WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 214

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 214

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 214 of Tulip (flower) / Tulipa l. from Netherlands 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
2015	3	1

Consensus Values IPE 214

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
As	µg/kg	66.9	11.70	17.5	20	68.5	8.65	3.27	61.5 - 72.4
B	mg/kg	18.9	2.21	11.7	90	18.7	1.52	0.29	18.4 - 19.3
Ca	g/kg	2.40	0.231	9.6	121	2.41	0.160	0.026	2.36 - 2.44
Cd	µg/kg	786	81.6	10.4	42	786	54.4	15.7	761 - 812
Cl (as Cl)	g/kg	1.70	0.320	18.9	23	1.70	0.230	0.083	1.56 - 1.83
Co	µg/kg	36.4	8.69	23.8	22	35.9	6.20	2.32	32.6 - 40.3
Cu	mg/kg	4.53	0.657	14.5	119	4.58	0.454	0.075	4.41 - 4.65
Fe	mg/kg	139	13.2	9.5	114	139	9.1	1.5	136.3 - 141.2
Hg	µg/kg	8.13	1.230	15.1	16	8.58	0.975	0.384	7.47 - 8.78
K	g/kg	21.8	1.33	6.1	124	21.8	0.87	0.15	21.58 - 22.05
Mg	g/kg	1.88	0.125	6.7	126	1.87	0.084	0.014	1.85 - 1.90
Mn	mg/kg	18.8	1.71	9.1	117	18.6	1.17	0.20	18.48 - 19.10
Mo	µg/kg	1510	136	9.0	40	1490	96	27	1462 - 1549
N - Kjeldahl (as N)	g/kg	25.9	1.56	6.0	79	26.0	1.08	0.22	25.60 - 26.29
Na	mg/kg	116	25.5	21.9	71	115	18.1	3.8	110 - 122
P (as P)	g/kg	3.96	0.259	6.5	125	3.96	0.170	0.029	3.91 - 4.00
S (as S)	g/kg	2.03	0.217	10.7	73	2.03	0.150	0.032	1.98 - 2.09
Zn	mg/kg	46.3	3.90	8.4	116	46.4	2.67	0.45	45.5 - 47.0

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
C - elementary	g/kg	465	18.7	4.0	35	464	12.6	3.9	459 - 472
N - elementary	g/kg	27.7	1.25	4.5	51	27.6	0.85	0.22	27.36 - 28.06

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	63.6	15.14	23.8	24	65.6	10.70	3.86	57.2 - 70.0

Indicative Values IPE 214

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Ba	mg/kg	0.654	0.3103	47.4	17	0.739	0.2270	0.0941	0.496 - 0.813
Cr	µg/kg	401	160.8	40.1	25	420	112.0	40.2	335 - 468
Ni	µg/kg	431	111.6	25.9	22	445	76.0	29.8	382 - 481
Pb	µg/kg	333	84.7	25.4	35	340	58.8	17.9	304 - 362
Sb	µg/kg	27.0	8.69	32.2	8	27.5	6.46	3.84	19.9 - 34.1
Se	µg/kg	12.6	4.46	35.4	11	14.5	3.30	1.68	9.64 - 15.6
Sr	mg/kg	1.32	0.118	9.0	14	1.30	0.075	0.040	1.25 - 1.38
V	µg/kg	165	63.5	38.6	14	172	45.0	21.2	128 - 201

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	90.6	45.13	49.8	20	81.8	32.83	12.61	69.5 - 112

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Total ash	g/kg	62.1	5.01	8.1	15	62.0	3.50	1.62	59.4 - 64.9

Informative Values IPE 214

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N
Be	µg/kg	-	-	0
I	µg/kg	119	20.0	4
Li	µg/kg	71.1	15.10	6
N - NO3 (as N)	mg/kg	36.0	3.52	4
Rb	µg/kg	7800	453	5
Sn	µg/kg	55.5	18.48	6
SO4 (as SO4)	g/kg	0.830	0.2700	3
Ti	mg/kg	4.09	1.454	8

Results smaller than (<)

Median of <	N
10.0	7

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	1200	330	3

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	102	19.0	3

Method: Other determinations

Element	Unit	Median	MAD	N
delta 13C	‰ V-PDB	-28.8	0.05	5
delta 15N	‰ Air	1.94	0.448	5

Method: Nutritional values

Element	Unit	Median	MAD	N
ADF-ash-free	g/kg	149	18.5	6
Crude fibre	g/kg	111	21.0	7
NDF-ash-free	g/kg	190	10.7	6
Total fat	g/kg	33.6	2.70	3