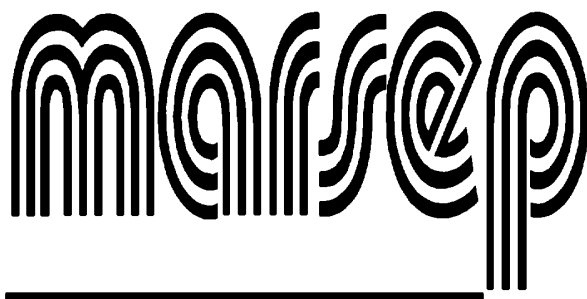




**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 278

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 278 of Compost, from Switzerland, is prepared for the WEPAL proficiency programs. The sample has been used in 7 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
2022	4	4
2020	3	3
2017	4	2
2017	3	4
2017	2	1

Consensus Values MARSEP 278

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ag	µg/kg	191	19.2	10.0	8	190	9.82	8.47	4.44
Al	g/kg	9.17	2.91	31.7	48	9.59	1.89	0.525	5.72
As	mg/kg	6.42	0.531	8.3	48	6.44	0.270	0.096	1.49
B	mg/kg	30.1	6.64	22.1	37	31.1	4.35	1.36	4.54
Ba	mg/kg	96.9	12.4	12.8	24	98.8	8.71	3.17	3.27
Be	µg/kg	445	54.0	12.1	17	446	31.9	16.4	3.68
Ca	g/kg	67.8	3.81	5.6	116	67.9	2.40	0.442	0.652
Cd	mg/kg	0.394	0.041	10.5	113	0.400	0.029	0.005	1.23
Co	mg/kg	5.30	0.428	8.1	97	5.30	0.240	0.054	1.02
Cr	mg/kg	66.2	11.5	17.3	115	65.5	6.48	1.34	2.02
Cu	mg/kg	47.8	3.49	7.3	126	48.1	2.10	0.388	0.811
Fe	g/kg	13.4	1.06	7.9	83	13.3	0.692	0.145	1.08
Hg	µg/kg	186	18.6	10.0	89	185	11.6	2.47	1.33
K	g/kg	7.35	1.31	17.9	127	7.40	0.842	0.146	1.98
Mg	g/kg	8.07	0.547	6.8	118	8.09	0.355	0.063	0.780
Mn	mg/kg	464	24.7	5.3	78	465	13.4	3.49	0.752
Mo	mg/kg	3.97	0.468	11.8	92	3.91	0.275	0.061	1.54
Na	g/kg	0.288	0.074	25.7	55	0.290	0.045	0.012	4.33
Ni	mg/kg	33.3	2.88	8.7	113	33.0	1.70	0.339	1.02
N	g/kg	11.4	0.515	4.5	114	11.4	0.301	0.060	0.532
P	g/kg	1.99	0.143	7.2	128	2.00	0.090	0.016	0.792
Pb	mg/kg	45.0	3.50	7.8	115	45.2	2.10	0.408	0.907
Sb	µg/kg	915	172	18.8	16	915	110	53.8	5.88
Sr	mg/kg	146	14.2	9.8	13	142	9.10	4.93	3.38
Zn	mg/kg	150	8.64	5.7	126	150	5.39	0.962	0.639
S	mg/kg	1503	132	8.8	36	1528	80.9	27.5	1.83
TC =totalC (org+inorg)	g/kg	181	10.8	6.0	22	182	6.00	2.89	1.60

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	39.7	5.35	13.5	29	40.5	2.70	1.24	3.13
loss-on-ignition	%	30.8	1.06	3.5	102	30.8	0.800	0.132	0.428
dry weight	%	94.2	0.585	0.6	17	94.3	0.410	0.177	0.188

Indicative Values MARSEP 278

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Bi	µg/kg	256	18.8	7.4	5	258	11.0	10.5	4.12
Ga	µg/kg	3342	113	3.4	4	3376	60.0	70.5	2.11
Li	mg/kg	12.9	2.47	19.2	9	12.6	1.30	1.03	7.99
S - SO4 (as S)	mg/kg	1451	73.3	5.1	7	1432	38.4	34.6	2.39
Se	µg/kg	310	79.8	25.8	15	331	52.8	25.8	8.32
Sn	mg/kg	4.20	1.10	26.2	17	4.17	0.590	0.333	7.95
Ti	mg/kg	239	111	46.6	8	228	60.5	49.2	20.6
V	mg/kg	20.2	5.80	28.6	29	21.1	4.40	1.35	6.64
Tl	µg/kg	98.5	18.9	19.2	6	104	10.7	9.65	9.80

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
residu-on-ignition	%	68.3	5.26	7.7	5	68.5	1.80	2.94	4.30