WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 280

WAGENINGEN
UNIVERSITY & RESEARCH

marsep

Certificate of Analysis MARSEP 280

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 mean and standard deviation are calculated using all reported data when at least 8 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into three sections: Consensus Values, Indicative Values and Values for Information. The division is made on the reliability of the data. Consensus Values are based on at least 16 results while the coefficient of variation is smaller than 25 %. Indicative Values are based on at least 8 and less than 16 results or a coefficient of variation between 25 % and 50 %. Other values, based on more than 2 and less than 8 results or a coefficient of variation higher than 50 %, are given for information only.

In the sections with Consensus Values and Indicative Values the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median and MAD (Median of Absolute Deviation) and the uncertainty in the consensus values. The confidence limits (at 95 % probability) are calculated for these determinands.
In the section with Information Values the following parameters are given: median, MAD and number of results. For determinands which have at least 5 results reported as smaller than (<) the median of these 'smaller than results' is calculated. In some cases this median of '<' values is much smaller than median and mean of the indicative values. This may be caused by a too optimistic (too low) value for the detection limit reported by a (small) majority of participating laboratories who report '<'-values.

All values, expressed on a weight basis (kg or %), are reported in oven dry (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 280 of Champost from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 4 periods (or rounds). The results on which the values in this report are based were taken from the periods given in the following table.

Year	Round	Number
2021	4	4
2019	3	3
2017	1	2
2014	1	1

Consensus Values MARSEP 280

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
B	mg/kg	15.8	3.18	20.1	37	15.9	2.20	0.65	14.8 - 16.9
Ba	mg/kg	62.7	5.58	8.9	25	63.3	3.80	1.40	60.4 - 65.0
TC =totalC (org+inorg)	g/kg	300	18.5	6.2	22	300	12.0	4.9	292 - 309
Ca	g/kg	56.6	2.77	4.9	105	56.5	1.94	0.34	56.1 - 57.2
Cd	mg/kg	0.314	0.0331	10.5	98	0.313	0.0235	0.0042	0.308 - 0.321
Co	mg/kg	1.15	0.173	15.0	88	1.17	0.120	0.023	1.12 - 1.19
Cr	mg/kg	9.73	1.615	16.6	108	9.81	1.100	0.194	9.42 - 10.04
Cu	mg/kg	25.6	2.18	8.5	116	25.7	1.48	0.25	25.2 - 26.0
Fe	g/kg	2.66	0.272	10.2	77	2.70	0.190	0.039	2.59 - 2.72
Hg	µg/kg	48.4	6.88	14.2	74	49.0	5.00	1.00	46.8 - 50.0
K	g/kg	21.7	1.54	7.1	116	21.6	1.05	0.18	21.43 - 22.00
Mg	g/kg	4.16	0.240	5.8	109	4.15	0.164	0.029	4.11 - 4.20
Mn	mg/kg	242	18.4	7.6	68	242	13.0	2.8	237 - 246
Mo	mg/kg	2.56	0.213	8.3	86	2.56	0.142	0.029	2.52 - 2.61
N	g/kg	19.2	0.61	3.2	109	19.2	0.40	0.07	19.07 - 19.30
Na	g/kg	2.43	0.188	7.7	52	2.42	0.130	0.033	2.38 - 2.48
Ni	mg/kg	4.10	0.450	11.0	102	4.16	0.311	0.056	4.01 - 4.19
P	g/kg	4.87	0.284	5.8	119	4.88	0.190	0.033	4.82 - 4.92
Pb	mg/kg	5.73	0.725	12.6	99	5.80	0.500	0.091	5.59 - 5.87
S	mg/kg	21800	2470	11.4	40	21900	1810	490	20980 - 22560
V	mg/kg	5.55	0.837	15.1	30	5.69	0.560	0.191	5.24 - 5.86
Zn	mg/kg	125	8.8	7.1	115	124	6.0	1.0	122.9 - 126.2

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
AOX	mg/kg	581	35.4	6.1	23	580	24.0	9.2	565 - 596
loss-on-ignition	%	57.3	1.05	1.8	93	57.4	0.74	0.14	57.11 - 57.54

Indicative Values MARSEP 280

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	g/kg	1.73	0.469	27.1	44	1.78	0.320	0.088	1.59 - 1.87
As	mg/kg	1.63	0.497	30.5	41	1.65	0.340	0.097	1.47 - 1.79
Be	µg/kg	97.3	9.36	9.6	12	98.5	6.50	3.38	91.5 - 103
Li	mg/kg	2.23	0.311	13.9	8	2.26	0.215	0.137	1.97 - 2.48
Sb	µg/kg	189	58.8	31.0	18	208	41.7	17.3	160 - 218
Se	µg/kg	386	145.1	37.6	19	418	104.0	41.6	316 - 456
Sn	mg/kg	0.407	0.0731	18.0	11	0.410	0.0480	0.0276	0.358 - 0.455
Sr	mg/kg	230	12.0	5.2	11	232	9.0	4.5	222 - 238

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
dry weight	%	92.0	0.56	0.6	14	92.1	0.39	0.19	91.71 - 92.34

Informative Values MARSEP 280

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
Ag	µg/kg	18.6	2.86	5	750.0	6
S - SO4 (as S)	mg/kg	22400	1490	5		
Ti	mg/kg	54.6	19.40	7		
Tl	µg/kg	34.4	3.80	6	100.0	9

Method: Other determinations

Element	Unit	Median	MAD	N
residu-on-ignition	%	43.3	0.90	5