

SUPPLEMENTARY DATA

Lavaud, M., Schmutz, M., Cavailles, J., & Falco, N. Exploring soil-plant interactions in vineyards using geophysics and hyperspectral imaging. *OENO One*, 59(4).
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SUPPLEMENTARY DATA

X(m)	Y(m)	Clay(%)	Silt(%)	Sand(%)	Texture Class	HCP_Cond.1[mS/m]	HCP_Cond.2[mS/m]	HCP_Cond.3[mS/m]	VCP_Cond.1[mS/m]	VCP_Cond.2[mS/m]	VCP_Cond.3[mS/m]
224,927	77,057	5.9	8.9	85.2	Sand	4,21	6,93	10,72	2,26	4,07	7,09
224,927	77,057	6.8	10	83.2	Sand	4,21	6,93	10,72	2,26	4,07	7,09
224,927	77,057	17.9	8.8	73.3	Sand	4,21	6,93	10,72	2,26	4,07	7,09
180,849	65,523	7.3	10.2	82.5	Sand	3,36	5,90	9,16	2,00	3,37	6,22
180,849	65,523	8.1	10.6	81.3	Sand	3,36	5,90	9,16	2,00	3,37	6,22
180,849	65,523	20.8	8.6	70.6	Loam	3,36	5,90	9,16	2,00	3,37	6,22
155,579	49,392	6.3	11.6	82.1	Sand	4,01	5,28	8,07	2,79	3,81	6,05
155,579	49,392	7.8	10.1	82.1	Sand	4,01	5,28	8,07	2,79	3,81	6,05
155,579	49,392	19.5	12.7	67.8	Sandy Loam	4,01	5,28	8,07	2,79	3,81	6,05
150,976	51,884	7.6	11.4	81	Sand	4,32	4,66	7,87	5,25	4,51	6,22
150,976	51,884	7.3	11.1	81.6	Sand	4,32	4,66	7,87	5,25	4,51	6,22
10,925	43,096	6.1	6.3	87.6	Sand	10,94	21,50	33,68	5,91	12,77	21,32
10,925	43,096	6.8	5.5	87.7	Sand	10,94	21,50	33,68	5,91	12,77	21,32
10,925	43,096	31.7	10.8	57.5	Sandy Clay Loam	10,94	21,50	33,68	5,91	12,77	21,32
24,468	31,330	6.6	6.3	87.1	Sand	8,02	15,60	25,32	4,03	8,98	15,79
24,468	31,330	24	11.4	64.6	Loam	8,02	15,60	25,32	4,03	8,98	15,79
31,866	66,033	5.6	6.2	88.2	Sand	6,03	12,10	19,66	3,37	7,25	12,26
31,866	66,033	6.9	6.2	86.9	Sand	6,03	12,10	19,66	3,37	7,25	12,26
31,866	66,033	5.8	6.7	87.5	Sand	6,03	12,10	19,66	3,37	7,25	12,26
48,397	29,497	5	6.6	88.4	Sand	4,75	9,50	15,14	2,60	6,00	9,92
48,397	29,497	8.1	10.1	81.8	Sand	4,75	9,50	15,14	2,60	6,00	9,92
53,844	38,752	5.7	6.5	87.8	Sand	5,05	9,39	14,71	2,55	5,77	9,93
53,844	38,752	5.8	7.5	86.7	Sand	5,05	9,39	14,71	2,55	5,77	9,93
53,844	38,752	6.6	7.9	85.5	Sand	5,05	9,39	14,71	2,55	5,77	9,93
74,828	61,580	6.1	8.3	85.6	Sand	5,31	9,26	14,57	2,11	5,93	10,07
74,828	61,580	6.6	9.8	83.6	Sand	5,31	9,26	14,57	2,11	5,93	10,07
74,828	61,580	9	8	83	Sand	5,31	9,26	14,57	2,11	5,93	10,07
57,155	18,353	5.9	7.1	87	Sand	4,94	9,92	15,72	2,57	6,10	10,15
57,155	18,353	5.7	9.6	84.7	Sand	4,94	9,92	15,72	2,57	6,10	10,15
118,782	72,142	8.3	11.6	80.1	Sand	2,95	4,48	7,96	4,17	3,96	5,91
118,782	72,142	9.3	12.4	78.3	Sand	2,95	4,48	7,96	4,17	3,96	5,91
118,782	72,142	12.1	7.8	80.1	Sand	2,95	4,48	7,96	4,17	3,96	5,91
118,147	63,455	8.9	17.2	73.9	Sand	5,34	4,34	7,24	7,38	5,66	6,76
118,147	63,455	7.9	10.4	81.7	Sand	5,34	4,34	7,24	7,38	5,66	6,76
99,025	64,850	7.5	9.7	82.8	Sand	3,76	5,02	8,24	6,56	6,06	7,38
99,025	64,850	7.1	10.1	82.8	Sand	3,76	5,02	8,24	6,56	6,06	7,38
92,192	35,801	7.2	9.7	83.1	Sand	4,33	6,79	12,09	7,93	6,88	9,11
92,192	35,801	7.3	9.9	82.8	Sand	4,33	6,79	12,09	7,93	6,88	9,11
93,604	55,751	8	11	81	Sand	5,41	3,92	7,75	12,50	8,94	8,73
93,604	55,751	8.6	11.5	79.9	Sand	5,41	3,92	7,75	12,50	8,94	8,73
49,285	90,814	51.5	24.5	25	clay	11,75	21,80	31,24	7,06	13,95	22,01
5,412	79,044	53.1	30.2	16.7	clay						
9,717	58,027	44.8	26.2	29	clay	8,99	17,39	27,35	4,87	10,14	17,16
28,730	95,534	40.2	34.3	25.5	clay	15,40	29,18	42,11	8,59	18,29	28,15
39,540	94,773	47.8	32.8	19.4	clay	15,45	28,98	41,44	9,14	18,02	27,68

Soil texture.

X(m)	Y(m)	Nitrogen (g/kg)	Nitrogen.2 (g/kg)	Potassium (g/kg)	Water content (%)	Carbon (g/kg)	HCP_Cond1(mS/m)	HCP_Cond2(mS/m)	HCP_Cond3(mS/m)	VCP_Cond1(mS/m)	VCP_Cond2(mS/m)	VCP_Cond3(mS/m)
17,919	42,850	30,10	29,08	531,20	64,39	12,82	8,10	13,41	8,10	11,55	20,35	31,29
18,680	58,991	28,94	27,15	539,00	67,42	15,28	8,22	13,61	8,22	11,91	20,60	31,28
27,968	73,760	31,37	30,29	551,10	68,76	14,65	7,58	12,36	7,58	10,65	18,60	28,45
34,059	21,686	30,81	29,87	528,60	66,83	10,41	6,00	9,28	6,00	8,27	13,67	21,45
38,931	82,135	30,82	28,09	553,30	67,10	10,21	8,21	13,43	8,21	11,92	19,85	29,53
49,285	90,814	36,81	27,24	651,00	65,96	10,26	8,26	13,90	8,26	11,92	20,20	29,99
7,412	39,044	24,18	29,75	448,10	70,77	11,38	11,52	20,78	11,52	17,11	30,19	44,14
7,717	48,027	29,92	28,06	527,60	70,91	11,71	11,61	20,21	11,61	18,19	29,10	41,87
28,730	95,534	31,58	26,08	627,70	65,03	10,14	12,52	22,07	12,52	18,68	30,54	43,58
39,540	94,773	29,70	28,03	548,20	67,28	12,57	12,08	20,06	12,08	17,34	28,27	39,99
96,031	76,806	31,48	31,41	507,80	68,02	11,66	5,09	6,12	5,09	6,04	7,79	11,37
125,266	72,999	32,72	31,82	511,00	69,07	12,07	5,90	5,75	5,90	3,94	6,68	10,00
142,319	64,168	39,06	34,77	563,50	67,97	10,60	7,56	7,66	7,56	2,82	6,10	10,38
162,266	64,168	33,99	32,16	541,90	70,24	9,89	5,47	6,14	5,47	6,83	7,91	11,43
182,365	68,431	34,71	33,76	540,00	65,90	10,03	4,91	6,04	4,91	5,76	7,45	10,84
210,991	75,892	35,07	34,24	541,20	68,01	9,69	4,93	6,36	4,93	6,10	8,03	11,64
84,763	52,595	35,41	34,50	514,60	66,19	10,19	18,90	12,62	18,90	8,95	7,90	10,36
93,138	40,871	36,83	33,69	538,90	67,80	12,12	11,40	10,82	11,40	6,88	8,79	13,21
91,158	26,101	35,03	32,39	549,70	67,03	9,83	24,63	13,60	24,63	14,06	7,90	17,92
104,558	60,209	33,54	33,64	504,00	68,71	10,50	20,12	9,91	20,12	15,80	6,00	9,29
100,142	34,628	37,59	33,40	583,30	67,79	11,78	27,71	12,60	27,71	6,40	5,47	10,57
103,644	49,093	33,78	31,56	537,40	68,64	12,34	18,09	7,88	18,09	8,65	6,72	10,93
36,343	62,188	35,23	30,63	581,70	63,62	11,60	6,48	9,48	6,48	8,64	13,71	20,97
54,919	65,842	34,59	33,04	541,30	67,05	10,33	5,73	8,06	5,73	6,62	10,99	16,41
75,780	68,431	33,65	32,49	538,10	65,01	9,18	5,62	8,02	5,62	5,80	11,38	17,30
35,277	44,982	34,41	32,97	544,70	25,98	10,23	6,26	12,52	6,26	8,12	12,02	16,67
55,224	39,957	31,21	29,28	551,60	67,63	10,31	5,45	7,90	5,45	7,46	11,08	15,77
71,668	26,406	32,89	33,54	502,30	35,92	9,79	5,25	7,73	5,25	7,33	11,34	17,49
122,982	46,657	34,77	34,89	495,30	68,73	10,00	10,92	7,56	10,92	5,41	7,11	10,10
150,998	45,439	32,54	32,76	515,20	67,98	10,34	9,96	6,32	9,96	6,32	6,99	10,08
171,250	51,377	32,32	31,39	527,60	65,90	10,56	4,88	5,75	4,88	5,44	7,33	10,52

Leaf components.

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X(m)	Y(m)	338.50	339.90	341.40	342.90	344.40	345.80	347.30	348.80	350.20
17.92	42.85	0.11	0.12	0.11	0.11	0.11	0.10	0.09	0.09	0.09
18.68	58.99	0.09	0.09	0.09	0.09	0.09	0.08	0.09	0.08	0.08
27.97	73.76	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.09	0.09
34.06	21.69	0.09	0.09	0.10	0.09	0.08	0.08	0.08	0.08	0.08
38.93	82.14	0.11	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09
49.29	90.81	0.14	0.12	0.13	0.11	0.12	0.12	0.11	0.11	0.11
7.41	39.04	0.10	0.09	0.08	0.08	0.09	0.08	0.08	0.08	0.08
7.72	48.03	0.11	0.10	0.09	0.09	0.08	0.08	0.08	0.07	0.07
28.73	95.53	0.13	0.12	0.11	0.11	0.11	0.11	0.10	0.10	0.10
39.54	94.77	0.09	0.10	0.09	0.10	0.09	0.09	0.08	0.08	0.08
96.03	76.81	0.11	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.07
125.27	73.00	0.13	0.12	0.12	0.12	0.11	0.11	0.10	0.10	0.10
142.32	64.17	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.11	0.11
162.27	64.17	0.13	0.12	0.12	0.11	0.11	0.11	0.11	0.10	0.10
182.36	68.43	0.14	0.13	0.12	0.13	0.11	0.11	0.10	0.11	0.11
210.99	75.89	0.14	0.13	0.14	0.13	0.13	0.12	0.12	0.10	0.10
84.76	52.60	0.12	0.12	0.11	0.10	0.10	0.10	0.09	0.09	0.09
93.14	40.87	0.11	0.10	0.10	0.10	0.09	0.08	0.08	0.08	0.07
91.16	26.10	0.12	0.12	0.10	0.11	0.10	0.09	0.09	0.09	0.08
104.56	60.21	0.13	0.12	0.12	0.11	0.11	0.11	0.10	0.09	0.09
100.14	34.63	0.10	0.10	0.10	0.09	0.09	0.08	0.08	0.08	0.08
103.64	49.09	0.10	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.08
36.34	62.19	0.09	0.08	0.07	0.08	0.09	0.08	0.08	0.08	0.07
54.92	65.84	0.10	0.10	0.11	0.09	0.09	0.08	0.08	0.08	0.08
75.78	68.43	0.12	0.12	0.13	0.12	0.11	0.10	0.11	0.10	0.10
35.28	44.98	0.11	0.10	0.09	0.09	0.08	0.09	0.09	0.09	0.08
55.22	39.96	0.11	0.10	0.11	0.10	0.10	0.09	0.09	0.08	0.09
71.67	26.41	0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.09
122.98	46.66	0.13	0.12	0.11	0.11	0.11	0.10	0.10	0.09	0.09
151.00	45.44	0.10	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.08
171.25	51.38	0.13	0.12	0.10	0.10	0.10	0.11	0.11	0.10	0.09

Extract of hand-based hyperspectral data (data columns are given for nine wavelengths in nm).

X(m)	Y(m)	410.73	413.63	416.54	419.45	422.36	425.26	428.17	431.08	433.98
17.92	42.85	257.31	251.29	251.38	260.23	264.91	276.42	291.80	294.32	282.61
18.68	58.99	262.52	255.77	254.67	261.76	264.57	274.89	289.53	290.54	277.72
27.97	73.76	239.21	232.83	231.63	237.67	240.16	249.19	261.87	263.54	253.34
34.06	21.69	268.95	264.16	264.88	273.54	278.64	289.97	307.06	310.45	299.42
38.93	82.14	264.33	257.32	255.92	263.15	264.51	273.02	286.99	288.51	276.76
49.29	90.81	291.66	280.34	276.64	283.59	287.22	296.22	313.76	315.06	300.63
7.41	39.04	247.10	240.01	237.96	242.95	245.11	254.22	268.00	268.66	256.00
7.72	48.03	266.09	258.17	256.52	263.77	266.85	276.41	290.78	292.65	280.55
28.73	95.53	293.36	284.74	283.03	290.74	294.96	307.77	324.07	323.90	307.93
39.54	94.77	296.59	283.90	278.77	284.16	286.60	296.61	311.23	311.39	296.52
96.03	76.81	191.78	190.76	194.90	206.17	214.85	229.69	247.11	253.27	248.41
125.27	73.00	193.45	188.48	188.77	196.38	201.31	212.60	226.92	230.04	222.73
142.32	64.17	208.87	204.48	204.77	212.04	215.33	225.15	239.05	242.60	234.64
162.27	64.17	201.42	197.92	199.08	206.83	211.94	223.68	238.49	241.78	233.68
182.36	68.43	198.33	195.64	197.14	204.73	209.40	220.76	235.84	239.86	232.23
210.99	75.89	199.44	195.49	196.22	203.63	208.42	219.17	233.68	236.84	228.79
84.76	52.60	161.79	160.10	162.83	171.50	178.25	190.99	205.50	211.13	207.62
93.14	40.87	188.12	185.70	187.70	195.76	201.64	213.31	228.14	232.61	226.52
91.16	26.10	185.92	182.07	182.99	190.70	195.52	206.39	220.39	223.67	216.23
104.56	60.21	160.56	159.46	162.51	171.36	177.58	190.03	204.99	210.63	206.55
100.14	34.63	185.54	182.04	183.24	190.80	196.55	208.06	222.40	225.91	219.05
103.64	49.09	197.01	194.61	196.99	206.24	211.92	224.38	239.54	244.46	238.45
36.34	62.19	250.68	246.53	248.21	258.50	263.42	275.55	292.25	297.21	287.92
54.92	65.84	221.09	219.44	223.03	233.94	241.32	254.97	271.82	277.11	270.18
75.78	68.43	197.19	196.37	200.70	212.35	221.00	235.89	254.23	261.16	256.15
35.28	44.98	238.33	234.74	236.46	245.78	250.97	263.98	280.08	283.59	273.46
55.22	39.96	216.87	212.62	213.26	220.80	225.25	237.25	251.63	254.38	245.64
71.67	26.41	250.70	244.34	243.52	250.32	254.51	265.00	280.02	281.40	269.10
122.98	46.66	180.40	177.92	179.85	187.76	193.67	205.70	220.54	224.92	218.97
151.00	45.44	187.29	182.76	182.91	189.55	193.77	203.85	217.01	220.05	212.96
171.25	51.38	200.46	195.66	195.40	201.47	204.79	214.55	227.79	230.32	221.59

Extract of drone-based hyperspectral data (data are given for nine wavelengths in nm).

Figure S1. Data at sampling locations.

Table S1. Correlation between drone-based hyperspectral measurements and leaf traits.

Carbon		Water		Potassium		Nitrogen	
Index	Correlation	Index	Correlation	Index	Correlation	Index	Correlation
diff_850_1650	-0.56	EVI2	0.409973	PRI	0.54	sumNIR	-0.68
SPVI	-0.56	sumRE	0.385289	maxRE	0.45	GM	0.64
DWSI	-0.56			sumRE	0.44	maxR	0.64
diff_850_1650	-0.56			PRI	0.54	GNDVI_2	0.64
SPVI	-0.56			maxRE	0.45		
DWSI	-0.56			sumRE	0.42		

Table S2. Correlation between ground-based hyperspectral measurements and leaf traits.

Carbon		Water		Potassium		Nitrogen	
Index	Correlation	Index	Correlation	Index	Correlation	Index	Correlation
EVI2	0.54	EVI2	-0.37	diff_1094_983	0.57	sumNIR	0.65
GNDVI_2	-0.50	PRI	-0.28	t_b_r_975	-0.53	EVI2	-0.61
GNDVI_1	-0.50	NRI	-0.28	diff_860_1240	-0.41	NDRE	0.60
GM	-0.49	DWSI	0.21	diff_860_1640	-0.41	GNDVI_2	0.583