WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 206

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 206

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 ºC and milled to pass a 0.5 mm sieve.

This IPE sample 206 of Sorghem (plant) / Sorgum bicolor from Austria is prepared for the WEPAL proficiency programs. The sample is used in 2 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
2015	3	3
2011	2	3

Consensus Values IPE 206

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
As	µg/kg	64.9	12.40	19.1	39	65.2	8.60	2.48	60.9 - 68.9
Ba	mg/kg	4.78	0.410	8.6	28	4.83	0.286	0.097	4.62 - 4.94
Ca	g/kg	3.00	0.249	8.3	225	3.01	0.174	0.021	2.97 - 3.03
Cd	µg/kg	53.7	7.96	14.8	61	54.4	5.58	1.27	51.6 - 55.7
Cl (as Cl)	g/kg	2.23	0.219	9.8	47	2.26	0.160	0.040	2.16 - 2.29
Co	µg/kg	67.1	12.00	17.9	51	67.0	8.70	2.10	63.7 - 70.5
Cr	µg/kg	809	160.8	19.9	50	811	107.5	28.4	764 - 855
Cu	mg/kg	2.35	0.406	17.3	206	2.38	0.285	0.035	2.29 - 2.40
Fe	mg/kg	162	15.9	9.8	208	162	11.0	1.4	160.2 - 164.5
K	g/kg	9.60	0.703	7.3	230	9.59	0.485	0.058	9.50 - 9.69
Mg	g/kg	1.05	0.073	7.0	230	1.05	0.050	0.006	1.04 - 1.06
Mn	mg/kg	21.0	1.69	8.1	215	21.0	1.15	0.14	20.73 - 21.18
Mo	µg/kg	216	32.2	14.9	55	218	22.2	5.4	207 - 224
N - Kjeldahl (as N)	g/kg	5.28	0.446	8.4	149	5.29	0.314	0.046	5.21 - 5.35
P (as P)	g/kg	1.22	0.087	7.1	231	1.23	0.060	0.007	1.21 - 1.23
Pb	µg/kg	224	54.2	24.2	55	237	39.0	9.1	209 - 239
S (as S)	g/kg	0.650	0.0609	9.4	137	0.653	0.0430	0.0065	0.640 - 0.661
Se	µg/kg	27.2	5.60	20.6	25	28.0	4.10	1.40	24.9 - 29.5
Sr	mg/kg	9.21	0.653	7.1	27	9.26	0.420	0.157	8.95 - 9.47
Zn	mg/kg	12.5	1.43	11.4	208	12.5	1.00	0.12	12.28 - 12.67

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
C - elementary	g/kg	450	10.8	2.4	74	450	7.4	1.6	447.3 - 452.3
N - elementary	g/kg	5.70	0.530	9.3	112	5.70	0.355	0.063	5.61 - 5.80

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
delta 13C	‰ V-PDB	-12.0	0.27	2.2	17	-11.9	0.18	0.08	-12.10 - -11.83
delta 15N	‰ Air	1080	43	3.9	19	1080	30	12	1060 - 1101

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Total ash	g/kg	43.4	2.27	5.2	28	43.8	1.55	0.54	42.6 - 44.3

Indicative Values IPE 206

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
B	mg/kg	2.83	0.865	30.5	153	2.94	0.600	0.087	2.70 - 2.97
Hg	µg/kg	2.28	1.090	47.9	20	2.70	0.845	0.305	1.77 - 2.79
Li	µg/kg	98.9	26.14	26.4	11	97.9	18.29	9.85	81.6 - 116
Ni	µg/kg	367	115.5	31.4	42	368	77.8	22.3	331 - 403
Rb	µg/kg	1530	112	7.3	8	1550	75	49	1436 - 1618
V	µg/kg	147	68.5	46.5	22	146	48.4	18.3	117 - 178

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	123	50.3	40.8	32	119	36.7	11.1	105 - 141

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	90.8	22.86	25.2	47	89.9	15.92	4.17	84.1 - 97.5

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
ADF-ash-free	g/kg	306	31.6	10.3	9	307	22.9	13.2	282 - 330
Crude fibre	g/kg	275	17.4	6.3	13	277	11.6	6.0	265 - 285
NDF-ash-free	g/kg	529	29.3	5.5	9	529	21.5	12.2	507 - 551
Total fat	g/kg	8.96	3.693	41.2	8	9.40	2.405	1.632	5.95 - 12.0

Informative Values IPE 206

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
Be	µg/kg	3.77	0.555	6	50.00	9
Bi	µg/kg	-	-	0	52.0	5
Cs	µg/kg	16.1	1.25	4		
Ga	µg/kg	74.0	29.52	3		
I	µg/kg	90.8	23.25	6		
N - NH4 (as N)	mg/kg	140	78.0	5		
N - NO3 (as N)	mg/kg	13.1	6.43	8	46.7	7
Na	mg/kg	31.7	19.34	108	57.5	27
Sb	µg/kg	9.85	3.950	11	50.00	8
Sn	µg/kg	63.4	43.69	9		
SO4 (as SO4)	g/kg	0.850	0.5395	8		
Ti	mg/kg	3.71	1.445	14		

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	7960	323	6

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	1370	610	4