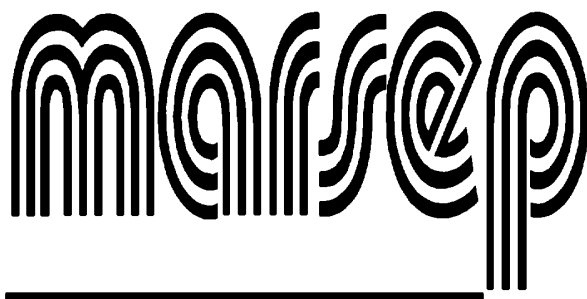




**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 236

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 236 of Organic Fertilizer, from Belgium, is prepared for the WEPAL proficiency programs. The sample has been used in 18 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
2025	4	1
2025	3	4
2025	2	4
2025	1	3
2024	4	1

Consensus Values MARSEP 236

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	0.325	0.116	35.7	52	0.366	0.071	0.020	6.20
As	mg/kg	0.164	0.033	20.4	18	0.164	0.022	0.010	6.01
Ba	mg/kg	10.4	1.25	12.1	25	10.5	0.821	0.313	3.01
Ca	g/kg	50.0	2.86	5.7	108	49.8	1.92	0.344	0.689
Cd	mg/kg	0.050	0.014	27.4	50	0.050	0.008	0.002	4.84
Co	mg/kg	0.140	0.042	30.2	49	0.144	0.019	0.008	5.39
Cr	mg/kg	3.53	0.555	15.7	99	3.54	0.284	0.070	1.98
Cu	mg/kg	39.3	4.33	11.0	112	39.3	2.67	0.512	1.30
Fe	g/kg	0.729	0.088	12.1	85	0.730	0.057	0.012	1.64
K	g/kg	86.6	6.30	7.3	122	86.3	3.70	0.713	0.823
Mg	g/kg	0.593	0.061	10.4	108	0.590	0.037	0.007	1.25
Mn	mg/kg	13.8	1.19	8.6	81	13.9	0.700	0.165	1.19
Mo	mg/kg	0.306	0.058	18.9	59	0.317	0.029	0.009	3.08
Na	g/kg	13.1	0.797	6.1	72	13.2	0.529	0.117	0.899
Ni	mg/kg	1.17	0.280	23.8	87	1.19	0.157	0.037	3.19
N	g/kg	87.3	2.90	3.3	117	87.1	1.90	0.336	0.384
P	g/kg	33.9	2.07	6.1	128	34.0	1.34	0.229	0.676
Pb	mg/kg	1.52	0.349	23.0	82	1.56	0.193	0.048	3.17
Se	µg/kg	446	60.4	13.5	21	446	58.0	16.5	3.70
Sr	mg/kg	49.1	7.11	14.5	15	48.0	6.00	2.30	4.68
V	mg/kg	0.983	0.228	23.2	28	1.06	0.167	0.054	5.49
Zn	mg/kg	106	7.84	7.4	114	107	5.12	0.917	0.862
S	mg/kg	54916	6245	11.4	60	54993	3276	1008	1.84
TC =totalC (org+inorg)	g/kg	293	8.89	3.0	41	292	7.00	1.73	0.592
U	mg/kg	0.114	0.012	10.5	8	0.113	0.009	0.005	4.63
TOC =total org.C	g/kg	291	12.3	4.2	9	295	5.61	5.12	1.76

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
loss-on-ignition	%	61.0	1.10	1.8	90	60.9	0.760	0.145	0.237
residue-on-ignition	%	38.1	1.11	2.9	19	38.2	0.730	0.317	0.833
dry weight	%	94.8	0.617	0.7	64	94.8	0.440	0.096	0.102

Indicative Values MARSEP 236

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	3.02	1.47	48.6	30	3.04	0.905	0.335	11.1
Hg	µg/kg	12.3	5.01	40.9	57	12.2	2.80	0.830	6.77
Li	mg/kg	0.767	0.207	27.0	8	0.756	0.120	0.092	12.0
N - NH4 (as N)	mg/kg	4900	1395	28.5	7	4937	879	659	13.4
S - SO4 (as S)	mg/kg	53624	3831	7.1	6	54028	2563	1955	3.65
Sb	µg/kg	58.6	29.1	49.6	7	129	6.90	13.7	23.4
Sn	mg/kg	0.191	0.116	60.5	9	0.193	0.067	0.048	25.2
Ti	mg/kg	21.1	12.0	56.7	8	21.5	8.34	5.29	25.1
OC = org.C	g/kg	321	60.4	18.8	12	349	45.1	21.8	6.79

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	25.3	5.12	20.2	11	24.8	2.50	1.93	7.62