

Table S1. Compost characteristics.

Compost		1st year	2nd year
pH _(H2O)		8.1	7.9
pH _(KCl)		7.4	7
Organic C	g kg ⁻¹	349	339
Organic matter	%	69.7	67.7
Total N	g kg ⁻¹	25.2	27.2
C/N		13.8	12.5
Assimilable K	mg kg ⁻¹	327	207
Assimilable P		464	444
Exchange complex	K ⁺	96.4	51.8
	Ca ²⁺	20.5	42.1
	Mg ²⁺	10.7	24.2
	Al ³⁺	0.1	0.1
	Na ⁺	0.53	0.71
	CECe	113.7	118.9
Ratio between exchange cations	Ca/Mg	2	2
	K/Mg	9	2.1

Table S2. Treatments with phytosanitary products, fertilizers and enrichers carried out in all the study plots each year.

Date of application	Products	Treatment for	Active ingredients	Dosage/100 L
3 rd week April	Xilug Luqsazufre Goemar	Downy mildew, powdery mildew, eriophids and red spider mite.	<ul style="list-style-type: none"> • Metalaxil 8%, Mancozeb 60% • Luqsazufre 80 • Seaweed cream: 25% of <i>Ascophyllum nodosum</i> extracts: 12.5 % of organic matter, 4% K₂O, 4% alginic acid, 0.5% mannitol. Contains plant hormones (cytokinin, auxins, gibberellins). 	250 g 400 g 300 mL
4 th week April	Pearze triple Luqsazufre	Downy mildew and alternaria	<ul style="list-style-type: none"> • Fosetil 50% • Cimox 4%, • Folpet 25% • Sulfur 80% 	250 g 400 g
2 nd week May	Acrobat Cu Luqsazufre		<ul style="list-style-type: none"> • Dimetomorf 6% • Copper 40% • Sulfur 60% 	300 g 400 g
3 rd week May	Barolom Combi Luqsazufre Goemar	Downy mildew	<ul style="list-style-type: none"> • Metalaxil 4.8% • Folpet 40% • Sulfur 80% • Seaweed cream 	200 g 400 g 300 mL
4 th week May	Helice Shavit Bulldock		<ul style="list-style-type: none"> • Cimox 4% • Folpet 205 • Copper 15% • Triadimenol 25% • Betaciflutrin 2.5% 	300 g 500 mL 80 mL
2 nd week June	Xilug Kohinor Dorado	Downy mildew, powdery mildew, eriophids and red spider mite.	<ul style="list-style-type: none"> • Metalaxil 8% • Mancozeb 60% • Midacloprid 20% • Penconazol 10% 	300 g 500 mL 400 mL
3 rd week June	Milzan Shavit	Downy mildew	<ul style="list-style-type: none"> • Cimoxanilo 4% • Mancozeb 40% • Triadimenol 25% 	400 g 50 mL
4 th week June	Helice Luqsazufre M-10	Downy mildew, powdery mildew, eriophids and red spider mite.	<ul style="list-style-type: none"> • Cimox 4%, • Folpet 20%, • Copper 15% • Sulfur 80% • Fertilizer CEE (21% P, 28% K, 0.14% B, 0.14% Mn y 0.014% Mo (p/V)) 	300 g 400 mL 400 g
2 nd week July	Conkora		<ul style="list-style-type: none"> • Cimox 5% • Copper 22.5% 	400 g
3 rd week July	Luqsazufre		<ul style="list-style-type: none"> • Sulfur 80% 	400 g
1 st week August	Trimilzan Shavit Kohinor	Downy mildew	<ul style="list-style-type: none"> • Cimoxanilo 3% • Copper 28% • Triadimenol 25 % • Imida cloprid 25% 	400 g 45 mL 50 mL
2 nd week August	Trimilzán Luqsazufre M-10	Powdery mildew, eriophids and red spider mite.	<ul style="list-style-type: none"> • Cimoxanilo 3% • Copper 28% • Sulfur 80% • Fertilizer CEE 	400 g 400 mL 400 g
4 th week August	Timilzan Astound Bulldock	Downy mildew	<ul style="list-style-type: none"> • Cimoxanilo 3% • Copper 28% • Ciprodinil 37.5% • Fludioxonil 25% • Betaciflutrin 2.5% 	400 g 400 g 500 mL
Between April and July (bimonthly application)	Zineb	Downy mildew. It also acts against. Peronospora and anthracnose	<ul style="list-style-type: none"> • Etilen-bisditiocarbamate of Zn 	300 g
3 rd week April (2 nd and 3 ^{er} year)	Magnesian limestone	Correction of acidity and cation imbalances.	<ul style="list-style-type: none"> • 60% CaCO₃ + 20% MgO (amendment, fast acting. Contains small amounts of microelements: B, Mn and Zn). 	1500 kg/ha

Table S3. Physical soil characteristics.

Soil	Bulk density (g cm ⁻³)	Stoniness (%)	Sand (%)	Silt (%)	Clay (%)	Texture
A1	1.29a	60.5a	78.7a	16.1a	5.2c	Sandy-loam
A2	1.34a	54.1b	78.7a	16.1a	5.2c	Sandy-loam
A3	1.35a	61.5a	78.7a	16.1a	5.2c	Sandy-loam
A4	0.98c	56.4b	79.9a	16.7a	3.4d	Sandy-loam
A5	0.98c	60.7a	79.9a	16.7a	3.4d	Sandy-loam
A6	0.96c	52.0b	79.9a	16.7a	3.4d	Sandy-loam
B1	0.99c	39.4cd	75.9a	17.9a	6.2b	Sandy-loam
B2	0.99c	40.3c	75.9a	17.9a	6.2b	Sandy-loam
B3	0.99c	41.6c	75.9a	17.9a	6.2b	Sandy-loam
B4	1.10b	14.5f	76.1a	17.6a	6.3b	Sandy-loam
B5	1.12b	24.4e	76.1a	17.6a	6.3b	Sandy-loam
B6	1.14b	63.9a	76.1a	17.6a	6.3b	Sandy-loam
B7	0.98c	44.7c	75.5a	18.1a	6.4b	Sandy-loam
B8	0.98c	37.9d	75.5a	18.1a	6.4b	Sandy-loam
CA	0.35d	44.6c	71.8b	19.6a	8.6a	Loamy-sand
CB	0.44d	10.2f	75.5a	15.8b	8.7a	Loamy-sand

In each column, values with different letters differ significantly ($p < 0.05$).

Table S4. Chemical soil characteristics (First year of sampling).

Soil	pH (H ₂ O)	pH (KCl)	Org C	OM	N	K	P	C/N	K ⁺	Ca ²⁺	Mg ²⁺	Al ³⁺	Na ⁺	eCEC	Ca/Mg	K/Mg
			g kg ⁻¹	%	g kg ⁻¹	mg kg ⁻¹	cmol(+) kg ⁻¹									
1st sampling – October																
A1	5.9c	5.3c	8.6f	1.5f	0.6f	259d	86b	14.3h	0.7c	12.2d	2.5f	0.1d	0.1c	15.5d	5.0f	0.3e
A2	6.1c	5.0c	9.4f	1.6f	0.7f	263d	89b	13.4h	0.7c	7.2e	2.6f	0.1d	0.1c	10.6ef	2.8g	0.3e
A3	6.8b	5.6b	7.8f	1.4f	0.7f	248d	91b	11.1h	0.6c	8.7e	2.9e	0.1d	0.1c	12.5e	3.0g	0.2e
A4	5.7c	4.7c	17.5e	3.0e	0.7f	280d	71c	25.0f	0.7c	4.4f	2.0f	0.1d	0.1c	7.4g	2.2g	0.4e
A5	5.6c	5.7b	18.0e	3.1e	0.8f	284d	76c	22.5f	0.7c	9.7e	2.5f	0.1d	0.2c	13.2e	3.9f	0.3e
A6	5.7c	5.8b	17.0e	2.9e	0.6f	286d	67c	28.3f	0.7c	7.4e	2.3f	0.1d	0.1c	10.7ef	3.2g	0.3e
B1	6.3b	5.6b	16.0e	2.8e	0.2f	261d	86b	80.0b	0.7c	2.6f	1.4g	0.4c	0.1c	5.2g	1.9g	0.5d
B2	6.1c	5.8b	15.0e	2.6e	0.3f	255d	89b	50.0d	0.7c	11.8d	1.4g	0.1d	0.2c	14.1d	8.7e	0.5d
B3	5.4d	5.7b	15.5e	2.7e	0.4f	264d	91b	38.8e	0.7c	2.8f	1.9f	0.1d	0.1c	5.6e	1.5g	0.4e
B4	6.5b	6.1b	20.0d	4.0d	0.2f	390c	86b	100.0a	1.0b	5.7e	2.0f	0.1d	0.1c	8.9f	2.8g	0.5d
B4	6.6b	5.4c	21.0d	4.2d	0.3f	382c	89b	70.0c	1.0b	3.1f	2.1f	0.3c	0.2c	6.7g	1.5g	0.5d
B6	6.5b	5.1c	21.5d	4.3d	0.2f	396c	91b	107.5a	1.0b	2.5f	2.0f	0.6c	0.1c	6.2g	1.3g	0.5d
B7	5.9c	5.6b	19.0d	3.3d	0.3f	333d	67c	63.3c	0.9b	3.7f	0.6h	0.1d	0.1c	5.4g	6.3e	1.4b
B8	6.0c	5.0c	17.0d	2.9d	0.4f	314d	54c	42.5de	0.8c	2.8f	0.6h	0.4c	0.1c	4.8g	4.4f	1.3b
CA	4.9d	4.3d	56.0a	11.2a	11.3a	158e	2e	5.4i	0.3d	0.2g	0.2h	1.6b	0.2c	2.5h	1.1h	1.6b
CB	4.9d	3.9d	44.0b	8.8b	3.9c	162e	2e	12.7h	0.3d	1.9f	0.7h	2.7a	0.2c	5.8g	2.7g	0.5d
2nd sampling – March																
A1	6.9b	6.2b	36.5b	7.3b	2.7d	386c	73c	13.4h	1.0b	19.5c	3.2e	0.1d	0.2c	23.9c	6.1f	0.3e
A2	6.7b	5.9b	33.0c	6.6c	3.3d	560a	45d	10.0hi	1.4b	16.0c	2.7e	0.1d	0.2c	20.3c	6.0f	0.5d
A3	7.0b	6.4a	33.5c	6.7c	4.2c	404c	103b	8.0i	1.0b	20.3c	1.5f	0.1d	0.1c	23.0c	13.9c	0.7d
A4	6.3b	5.5b	32.0c	6.4c	3.6d	294d	67c	8.8i	0.7c	13.3d	2.3f	0.1d	0.1c	16.6d	5.8f	0.3e
A5	7.1a	6.4a	30.0c	6.0c	2.5d	236d	68c	12.2h	0.6c	24.6b	1.2f	0.1d	0.1c	26.6b	20.5b	0.5d
A6	7.2a	6.4a	23.5d	4.7d	2.0d	202e	52d	11.6h	0.5c	20.0c	0.7g	0.1d	0.1c	21.5c	27.0a	0.7d
B1	7.2a	6.2b	29.5c	5.9c	2.6d	360c	108a	11.4h	0.9c	20.1c	4.9d	0.1d	0.1c	26.1c	4.1f	0.2e
B2	7.1a	6.3a	21.0d	4.2d	1.9d	238d	106a	11.1h	0.6c	15.4d	3.9e	0.1d	0.1c	20.1c	3.9f	0.2e
B3	7.2a	6.1b	28.0c	5.6c	2.5d	278d	107a	11.1h	0.7c	13.6d	6.3c	0.1d	0.1c	20.8c	2.2g	0.1e
B4	7.5a	6.8a	45.0b	9.0b	4.1c	214e	111a	10.9h	0.5c	38.8a	4.6d	0.1d	0.1c	44.2a	8.4e	0.1e
B4	6.9b	6.2b	31.5c	6.3c	2.9d	274d	131a	11.0h	0.7c	19.3c	4.5d	0.1d	0.1c	24.7c	4.3f	0.2e
B6	6.7b	6.0b	45.5b	9.1b	3.9d	362c	79c	11.8h	0.9c	20.4c	4.7d	0.1d	0.2c	26.3b	4.3f	0.2e
B7	7.2a	6.5a	48.5b	9.7b	4.3c	474b	86b	11.4h	1.2b	20.2c	10.6a	0.1d	0.2c	32.2b	1.9g	0.1e
B8	6.6b	5.8b	39.5b	7.9b	3.4c	374c	76c	11.5h	0.9c	16.5c	4.2d	0.1d	0.1c	21.8c	4.0f	0.2e
CA	5.0d	4.2d	61.0a	12.0a	11.4a	112d	3e	5.4i	0.4d	0.2g	0.2h	1.6b	0.2c	2.6h	1.0h	2.0a
CB	4.9d	3.9d	48.0b	9.6b	3.8c	138d	7e	12.6h	0.3d	2.0f	0.7h	2.8a	0.1c	5.9g	2.9g	0.4e
3rd sampling – July																
A1	6.9b	6.2b	26.0c	5.2c	1.8d	278d	51d	14.6h	0.7c	10.9d	1.9f	0.1d	0.1c	13.8e	5.7f	0.4e
A2	6.5b	5.9b	29.5c	5.9c	2.7d	672a	54c	11.1h	1.7b	11.0d	1.8f	0.1d	0.2c	14.8e	6.1f	0.9c
A3	7.0b	6.4a	26.0c	5.2c	2.4d	284d	40d	10.9h	0.7c	16.9c	1.2g	0.1d	0.1c	19.1d	13.7c	0.6d
A4	6.5b	5.9b	31.0c	6.2c	2.5d	364c	60c	12.6h	0.9c	15.2d	2.6f	0.1d	0.2c	19.0d	5.9f	0.4e
A5	7.3a	6.7a	28.0c	5.6c	2.4d	362c	57c	11.5h	0.9c	24.0b	1.9f	0.1d	0.2c	27.1b	12.8c	0.5d
A6	6.9b	6.4a	21.5d	4.3d	1.9d	210e	51d	11.6h	0.5c	16.2c	1.3g	0.1d	0.2c	18.2d	13.0c	0.4e
B1	7.1a	6.5a	23.0d	4.6d	1.8d	480b	60c	12.6h	1.2b	15.3e	3.5e	0.1d	0.2c	20.3c	4.4f	0.3e
B2	7.1a	6.6a	13.5e	2.7e	1.0d	344c	67c	13.0h	0.9c	11.0e	2.3f	0.1d	0.1c	14.4e	4.7f	0.4e
B3	7.6a	7.1a	24.5d	4.9d	1.8d	304d	96b	13.7h	0.8c	21.7b	5.4c	0.1d	0.1c	28.1b	4.0f	0.1e
B4	7.2a	6.6a	29.0c	5.8c	1.8d	352c	79c	16.4h	0.9c	15.8c	4.0d	0.1d	0.2c	21.0c	4.0f	0.2e
B4	7.5a	6.9a	36.0c	7.2c	2.6d	348c	99b	13.8h	0.9c	23.5b	5.8c	0.1d	0.2c	30.5b	4.0f	0.2e
B6	7.2a	6.5a	49.5b	9.9b	3.0d	442c	67c	16.8h	1.1b	16.9c	7.6b	0.1d	0.2c	25.9c	2.2g	0.2e
B7	7.2a	6.5a	53.5a	10.7a	3.2c	462b	80b	16.7h	1.2b	17.1c	8.4ab	0.1d	0.2c	27.0b	2.0g	0.1e
B8	7.0b	6.3a	48.5b	9.7b	3.1c	382c	83b	15.7h	1.0b	14.0d	7.2b	0.1d	0.2c	22.4c	2.0g	0.1e
CA	4.9d	4.2d	61.5a	12.3a	11.5a	113d	3e	5.3i	0.3d	0.2g	0.2h	1.5b	0.2c	2.4h	1.0h	1.5b
CB	4.8d	3.9d	47.5b	9.5b	3.8c	138d	8e	12.5h	0.3d	1.8f	0.8h	2.8a	0.2c	5.9g	2.3g	0.4e

Org C: Organic carbon content; OM: Organic matter; eCEC: effective cation exchange capacity. In each column, values with different letters differ significantly ($p < 0.05$).

Table S5. Chemical soil characteristics (Second year of sampling).

Soil	pH (H ₂ O)	pH (KCl)	Org C	OM	N	K	P	C/N	K ⁺	Ca ²⁺	Mg ²⁺	Al ³⁺	Na ⁺	eCEC	Ca/Mg	K/Mg
			g kg ⁻¹	%	g kg ⁻¹	mg kg ⁻¹	cmol(+) kg ⁻¹									
4 th sampling – October																
A1	7.1a	6.4a	33.0c	6.6c	1.8d	314d	69c	18.9g	0.8c	20.6b	2.5f	0.1d	0.2c	24.1c	8.4e	0.3e
A2	6.8b	6.2b	35.0c	7.0c	3.1c	612a	61c	11.5h	1.5b	17.7c	3.0e	0.1d	0.2c	22.5c	6.0f	0.5d
A3	7.1a	6.6a	26.5d	5.3d	1.9d	230d	53d	14.1h	0.6c	19.7c	1.7f	0.1d	0.2c	22.2c	11.9c	0.3e
A4	6.7b	5.8b	31.5c	6.3c	2.8d	254d	60c	11.4h	0.6c	14.6d	2.7e	0.1d	0.2c	18.2d	5.5f	0.2e
A5	7.1a	6.5a	27.5c	5.5c	2.4d	350c	41d	11.3h	0.9c	22.5b	1.9f	0.1d	0.2c	25.6c	11.8c	0.5d
A6	7.2a	6.5a	24.5d	4.9d	1.7d	188e	21e	14.7h	0.5c	14.6d	1.1g	0.1d	0.1c	16.4d	13.4c	0.4e
B1	7.3a	6.7a	29.0c	5.8c	2.6d	396c	68c	11.1h	1.0b	19.9c	3.7e	0.1d	0.1c	24.9c	5.4f	0.3e
B2	7.6a	7.0a	18.0e	3.6e	1.5d	262d	82b	12.4h	0.7c	15.4d	3.6e	0.1d	0.1c	19.9d	4.3f	0.2e
B3	6.2c	5.7b	24.0d	4.8d	2.0d	364c	127a	11.8h	0.9c	12.6d	3.2e	0.1d	0.2c	17.0d	3.9f	0.3e
B4	7.5a	6.9a	30.5c	6.1c	2.1d	288d	85b	14.5h	0.7c	25.7b	3.2e	0.1d	0.2c	29.9b	8.1e	0.2e
B4	7.3a	6.6a	28.0c	5.6c	2.1d	302d	69c	13.7h	0.8c	15.0d	5.6c	0.1d	0.2c	21.6c	2.7g	0.1e
B6	7.3a	6.5a	37.5c	7.5c	2.4d	378c	34d	15.6h	0.9c	13.9d	6.1c	0.1d	0.2c	21.2c	2.3g	0.2e
B7	6.9b	6.2b	45.5b	9.1b	2.5d	390c	49d	18.5g	1.0b	18.0c	4.8d	0.1d	0.2c	24.1c	3.8f	0.2e
B8	6.6b	5.9b	49.0b	9.8b	3.2c	424c	39d	15.6h	1.1b	13.6d	6.4c	0.1d	0.2c	21.4c	2.1g	0.2e
CA	4.8d	4.2d	56.1a	11.2a	11.5a	110e	2e	4.9i	0.4d	0.2g	0.3h	1.6b	0.2c	2.7h	0.7h	1.3b
CB	4.8d	4.0d	43.1b	8.6b	4.0c	135e	9e	10.8h	0.3d	1.9f	0.7h	2.7a	0.2c	5.8g	2.7g	0.4e
5 th sampling – March																
A1	7.0b	6.1b	34.0c	6.8c	3.3c	332d	72c	10.2	0.8c	18.3c	3.2e	0.1d	0.1c	22.6c	5.8f	0.3e
A2	7.0b	6.2b	33.0c	6.6c	4.0c	570a	46d	8.2i	1.4b	13.8d	2.3f	0.1d	0.2c	17.8d	6.0f	0.6d
A3	7.4a	6.8a	30.5c	6.1c	3.0c	330d	56c	10.3h	0.8c	17.5c	1.2g	0.1d	0.2c	19.8d	14.3c	0.7d
A4	6.8b	6.4a	27.5c	5.5c	2.8d	366c	65c	9.8i	0.9c	13.8d	2.4f	0.1d	0.1c	17.4d	5.7f	0.4e
A5	7.4a	6.8a	29.5c	5.9c	1.9d	306d	76c	15.3h	0.8c	21.4b	1.3g	0.1d	0.1c	23.7c	16.7b	0.6d
A6	7.2a	6.6a	31.0c	6.2c	3.7c	234d	83b	8.4i	0.6c	18.6c	1.5f	0.1d	0.2c	20.9c	12.7c	0.4e
B1	7.5a	6.7a	31.0c	6.2c	1.9d	444c	70c	16.1h	1.1b	16.1c	4.0d	0.1d	0.1c	21.4c	4.1f	0.3e
B2	7.5a	7.0a	19.0e	3.8e	1.2d	254d	95b	15.5h	0.6c	17.0c	2.7e	0.1d	0.2c	20.6c	6.3e	0.2e
B3	7.8a	7.1a	26.0d	5.2d	2.2d	320d	119a	11.6h	0.8c	21.2b	4.9d	0.1d	0.2c	27.1b	4.4f	0.2e
B4	7.5a	6.7a	32.5c	6.5c	1.8d	340c	78c	17.9g	0.9c	16.7c	3.4e	0.1d	0.2c	41.2a	4.9f	0.3e
B4	7.6a	6.9a	26.5d	5.3d	1.6d	314d	68c	16.8h	0.8c	12.8d	4.7d	0.1d	0.1c	18.5d	2.7g	0.2e
B6	7.0b	6.2b	41.5b	8.3b	3.5c	366c	43d	11.9h	0.9c	14.3d	4.0e	0.1d	0.3b	19.6d	3.6f	0.2e
B7	7.2a	6.5a	49.5b	9.9b	3.2c	366c	45d	15.7h	0.9c	17.8c	8.5b	0.1d	0.2c	27.5b	2.1g	0.1e
B8	7.1a	6.3a	40.0b	8.0b	2.3d	328d	37d	17.6h	0.8c	13.5d	5.9	0.1d	0.2c	20.5c	2.3g	0.1e
CA	5.0d	4.4d	63.5a	12.7a	11.4a	115a	2e	5.6i	0.3d	0.3g	0.3h	1.7b	0.2c	2.8h	1.0hg	1.0c
CB	5.1d	4.0d	47.5b	9.5b	3.9c	128a	8e	12.2h	0.3d	1.7f	0.8h	2.7a	0.2c	5.7g	2.1gg	0.4e
6 th sampling – July																
A1	6.5b	5.7b	30.0c	6.0c	2.3d	296d	50d	13.2h	0.7c	9.2e	2.6f	0.1d	0.2c	12.9e	3.6f	0.3e
A2	7.7a	6.9a	29.0c	5.8c	2.5d	324d	110a	11.8h	0.8c	16.0c	1.8f	0.1d	0.2c	18.8d	9.1d	0.5d
A3	6.5b	5.8b	26.5d	5.3d	2.6d	442c	55c	10.1hi	1.1b	7.7e	2.1f	0.1d	0.1c	11.1e	3.7f	0.5d
A4	7.5a	6.9a	25.5d	5.1d	2.6d	244d	51d	9.7i	0.6c	10.7d	1.2g	0.1d	0.1c	12.7e	8.9d	0.5d
A5	7.0b	6.3a	26.0d	5.2d	3.0c	316d	70c	8.7i	0.8c	8.9e	2.4f	0.1d	0.1c	12.3e	3.8f	0.3e
A6	7.3a	6.6a	27.0d	5.4d	1.9d	246d	81b	14.0h	0.6c	9.0e	3.9e	0.1d	0.1c	13.8e	2.3g	0.2e
B1	7.1a	6.5a	28.5c	5.7c	3.3c	294d	60c	8.6i	0.7c	13.0d	1.4g	0.1d	0.2c	15.4d	9.4d	0.5d
B2	7.6a	6.9a	16.5e	3.3e	0.9e	284d	100b	18.9g	0.7c	8.4e	3.4e	0.1d	0.1c	12.7e	2.5g	0.2e
B3	7.0b	6.4a	18.0e	3.6e	1.2d	278d	60c	14.7h	0.7c	6.6e	1.6f	0.1d	0.1c	9.1f	4.1f	0.4e
B4	7.3a	6.5a	28.5c	5.7c	2.3d	314d	94b	12.5h	0.8c	8.9e	3.3e	0.1d	0.1c	13.2e	2.7g	0.2e
B4	7.3a	6.5a	25.0d	5.0c	2.6d	280d	120a	9.5i	0.7c	10.4d	3.3e	0.1d	0.1c	14.7de	3.1g	0.2e
B6	6.9b	6.3a	39.5c	7.9b	2.6d	440c	60c	15.1h	1.1b	9.7e	6.1c	0.1d	0.2c	17.2d	1.6g	0.2e
B7	6.8b	6.2a	50.5b	10.1b	5.8b	272d	131a	8.7i	5.2a	15.2d	3.9e	0.1d	0.6a	25.0c	3.9f	1.3b
B8	7.1a	6.3a	40.0b	8.0b	2.3d	328d	37d	17.6h	0.8c	13.5d	5.9c	0.1d	0.2c	20.5c	2.3g	0.1e
CA	4.9d	4.2d	63.2a	12.6a	11.0a	112e	2e	5.7i	0.4d	0.3g	0.2h	1.7b	0.3b	2.9h	1.5gh	2.0a
CB	4.8d	3.8d	48.5b	9.7b	3.8c	137e	9e	12.8h	0.3d	1.8f	0.8h	2.9a	0.2c	6.0g	2.3g	0.4e

Org C: Organic carbon content; OM: Organic matter; eCEC: effective cation exchange capacity. In each column, values with different letters differ significantly ($p < 0.05$).

Table S6. Chemical soil characteristics (Third year of sampling).

Soil	pH (H ₂ O)	pH (KCl)	Org C	OM	N	K	P	C/N	K ⁺	Ca ²⁺	Mg ²⁺	Al ³⁺	Na ⁺	eCEC	Ca/Mg	K/Mg
			g kg ⁻¹	%	g kg ⁻¹	mg kg ⁻¹	cmol(+) kg ⁻¹									
7 th sampling – October																
A1	6.7b	5.9b	23.0d	4.6d	3.5c	230d	44d	6.6i	0.6c	8.3e	2.4f	0.1d	0.1c	11.5e	3.4g	0.2e
A2	7.1a	6.5a	28.5c	5.7c	3.2c	294d	60c	9.1i	0.7c	13.0d	1.4g	0.1d	0.2c	15.4d	9.4d	0.5d
A3	7.4a	6.5a	31.5c	6.3c	3.9c	554b	65c	8.2i	1.4b	12.9d	1.8f	0.1d	0.2c	16.3d	7.2e	0.8d
A4	7.0b	6.2a	23.0d	4.6d	1.8d	260d	35d	13.1h	0.7c	8.1e	2.0f	0.1d	0.1c	11.0e	4.1f	0.3e
A5	7.6a	6.8a	28.5c	5.7c	1.8d	192e	63c	16.3h	0.5c	15.7c	1.1g	0.1d	0.1c	17.5d	14.0c	0.4e
A6	7.4a	6.6a	22.0d	4.4d	1.8d	210e	51d	12.6h	0.5c	10.5d	1.2g	0.1d	0.2c	12.5e	8.9d	0.4e
B1	7.0b	6.2a	30.0c	6.0c	2.1d	318d	61c	14.3h	0.8c	8.9e	3.4e	0.1d	0.1c	13.3e	2.6g	0.2e
B2	7.8a	6.8a	16.5e	3.3e	1.8d	308d	79c	9.4i	0.8c	8.3e	2.7e	0.1d	0.1c	11.9e	3.1g	0.3e
B3	7.4a	6.5a	31.0c	6.2c	3.2c	256d	109a	9.8i	0.6c	10.5d	3.6e	0.1d	0.2c	14.9d	3.0g	0.2e
B4	7.3a	6.3a	27.0d	5.4d	2.1d	270d	55c	12.9h	0.7c	7.8e	2.4f	0.1d	0.1c	11.1e	3.2g	0.3e
B4	7.7a	6.8a	37.0c	7.4c	3.9c	294d	72c	9.6i	0.7c	11.7d	4.9d	0.1d	0.1c	17.5d	2.4g	0.2e
B6	7.2a	6.2a	43.5b	8.7b	3.9c	394c	54c	11.3h	1.0bc	9.2e	5.4c	0.1d	0.2c	15.8d	1.7g	0.2e
B7	7.2a	6.3a	47.0b	9.4b	3.2c	358c	55c	14.9h	0.9c	11.7d	6.4c	0.1d	0.1c	19.2d	1.8g	0.1e
B8	7.3a	6.4a	44.0b	8.8b	3.2c	338c	50d	14.0h	0.9c	10.9d	6.0c	0.1d	0.1c	18.0d	1.8g	0.1e
CA	4.8d	4.3d	58.2a	11.6a	11.5a	112e	2e	5.1i	0.4d	0.2g	0.3h	1.6b	0.2c	2.7h	0.7h	1.3b
CB	4.7d	3.8d	46.4b	9.3b	3.7c	130e	8e	12.5h	0.2d	1.8f	0.7h	2.6a	0.2c	5.5g	2.6g	0.3e
8 th sampling – March																
A1	6.5b	5.8b	27.0d	5.4d	2.8d	264d	52d	9.6i	0.7c	8.4e	2.3f	0.1d	0.2c	11.7e	3.6f	0.3e
A2	6.4b	5.8b	31.5c	6.3c	2.8d	314d	50d	11.3h	0.8c	10.0e	2.6f	0.1d	0.2c	13.7e	3.8f	0.3e
A3	6.8a	6.2a	34.0c	6.8c	2.5d	192e	52d	13.9h	0.5c	12.2d	1.4g	0.1d	0.2c	14.4de	8.7r	0.3e
A4	6.5b	5.7b	22.0d	4.4d	2.5d	258d	37d	9.0i	0.6c	6.8e	1.8f	0.1d	0.2c	9.5f	3.7f	0.4e
A5	7.2a	6.5a	27.0c	5.4c	2.1d	212e	50d	12.9h	0.5c	13.7d	1.1g	0.1d	0.2c	15.6d	12.5c	0.5d
A6	7.3a	6.7a	20.5d	4.1d	1.4e	160e	46d	14.6h	0.4c	10.5d	1.4g	0.1d	0.1c	12.6e	7.4e	0.3e
B1	6.7a	6.0a	28.0d	5.6d	2.1d	254d	48d	13.3h	0.6c	9.6e	3.1e	0.1d	0.2c	13.7e	3.1g	0.2e
B2	7.3a	6.6a	17.0e	3.4e	1.4e	174e	65c	12.1h	0.4c	7.9e	2.3f	0.1d	0.1c	10.8ef	3.4g	0.2e
B3	7.2a	6.4a	27.5c	5.5c	1.8d	234d	97b	15.7h	0.6c	10.7d	3.9e	0.1d	0.2c	15.5d	2.7g	0.2e
B4	6.8a	6.1a	36.0c	7.2c	2.1d	160e	64c	17.1gh	0.4c	10.1e	2.4f	0.1d	0.2c	13.1e	4.3f	0.2e
B4	6.4b	5.7b	39.0c	7.8c	2.5d	234d	68c	15.9h	0.6c	10.2e	3.4e	0.1d	0.2c	14.5de	3.0g	0.2e
B6	6.7a	6.2a	27.0d	5.4d	1.6d	222e	60c	17.1gh	0.6c	9.6e	3.0e	0.1d	0.1c	13.4e	3.2g	0.2e
B7	6.9a	6.1a	30.0d	6.0d	2.8d	186e	58c	10.7h	0.5c	8.3e	3.9e	0.1d	0.2c	13.0e	2.1g	0.1e
B8	6.7a	5.9b	51.5b	10.3b	2.5d	276d	28d	21.0g	0.7c	8.4e	5.3c	0.1d	0.2c	14.6e	1.6g	0.1e
CA	4.9d	4.4d	61.8a	12.4a	11.4a	111e	3e	5.4i	0.3d	0.3g	0.3h	1.7b	0.2c	2.8h	1.0h	1.0c
CB	4.9d	4.0d	50.2b	10.0b	3.8c	133e	9e	13.2h	0.3d	1.9f	0.8h	2.9a	0.3b	6.2g	2.4g	0.4e
9 th sampling – October																
A1	6.8a	5.9a	24.0d	4.8d	2.3d	412c	48d	10.5hi	1.0b	8.3e	2.1f	0.1d	0.2c	11.7e	3.9f	0.5d
A2	6.3b	5.4b	31.0c	6.2c	2.5d	536b	113a	12.7h	1.3b	7.6e	1.9f	0.3c	0.2c	11.3e	4.1f	0.7d
A3	7.1a	6.3a	32.5c	6.5c	3.2c	388c	53d	10.3hi	1.0b	13.1d	1.5f	0.1d	0.3b	15.9d	8.8e	0.7de
A4	6.6b	5.8b	22.5d	4.5d	2.3d	236d	52d	9.9i	0.6c	7.4e	2.0f	0.1d	0.2c	10.2e	3.8f	0.3d
A5	7.0a	6.6a	33.0c	6.6c	2.3d	398c	74c	14.5h	1.0bc	15.1d	1.6f	0.1d	0.2c	18.0d	9.7d	0.7d
A6	7.0a	6.3a	25.5d	5.1d	2.3d	346c	80b	11.2h	0.9c	10.1e	1.2g	0.1d	0.2c	12.4e	8.8e	0.8d
B1	6.5b	5.8b	25.5d	5.1d	1.8d	532b	62c	14.6h	1.3b	7.0e	2.5f	0.1d	0.2c	11.1e	2.9g	0.5d
B2	6.9a	6.2a	15.5e	3.1e	1.4e	282d	105b	11.1h	0.7c	6.9e	2.2f	0.1d	0.2c	10.1ef	3.2g	0.3e
B3	6.4b	5.5b	18.0e	3.6e	1.8d	166e	63c	10.1hi	0.4c	5.2e	2.1f	0.1d	0.2c	8.0fg	2.4g	0.2e
B4	7.0a	6.2a	24.0d	4.8d	2.3d	268d	91b	10.5hi	0.7c	8.4e	3.4e	0.1d	0.2c	12.8e	2.5g	0.2e
B4	7.3a	6.6a	35.0c	7.0c	2.3d	250d	125a	15.4h	0.6c	10.7d	4.0d	0.1d	0.2c	15.7d	2.7g	0.2e
B6	6.7a	5.8b	32.5c	6.5c	3.2c	348c	64c	10.3hi	0.9c	7.9e	3.2e	0.1d	0.3b	12.4e	2.5g	0.3e
B7	6.6b	5.8b	33.5c	6.7c	4.0c	434c	127a	8.3i	1.1b	7.4e	3.7e	0.1d	0.2c	12.5e	2.0g	0.3e
B8	7.0a	6.2a	40.0b	8.0b	4.0c	324d	39d	9.9i	0.8c	12.4d	6.3c	0.1d	0.3b	19.9c	2.0g	0.1e
CA	5.0d	4.3d	61.4a	12.3a	11.3a	110e	3e	5.4i	0.4d	0.2g	0.2h	1.6b	0.2c	2.6h	1.0h	2.0a
CB	4.9d	3.8d	49.5b	9.9b	3.9c	132e	9e	12.7h	0.3d	2.0f	0.8h	2.8a	0.2c	6.1g	2.5g	0.4e

Org C: Organic carbon content; OM: Organic matter; eCEC: effective cation exchange capacity. In each column, values with different letters differ significantly ($p < 0.05$).

Table S7. Total and available contents of copper and zinc in vineyard soils and controls.

Soil	1st sampling (year 1)				2nd sampling (year 2)				3rd sampling (year 3)			
	CuT	CuA	ZnT	ZnA	CuT	CuA	ZnT	ZnA	CuT	CuA	ZnT	ZnA
	mg kg ⁻¹											
A1	206b, <i>b</i>	16.6d, <i>b</i>	103a, <i>c</i>	2.8a, <i>c</i>	189c, <i>b</i>	17.2d, <i>b</i>	115b, <i>b</i>	6.7a, <i>b</i>	241b, <i>a</i>	28.7e, <i>a</i>	140c, <i>a</i>	17.5b, <i>a</i>
A2	208b, <i>b</i>	17.0d, <i>b</i>	108a, <i>c</i>	2.6a, <i>c</i>	195c, <i>b</i>	17.5d, <i>b</i>	124b, <i>b</i>	6.5a, <i>b</i>	247b, <i>a</i>	28.8e, <i>a</i>	153b, <i>a</i>	17.3b, <i>a</i>
A3	210b, <i>b</i>	18.2d, <i>b</i>	111a, <i>c</i>	2.9a, <i>c</i>	219b, <i>b</i>	20.1d, <i>b</i>	132a, <i>b</i>	6.8a, <i>b</i>	271b, <i>a</i>	31.6e, <i>a</i>	165a, <i>a</i>	16.7b, <i>a</i>
A4	206b, <i>b</i>	14.9d, <i>b</i>	103a, <i>c</i>	2.8a, <i>c</i>	208b, <i>b</i>	15.4d, <i>b</i>	121b, <i>b</i>	6.7a, <i>b</i>	260b, <i>a</i>	26.9e, <i>a</i>	145c, <i>a</i>	18.1b, <i>a</i>
A5	208b, <i>b</i>	14.6d, <i>b</i>	108a, <i>c</i>	2.6a, <i>c</i>	213b, <i>b</i>	15.8d, <i>b</i>	142a, <i>b</i>	6.5a, <i>b</i>	265b, <i>a</i>	27.3e, <i>a</i>	171a, <i>a</i>	18.5b, <i>a</i>
A6	210b, <i>b</i>	15.2d, <i>b</i>	111a, <i>c</i>	2.9a, <i>c</i>	215b, <i>b</i>	16.7d, <i>b</i>	130a, <i>b</i>	6.8a, <i>b</i>	267b, <i>a</i>	28.2e, <i>a</i>	158b, <i>a</i>	17.2b, <i>a</i>
B1	117c, <i>c</i>	17.6d, <i>b</i>	70c, <i>c</i>	2.0b, <i>c</i>	132d, <i>b</i>	18.2d, <i>b</i>	93.6d, <i>b</i>	5.9b, <i>b</i>	184d, <i>a</i>	83.7a, <i>a</i>	132d, <i>a</i>	22.3a, <i>a</i>
B2	114c, <i>c</i>	18.2d, <i>b</i>	72c, <i>c</i>	1.8b, <i>c</i>	126d, <i>b</i>	23.9d, <i>b</i>	89.5d, <i>b</i>	5.7b, <i>b</i>	178d, <i>a</i>	92.4a, <i>a</i>	131d, <i>a</i>	21.3a, <i>a</i>
B3	301a, <i>c</i>	27.4c, <i>b</i>	68c, <i>c</i>	1.4c, <i>c</i>	318a, <i>b</i>	32.4c, <i>b</i>	84.4d, <i>b</i>	5.3b, <i>b</i>	370a, <i>a</i>	89.9a, <i>a</i>	130d, <i>a</i>	23.1a, <i>a</i>
B4	309a, <i>c</i>	35.4b, <i>b</i>	90b, <i>c</i>	1.9b, <i>c</i>	324a, <i>b</i>	42.5b, <i>b</i>	112b, <i>b</i>	5.8b, <i>b</i>	376a, <i>a</i>	62.0c, <i>a</i>	145c, <i>a</i>	18.6b, <i>a</i>
B4	131bc, <i>b</i>	26.2c, <i>c</i>	88b, <i>c</i>	1.7b, <i>c</i>	123d, <i>b</i>	39.2b, <i>b</i>	118b, <i>b</i>	5.6b, <i>b</i>	175d, <i>a</i>	55.7d, <i>a</i>	158b, <i>a</i>	17.9b, <i>a</i>
B6	306a, <i>c</i>	56.9a, <i>b</i>	88b, <i>c</i>	1.5c, <i>c</i>	319a, <i>b</i>	63.7a, <i>b</i>	109c, <i>b</i>	5.4b, <i>b</i>	371a, <i>a</i>	79.2ab, <i>a</i>	135d, <i>a</i>	17.9b, <i>a</i>
B7	149b, <i>c</i>	51.2a, <i>b</i>	110a, <i>c</i>	1.8b, <i>c</i>	160c, <i>b</i>	57.8a, <i>b</i>	123b, <i>b</i>	5.7b, <i>b</i>	212c, <i>a</i>	77.3b, <i>a</i>	146c, <i>a</i>	18.6b, <i>a</i>
B8	140b, <i>c</i>	49.4a, <i>b</i>	109a, <i>c</i>	1.9b, <i>c</i>	152c, <i>b</i>	52.4a, <i>b</i>	125b, <i>b</i>	5.8b, <i>b</i>	204c, <i>a</i>	70.9b, <i>a</i>	144c, <i>a</i>	18.8b, <i>a</i>
CA	39d, <i>a</i>	1.2e, <i>b</i>	63d, <i>b</i>	0.8d, <i>c</i>	41e, <i>b</i>	1.2e, <i>a</i>	67.3e, <i>b</i>	1.5c, <i>b</i>	44e, <i>a</i>	7.1f, <i>a</i>	78.3e, <i>a</i>	2.8c, <i>a</i>
CB	28d, <i>b</i>	1.1e, <i>b</i>	61d, <i>c</i>	0.9d, <i>c</i>	30e, <i>b</i>	1.1e, <i>b</i>	66.9e, <i>b</i>	1.9c, <i>b</i>	53e, <i>a</i>	9.7f, <i>a</i>	74.9e, <i>a</i>	3.6c, <i>a</i>

CuT: Copper total content; CuA: Copper available content; ZnT: Zinc total content; ZnA: Zinc available content. In each column, values with different letters differ significantly ($p < 0.05$). In each row for each sampling year, CuT, CuA, ZnT or ZnA values with different *italics letters* different letters differ significantly ($p < 0.05$)