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TABLE S1. Soil texture of the blocks in the experimental field. Soils were classified according to USDA classification.

Block	Sampling depth	Sand (%)	Silt (%)	Clay (%)	Skeleton (%)	Soil texture
1	0-30 cm	43	40	17	5	Loam
1	30-90cm	34	45	21	1	Loam
2	0-30 cm	37	41	22	3	Loam
2	30-90cm	34	37	29	2	Clayey loam
3	0-30 cm	32	41	27	1	Loam
3	30-90cm	33	40	27	1	Loam
4	0-30 cm	36	39	25	2	Loam
4	30-90cm	42	33	25	7	Loam

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TABLE S2. Plant protection regime in integrated (A), biodynamic (B) and organic (B) treatments.

A) Fungicide Application in the Integrated Treatment

Date	Pesticide	Concentration	Amount	Active Component Group
17/05/16	Folpan	0,1 %	0,4 kg/ha	Phtalimide
	Wettable Sulfur Stulln		5 kg/ha	Sulfur
	Water		150 L/ha	
31/05/16	Delan WG	0,05 %	0,3 kg/ha	Chinone
	Veriphos	0,25 %	1,5 L/ha	Potassium Phosphonate
	Vento Power	0,1 %	0,6 L/ha	Chinoline/Azole
	Water		150 L/ha	
09/06/16	Profiler	0,188 %	1,5 kg/ha	Acylpicolide
	Vivando	0,02 %	0,16 L/ha	Benzophenone
	Water		225 L/ha	
22/06/16	Orvego	0,1 %	1 L/ha	Pyrimidylamine/CAA
	Luna Experience	0,031 %	0,3 L/ha	Tebuconazole/Fluopyrame
	Water		400 L/ha	
05/07/16	Enervin	0,25 %	3 kg/ha	Pyrimidylamine
	Dynali	0,05 %	0,6 L/ha	Phenylacetamide/Azole
	Water		500 L/ha	
20/07/16	Teldor (Bunch Zone)	0,1 %	0,6 kg/ha	Hydroxyanilide
	Water		200 L/ha	
14/07/16	Equation Pro	0,04 %	0,56 kg/ha	Cyanoacetamidoxime/ Oxazolidin-dione
	Talendo	0,025 %	0,35 L/ha	Quinazolinone
	Water		500 L/ha	
26/07/16	Melody Combi	0,15 %	2,4 kg/ha	Valinamide (CAA)
	Vivando	0,02 %	0,32 L/ha	Benzophenone
	Water		500 L/ha	
09/08/16	Mildicut	0,25 %	4 L/ha	Sulfonamide
	Systhane	0,015 %	0,24 L/ha	Azole
	Water		500 L/ha	
23/08/16	Mildicut	0,25 %	4 L/ha	Sulfonamide
	Systhane	0,015 %	0,24 L/ha	Azole
29/08/16	Switch (Bunch Zone)	0,06 %	0,384 kg/ha	Anilinopyrimidine/Phenylpyrrole
	Water		200 L/ha	

B) Fungicide Application in the Organic and Biodynamic Treatment

Date	Pesticide	Amount	Active Component Group
17/05/16	Wettable Sulfur 3,6 Kg/ha	3,6 kg/ha	Sulfur
	Water	155 L/ha	
27/05/16	Wettable Sulfur 3,6 Kg/ha	3,6 kg/ha	Sulfur
	Funguran Progress (100 g Cu/ha)	0,29 kg/ha	Copper
	Water	155 L/ha	
01/06/16	Wettable Sulfur 3,6 Kg/ha	3,6 kg/ha	Sulfur
	Funguran Progress (250 g Cu/ha)	0,715 kg/ha	Copper
	Water	155 L/ha	
08/06/16	Wettable Sulfur 3,6 Kg/ha	3,60 kg/ha	Sulfur
	Funguran Progress (300 g Cu/ha)	0,86 kg/ha	Copper
	Water	225 L/ha	
14/06/16	Wettable Sulfur 3,6 kg/ha	3,60 kg/ha	Sulfur
	Funguran Progress (500 g Cu/ha)	1,43 kg/ha	Copper
	Water	300 L/ha	
20/06/16	Wettable Sulfur 3,6 kg/ha	3,60 kg/ha	Sulfur
	Funguran Progress (500 g Cu/ha)	1,43 kg/ha	Copper
	Water	300 L/ha	
28/06/16	Wettable Sulfur 3,6 kg/ha	3,6 kg/ha	Sulfur
	Funguran Progress (400 g Cu/ha)	1,143 kg/ha	Copper
	Vitisan 4,0 kg/ha	4 kg/ha	Potassiumbicarbonate
	Water	300 L/ha	
08/07/16	Wettable Sulfur 3,6 Kg/ha	3,2 kg/ha	Sulfur
	Funguran Progress (400 g Cu/ha)	1,143 kg/ha	Copper
	Vitisan (4kg/ha)	4 kg/ha	Potassiumbicarbonate
	PrevB2: 300 ml / hl Spray mixture	0,9 L/ha	Citrus Oil
	Water	300 L/ha	
14/07/16	Wettable Sulfur 3,6 Kg/ha	3,6 kg/ha	Sulfur
	Funguran Progress (300 g Cu/ha)	0,857 kg/ha	Copper
	Vitisan (4kg/ha)	4 kg/ha	Potassiumbicarbonate
	PrevB2: 300 ml / hl Spray mixture	1,5 L/ha	Citrus Oil
	Water	500 L/ha	
20/07/16	Wettable Sulfur 3,6 Kg/ha	3,6 kg/ha	Sulfur
	Funguran Progress (300 g Cu/ha)	0,857 kg/ha	Copper
	Vitisan (4kg/ha)	4 kg/ha	Potassiumbicarbonate
	PrevB2: 300 ml / hl Spray mixture	1,5 L/ha	Citrus Oil
	Water	500 L/ha	
29/07/16	Wettable Sulfur 3,6 Kg/ha	3,6 kg/ha	Sulfur
	Funguran Progress (300 g Cu/ha)	0,857 kg/ha	Copper
	Vitisan 4,0 kg/ha	4 kg/ha	Potassiumbicarbonate
	Wetcit 200 ml/hl	1 L/ha	Citrus Oil
	Water	500 L/ha	
09/08/16	Funguran Progress (300 g Cu/ha)	0,857 kg/ha	Copper
	Vitisan 5,0 kg/ha	5 kg/ha	Potassiumbicarbonate
	Wetcit 200 ml/hl	1 L/ha	Citrus Oil
	Water	500 L/ha	

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TABLE S3. Cover crops used in the experiment.

Treatment	Organic/Biodynamic	Integrated
Name	Wolff-Mixture	Mulch Mixture 2
Producer	Feldsaaten Freudenberger, Krefeld, Germany	
Component 1	7,5 % *Trifolium alexandrinum*	10 % *Lolilum perenne*
Component 2	7,5 % *Trifolium incarnatum*	10 % *Lolilum perenne*
Component 3	2,5 % *Phacelia tanacetifolia*	20 % *Poa pratensis*
Component 4	20 % *Lathyrus latifolius*	20 % *Poa pratensis*
Component 5	7,5 % *Melilotus albus*	40 % *Poa pratensis*
Component 6	15 % *Onobrychis spec.*	
Component 7	7,5 % *Medicago sativa*	
Component 8	5 % *Medicago lupulina*	
Component 9	5 % *Trifolium resupinatum*	
Component 10	2,5 % *Trifolium hybridum*	
	10 % "Bienenweidenmischung":	
Component 11	*Phacelia spec.*	
Component 12	*Fagopyrum esculentum*	
Component 13	*Coriandrum sativum*	
Component 14	*Calendula officinalis*	
Component 15	*Nigella sativa*	
Component 16	*Raphanus sativus var. Oleiformis*	
Component 17	*Malva sylvestris*	
Component 18	*Borago officinalis*	
Component 19	*Anethum graveolens*	
Component 20	*Helianthus annuus*	
	10 % "Würzmischung":	
Component 21	*Sanguisorba minor*	
Component 22	*Carum carvi*	
Component 23	*Plantago lanceolata*	
Component 24	*Cichorium intybus*	
Component 25	*Achillea millefolium*	
Component 26	*Daucus carota subsp. carota*	
Component 27	*Petroselinum crispum*	
Component 28	*Foeniculum vulgare*	
Component 29	*Pastinaca sativa*	
Component 30	*Lotus corniculatus*	
Date sown:	18/08/14	11/04/11

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TABLE S4. Details of soil and vine management in the experimental season.

date	integrated	organic	biodynamic
26/10/15	sowing cover crop (vetch + rye)	sowing cover crop (Dr. Hofmann mixture), every 2nd row	
05/04/16	herbicide application under-vine: 5 L/ha		
20/04/16			horn manure application
27/04/16	chopping up pruning wood		
10/05/16	mulching	mulching + mechanical under-vine management	
11/05/16	cultivator (every 2nd row)		
12/05/16			horn manure application
24/05/16		rolling + mechanical under-vine management	
07/06/16		cultivator (every 2nd row) + mechanical under-vine management	
08/06/16		mulching + mechanical under-vine management	
14/06/16			horn silica application
29/06/16		cultivator (every 2nd row) + mechanical under-vine management	
07/07/16	Topping + mulching (every 2nd row)		
08/07/16	defoliation (1 side of canopy) + mulching		
20/07/16	cultivator (every 2nd row)	cultivator (every 2nd row) + mechanical under-vine management	
28/07/16	herbicide application under-vine: 5 L/ha		
30/07/16			horn silica application
01/08/16	Topping + mulching (every 2nd row)		
10/08/16		mechanical under-vine management (every 2nd row)	
11/08/16	cultivator (every 2nd row)	cultivator (every 2nd row) + mechanical under-vine management	
24/08/16	sowing cover crop (vetch + rye)	sowing cover crop (Dr. Hofmann mixture), every 2nd row	
08/09/16	mulching		
04/10/16			horn silica application

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TABLE S5. Results of soil chemical analysis of integrated (INT), organic (ORG) and biodynamic (BD) management systems prior to data collection (modified according to Döring *et al.,* 2015).

Parameter	INT (mean ± sd)	ORG (mean ± sd)	BD (mean ± sd)	treat
pH	7.22 ± 0.29	7.2 ± 0.21	7.31 ± 0.11	ns
P_2O_5 [mg / 100 g soil]	79.63 ± 10.24	83.25 ± 9.78	79.25 ± 15.23	ns
K_2O [mg / 100 g soil]	40.25 ± 8.74	43.38 ± 4.17	43.63 ± 5.37	ns
MgO [mg / 100 g soil]	13.38 ± 2.5	12.88 ± 1.55	12.62 ± 1.51	ns
humus [%]	2.03 ± 0.65	2.58 ± 0.56	2.4 ± 0.55	ns
C/N ratio	20.69 ± 7.03	20.81 ± 7.74	20.75 ± 4.14	ns
soil moisture [%]	16.43 ± 0.96	16.26 ± 1.14	16.87 ± 1.73	ns

Table S6. Yield and pruning weight of integrated (INT), organic (ORG) and biodynamic (BD) plots.

Parameter	INT (mean ± sd)		ORG (mean ± sd)		BD (mean ± sd)		treat
Yield [kg ha^{-1}]	8358 ± 1279	a	6790 ± 1302	b	7231 ± 1305	ab	**
Pruning weight [kg ha^{-1}]	4347 ± 513	a	3305 ± 377	b	3276 ± 234	b	***

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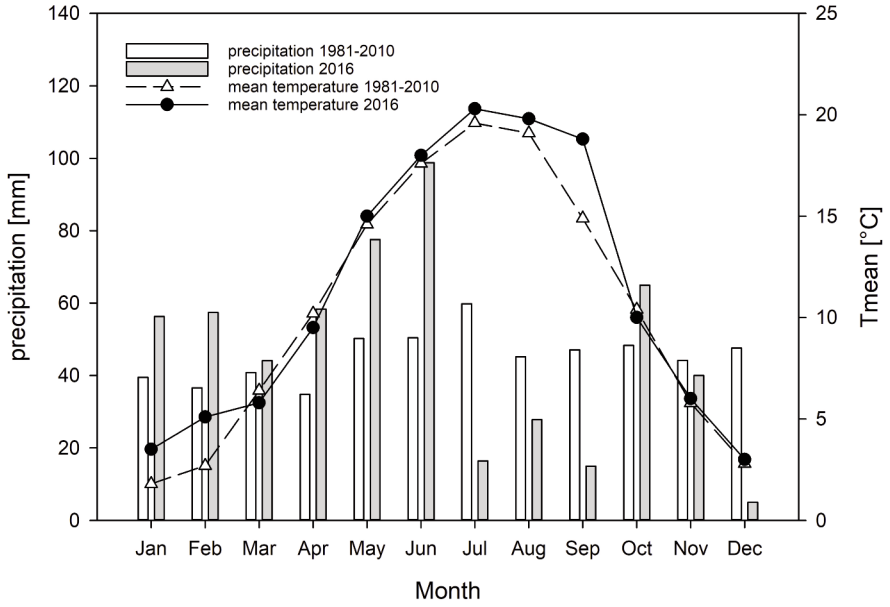

FIGURE S1. Mean monthly temperature and precipitation for the experimental site, presented as long-term average (1980–2010) and 2016 data.

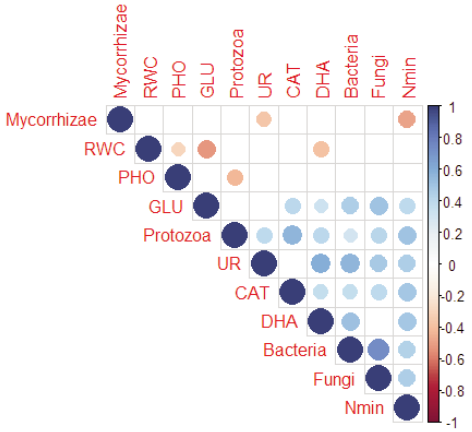

FIGURE S2. Correlation plot of data recorded throughout the season.

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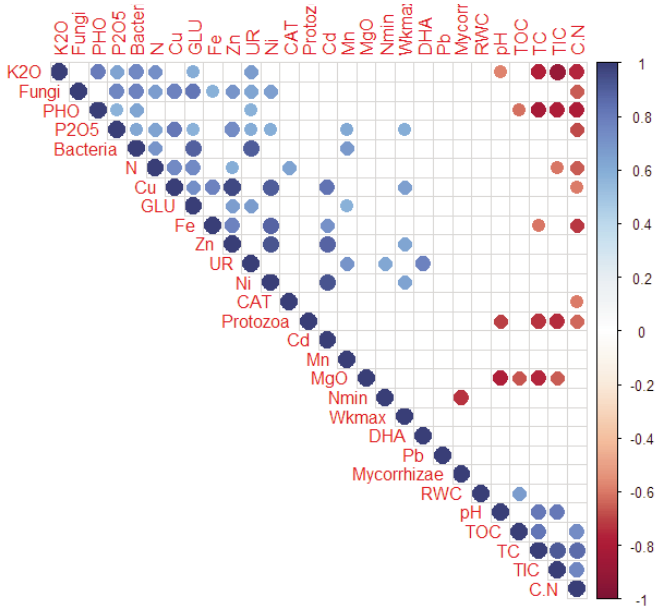

FIGURE S3. Correlation plot of yearly means of microbiological parameters and soil data.