WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 194

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 194

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 194 of Staghorn sumac / Rhus typhina, 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
2017	4	4
2013	2	2

Consensus Values IPE 194

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	39.5	4.15	10.5	141	39.4	2.56	0.437	1.10
Cu	mg/kg	5.52	0.693	12.6	187	5.61	0.438	0.063	1.15
Fe	mg/kg	105	12.9	12.3	191	105	8.00	1.17	1.12
Mn	mg/kg	41.8	3.67	8.8	197	41.8	2.30	0.327	0.781
Zn	mg/kg	26.5	2.28	8.6	195	26.5	1.43	0.204	0.769
As	µg/kg	80.0	17.3	21.6	30	80.8	8.30	3.95	4.94
Cd	µg/kg	36.6	6.56	17.9	41	37.3	3.93	1.28	3.50
Co	µg/kg	73.3	14.9	20.3	34	74.3	6.85	3.19	4.35
Cr	µg/kg	1037	187	18.0	42	1050	98.8	36.0	3.47
Hg	µg/kg	39.1	5.16	13.2	25	38.9	2.11	1.29	3.30
Mo	µg/kg	491	51.1	10.4	50	499	31.0	9.03	1.84
Pb	µg/kg	1238	151	12.2	45	1250	90.3	28.2	2.28
Se	µg/kg	360	63.0	17.5	28	351	43.7	14.9	4.13
Ba	mg/kg	8.45	1.14	13.5	21	8.48	0.719	0.312	3.70
Sb	µg/kg	73.2	11.7	15.9	14	73.8	6.37	3.89	5.32
V	µg/kg	172	23.5	13.7	16	173	15.5	7.35	4.27
Sr	mg/kg	59.6	4.71	7.9	21	59.0	2.80	1.29	2.16
Rb	µg/kg	14676	1216	8.3	11	14413	887	458	3.12
Ca	g/kg	22.4	1.80	8.0	203	22.5	1.20	0.158	0.705
Cl (as Cl)	g/kg	3.06	0.236	7.7	38	3.02	0.170	0.048	1.57
K	g/kg	13.3	0.885	6.7	209	13.3	0.560	0.077	0.577
Mg	g/kg	2.25	0.148	6.6	205	2.26	0.091	0.013	0.573
N - Kjeldahl (as N)	g/kg	15.2	1.02	6.7	138	15.2	0.619	0.109	0.713
Na	mg/kg	193	33.6	17.4	114	192	22.0	3.94	2.04
P (as P)	g/kg	2.03	0.124	6.1	208	2.03	0.073	0.011	0.529
S (as S)	g/kg	1.33	0.142	10.7	108	1.33	0.085	0.017	1.29

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	467	12.8	2.7	74	467	8.25	1.86	0.397
N - elementary	g/kg	16.1	0.713	4.4	101	16.0	0.436	0.089	0.553

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	50.6	14.0	27.6	38	51.0	8.68	2.83	5.60

Consensus Values IPE 194

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-29.4	0.281	1.0	17	-29.4	0.180	0.085	0.290
delta 15N	‰ Air	13.6	0.675	5.0	18	13.5	0.358	0.199	1.46

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	231	29.6	12.9	12	234	16.0	10.7	4.64
ADF-ash-free	g/kg	289	15.5	5.4	9	293	11.5	6.46	2.24
NDF-ash-free	g/kg	401	49.8	12.4	9	403	34.0	20.8	5.18
Total ash	g/kg	84.8	7.92	9.3	23	84.9	6.28	2.06	2.44

Indicative Values IPE 194

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
I	µg/kg	329	78.4	23.8	7	325	45.0	37.1	11.2
Li	µg/kg	111	25.4	23.0	7	110	20.2	12.0	10.9
Ni	µg/kg	423	145	34.3	29	422	88.0	33.7	7.97
Bi	µg/kg	6.75	2.05	30.3	4	7.25	1.09	1.28	18.9
Sn	µg/kg	150	38.6	25.8	8	144	28.3	17.0	11.4
Ti	mg/kg	3.09	2.57	83.2	9	3.31	1.92	1.07	34.7
Ag	µg/kg	4.96	3.01	60.7	5	4.85	1.75	1.68	33.9
Be	µg/kg	2.94	0.743	25.2	8	3.02	0.390	0.328	11.2
Cs	µg/kg	73.3	3.92	5.4	5	72.3	2.30	2.19	2.99
N - NO3 (as N)	mg/kg	43.5	29.5	67.7	11	50.7	17.5	11.1	25.5
SO4 (as SO4)	g/kg	0.684	0.691	101.0	8	0.914	0.375	0.305	44.6

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	69.9	21.6	30.8	17	72.0	14.5	6.54	9.35

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Total fat	g/kg	32.6	7.78	23.9	9	31.4	4.50	3.24	9.96