WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 199

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 199

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 199 of Oak-wood / Quercus robur, from Finland, is prepared for the WEPAL proficiency programs. The sample has been used in 4 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
2022	4	2
2018	4	4
2014	1	1
2010	1	4

Consensus Values IPE 199

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	3.32	0.994	29.9	262	3.43	0.575	0.077	2.31
Cu	mg/kg	0.894	0.425	47.5	310	0.930	0.256	0.030	3.38
Fe	mg/kg	41.7	8.56	20.5	371	42.0	5.03	0.556	1.33
Mn	mg/kg	70.8	6.15	8.7	388	71.0	3.90	0.390	0.551
Zn	mg/kg	8.69	1.23	14.1	373	8.80	0.750	0.079	0.913
Cd	µg/kg	82.3	7.84	9.5	94	82.6	4.55	1.01	1.23
Co	µg/kg	30.9	6.33	20.5	64	30.0	3.70	0.990	3.20
Cr	µg/kg	307	122	39.9	66	328	83.5	18.8	6.14
Ba	mg/kg	5.28	0.462	8.8	37	5.29	0.263	0.095	1.80
Bi	µg/kg	54.8	7.56	13.8	11	54.9	5.13	2.85	5.20
V	µg/kg	41.5	8.57	20.7	24	43.5	6.10	2.19	5.27
Sr	mg/kg	3.42	0.354	10.4	41	3.43	0.253	0.069	2.02
Rb	µg/kg	1758	75.3	4.3	12	1768	38.0	27.2	1.54
Ca	g/kg	0.699	0.101	14.5	396	0.700	0.060	0.006	0.911
K	g/kg	0.416	0.092	22.1	383	0.420	0.050	0.006	1.41
Mg	g/kg	0.172	0.021	12.3	385	0.170	0.011	0.001	0.784
N - Kjeldahl (as N)	g/kg	0.773	0.447	57.8	224	0.835	0.302	0.037	4.83
Na	mg/kg	95.2	22.1	23.2	224	97.0	13.0	1.84	1.94
P (as P)	g/kg	0.054	0.020	36.9	342	0.058	0.010	0.001	2.50
S (as S)	g/kg	0.060	0.020	33.2	195	0.062	0.012	0.002	2.97

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	503	13.9	2.8	115	503	8.50	1.62	0.322
N - elementary	g/kg	0.949	0.518	54.7	159	0.990	0.380	0.051	5.42

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	22.8	6.25	27.5	76	22.9	4.20	0.896	3.94

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-26.0	0.195	0.7	18	-26.0	0.120	0.057	0.221

Consensus Values IPE 199

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	695	40.9	5.9	24	694	23.5	10.4	1.50
ADF-ash-free	g/kg	741	27.1	3.7	13	735	21.9	9.38	1.27
NDF-ash-free	g/kg	898	31.6	3.5	11	901	18.0	11.9	1.33
Total ash	g/kg	3.16	0.821	26.0	44	3.20	0.455	0.155	4.90

Indicative Values IPE 199

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	µg/kg	15.3	12.8	83.6	30	20.1	9.15	2.92	19.1
Hg	µg/kg	2.30	1.13	49.0	33	2.57	0.870	0.245	10.7
Li	µg/kg	56.6	15.6	27.6	12	56.6	11.7	5.64	9.98
Mo	µg/kg	20.8	16.2	78.0	52	26.7	12.4	2.82	13.5
Ni	µg/kg	164	82.5	50.2	50	183	53.6	14.6	8.87
Pb	µg/kg	91.9	45.6	49.6	80	97.0	27.2	6.37	6.94
Se	µg/kg	7.43	7.86	105.8	21	10.0	6.28	2.15	28.9
Sb	µg/kg	5.87	2.13	36.3	12	5.82	1.01	0.770	13.1
Sn	µg/kg	22.0	15.7	71.3	15	27.5	10.4	5.06	23.0
Ti	mg/kg	0.904	0.809	89.5	8	1.06	0.443	0.357	39.5
Ag	µg/kg	32.7	4.82	14.7	8	34.1	2.60	2.13	6.52
Cs	µg/kg	18.4	2.51	13.7	5	18.3	1.40	1.40	7.63
Cl (as Cl)	g/kg	0.178	0.199	112.0	45	0.210	0.145	0.037	20.9
N - NH4 (as N)	mg/kg	9.47	4.69	49.5	4	10.9	2.49	2.93	30.9
N - NO3 (as N)	mg/kg	5.21	3.26	62.5	11	5.35	1.97	1.23	23.6
SO4 (as SO4)	g/kg	0.085	0.061	71.5	7	0.100	0.035	0.029	33.8

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	36.2	11.6	32.0	35	36.8	7.20	2.45	6.77

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 15N	‰ Air	-1.80	2.46	136.3	10	-1.35	1.75	0.973	53.9

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
NDF-ash-containing	g/kg	887	45.8	5.2	5	892	26.0	25.6	2.89
Total fat	g/kg	10.6	7.62	71.8	19	9.80	4.80	2.18	20.6