



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 213



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 IPE samples are dried at 70°C and milled to pass a 0.5 mm sieve.

This IPE sample 213 of Milk Thistle Seed / *Silybum marianum*, from Bulgaria, is prepared for the WEPAL proficiency programs. The sample has been used in 1 period (or round). The results on which the values in this report are based were taken from the period given in the following table:

Year	Round	Number
2013	4	3



Consensus Values IPE 213

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	16.5	2.18	13.2	66	16.8	1.29	0.335	2.03
Cu	mg/kg	16.4	1.60	9.8	91	16.3	0.980	0.210	1.28
Fe	mg/kg	85.2	10.1	11.9	89	85.9	6.10	1.34	1.58
Mn	mg/kg	28.9	2.75	9.5	90	29.1	1.83	0.362	1.25
Zn	mg/kg	55.2	4.48	8.1	90	55.0	2.77	0.590	1.07
Cd	µg/kg	381	40.5	10.7	28	380	25.7	9.58	2.52
Co	µg/kg	70.9	14.2	20.0	24	70.4	9.50	3.62	5.11
Mo	µg/kg	985	116	11.8	30	989	81.5	26.5	2.69
Ni	µg/kg	1096	107	9.7	21	1090	72.2	29.1	2.65
Ba	mg/kg	5.16	0.656	12.7	10	5.14	0.407	0.259	5.02
Sr	mg/kg	12.9	1.46	11.3	11	12.6	0.696	0.549	4.25
Ca	g/kg	9.56	0.772	8.1	95	9.53	0.480	0.099	1.04
K	g/kg	6.01	0.455	7.6	96	6.02	0.265	0.058	0.966
Mg	g/kg	3.93	0.296	7.5	96	3.91	0.181	0.038	0.961
N - Kjeldahl (as N)	g/kg	27.7	1.65	5.9	61	27.6	1.00	0.263	0.951
P (as P)	g/kg	6.77	0.632	9.3	99	6.71	0.370	0.079	1.17
S (as S)	g/kg	1.76	0.202	11.5	59	1.75	0.100	0.033	1.87

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	552	16.0	2.9	26	552	7.01	3.93	0.712
N - elementary	g/kg	28.2	1.39	4.9	44	28.2	0.950	0.261	0.925

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Total ash	g/kg	49.8	3.30	6.6	10	50.2	2.01	1.30	2.62



Indicative Values IPE 213

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	µg/kg	18.3	18.8	102.9	13	18.6	10.3	6.53	35.7
Cr	µg/kg	183	163	88.9	16	181	77.9	50.9	27.8
Pb	µg/kg	14.6	14.5	99.1	14	19.1	9.62	4.84	33.1
Se	µg/kg	40.0	20.2	50.4	14	46.9	12.9	6.73	16.8
V	µg/kg	17.5	5.55	31.6	7	18.8	1.82	2.62	14.9
Rb	µg/kg	2689	413	15.4	4	2694	295	258	9.60
Cl (as Cl)	g/kg	0.367	0.208	56.6	19	0.375	0.125	0.060	16.2
N - NH4 (as N)	mg/kg	134	28.9	21.5	4	134	18.3	18.1	13.5
Na	mg/kg	29.8	13.8	46.3	43	31.0	7.40	2.63	8.82

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	12.5	5.73	46.0	11	12.1	3.20	2.16	17.3

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	8.25	3.91	47.4	17	8.50	2.60	1.18	14.4

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	402	41.3	10.3	6	405	20.6	21.1	5.23