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

Consensus Values IPE 214

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	18.9	2.17	11.5	90	18.7	1.52	0.285	1.51
Cu	mg/kg	4.54	0.692	15.3	119	4.58	0.454	0.079	1.75
Fe	mg/kg	139	15.3	11.0	114	139	9.06	1.79	1.29
Mn	mg/kg	18.7	1.98	10.6	117	18.6	1.17	0.229	1.22
Zn	mg/kg	46.3	4.22	9.1	116	46.4	2.67	0.489	1.06
Cd	µg/kg	780	99.5	12.7	42	786	54.4	19.2	2.46
Mo	µg/kg	1504	142	9.4	40	1493	96.0	28.1	1.87
Sr	mg/kg	1.31	0.153	11.7	14	1.30	0.075	0.051	3.90
Ca	g/kg	2.40	0.269	11.2	121	2.41	0.160	0.031	1.27
Cl (as Cl)	g/kg	1.69	0.304	18.0	23	1.70	0.230	0.079	4.69
K	g/kg	21.8	1.50	6.9	124	21.8	0.874	0.168	0.771
Mg	g/kg	1.88	0.141	7.5	126	1.87	0.084	0.016	0.834
N - Kjeldahl (as N)	g/kg	26.0	1.73	6.7	79	26.0	1.08	0.243	0.936
Na	mg/kg	117	34.8	29.8	71	115	18.1	5.17	4.42
P (as P)	g/kg	3.95	0.316	8.0	125	3.96	0.170	0.035	0.894
S (as S)	g/kg	2.03	0.229	11.3	73	2.03	0.150	0.034	1.65

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	465	20.4	4.4	35	464	12.6	4.32	0.928
N - elementary	g/kg	27.7	1.26	4.5	51	27.6	0.850	0.220	0.795

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	63.6	15.0	23.7	24	65.6	10.7	3.84	6.04

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Total ash	g/kg	62.4	5.56	8.9	15	62.0	3.50	1.79	2.88

Indicative Values IPE 214

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	µg/kg	66.2	15.3	23.1	20	68.5	8.65	4.27	6.45
Co	µg/kg	36.5	9.66	26.4	22	35.9	6.20	2.58	7.05
Cr	µg/kg	405	179	44.4	25	420	112	44.9	11.1
Hg	µg/kg	8.20	1.67	20.4	16	8.58	0.975	0.523	6.37
I	µg/kg	107	44.7	41.7	4	119	20.0	28.0	26.1
Li	µg/kg	63.4	36.3	57.2	6	71.1	15.1	18.5	29.2
Ni	µg/kg	430	125	29.1	22	445	76.0	33.3	7.74
Pb	µg/kg	333	106	31.9	35	340	58.8	22.5	6.75
Se	µg/kg	11.5	7.53	65.5	11	14.5	3.30	2.84	24.7
Ba	mg/kg	0.659	0.326	49.4	17	0.739	0.227	0.099	15.0
Sb	µg/kg	27.0	8.96	33.1	8	27.5	6.46	3.96	14.6
Sn	µg/kg	46.1	29.6	64.2	6	55.5	18.5	15.1	32.8
Ti	mg/kg	3.24	2.14	66.0	8	4.09	1.45	0.946	29.2
V	µg/kg	163	72.2	44.2	14	172	45.0	24.1	14.8
Rb	µg/kg	7862	792	10.1	5	7800	453	442	5.63
N - NO3 (as N)	mg/kg	35.9	6.84	19.1	4	36.0	3.52	4.27	11.9

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	88.8	35.7	40.1	20	81.8	32.8	9.97	11.2

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-28.8	0.100	0.3	5	-28.8	0.050	0.056	0.193
delta 15N	‰ Air	1.91	0.716	37.5	5	1.94	0.448	0.400	21.0

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	101	16.9	16.7	7	111	21.0	7.97	7.87
ADF-ash-free	g/kg	152	26.3	17.3	6	149	18.5	13.4	8.82
NDF-ash-free	g/kg	191	17.4	9.1	6	190	10.7	8.90	4.66