WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 169

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 169

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 169 of Leek / Allium porrum from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 3 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
2019	2	1
2015	4	3
2011	4	1

Consensus Values IPE 169

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
As	µg/kg	99.1	13.84	14.0	57	99.9	9.88	2.29	95.5 - 102.8
B	mg/kg	19.7	1.81	9.2	224	19.8	1.25	0.15	19.48 - 19.95
Ba	mg/kg	4.27	0.393	9.2	36	4.24	0.275	0.082	4.14 - 4.41
Ca	g/kg	7.68	0.499	6.5	319	7.65	0.340	0.035	7.62 - 7.73
Cd	µg/kg	3550	360	10.2	104	3550	254	44	3476 - 3616
Cl (as Cl)	g/kg	5.50	0.307	5.6	65	5.50	0.220	0.048	5.42 - 5.57
Co	µg/kg	44.7	7.83	17.5	68	45.4	5.43	1.19	42.8 - 46.6
Cu	mg/kg	5.27	0.562	10.7	288	5.30	0.390	0.041	5.20 - 5.33
Fe	mg/kg	91.1	9.54	10.5	292	91.8	6.68	0.70	90.0 - 92.2
Hg	µg/kg	14.4	1.88	13.0	40	14.5	1.42	0.37	13.8 - 15.0
K	g/kg	33.8	2.33	6.9	328	33.7	1.61	0.16	33.53 - 34.04
Mg	g/kg	2.41	0.159	6.6	320	2.40	0.110	0.011	2.39 - 2.42
Mn	mg/kg	75.3	5.02	6.7	300	75.3	3.43	0.36	74.7 - 75.9
Mo	µg/kg	863	92.9	10.8	95	865	65.1	11.9	844 - 882
N - Kjeldahl (as N)	g/kg	27.7	1.23	4.4	193	27.6	0.85	0.11	27.51 - 27.86
N - NO3 (as N)	mg/kg	675	56.8	8.4	26	672	40.0	13.9	652 - 698
Na	mg/kg	381	41.5	10.9	197	383	29.0	3.7	375 - 387
P (as P)	g/kg	3.46	0.220	6.4	322	3.46	0.151	0.015	3.44 - 3.49
Pb	µg/kg	833	99.3	11.9	83	831	69.0	13.6	812 - 855
Rb	µg/kg	11500	1120	9.7	26	11600	780	270	11040 - 11950
S (as S)	g/kg	5.08	0.467	9.2	183	5.05	0.326	0.043	5.01 - 5.15
Se	µg/kg	39.2	9.35	23.9	40	40.3	6.45	1.85	36.2 - 42.1
Sr	mg/kg	15.6	1.49	9.5	37	15.9	1.05	0.31	15.1 - 16.1
V	µg/kg	162	25.9	16.0	27	157	18.4	6.2	152 - 172
Zn	mg/kg	169	14.0	8.3	298	169	9.7	1.0	167.7 - 170.9

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
C - elementary	g/kg	435	14.7	3.4	112	434	10.1	1.7	432.0 - 437.5
N - elementary	g/kg	29.6	1.18	4.0	164	29.5	0.80	0.11	29.38 - 29.74

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	45.0	6.66	14.8	61	45.0	4.55	1.07	43.3 - 46.7

Consensus Values IPE 169

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
delta 13C	‰ V-PDB	-28.8	0.28	1.0	22	-28.8	0.20	0.07	-28.87 - -28.63
delta 15N	‰ Air	500	15.4	3.1	20	500	10.8	4.3	493 - 507

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Crude fibre	g/kg	129	7.2	5.6	18	129	5.4	2.1	125.4 - 132.6
Total ash	g/kg	99.8	3.78	3.8	33	100.4	2.62	0.82	98.4 - 101.1

Indicative Values IPE 169

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Br	mg/kg	10.6	1.12	10.6	9	10.6	0.81	0.47	9.76 - 11.5
Cr	µg/kg	395	130.8	33.1	72	407	93.9	19.3	365 - 426
Cs	µg/kg	11.8	5.11	43.1	11	13.4	3.93	1.92	8.46 - 15.2
Li	µg/kg	164	43.4	26.5	16	168	28.0	13.6	141 - 187
Ni	µg/kg	341	112.2	32.9	59	358	79.6	18.3	312 - 370
Sb	µg/kg	21.4	9.07	42.4	28	22.8	6.45	2.14	17.9 - 24.9
SO4 (as SO4)	g/kg	2.74	0.330	12.0	11	2.75	0.240	0.124	2.53 - 2.96

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	70.8	25.52	36.0	40	75.7	18.05	5.04	62.6 - 79.0

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
ADF-ash-free	g/kg	176	20.1	11.4	12	172	14.9	7.3	164 - 189
NDF-ash-free	g/kg	211	46.2	21.8	11	206	34.0	17.4	181 - 242
Total fat	g/kg	31.5	8.85	28.1	11	30.4	5.70	3.34	25.7 - 37.4

Informative Values IPE 169

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
Ag	µg/kg	7.81	1.230	7	100.00	5
Be	µg/kg	5.12	2.350	6	20.00	17
Bi	µg/kg	3.29	1.430	5	52.00	7
F	mg/kg	0.430	0.0300	3		
Ga	µg/kg	23.0	3.33	5		
I	µg/kg	147	67.0	11		
N - NH4 (as N)	mg/kg	605	393.6	9		
Sn	µg/kg	72.5	30.41	16	100.0	5
Ti	mg/kg	2.11	0.980	15	10.00	5

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	1410	291	7

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	140	133.8	7