



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 202



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 202 of Hop / Humulus lupulus, from Netherlands, is prepared for the WEPAL proficiency programs. The sample has been used in 1 period (or round). The results on which the values in this report are based were taken from the period given in the following table:

Year	Round	Number
2011	2	2



Consensus Values IPE 202

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	33.0	3.46	10.5	74	33.0	2.20	0.503	1.52
Cu	mg/kg	5.15	0.797	15.5	94	5.10	0.445	0.103	2.00
Fe	mg/kg	101	14.2	14.1	95	101	8.60	1.82	1.80
Mn	mg/kg	125	8.43	6.7	97	125	5.48	1.07	0.853
Zn	mg/kg	50.4	3.48	6.9	94	50.2	2.16	0.448	0.889
As	µg/kg	216	37.6	17.5	20	214	26.0	10.5	4.88
Co	µg/kg	70.8	14.3	20.2	24	70.0	8.15	3.64	5.14
Mo	µg/kg	463	62.2	13.4	29	471	31.6	14.4	3.12
Pb	µg/kg	460	73.5	16.0	25	451	42.0	18.4	4.00
Ba	mg/kg	9.24	1.03	11.1	10	9.28	0.495	0.407	4.41
Sr	mg/kg	36.8	2.09	5.7	12	37.0	1.21	0.755	2.05
Ca	g/kg	18.1	1.26	6.9	105	18.1	0.750	0.153	0.847
Cl (as Cl)	g/kg	1.63	0.176	10.8	24	1.63	0.120	0.045	2.75
K	g/kg	19.2	1.26	6.6	107	19.2	0.800	0.153	0.793
Mg	g/kg	5.00	0.338	6.8	105	5.00	0.225	0.041	0.825
N - Kjeldahl (as N)	g/kg	14.6	0.687	4.7	73	14.6	0.420	0.101	0.687
N - NO ₃ (as N)	mg/kg	198	21.8	11.0	10	201	9.50	8.61	4.35
Na	mg/kg	227	38.1	16.8	63	230	21.5	6.00	2.64
P (as P)	g/kg	4.83	0.307	6.4	106	4.84	0.210	0.037	0.772
S (as S)	g/kg	1.45	0.121	8.3	64	1.44	0.080	0.019	1.30

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	452	10.6	2.3	41	452	6.00	2.07	0.459
Al	mg/kg	111	16.0	14.4	11	109	9.00	6.02	5.44
N - elementary	g/kg	15.7	0.784	5.0	62	15.7	0.425	0.124	0.792

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-27.7	0.572	2.1	14	-27.6	0.376	0.191	0.691

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Total ash	g/kg	91.6	5.40	5.9	13	91.0	4.58	1.87	2.04



Indicative Values IPE 202

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Cd	µg/kg	30.8	11.6	37.6	18	34.1	5.90	3.41	11.1
Cr	µg/kg	1085	348	32.1	22	1106	217	92.8	8.55
Hg	µg/kg	9.38	1.75	18.6	12	9.38	0.840	0.630	6.72
Li	µg/kg	608	301	49.5	4	611	137	188	30.9
Ni	µg/kg	384	139	36.2	20	409	70.4	38.9	10.1
Se	µg/kg	16.1	7.48	46.5	11	16.2	4.00	2.82	17.5
Sb	µg/kg	30.2	0.830	2.7	5	30.3	0.300	0.464	1.54
Ti	mg/kg	6.02	2.44	40.5	5	5.69	1.40	1.36	22.7
V	µg/kg	121	26.8	22.1	8	124	19.0	11.8	9.78

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	72.4	21.6	29.8	22	75.7	14.9	5.75	7.93

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 15N	‰ Air	0.787	0.926	117.8	13	0.759	0.478	0.321	40.8

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	258	40.5	15.7	6	261	20.4	20.7	8.01