WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 219

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 219

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

This IPE sample 219 of Sorghum / Sorghum bicolor L. from Austria is prepared for the WEPAL proficiency programs. The sample is 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
2014	2	2

Consensus Values IPE 219

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
As	µg/kg	42.9	9.50	22.1	18	46.0	7.28	2.80	38.2 - 47.6
B	mg/kg	2.92	0.715	24.4	70	3.00	0.492	0.107	2.75 - 3.09
Ca	g/kg	2.81	0.179	6.4	110	2.80	0.124	0.021	2.77 - 2.84
Cd	µg/kg	55.3	7.23	13.1	28	55.3	4.75	1.71	52.5 - 58.1
Cl (as Cl)	g/kg	2.05	0.164	8.0	20	2.04	0.115	0.046	1.97 - 2.13
Co	µg/kg	37.1	8.34	22.5	18	37.9	6.15	2.46	33.0 - 41.2
Cr	µg/kg	306	60.5	19.8	20	306	41.8	16.9	277 - 334
Cu	mg/kg	2.30	0.442	19.2	102	2.37	0.314	0.055	2.21 - 2.39
Fe	mg/kg	104	11.7	11.2	102	105	8.2	1.4	102.2 - 106.8
K	g/kg	9.48	0.572	6.0	113	9.50	0.390	0.067	9.37 - 9.59
Mg	g/kg	1.03	0.081	7.8	113	1.03	0.056	0.009	1.02 - 1.05
Mn	mg/kg	19.2	2.10	10.9	103	19.1	1.45	0.26	18.8 - 19.6
Mo	µg/kg	216	34.3	15.9	26	218	25.0	8.4	202 - 230
N - Kjeldahl (as N)	g/kg	4.94	0.360	7.3	68	4.95	0.250	0.054	4.86 - 5.03
P (as P)	g/kg	1.24	0.071	5.8	114	1.24	0.050	0.008	1.23 - 1.25
Pb	µg/kg	153	23.1	15.1	22	161	17.9	6.2	143 - 163
S (as S)	g/kg	0.678	0.0570	8.4	64	0.680	0.0400	0.0089	0.664 - 0.693
Zn	mg/kg	12.3	1.17	9.5	103	12.5	0.80	0.14	12.05 - 12.50

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
C - elementary	g/kg	448	11.4	2.5	45	445	8.0	2.1	444.6 - 451.4
N - elementary	g/kg	5.24	0.412	7.9	61	5.28	0.280	0.066	5.14 - 5.35

Indicative Values IPE 219

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Ba	mg/kg	4.15	0.413	10.0	10	4.10	0.283	0.163	3.86 - 4.44
Hg	µg/kg	1.99	0.413	20.8	9	2.11	0.330	0.172	1.68 - 2.30
N - NO3 (as N)	mg/kg	22.5	4.97	22.1	9	24.1	3.60	2.07	18.7 - 26.2
Ni	µg/kg	251	80.1	31.9	17	262	58.2	24.3	211 - 292
Se	µg/kg	30.3	10.81	35.6	9	32.2	8.02	4.50	22.2 - 38.5
Sr	mg/kg	9.01	0.875	9.7	12	9.06	0.615	0.316	8.46 - 9.56
Ti	mg/kg	1.19	0.528	44.2	9	1.26	0.386	0.220	0.795 - 1.59
V	µg/kg	101	17.2	17.1	11	101	12.0	6.5	89.3 - 112

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	62.3	27.91	44.8	8	67.6	18.37	12.34	39.5 - 85.0

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	46.3	17.48	37.8	25	50.5	12.09	4.37	39.1 - 53.5

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
delta 13C	‰ V-PDB	-12.0	0.35	2.9	12	-12.0	0.25	0.12	-12.18 - -11.75
delta 15N	‰ Air	1040	18	1.7	13	1030	12	6	1025 - 1047

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Total ash	g/kg	42.1	1.71	4.1	11	41.7	1.20	0.64	41.0 - 43.3

Informative Values IPE 219

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
Be	µg/kg	1.96	0.055	3	20.00	5
Li	µg/kg	71.8	48.10	6		
N - NH4 (as N)	mg/kg	59.3	33.00	4		
Na	mg/kg	17.7	12.50	48	100.0	15
Rb	µg/kg	1640	25	3		
Sb	µg/kg	9.41	1.187	7		
Sn	µg/kg	32.8	7.26	4		
SO4 (as SO4)	g/kg	0.500	0.1800	5		

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	7970	899	3

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	1490	783	6

Method: Nutritional values

Element	Unit	Median	MAD	N
ADF-ash-free	g/kg	316	6.0	3
Crude fibre	g/kg	296	11.7	4
NDF-ash-free	g/kg	556	5.2	3
Total fat	g/kg	6.99	2.290	3