0.64 a	ns	0.00±0.00	0.00±0.00	-
<i>Tylenchus</i>	<i>Tyl</i>	29.38±3.71 a	23.90±2.90 a	ns	11.27±4.45 a	12.74±3.11 a	ns	15.45±2.34 a	13.91±1.99 a	ns	6.68±1.51 a	4.57±1.42 a	ns
Plant-parasites		46.39±6.23 a	51.51±3.90 a	ns	42.28±6.49 a	53.66±4.80 a	ns	52.15±2.28 a	54.46±1.59 a	ns	60.81±3.94 a	56.74±5.72 a	ns
<i>Mesodorylaimus</i>	<i>Mes</i>	0.70±0.23 a	0.75±0.47 a	ns	0.00±0.00 a	2.03±0.69 b	P<0.05	0.50±0.50 a	2.87±1.17 a	ns	1.24±0.75 a	1.04±1.04 a	ns
Omnivores-predators		1.90±0.40 a	4.79±1.41 b	P<0.10	2.34±1.86 a	4.30±1.04 a	ns	2.19±0.62 a	4.77±0.58 b	P<0.05	2.23±0.84 a	3.64±1.55 a	ns

32 <sup>1)</sup>The total percent of genera with <1% is not listed. “-” means independent ~~L-T~~ test was not performed.

33 Values within a row followed by different letters are significantly different at  $P<0.10$ . ns, no significance,  $P>0.10$ .

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36 **Appendix E**

37 Nematode ecological indices (mean  $\pm$ SE,  $n=4$ ) between straw removal (-S) and straw  
 38 incorporation (+S) under non-fertilized (-NPK) and fertilized (+NPK) soils at the  
 39 sampling seasons of wheat and rice<sup>1)</sup>

Fertilization	Sampling time	Straw	H'	MI	EI	SI
-NPK	May	-S	2.34 $\pm$ 0.07 a	2.55 $\pm$ 0.04 a	61.29 $\pm$ 5.76 b	75.19 $\pm$ 4.78 a
		+S	2.60 $\pm$ 0.15 a	2.77 $\pm$ 0.09 b	39.39 $\pm$ 4.49 a	80.13 $\pm$ 4.74 a
			ns	$P<0.10$	$P<0.05$	ns
	October	-S	2.57 $\pm$ 0.06 a	2.71 $\pm$ 0.11 a	59.81 $\pm$ 7.66 a	84.58 $\pm$ 1.20 a
		+S	2.56 $\pm$ 0.10 a	2.85 $\pm$ 0.13 a	63.92 $\pm$ 4.35 a	87.93 $\pm$ 4.00 a
			ns	ns	ns	ns
+NPK	May	-S	2.66 $\pm$ 0.03 a	2.70 $\pm$ 0.08 a	32.36 $\pm$ 2.68 a	71.45 $\pm$ 3.36 a
		+S	2.66 $\pm$ 0.03 a	2.69 $\pm$ 0.08 a	28.16 $\pm$ 4.41 a	69.48 $\pm$ 4.04 a
			ns	ns	ns	ns
	October	-S	2.39 $\pm$ 0.06 a	2.77 $\pm$ 0.10 a	47.54 $\pm$ 5.28 a	79.72 $\pm$ 5.78 a
		+S	2.59 $\pm$ 0.10 a	2.90 $\pm$ 0.05 a	51.12 $\pm$ 6.13 a	82.99 $\pm$ 2.57 a
			ns	ns	ns	ns

40 1)H', Shannon-Weaver diversity index; MI, maturity index; EI, enrichment index; SI,  
 41 structural index.

42 Values within a column followed by different letters are significantly different at  
 43  $P<0.10$ . ns, no significance,  $P>0.10$ .

44 **Appendix F**

45 Nematode metabolic footprints (ug C 100g<sup>-1</sup> dry soil)(mean ±SE, n=4) between straw  
 46 removal (-S) and straw incorporation (+S) under non-fertilized (-NPK) and fertilized  
 47 (+NPK) soils at the sampling seasons of wheat and rice<sup>1)</sup>

Fertilization	Sampling time	Straw	BFfoot	FFfoot	PPfoot	Eefoot	Ssfoot
-NPK	May	-S	98.66±3.48 a	23.96±9.57 a	60.84±8.87 a	79.93±1.52 b	54.55±9.49 a
		+S	93.14±9.65 a	22.84±7.81 a	113.80±7.42 b	37.91±12.34 a	244.34±57.55 b
		ns	ns	<i>P</i> <0.01	<i>P</i> <0.05	<i>P</i> <0.05	
	October	-S	20.73±6.56 a	7.66±2.41 a	17.21±6.47 a	12.70±4.93 a	18.77±7.86 a
		+S	33.70±4.54 a	9.43±4.33 a	40.16±5.63 b	18.09±2.59 a	52.90±13.05 b
		ns	ns	<i>P</i> <0.05	ns	<i>P</i> <0.10	
+NPK	May	-S	67.90±16.38 a	48.18±13.91 a	83.83±15.54 a	17.38±8.54 a	108.06±30.77 a
		+S	84.99±5.90 a	43.58±4.00 a	78.83±3.49 a	15.58±7.06 a	156.18±38.23 a
		ns	ns	ns	ns	ns	
	October	-S	20.83±5.38 a	11.48±1.36 a	51.35±9.23 a	11.06±3.78 a	21.21±2.77 a
		+S	29.20±10.07 a	25.73±4.73 b	68.96±20.20 a	19.71±7.70 a	52.16±8.56 b
		ns	<i>P</i> <0.05	ns	ns	<i>P</i> <0.05	

48 <sup>1)</sup>BFfoot, bacterivore footprint; FFfoot, fungivore footprint; PPfoot, plant-parasite  
 49 footprint; Eefoot, enrichment footprint; Ssfoot, structure footprint.

50 Values within a column followed by different letters are significantly different at  
 51 *P*<0.10. ns, no significance, *P*>0.10.

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