WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 175

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 175

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 175 of Tulip (tuber) / Tulipa l., from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been 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
2010	3	2
2006	3	1

Consensus Values IPE 175

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	7.40	1.16	15.7	167	7.35	0.750	0.113	1.52
Cu	mg/kg	3.95	0.574	14.5	227	3.95	0.330	0.048	1.20
Fe	mg/kg	36.9	6.45	17.5	227	36.4	4.10	0.535	1.45
Mn	mg/kg	5.23	0.803	15.4	228	5.29	0.462	0.067	1.27
Zn	mg/kg	10.9	1.23	11.3	232	11.0	0.800	0.101	0.924
Cd	µg/kg	124	15.3	12.3	71	123	8.20	2.27	1.83
Hg	µg/kg	4.99	1.01	20.2	37	5.09	0.660	0.208	4.16
Mo	µg/kg	350	41.1	11.7	55	353	22.3	6.92	1.98
Ni	µg/kg	237	86.0	36.3	61	241	54.0	13.8	5.81
Pb	µg/kg	93.4	28.6	30.6	58	97.0	16.0	4.69	5.02
Sr	mg/kg	1.60	0.154	9.6	26	1.62	0.085	0.038	2.36
Rb	µg/kg	5109	540	10.6	10	5235	254	213	4.18
Ca	g/kg	0.473	0.089	18.8	240	0.470	0.050	0.007	1.52
Cl (as Cl)	g/kg	1.14	0.177	15.6	51	1.15	0.124	0.031	2.73
K	g/kg	9.45	0.752	8.0	246	9.49	0.515	0.060	0.635
Mg	g/kg	0.655	0.052	7.9	243	0.660	0.030	0.004	0.637
N - Kjeldahl (as N)	g/kg	12.5	0.644	5.2	163	12.4	0.430	0.063	0.505
N - NH4 (as N)	mg/kg	324	35.3	10.9	8	322	15.2	15.6	4.81
Na	mg/kg	109	18.3	16.8	147	109	11.4	1.88	1.74
P (as P)	g/kg	2.23	0.147	6.6	247	2.22	0.080	0.012	0.524
S (as S)	g/kg	0.930	0.095	10.2	144	0.930	0.058	0.010	1.06

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	433	11.4	2.6	63	433	7.00	1.80	0.415
N - elementary	g/kg	13.0	0.541	4.2	92	12.9	0.265	0.071	0.543

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	20.2	4.86	24.1	45	20.9	2.10	0.905	4.49

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Total ash	g/kg	23.5	2.97	12.7	20	23.7	2.15	0.831	3.54

Indicative Values IPE 175

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	µg/kg	22.7	14.5	64.0	26	25.9	7.85	3.56	15.7
Br	mg/kg	5.18	2.25	43.5	6	5.23	1.40	1.15	22.2
Co	µg/kg	20.7	7.20	34.8	34	21.0	3.78	1.54	7.46
Cr	µg/kg	159	90.2	56.8	50	185	61.0	15.9	10.0
Li	µg/kg	32.9	8.36	25.4	6	34.3	4.05	4.27	13.0
Se	µg/kg	16.8	8.24	49.0	17	18.1	4.58	2.50	14.8
Ba	mg/kg	0.189	0.056	29.6	14	0.194	0.034	0.019	9.88
Sb	µg/kg	8.19	10.1	122.9	9	10.1	6.16	4.20	51.2
V	µg/kg	42.0	19.2	45.7	16	43.3	8.64	6.00	14.3
Cs	µg/kg	18.3	0.755	4.1	4	18.1	0.400	0.472	2.58
N - NO3 (as N)	mg/kg	7.46	11.5	153.7	12	7.75	6.05	4.14	55.5
SO4 (as SO4)	g/kg	0.749	0.304	40.5	8	0.761	0.184	0.134	17.9

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	28.0	13.7	49.0	20	27.6	9.10	3.84	13.7

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Si	mg/kg	40.4	10.1	24.9	4	42.5	5.30	6.28	15.5

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	18.3	6.86	37.4	7	19.1	4.93	3.24	17.7
Total fat	g/kg	2.55	1.42	55.9	5	2.90	0.900	0.796	31.2