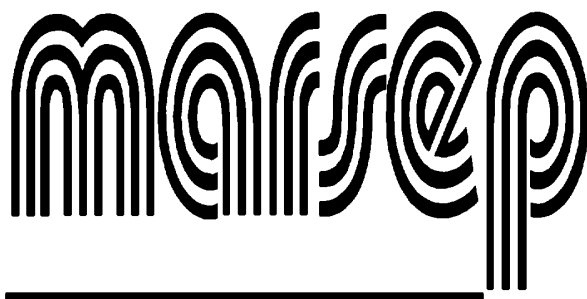




**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 237

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.

Please note: Most WEPAL-QUASIMEME reference materials are found to be stable over the long term (>10 years) for most determinand/matrix combinations. There are a few exceptions known to us as being less stable over the long term. These are organotins in sediment (MS6), ASP in shellfish (BT7), some PAHs and PCBs in sediment (SETOC) and N-NH₄ (as N) in clay soils (ISE).

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 237 of Organic Fertilizer, from Belgium, is prepared for the WEPAL proficiency programs. The sample has been used in 13 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. It also gives a better estimate of the concentrations of non-stable or volatile determinands. The results on which the values in this report are based were taken from the periods given in the following table:

Year	Round	Number
2026	1	3
2025	1	2
2020	4	3
2018	2	2
2015	3	2

Consensus Values MARSEP 237

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	1.06	0.171	16.2	57	1.05	0.100	0.028	2.68
As	mg/kg	1.23	0.201	16.3	43	1.25	0.144	0.038	3.11
B	mg/kg	12.2	3.44	28.3	37	12.0	2.20	0.706	5.81
Ba	mg/kg	18.4	2.99	16.3	31	18.0	1.70	0.670	3.65
Be	µg/kg	82.9	9.50	11.5	14	82.2	6.70	3.17	3.83
Ca	g/kg	28.9	1.27	4.4	119	29.0	0.800	0.145	0.503
Cd	mg/kg	0.100	0.030	29.4	84	0.104	0.017	0.004	4.01
Co	mg/kg	2.17	0.250	11.5	99	2.17	0.136	0.031	1.44
Cr	mg/kg	6.83	0.872	12.8	114	6.78	0.525	0.102	1.49
Cu	mg/kg	20.1	2.02	10.1	129	20.0	1.30	0.223	1.11
Fe	g/kg	2.00	0.174	8.7	91	2.02	0.110	0.023	1.14
K	g/kg	102	8.46	8.3	135	101	5.20	0.910	0.895
Mg	g/kg	24.6	1.37	5.6	127	24.6	0.900	0.152	0.617
Mn	mg/kg	139	11.5	8.2	82	140	8.00	1.58	1.14
Mo	mg/kg	0.701	0.132	18.9	82	0.721	0.079	0.018	2.61
Na	g/kg	12.9	1.04	8.1	67	13.0	0.761	0.159	1.23
Ni	mg/kg	5.45	0.649	11.9	110	5.43	0.415	0.077	1.42
N	g/kg	84.4	6.11	7.2	131	83.9	4.19	0.668	0.791
P	g/kg	30.9	1.68	5.4	141	30.9	1.00	0.176	0.571
Pb	mg/kg	1.43	0.265	18.6	91	1.44	0.151	0.035	2.43
Sb	µg/kg	121	24.6	20.4	17	119	17.6	7.45	6.17
Sr	mg/kg	62.0	6.68	10.8	20	61.4	5.45	1.87	3.01
V	mg/kg	18.6	1.76	9.4	44	18.5	1.11	0.331	1.78
Zn	mg/kg	65.7	4.24	6.5	129	65.9	2.60	0.467	0.710
S	mg/kg	53254	5492	10.3	49	53500	3100	981	1.84
TC =totalC (org+inorg)	g/kg	233	9.94	4.3	38	234	7.40	2.01	0.863
TOC =total org.C	g/kg	236	9.99	4.2	8	237	6.52	4.42	1.87

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	24.7	4.09	16.6	26	24.9	2.55	1.00	4.06
loss-on-ignition	%	56.5	0.758	1.3	108	56.5	0.483	0.091	0.161
residue-on-ignition	%	43.2	0.686	1.6	14	43.3	0.515	0.229	0.530
dry weight	%	94.2	0.653	0.7	35	94.2	0.500	0.138	0.147

Indicative Values MARSEP 237

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Hg	µg/kg	12.9	5.61	43.3	68	13.0	3.61	0.850	6.57
Li	mg/kg	0.933	0.253	27.1	11	0.911	0.199	0.095	10.2
N - NH4 (as N)	mg/kg	20038	2287	11.4	4	19462	1222	1429	7.13
N - NO3 (as N)	mg/kg	10055	2999	29.8	4	10130	1662	1874	18.6
S - SO4 (as S)	mg/kg	52114	2782	5.3	7	52985	1640	1314	2.52
Se	µg/kg	343	134	39.2	18	368	76.6	39.6	11.5
Sn	mg/kg	0.196	0.110	56.0	15	0.195	0.069	0.035	18.1
Ti	mg/kg	147	41.9	28.6	15	145	24.0	13.5	9.22
Tl	µg/kg	21.7	4.10	18.8	5	22.3	2.30	2.29	10.5
U	mg/kg	0.434	0.028	6.4	7	0.428	0.017	0.013	3.00
OC = org.C	g/kg	263	63.1	24.0	7	240	45.8	29.8	11.3