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Data Article

From vine to wine: Data on $^{87}Sr/^{86}Sr$ from rocks and soils as a geologic and pedologic characterisation of vineyards

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ABSTRACT

This data article describes the soils characterisation, bedrock geochemical composition and descriptive statistics of $^{87}Sr/^{86}Sr$ in wines, grape saps, labile fractions of soils (bio-available), whole soils, and bedrocks used to explore the Sr isotope conservation from rocks and soils to vine and wine. These data also describe the reproducibility of the isotopic composition of wine over four harvest years (2008–2011) on 11 selected experimental parcels (sampling point). The data reported in this paper are related to the research article (Braschi et al., 2018) [1].

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Specifications Table

Subject area	*Geology, Geochemistry, Pedology*
More specific subject area	*Micro-vinification, geologic traceability, Sr-isotopes, Chianti wine*
Type of data	*Text file and Tables*
How data was acquired	*Field: vineyard surveys (grape, sap, soil and bedrock); laboratory measurements: major and trace elements through inductively coupled plasma mass spectrometry (ICP-MS) on bedrock, isotopic composition through thermal ionisation mass spectrometry (TIMS) on wine, sap, soil and bedrock, soil characterisation through calcimeter method*
Data format	*Analyses*
Experimental factors	*Micro-vinification winemaking technique on grapes*
Experimental features	*Pedologic classification of soils and chemical purification of the Sr*
Data source location	*Castle of Brolio "Barone Ricasoli" winery (Gaiole in Chianti, Siena, Italy)*
Data accessibility	*All data are presented in this article*
Related research article	*Eleonora Braschi, Sara Marchionni, Simone Priori, Martina Casalini, Simone Tommasini, Laura Natarelli, Antonella Buccianti, Pierluigi Bucelli, Edoardo A.C. Costantini, and Sandro Conticelli. (2018) Tracing the $^{87}Sr/^{86}Sr$ from rocks and soils to vine and wine: an experimental study on geologic and pedologic characterisation of vineyards using radiogenic isotope of heavy elements*

Value of the Data

- These data are critical in describing the reproducibility of the isotopic composition of wine over four harvest years (2008–2011).
- The data are important for monitoring the micro-scale $^{87}Sr/^{86}Sr$ variation among wines deriving from single rows, growth on different soil and/or bedrock.
- The data will contribute to better understanding the application of Sr-isotopes as geographic tracer for agricultural products.
- The data show the relationship occurring between the $^{87}Sr/^{86}Sr$ of wines and that derived by the labile fraction of the soil.

1. Data

This dataset is composed by 11 selected vine-plants sites over a period of 4 harvest years (when available), 5 samples of grapevine sap, 11 samples of whole soil, 8 soil-extracted labile fractions (bio-available component) and 12 selected bedrock samples. All the samples were fully characterised using pedologic and geochemical methods. Micro-vinification samples, soils and saps were also treated using descriptive statistical analyses. For a detailed description of the data and full discussion of them see [1].

2. Experimental design, materials, and methods

2.1. Soil description and characterisation

At the site of each sampling point about 3–5 kg of soil were collected for the soil description and characterisation at the CREA laboratories in Florence. Soil texture was determined in the laboratory through the sieve and pipet methods. $CaCO_3$ content was determined measuring volumetrically the CO_2 gas produced (Table 1); [7] by the addition of HCl in a Dietrich-Fruhling calcimeter. The active $CaCO_3$, which is the more active fraction easily dissolving and precipitating was analysed with a solution of CH_3COONH_4. Soil organic carbon content was determined by using the Walkley–Black procedure; pH and electrical conductivity were measured in a 1:2.5 (w w^{-1}) water suspension; cation exchange capacity (CEC) was measured by use of 1 M CH_3COONa solution at pH 7.0; exchangeable bases were extracted with 1 M CH_3COONH_4 solution at pH 7.0 and measured by flame photometry (Na, K, and Ca) and atomic absorption spectrometry (Mg); Fe, Mn, Zn, and Cu were measured in the solution with diethylenetriamine pentaacetic acid (DTPA) at pH 7.3, according to the method of [2].

According to the WRB classification system [3] six soil typologies were recognised (See Table 1). *Torricella soil* is a Skeletic Calcaric Cambisol (Clayic) formed on marly-calcareous flysches (profiles BRO1 and BRO2), very rich in coarse irregular gravel and calcium carbonate (25–27 wt%). The soil is loamy-clayey and it has an organic matter content of 1.4–2.3 vol.% in the Ap horizons.

Leccio1 soil, an Abruptic Eutric Luvisol (Loamic) and *Leccio2 soil*, a Calcaric Cambisol (Arenic), were both situated on marine sands and conglomerates (profiles BRO9 and BRO10 for *Leccio1*, BRO11 and BRO12 for *Leccio2*). *Leccio1* is a rather preserved soil and it is placed on stable surfaces or in impluvia. Sometimes it buries an older soil developed on the Tertiary flysch. It is reddish colored, deep, with sandy-clay loamy texture, and common medium and fine gravels. It has scarce calcium carbonate (0.5–4.5 wt.%) and exchangeable potassium (48–143 mg kg^{-1}). The soil has a good drainage and a medium AWC (120–130 mm m^{-1}). *Leccio2* is the most eroded soil on the marine sands, brownish in colour, poorly structured or loose, loamy sandy textured and with variable gravel content. The drainage is excessive and the AWC is low (90–110 mm m^{-1}). The calcium carbonate is moderate (5–15 wt.%) and the organic matter is low (0.4–1.1 wt.% in the Ap horizon).

Miniera soil, Endogleyic Stagnosol (Eutric, Clayic), is formed on marine clays. The reference profiles (BRO5 and BRO13) were classified as Stagnic Calcaric Cambisol (Clayic) and Cambic Calcisol (Clayic, Stagnic, Ruptic). It is a brownish-grey soil, poorly structured, clayey (about 45–50 wt.% of clay), sometimes with lignite residues and gypsum crystals in the parent material. The calcium carbonate content is very variable and sometimes a calcic horizon occurs. The soil shows many redoxymorphic features, due to scarce internal drainage, and the AWC is moderately high (130–150 mm*m^{-1}).

Nebbiano soil, a Chromic Cambisol (Loamic), is formed on the sandy loamy fluvio-lacustrine deposits with gravels lenses (profiles BRO4 and BRO6). It is another preserved reddish paleosol, deep, moderately structured and with loamy or fine loamy texture. It has a scarce content of calcium carbonate (1–3 wt.%), moderate organic matter (1.2–1.7 wt.% in the Ap), low exchangeable potassium (50–140 mg kg^{-1}). It is well drained and the AWC is moderate (110–125 mm*m^{-1}).

Santa Lucia soil, a Stagnic Calcaric Cambisol (Clayic) is formed on the relatively more recent Plio-Pleistocene fluvio-lacustrine clays (profile BRO8). It is a brown soil, loamy-clay textured, moderately structured, showing sometimes ferric nodules or a petroferric horizon in depth (about 1–1.5 m deep). This soil is usually poorly gravelly, plastic and with a firm consistency when dried. The calcium carbonate is moderate (4–12 wt.%) and the organic matter is scarce (1–1.2 wt.% in the Ap horizon). The soil is somewhat poorly drained and has moderately high AWC (130–150 mm*m^{-1}).

2.2. Bedrock geochemical characterisation

The 12 samples of bedrock were grinded and powdered as usually implies for geologic rock samples.

For these samples major and trace element contents were determined through ICP-MS at the Activation Laboratories Ltd. (Ontario, Canada). Data are reported in Table 2. Figures of data agree with analytical precision.

2.3. *Wine, soil and sap isotopic composition*

The chemical procedure followed to purify the Sr fraction from the organic matrix in wines is the same described in [4], which generally provides the mineralisation of the organic matter through sequential additions of concentrated H_2O_2 and HNO_3. Once the organics are completely turned into inorganic matter, the samples were purified to chemically separate the Sr fraction through chromatographic methods [4]. All the measurements of the $^{87}Sr/^{86}Sr$ ratios were performed through thermal ionisation mass spectrometry (TIMS) using a Thermofinningan Triton TI® at the Radiogenic Isotopes Laboratories at the Università degli Studi di Firenze, using the dynamic mode following the analytical procedure of [5].

Each harvest point is represented by the grape deriving from three different adjacent vine rows, respectively micro-vinificated in controlled laboratory conditions. The micro-vinification procedure was chosen in order to achieve deep control of the boundary condition of the winemaking process.

The data reported in Table 3, thus represent the average values of each measurement (made of 120 cycles) for the three different rows, over the four harvest years.

For the soil samples, both the bulk and the leached (i.e., labile fraction) $^{87}Sr/^{86}Sr$ compositions were analysed (data reported in Table 3). Bulk soil analyses were performed following the chemical procedure of [5] commonly used for rocks digestion, whereas the labile fractions were collected through UNIBEST® exchange resins, designed to reproduce the up-take of the plant roots from the soil following the procedure described in [6].

The grapevine saps were processed using the same chemical procedure of the wines [4], due to their similar organic matrix. Data are reported in Table 3.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2018.03.078.

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Table 1: soil description and soil/bedrock characterization for each harvest point

Harvest point	Local soil name	WRB classification (2014)	Soil texture	Horizon	Depth (cm)	Geologic formation of parent material	Sand (%)	Clay (%)	Carbonates (%)	Grapevine roots (% on total)
BRO1	Torricella	Skeletic Calcaric Cambisol	Clayic	Ap	20	MLL	22	37	26.3	36
				Bw	110		17	42	25.5	64
BRO2	Torricella	Skeletic Calcaric Cambisol	Clayic	Ap	28	MLL	26	39	25.3	37
				Bw	100		30	42	27.5	63
BRO4	Nebbiano	Chromic Cambisol	Loamic	Ap1	35	PLE	48	29	2.3	33
				Ap2	85		48	31	1.6	60
				Bw	130		49	26	1.1	7
BRO5	Miniera	Stagnic Calcaric Cambisol	Clayic	Ap	25	FAA	26	48	2.4	30
				Bwg	68		24	52	1.1	60
				Cg	83		24	44	0.9	10
BRO6	Nebbiano	Chromic Cambisol	Loamic	Ap1	25	PLE	39	36	2.5	19
				Ap2	110		44	33	2.8	56
				Bwg	140		55	27	0.9	25
BRO8	Santa Lucia	Stagnic Calcaric Cambisol	Clayic	Ap	10	PLE	8	60	3.9	45
				Bwg1	80		15	56	4.8	50
				Bwg2	100		20	50	12.4	5
BRO9	Leccio 1	Abruptic Eutric Luvisol	Loamic	Ap	20	PLI	48	29	0.6	31
				Bw	70		n.d.	n.d.	n.d.	59
				2Bt	140	MLL	22	42	0.5	10
BRO10	Leccio 1	Abruptic Eutric Luvisol	Loamic	Ap	60	PLI	46	32	1.1	76
				2Bt	120	MLL	26	39	4.6	24
BRO11	Leccio 2	Calcaric Cambisol	Arenic	Ap	40	PLI	52	20	15.6	41
				Bw	100		60	17	17.3	35
				BC	130		58	17	10.9	24
BRO12	Leccio 2	Calcaric Cambisol	Arenic	Ap	35	PLI	72	10	6.4	25
				Bw	100		70	12	5.5	50
				BC	130		n.d.	n.d.	n.d.	25
BRO13	Miniera	Cambic Calcisol	Clayc, Stagnic, Ruptic	Ap	30	PLI	46	32	17.8	7
				2A	75	FAA	n.d.	n.d.	9.2	38
				2Bkg	110		16	45	36.3	55

Footnotes: local soil names are from [7]; Bedrocks names: MLL= Monte Morello Formation, (Upper Paleocene to Middle Eocene); PLI =: PLIb (Pliocene Poligenic Marine Conglomerate) and PLIs (Pliocene Marine Yellow Sandstone); PLE= Plio-Pleistocene fluviolacustrine deposits; FAA= Blue Shale Formation. Horizons - A: mineral horizon formed at surface, that exhibits accumulation of humified organic matter and/or disturbance of cultivation; B: Sub-surface mineral horizon that exhibit pedogenetic processes; C: Deep horizon little affected by pedogenetic processes and that maintain some features of parent material. The number before the letters indicate a lithological discontinuity of the parent material. Suffix symbols: p-ploughed horizon; w-development of weathering process (colour and structure); g: gleying features, grey mottles due to the iron reduction and leaching after long water stagnation; t: accumulation clay, illuviated from the upper horizons; k: accumulation of carbonates. Legend: n.d. = not determined.

Table 2: Chemical composition of major (wt.%) and trace elements (ppm) of bedrock samples. Sampling localities and geographical coordinates are also reported.

Sample	MLL 1	MLL 2	MLL 3	PLIs	PLIb0	PLIb 1	PLIb 2	PLIb 3	PLIb 4	PLIb 5	PLIb 6	PLIb 7
Lithology	Limestone	Marly-limest	Marl	Sand	Sand	Pebbles	Pebbles	Pebbles	Pebbles	Pebbles	Pebbles	bluish shale
Locality	Le Pecine	Le Pecine	Le Pecine	SP62	La Torricella	La Torricella	La Torricella	La Torricella	La Torricella	La Torricella	La Torricella	La Torricella
Latitude	43°23'05''N	43°23'05''N	43°23'05''N	43°21'29''N	43°22'57''N	43°22'57''N	43°22'57''N	43°22'57''N	43°22'57''N	43°22'57''N	43°22'57''N	43°22'56''N
Longitude	11°25'50''E	11°25'50''E	11°25'50''E	11°25'39''E	11°26'02''E	11°26'02''E	11°26'02''E	11°26'02''E	11°26'02''E	11°26'02''E	11°26'02''E	11°26'05''E
wt%												
SiO_2	26.11	25.43	26.31	51.40	53.37	26.47	5.31	16.65	30.60	55.43	60.70	62.13
Al_2O_3	3.13	3.53	3.34	9.28	7.14	2.36	0.33	1.16	0.91	4.21	2.47	17.72
Fe_2O_3tot	1.45	1.50	1.43	4.08	2.68	3.42	0.71	0.68	1.59	5.47	1.91	2.02
MnO	0.08	0.09	0.08	0.10	0.08	0.27	0.28	0.05	0.08	0.14	0.04	0.01
MgO	2.86	1.80	1.47	1.27	0.71	0.72	0.58	0.61	0.43	1.24	0.48	1.37
CaO	35.35	36.80	35.49	15.85	17.74	35.90	51.63	44.28	37.59	17.05	17.62	2.18
Na_2O	0.11	0.11	0.07	1.24	1.22	0.08	0.03	0.04	0.02	0.39	0.28	0.30
K_2O	0.44	0.48	0.52	1.23	1.11	0.20	0.05	0.10	0.07	0.34	0.23	2.79
TiO_2	0.16	0.18	0.17	0.38	0.26	0.09	0.02	0.05	0.03	0.33	0.24	0.86
P_2O_5	0.23	0.28	0.25	0.10	0.06	0.13	0.05	0.08	0.05	0.06	0.07	0.03
LOI	28.81	30.05	29.89	14.92	15.53	29.07	39.98	35.04	29.02	14.98	14.48	9.22
Total	98.74	100.20	99.02	99.86	99.90	98.71	98.97	98.75	100.40	99.64	98.51	98.63
ppm												
Sc	4	5	5	8	6	3	< 1	2	1	4	3	21
Be	< 1	< 1	< 1	2	1	< 1	< 1	< 1	< 1	< 1	< 1	3
V	51	57	52	72	39	20	7	13	11	29	25	143
Cr	70	70	70	120	70	30	< 20	20	20	50	90	170
Co	5	7	3	8	6	< 1	< 1	< 1	< 1	3	3	4
Ni	30	40	30	50	40	20	< 20	< 20	< 20	20	< 20	40
Cu	50	50	40	10	< 10	10	10	20	10	20	30	60
Zn	40	< 30	40	60	50	< 30	< 30	< 30	< 30	< 30	30	50
Ga	5	5	5	11	8	3	< 1	2	< 1	5	3	25
Ge	< 0.5	< 0.5	0.6	1.1	0.9	0.6	< 0.5	< 0.5	< 0.5	1.2	1	2.8
As	< 5	< 5	< 5	6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Rb	21	24	25	56	44	6	1	4	2	8	9	160
Sr	672	690	627	400	430	716	619	810	810	210	177	95
Y	18.7	20.5	20.3	17.5	19.5	14.7	6.7	9.9	11.3	13.1	12.9	21
Zr	34	38	37	112	87	21	7	14	12	116	85	135
Nb	4.4	4.7	4.9	7.3	4.8	1.6	0.4	1	0.6	4.4	3.3	15.7
Mo	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	4	3
Ag	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
In	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sn	< 1	< 1	< 1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	4
Sb	< 0.2	0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.3	0.2
Cs	1.0	1.2	1.3	2.2	1.4	0.3	< 0.1	0.2	< 0.1	0.3	0.5	10.2
Ba	164	391	177	192	201	249	70	48	94	405	720	510
La	15.7	17.6	17.4	19.8	15.8	9.5	3.9	7.9	7.5	14.6	14.4	43.4
Ce	17.7	19.9	19.5	39.9	28.4	18.2	5.6	10.3	10.0	28.3	25.1	80.3
Pr	3.45	3.70	3.77	4.78	3.65	2.53	0.81	1.69	1.38	3.54	3.60	9.50
Nd	13.30	14.90	14.30	17.30	13.60	10.40	2.89	6.41	5.66	12.80	12.60	32.20
Sm	2.61	3.14	2.78	3.43	2.77	2.62	0.62	1.23	1.20	2.58	2.57	5.88
Eu	0.662	0.733	0.731	0.847	0.664	0.877	0.155	0.321	0.391	0.547	0.535	1.250
Gd	2.85	3.15	3.15	3.54	2.88	2.78	0.75	1.45	1.59	2.44	2.45	4.58
Tb	0.44	0.45	0.49	0.55	0.46	0.42	0.12	0.22	0.24	0.38	0.39	0.73
Dy	2.72	2.84	2.86	3.24	2.72	2.26	0.80	1.34	1.38	2.32	2.22	4.47
Ho	0.54	0.58	0.58	0.59	0.51	0.41	0.16	0.27	0.28	0.42	0.43	0.87
Er	1.58	1.56	1.66	1.70	1.46	1.02	0.47	0.74	0.74	1.26	1.22	2.60
Tm	0.227	0.224	0.231	0.251	0.207	0.133	0.064	0.107	0.105	0.177	0.165	0.391
Yb	1.37	1.44	1.40	1.61	1.28	0.81	0.42	0.64	0.55	1.10	1.06	2.75
Lu	0.209	0.22	0.219	0.252	0.198	0.129	0.068	0.103	0.091	0.179	0.163	0.429
Hf	0.8	0.8	0.8	2.7	2.0	0.4	< 0.1	0.3	0.2	2.6	1.9	3.3
Ta	0.31	0.33	0.32	0.61	0.42	0.11	< 0.01	0.06	0.02	0.40	0.30	1.36
W	0.6	1.4	0.5	1.4	0.8	< 0.5	1.0	< 0.5	< 0.5	0.7	< 0.5	2.8
Tl	0.09	< 0.05	0.08	0.18	0.21	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.73
Pb	< 5	< 5	< 5	9	8	< 5	7	< 5	< 5	< 5	5	20
Bi	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2
Th	2.28	2.43	2.44	5.93	4.75	1.45	0.28	0.96	0.53	4.22	2.76	13.90
U	1.29	1.38	1.39	1.56	1.29	1.23	1.20	1.59	1.16	2.28	0.95	3.50

Table 3: Descriptive statistics calculated on each harvest point (mean, median, s.d., variance, minimum and maximum values, number of counts)

WINES

	BRO1				**BRO2**				**BRO4**				**BRO5**			
	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$
Mean	0.708184	0.708177	0.708285	0.708276	0.708211	0.708203	0.708270	n.d.	0.708465	0.708428	0.708420	0.708542	0.708747	0.708772	0.708754	0.708765
Median	0.708176	0.708180	0.708283	0.708276	0.708213	0.708202	0.708273	n.d.	0.708465	0.708428	0.708431	0.708543	0.708748	0.708774	0.708753	0.708767
Standard Deviation (s.d.)	0.000063	0.000050	0.000053	0.000050	0.000046	0.000043	0.000054	n.d.	0.000051	0.000051	0.000102	0.000040	0.000042	0.000043	0.000042	0.000042
Sample Variance	3.93E-09	2.53E-09	2.77E-09	2.48E-09	2.11E-09	1.87E-09	2.89E-09	n.d.	2.65E-09	2.56E-09	1.04E-08	1.62E-09	1.76E-09	1.85E-09	1.73E-09	1.78E-09
Min	0.708040	0.708044	0.708059	0.708154	0.708092	0.708069	0.708137	n.d.	0.708323	0.708327	0.708083	0.708418	0.708631	0.708631	0.708630	0.708651
Max	0.708358	0.708343	0.708516	0.708421	0.708361	0.708359	0.708392	n.d.	0.708636	0.708562	0.708898	0.708679	0.708901	0.708885	0.708878	0.708872
Counts	360	360	349	360	360	360	360	n.d.	360	342	357	343	360	360	360	360

	BRO6				**BRO8**				**BRO9**				**BRO10**			
	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$
Mean	0.708339	0.708443	0.708526	n.d.	0.708556	0.708545	0.708498	n.d.	0.709010	0.709043	0.708889	n.d.	n.d.	0.708652	0.708554	n.d.
Median	0.708337	0.708454	0.708528	n.d.	0.708558	0.708542	0.708500	n.d.	0.709000	0.709062	0.708898	n.d.	n.d.	0.708639	0.708549	n.d.
Standard Deviation (s.d.)	0.000051	0.000075	0.000108	n.d.	0.000052	0.000050	0.000071	n.d.	0.000077	0.000074	0.000061	n.d.	n.d.	0.000076	0.000069	n.d.
Sample Variance	2.55E-09	5.65E-09	1.17E-08	n.d.	2.68E-09	2.48E-09	5.06E-09	n.d.	5.96E-09	5.49E-09	3.67E-09	n.d.	n.d.	5.78E-09	4.82E-09	n.d.
Min	0.708214	0.708246	0.708006	n.d.	0.708405	0.708397	0.708284	n.d.	0.708820	0.708821	0.708693	n.d.	n.d.	0.708467	0.708272	n.d.
Max	0.708482	0.708620	0.708859	n.d.	0.708706	0.708746	0.708665	n.d.	0.709218	0.709193	0.709018	n.d.	n.d.	0.708831	0.708779	n.d.
Counts	360	360	355	n.d.	360	360	360	n.d.	360	360	239	n.d.	n.d.	360	340	n.d.

	BRO11				**BRO12**				da vedere insieme **BRO13**			
	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$	$(^{87}Sr/^{86}Sr)_{2008}$	$(^{87}Sr/^{86}Sr)_{2009}$	$(^{87}Sr/^{86}Sr)_{2010}$	$(^{87}Sr/^{86}Sr)_{2011}$
Mean	0.708355	0.708397	0.708417	0.708425	0.708641	0.708685	0.708725	n.d.	0.708673	0.708647	0.708683	0.708685
Median	0.708356	0.708398	0.708420	0.708426	0.708640	0.708685	0.708725	n.d.	0.708668	0.708647	0.708681	0.708683
Standard Deviation (s.d.)	0.000042	0.000043	0.000051	0.000043	0.000042	0.000050	0.000050	n.d.	0.000063	0.000041	0.000040	0.000042
Sample Variance	1.80E-09	1.89E-09	2.56E-09	1.87E-09	1.74E-09	2.48E-09	2.49E-09	n.d.	3.96E-09	1.70E-09	1.57E-09	1.77E-09
Min	0.708233	0.708277	0.708244	0.708299	0.708512	0.708538	0.708624	n.d.	0.708536	0.708528	0.708578	0.708579
Max	0.708461	0.708563	0.708558	0.708567	0.708752	0.708810	0.708861	n.d.	0.708820	0.708768	0.708776	0.708831
Counts	360	360	360	360	360	360	223	n.d.	240	360	240	360

SOIL

	BRO1		**BRO4**		**BRO5**		**BRO9**		**BRO10**		**BRO11**		**BRO12**		**BRO13**	
	Labile fraction	Whole soil	Labile fraction	Whole soil	Labile fraction	Whole soil	Labile fraction	Whole soil	Labile fraction	Whole soil	Labile fraction	Whole soil	Labile fraction	Whole soil	Labile fraction	totale
Mean	0.708049	0.709368	0.708164	0.712808	0.708761	0.709991	0.709033	0.714973	0.708600	0.713948	0.708321	0.710120	0.708624	0.713433	0.708433	0.711408
Median	0.708049	0.709366	0.708165	0.712823	0.708762	0.709992	0.709037	0.714978	0.708597	0.713992	0.708323	0.710125	0.708631	0.713433	0.708434	0.711408
Standard Deviation (s.d.)	0.000040	0.000105	0.000038	0.000107	0.000042	0.000046	0.000037	0.000044	0.000035	0.000364	0.000040	0.000042	0.000040	0.000045	0.000043	0.000044
Sample Variance	1.57E-09	1.11E-08	1.48E-09	1.14E-08	1.76E-09	2.11E-09	1.36E-09	1.93E-09	1.23E-09	1.32E-07	1.63E-09	1.78E-09	1.60E-09	2.00E-09	1.88E-09	1.92E-09
Min	0.707956	0.708913	0.708061	0.712388	0.708654	0.709888	0.708934	0.714860	0.708516	0.711481	0.708211	0.710026	0.708538	0.713291	0.708322	0.711247
Max	0.708168	0.709665	0.708244	0.713031	0.708855	0.710105	0.709140	0.715081	0.708673	0.714443	0.708441	0.710208	0.708709	0.713542	0.708555	0.711525
Counts	120	120	120	80	120	120	120	120	120	60	119	120	120	120	120	120

SAP

	BRO1	**BRO8**	**BRO9**	**BRO11**	**BRO13**
Mean	0.708308	0.708583	0.708554	0.708401	0.708560
Median	0.708307	0.708583	0.708555	0.708401	0.708557
Standard Deviation (s.d.)	0.000038	0.000036	0.000041	0.000040	0.000043
Sample Variance	1.44E-09	1.32E-09	1.69E-09	1.59E-09	1.82E-09
Min	0.708208	0.708498	0.708465	0.708319	0.708463
Max	0.708408	0.708666	0.708667	0.708504	0.708696
Counts	120	120	120	120	120

Footnotes: $(^{87}Sr/^{86}Sr)_y$ is the annual isotope value obtained by the mean of 3 micro-vinification of the same sapling point from the 3 representative vine plant/vine row. Legend: sd = standard deviation at 68% confidence level obtained on the total measured Sr isotopes values of the 3 samples; n.d. = not determined. Counts refer to the number of measurements (set of cycles). See text for details.