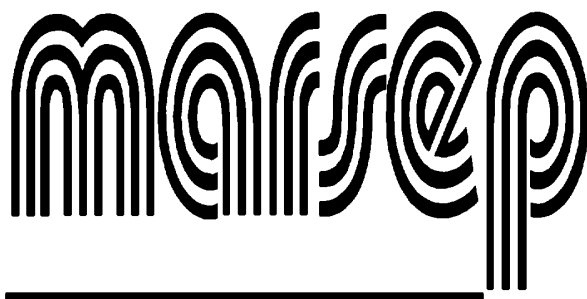




**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 279

General Information

In this report an overview is given of analytical data for this sample collected in our proficiency testing program. The consensus values are calculated using a robust statistical model. With this NDA model, the mean and standard deviation are calculated using all reported data when at least 4 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into two sections: Consensus Values and Indicative Values. The division is made on the reliability of the data. Consensus Values are based on at least 8 results and a maximum relative uncertainty of 6.25%. Indicative Values are based on a maximum relative uncertainty of 35% and a minimum of 4 and maximum of 7 results, or a relative uncertainty greater than 6.25% when there are at least 8 results.

For each determinand the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation), the uncertainty of the mean (consensus or indicative) value and the relative uncertainty.

All values, expressed on a weight basis (kg or %), are reported as oven-dried (105°C) material. Moisture is reported in the material as received.

Sample information

WEPAL reference materials are from natural sources only. There is no spiking, mixing or other alterations of the samples. For sample preparation, the MARSEP samples are dried at 40°C and milled to pass a 0.5 mm sieve.

This MARSEP sample 279 of Compost, from Switzerland, is prepared for the WEPAL proficiency programs. The sample has been used in 9 periods (or rounds). Only results from the last 5 periods are used. This way, the consensus values reflect the latest 'state of the art' analytical techniques used by the laboratories. The results on which the values in this report are based were taken from the periods given in the following table:

Year	Round	Number
2024	3	1
2023	4	4
2023	3	3
2023	2	1
2023	1	2

Consensus Values MARSEP 279

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	8.38	2.60	31.1	61	8.65	2.06	0.416	4.97
As	mg/kg	5.99	0.602	10.1	60	6.03	0.419	0.097	1.62
B	mg/kg	26.7	6.07	22.8	48	27.1	4.49	1.10	4.11
Ba	mg/kg	85.1	14.4	16.9	30	86.6	10.7	3.28	3.86
Be	µg/kg	378	72.0	19.1	20	390	66.2	20.1	5.33
Bi	µg/kg	241	24.2	10.0	8	240	17.5	10.7	4.42
Ca	g/kg	67.5	3.92	5.8	116	67.5	2.35	0.455	0.674
Cd	mg/kg	0.334	0.040	12.1	109	0.338	0.024	0.005	1.45
Co	mg/kg	5.03	0.466	9.3	98	5.00	0.300	0.059	1.17
Cr	mg/kg	75.8	13.3	17.5	115	76.6	8.50	1.55	2.04
Cu	mg/kg	54.3	4.95	9.1	125	54.8	3.20	0.553	1.02
Fe	g/kg	12.2	1.05	8.6	91	12.2	0.764	0.137	1.13
Hg	µg/kg	111	19.4	17.6	102	110	12.6	2.41	2.18
K	g/kg	10.1	1.27	12.6	139	9.99	0.710	0.134	1.33
Mg	g/kg	8.46	0.517	6.1	127	8.45	0.320	0.057	0.678
Mn	mg/kg	457	32.8	7.2	94	456	20.0	4.23	0.927
Mo	mg/kg	5.22	0.522	10.0	92	5.25	0.350	0.068	1.30
Na	g/kg	0.324	0.102	31.4	73	0.330	0.070	0.015	4.60
Ni	mg/kg	31.8	3.09	9.7	115	31.6	2.15	0.360	1.13
N	g/kg	13.1	0.630	4.8	127	13.0	0.371	0.070	0.534
P	g/kg	2.27	0.149	6.6	137	2.28	0.090	0.016	0.700
Pb	mg/kg	33.7	3.35	9.9	115	34.2	2.15	0.390	1.16
S - SO ₄ (as S)	mg/kg	1533	131	8.5	8	1491	67.7	57.8	3.77
Sn	mg/kg	3.63	0.752	20.7	22	3.68	0.459	0.200	5.52
Sr	mg/kg	150	13.8	9.2	20	150	9.70	3.86	2.57
V	mg/kg	20.0	4.29	21.4	37	20.5	3.62	0.882	4.41
Zn	mg/kg	133	11.5	8.6	126	133	7.24	1.28	0.958
S	mg/kg	1741	222	12.7	57	1755	124	36.7	2.11
TC =totalC (org+inorg)	g/kg	213	7.95	3.7	48	214	5.05	1.43	0.673
U	mg/kg	0.645	0.108	16.7	16	0.670	0.074	0.034	5.23
TOC =total org.C	g/kg	201	15.8	7.9	15	201	7.89	5.11	2.54
OC = org.C	g/kg	207	17.7	8.6	9	208	11.8	7.39	3.57

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	47.0	5.27	11.2	22	46.1	3.15	1.40	2.98
loss-on-ignition	%	36.0	0.841	2.3	102	36.1	0.550	0.104	0.289

Consensus Values MARSEP 279

Method: Other determinations									(cont.)
Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
residue-on-ignition	%	64.3	1.14	1.8	16	64.0	0.550	0.355	0.552
dry weight	%	94.8	0.588	0.6	68	94.8	0.465	0.089	0.094

Indicative Values MARSEP 279

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ag	µg/kg	215	45.3	21.1	14	212	20.5	15.1	7.05
Ga	µg/kg	2511	394	15.7	4	2605	210	246	9.81
Li	mg/kg	11.6	2.95	25.6	13	11.3	2.56	1.02	8.86
N - NH4 (as N)	mg/kg	21.0	6.52	31.1	4	21.1	4.68	4.08	19.4
Sb	µg/kg	931	219	23.5	22	977	129	58.4	6.27
Se	µg/kg	350	300	85.6	23	429	217	78.1	22.3
Si	g/kg	135	27.9	20.8	4	127	14.7	17.5	13.0
Ti	mg/kg	223	172	77.2	12	256	131	62.0	27.8
Tl	µg/kg	105	69.7	66.6	14	137	53.5	23.3	22.3