



**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 mean and standard deviation are calculated using all reported data when at least 8 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into three sections: Consensus Values, Indicative Values and Values for Information. The division is made on the reliability of the data. Consensus Values are based on at least 16 results while the coefficient of variation is smaller than 25 %. Indicative Values are based on at least 8 and less than 16 results or a coefficient of variation between 25 % and 50 %. Other values, based on more than 2 and less than 8 results or a coefficient of variation higher than 50 %, are given for information only.

In the sections with Consensus Values and Indicative Values the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median and MAD (Median of Absolute Deviation) and the uncertainty in the consensus values. The confidence limits (at 95 % probability) are calculated for these determinands.

In the section with Information Values the following parameters are given: median, MAD and number of results. For determinands which have at least 5 results reported as smaller than (<) the median of these 'smaller than results' is calculated. In some cases this median of '<' values is much smaller than median and mean of the indicative values. This may be caused by a too optimistic (too low) value for the detection limit reported by a (small) majority of participating laboratories who report '<' -values.

All values, expressed on a weight basis (kg or %), are reported in oven dry (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 is used in 9 periods (or rounds). Only results from the last 5 periods are used. In this way the consensus values will reflect the latest 'state of the art' in the analytical techniques used in 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	95 % confidence limits		
As	µg/kg	59.6	11.27	18.9	74	59.6	8.25	1.64	56.9	-	62.2
B	mg/kg	16.4	1.46	8.9	407	16.4	1.00	0.09	16.30	-	16.59
Ba	mg/kg	16.4	1.14	6.9	70	16.3	0.81	0.17	16.13	-	16.67
Ca	g/kg	17.2	1.02	5.9	581	17.2	0.70	0.05	17.12	-	17.29
Cd	µg/kg	73.4	7.44	10.1	145	73.7	5.00	0.77	72.2	-	74.6
Co	µg/kg	105	20.2	19.3	133	103	14.0	2.2	101.2	-	108.2
Cu	mg/kg	5.47	0.550	10.1	536	5.49	0.385	0.030	5.42	-	5.51
Fe	mg/kg	64.5	6.86	10.6	541	65.0	4.70	0.37	63.9	-	65.1
Hg	µg/kg	24.5	2.12	8.6	71	24.7	1.50	0.31	24.0	-	25.0
K	g/kg	10.5	0.59	5.6	586	10.5	0.40	0.03	10.43	-	10.53
Li	µg/kg	38.3	6.78	17.7	16	39.6	5.29	2.12	34.7	-	41.9
Mg	g/kg	2.62	0.159	6.1	581	2.61	0.109	0.008	2.60	-	2.63
Mn	mg/kg	104	7.2	7.0	554	104	5.0	0.4	103.1	-	104.3
Mo	µg/kg	440	62.3	14.2	130	444	44.0	6.8	429	-	451
N - Kjeldahl (as N)	g/kg	11.6	0.58	5.0	374	11.6	0.40	0.04	11.50	-	11.62
Ni	µg/kg	827	134.7	16.3	126	824	92.0	15.0	803	-	851
P (as P)	g/kg	2.29	0.129	5.6	583	2.30	0.090	0.007	2.28	-	2.31
Pb	µg/kg	770	70.4	9.1	146	770	50.0	7.3	759	-	782
Rb	µg/kg	9010	610	6.8	31	9040	426	137	8782	-	9229
S (as S)	g/kg	0.637	0.0724	11.4	339	0.630	0.0500	0.0049	0.629	-	0.645
Sb	µg/kg	47.5	5.06	10.6	33	46.8	3.70	1.10	45.7	-	49.3
Sr	mg/kg	42.3	1.95	4.6	78	42.3	1.35	0.28	41.9	-	42.8
V	µg/kg	108	21.4	19.8	47	111	16.0	3.9	102	-	115
Zn	mg/kg	31.5	2.30	7.3	545	31.5	1.60	0.12	31.33	-	31.72

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	47.1	10.94	23.2	66	48.8	7.63	1.68	44.4	-	49.8
C - elementary	g/kg	478	11.0	2.3	169	478	7.4	1.1	476.5	-	479.9
N - elementary	g/kg	12.2	0.56	4.6	258	12.2	0.39	0.04	12.15	-	12.29

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	35.1	8.01	22.8	108	35.9	5.57	0.96	33.6	-	36.6



Consensus Values IPE 172

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
delta 13C	‰ V-PDB	-28.7	0.24	0.8	26	-28.7	0.17	0.06	-28.80	-	-28.61

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Crude fibre	g/kg	221	15.2	6.9	27	220	10.0	3.7	215	-	227
Total ash	g/kg	65.8	4.57	6.9	66	66.0	3.00	0.70	64.7	-	66.9



Indicative Values IPE 172

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Bi	µg/kg	5.96	1.503	25.2	13	6.14	1.110	0.521	5.06	-	6.86
Cr	µg/kg	403	131.4	32.6	121	436	96.0	14.9	379	-	426
Cs	µg/kg	16.0	1.69	10.6	12	15.6	1.15	0.61	14.9	-	17.0
N - NH4 (as N)	mg/kg	68.7	23.04	33.6	17	74.3	14.00	6.98	56.9	-	80.5
Na	mg/kg	43.9	18.83	42.9	306	46.8	13.30	1.35	41.8	-	46.0
Se	µg/kg	24.7	11.03	44.7	49	25.6	7.70	1.97	21.5	-	27.8
Sn	µg/kg	54.3	14.25	26.2	20	56.1	9.86	3.98	47.7	-	61.0

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Si	mg/kg	355	119.7	33.7	9	389	77.0	49.9	265	-	445

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
ADF-ash-free	g/kg	350	22.6	6.5	15	347	15.5	7.3	338	-	363
NDF-ash-free	g/kg	415	51.9	12.5	14	419	36.0	17.4	385	-	445
Total fat	g/kg	21.5	8.75	40.7	22	21.4	6.17	2.33	17.6	-	25.3



Informative Values IPE 172

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
Ag	µg/kg	8.16	2.760	7		
Be	µg/kg	3.60	1.320	17	40.00	23
Br	mg/kg	1.000	0.3750	9	2.000	5
Cl (as Cl)	g/kg	0.307	0.1570	99	0.400	13
F	mg/kg	3.00	0.400	3		
Ga	µg/kg	69.0	8.00	5		
I	µg/kg	203	117.6	16		
N - NO3 (as N)	mg/kg	26.8	15.73	26	48.4	19
SO4 (as SO4)	g/kg	0.113	0.0530	17		
Ti	mg/kg	2.59	1.150	21	10.00	9

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	165	34.0	5

Method: Other determinations

Element	Unit	Median	MAD	N
delta 15N	‰ Air	-0.440	0.2120	26

Method: Nutritional values

Element	Unit	Median	MAD	N
NDF-ash-containing	g/kg	371	3.0	5