SUPPLEMENTARY MATERIAL

Manuscript: Soil biota in vineyards are more influenced by plants and soil quality than by tillage intensity or the surrounding landscape

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Supplementary Table S1. Earthworm species and mean ± SD density m^{-2} in vineyards where inter-rows have been periodically mechanically disturbed (PMD) or left with permanent green cover (PGC).

Earthworm functional groups/species	Density m^{-2}	
	PMD	PGC
Anecics		
Aporrectodea caliginosa (anecic) (Savigny, 1826)	1.0 ± 5.1	0.5 ± 3.6
Aporrectodea sp.*	0.5 ± 3.6	0.5 ± 3.6
Lumbricus terrestris (L.)	5.2 ± 19.3	0
Lumbricus sp. (juv.)*	12.0 ± 23.6	0
Morphotype anecic*	18.8 ± 41.7	11.5 ± 24.7
Endogeics		
Aporrectodea caliginosa (endogeic) (Savigny, 1826)	78.6 ± 89.6	24.5 ± 63.7
Aporrectodea rosea (Savigny, 1826)	31.3 ± 42.4	59.4 ± 97.0
Morphotype endogeic*	16.7 ± 21.5	8.3 ± 14.9
Proctodrilus antipai (Michaelsen, 1891)	6.8 ± 15.2	0
Octolasion lacteum (Örley, 1885)	2.6 ± 9.3	5.2 ± 15.4
Allolobophora chlorotica (Savigny, 1826)	6.3 ± 23.9	0.5 ± 3.6
Aporrectodea sp. (juv.)*	0	1.0 ± 5.1
Octolasion sp. (juv.)*	2.1 ± 7.0	0
not identified	0	0.5 ± 3.6

* these specimens could not be identified to the species level.

Supplementary Table S2. Springtail species and mean ± SD densities in soil samples (5.5 x 5.5 x 10 cm) and mean ± SD activity density in the pitfall traps in vineyards where inter-rows have been periodically mechanically disturbed (PMD) or left with permanent green cover (PGC).

Springtail species	Soil samples		Pitfall traps	
	PMD	PGC	PMD	PGC
Axenyllodes bayeri (Kseneman 1935)	693.0 ± 1917.9	1365.4 ± 4968.7	-	-
Ceratophysella bengtssoni (Ågren 1904)	0	10.3 ± 58.5	-	-
Ceratophysella quinqisetosa cf. (Gisin 1958)	868.9 ± 4337.6	1034.4 ± 2982.9	-	-
Ceratophysella sigillata (Uzel 1891)	0	10.34 ± 58.51	-	-
Ceratophysella succinea (Gisin 1949)	41.4 ± 234.1	186.2 ± 365.9	0.6 ± 3.7	1.1 ± 2.1
Cryptopygus bipunctatus (Axelson 1903)	3796.2 ± 13678.5	0	-	-
Cryptopygus orientalis (Stach 1947)	31.0 ± 98.0	10.3 ± 58.5	-	-
Cyphoderus albinus (Nicolet 1842)	10.3 ± 58.5	124.1 ± 383.0	0.2 ± 0.8	0.2 ± 0.9
Cyphoderus bidenticulatus (Parona 1888)	0	10.3 ± 58.5	0.1 ± 0.2	0
Desoria fennica cf. (Reuter 1895)	206.9 ± 574.9	10.3 ± 58.5	0	0.1 ± 0.2
Desoria olivacea (Tullberg 1871)	206.9 ± 473.7	51.7 ± 148.3	4.7 ± 8.5	1.7 ± 2.2
Desoria sp.	10.3 ± 58.5	0	-	-
Entomobrya handschini (Stach 1922)	10.3 ± 58.5	0	1.8 ± 1.9	4.8 ± 4.5
Entomobrya marginata (Tullberg 1871)	0	10.3 ± 58.5	2.7 ± 6.1	0.5 ± 1.1
Entomobrya multifasciata (Tullberg 1871)	-	-	0	0.1 ± 0.2
Folsomia candida (Willem 1902)	113.8 ± 381.7	0	-	-
Folsomides parvulus (Stach 1922)	175.8 ± 468.0	682.7 ± 2436.6	-	-
Heteromurus major (Moniez 1889)	300.0 ± 816.7	103.4 ± 471.4	17.4 ± 17.3	13.2 ± 15.9
Heteromurus nitidus (Templeton 1835)	0	20.7 ± 117.0	1.0 ± 1.2	0.9 ± 2.0
Heterosminthurus claviger (Gisin 1958)	-	-	0.1 ± 0.3	0
Hypogastrura sahlbergi (Reuter 1895)	0	31.0 ± 175.5	-	-
Isotoma viridis (Bourlet 1839)	993.0 ± 1275.1	1965.3 ± 3615.1	29.0 ± 25.0	17.7 ± 25.3
Isotomodes productus (Axelson 1906)	113.8 ± 643.6	0	-	-
Isotomurus sp.	82.8 ± 265.9	0	-	-
Lepidocyrtus cyaneus (Tullberg 1871)	41.4 ± 111.2	0	13.2 ± 14.6	2.2 ± 2.9

Lepidocyrtus lanuginosus (Gmelin 1788)	10.3 ± 58.5	10.3 ± 58.5	0.7 ± 2.0	0.1 ± 0.6
Lepidocyrtus lignorum (Fabricius 1775)	62.1 ± 244.2	10.3 ± 58.5	0	0.2 ± 0.7
Lepidocyrtus paradoxus (Uzel 1891)	0	51.7 ± 148.3	1.1 ± 2.0	1.5 ± 2.7
Mesaphurora sp.	7023.4 ± 7871.0	9464.5 ± 8822.9	-	-
Metaphorura affinis (Börner 1902)	1168.8 ± 3947.9	672.3 ± 1413.1	0	0.1 ± 0.2
Metaphorura riozoi (Castaño-Meneses, Palacios-Vargas & Traser 2000)	848.2 ± 2695.5	1117.1 ± 2776.7	-	-
Micranurida pygmaea (Börner 1901)	0	920.6 ± 2091.3	-	-
Neotullbergia ramicuspis (Gisin 1953)	796.5 ± 1255.1	134.5 ± 384.0	-	-
Orchesella cincta (Linnaeus 1758)	0	41.4 ± 139.4	5.8 ± 7.8	5.4 ± 6.5
Orchesella pannonica (Stach 1960)	-	-	0.1 ± 0.2	0.1 ± 0.2
Parisotoma notabilis (Schäffer 1896)	10167.9 ± 16787.9	17077.5 ± 25851.0	1.2 ± 2.7	2.3 ± 6.5
Pogonognathellus flavescens (Tullberg 1871)	-	-	0.1 ± 0.3	0.1 ± 0.5
Proisotoma sp.	41.4 ± 183.2	0	-	-
Protaphorura armata (Tullberg 1869)	130083.0 ± 9966.0	868.9 ± 1621.0	-	-
Protaphorura subfimata (Thibaud & Christian 1986)	0	2037.7 ± 6840.1	-	-
Pseudachorutella asigillata (Börner 1901)	0	10.3 ± 58.5	0	0.2 ± 0.6
Pseudachorutes dubius (Krausbauer 1898)	0	10.3 ± 58.5	-	-
Pseudachorutes parvulus (Börner 1901)	113.8 ± 472.7	62.1 ± 155.9	0.1 ± 0.2	0.6 ± 1.9
Pseudosinella alba (Packard 1873)	206.9 ± 509.7	51.7 ± 170.4	0.8 ± 2.4	0.4 ± 1.2
Pseudosinella duodecimpunctata (Denis 1931)	10.3 ± 58.5	0	-	-
Pseudosinella octopunctata (Görner 1901)	10.3 ± 58.5	0	-	-
Pseudosinella petterseni (Börner 1901)	62.1 ± 196.1	0	0.1 ± 0.2	0
Pseudosinella sexoculata (Schött 1902)	0	10.3 ± 58.5	0.3 ± 0.7	0.1 ± 0.3

Table 6 (continued)

Seira spp.	-	-	0	0.1 ± 0.2
Sminthurinus aureus (Lubbock 1862)	548.2 ± 1062.2	103.4 ± 213.3	4.0 ± 4.1	1.5 ± 1.8
Sminthurus multipunctatus (Schäffer 1896)	-	-	0.1 ± 0.4	0.1 ± 0.2
Sminthurus viridis (Linnaeus 1758)	10.3 ± 58.5	0	0.1 ± 0.2	0

Sphaeridia pumilis (Krausbauer 1898)	817.2 ± 2224.4	103.4 ± 319.5	0.7 ± 0.9	0.7 ± 1.2
Stenaphorurella denisi (Bagnall 1935)	10.3 ± 58.5	341.3 ± 1084.8	-	-
Stenaphorura quadrispina (Börner 1901)	0	72.4 ± 311.6	-	-
Tomocerus vulgaris (Tullberg 1871)	-		0	0.1 ± 0.2
Willemia buddenbrocki (Hüther 1959)	20.7 ± 81.4	51.7 ± 292.6	-	-
Willemia intermedia (Mills 1934)	93.1 ± 192.4	268.9 ± 1110.4	-	-
Willemia scandinavica (Stach 1949)	631.0 ± 1596.0	941.3 ± 1664.8	-	-
Willowsia nigromaculata (Lubbock 1873)	-	-	0.1 ± 0.2	0
Xenylla maritima (Tullberg 1869)	-	-	0	0.1 ± 0.2
not identified	82.8 ± 237.8	72.4 ± 139.0	-	-

Supplementary Table S3: Management characteristics of the study vineyards where inter-rows have been periodically mechanically disturbed (PMD) or left with permanent green cover (PGC).

Management	Periodical mechanical disturbance (PMD)	Permanent green cover (PGC)
Farming type	1 organic, 7 conventional	2 organic, 6 conventional
Last disturbance event	1- 4 years	5-45 years
Soil cultivation machinery	chisel plow (depth: 15-30 cm), harrow (depth 3-15 cm), deep loosening (25-40 cm)	N.A.
Inter-row vegetation	Specific seed mixtures for vineyards (legumes, herbs), spontaneous vegetation	
Fertilization	Shredded pruning material, green manure, compost, pomace, inorganic NPK	

Supplement Table S4: Morphological traits of springtails adapted from Vandewalle et al., (2010) and Martins da Silva et al., (2015b)

Traits	Data type	Attribute type
Number of ocelli	Ordinal	0-8
Body size	Quantitative	in mm
Pigmentation level	Ordinal	0 = white, 1 = lightly pigmented, 2 = intensly pigmented
Pigmentation pattern	Binary	0 = absent, 1 = present
Hairs/scales	Binary	0 = absent, 1 = present
Furca	Ordinal	0 = absent, 1 = reduced/short, 2 = fully developed
Antenna/body ratio	Ordinal	0 = $X \leq 0.5$; 1 = $0.5 < X \leq 1$; 2 = $X > 1$