



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 172



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 172 of Cherry Laurel / *Prunus laurocerasus*, from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been used in 9 periods (or rounds). Only results from the last 5 periods are used. This way, the consensus values reflect the latest 'state of the art' analytical techniques used by the laboratories. The results on which the values in this report are based were taken from the periods given in the following table:

Year	Round	Number
2014	3	4
2010	4	2
2010	3	4
2010	2	1
2010	1	3



Consensus Values IPE 172

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	16.5	1.67	10.2	407	16.4	1.00	0.104	0.630
Cu	mg/kg	5.47	0.585	10.7	536	5.49	0.385	0.032	0.578
Fe	mg/kg	64.5	7.96	12.3	541	65.0	4.70	0.428	0.663
Mn	mg/kg	104	7.69	7.4	554	104	4.99	0.408	0.394
Zn	mg/kg	31.5	2.48	7.9	545	31.5	1.60	0.133	0.421
As	µg/kg	59.4	13.9	23.4	74	59.6	8.25	2.02	3.40
Cd	µg/kg	73.6	9.17	12.5	145	73.7	5.00	0.952	1.29
Co	µg/kg	105	24.2	23.1	133	103	14.0	2.62	2.50
Cr	µg/kg	398	128	32.2	121	436	96.0	14.6	3.65
Hg	µg/kg	24.6	2.42	9.8	71	24.7	1.50	0.359	1.46
Mo	µg/kg	441	66.9	15.2	130	444	44.0	7.33	1.66
Ni	µg/kg	831	148	17.8	126	824	92.0	16.5	1.99
Pb	µg/kg	770	91.2	11.8	146	770	50.0	9.43	1.22
Ba	mg/kg	16.4	1.19	7.3	70	16.3	0.805	0.178	1.08
Sb	µg/kg	47.5	7.30	15.4	33	46.8	3.70	1.59	3.35
V	µg/kg	108	24.7	22.8	47	111	16.0	4.50	4.16
Sr	mg/kg	42.3	2.20	5.2	78	42.3	1.35	0.312	0.737
Cs	µg/kg	16.2	2.12	13.1	12	15.6	1.15	0.765	4.71
Rb	µg/kg	8991	669	7.4	31	9040	426	150	1.67
Ca	g/kg	17.2	1.15	6.7	581	17.2	0.700	0.060	0.347
K	g/kg	10.5	0.640	6.1	586	10.5	0.400	0.033	0.315
Mg	g/kg	2.62	0.170	6.5	581	2.61	0.109	0.009	0.337
N - Kjeldahl (as N)	g/kg	11.6	0.627	5.4	374	11.6	0.400	0.041	0.351
Na	mg/kg	44.4	21.4	48.3	306	46.8	13.3	1.53	3.45
P (as P)	g/kg	2.29	0.130	5.7	583	2.30	0.090	0.007	0.294
S (as S)	g/kg	0.638	0.083	13.1	339	0.630	0.050	0.006	0.888

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	478	12.7	2.7	169	478	7.40	1.22	0.256
Al	mg/kg	47.1	13.2	28.0	66	48.8	7.63	2.03	4.30
N - elementary	g/kg	12.2	0.584	4.8	258	12.2	0.394	0.045	0.372

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	35.2	8.58	24.4	108	35.9	5.57	1.03	2.93



Consensus Values IPE 172

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-28.7	0.228	0.8	26	-28.7	0.170	0.056	0.195

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	221	24.8	11.2	27	220	10.0	5.98	2.70
ADF-ash-free	g/kg	351	25.9	7.4	15	347	15.5	8.36	2.38
NDF-ash-free	g/kg	415	58.1	14.0	14	419	36.0	19.4	4.67
Total ash	g/kg	65.6	4.86	7.4	66	66.0	3.00	0.748	1.14



Indicative Values IPE 172

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Br	mg/kg	0.841	0.422	50.1	9	1.00	0.375	0.176	20.9
Ga	µg/kg	67.7	15.1	22.3	5	69.0	8.00	8.45	12.5
I	µg/kg	232	172	74.1	16	203	118	53.6	23.2
Li	µg/kg	38.0	9.46	24.9	16	39.6	5.29	2.96	7.78
Se	µg/kg	23.5	12.3	52.5	49	25.6	7.70	2.20	9.37
Bi	µg/kg	5.94	1.78	30.0	13	6.14	1.11	0.617	10.4
Sn	µg/kg	54.9	20.9	38.0	20	56.1	9.86	5.83	10.6
Ti	mg/kg	2.59	1.93	74.6	21	2.59	1.15	0.528	20.3
Be	µg/kg	3.20	2.30	71.8	17	3.60	1.32	0.697	21.8
Cl (as Cl)	g/kg	0.291	0.225	77.4	99	0.307	0.157	0.028	9.72
N - NH ₄ (as N)	mg/kg	63.1	31.3	49.6	17	74.3	14.0	9.50	15.0
N - NO ₃ (as N)	mg/kg	19.8	18.5	93.6	26	26.8	15.7	4.54	23.0
SO ₄ (as SO ₄)	g/kg	0.106	0.075	70.2	17	0.113	0.053	0.023	21.3

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Si	mg/kg	343	169	49.4	9	389	77.0	70.6	20.6

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Si	mg/kg	160	44.8	28.0	5	165	34.0	25.0	15.7

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 15N	‰ Air	-0.487	0.368	75.6	26	-0.440	0.212	0.090	18.5

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
NDF-ash-containing	g/kg	372	4.48	1.2	5	371	3.00	2.50	0.672
Total fat	g/kg	21.9	10.4	47.6	22	21.4	6.17	2.77	12.7