WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 187

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 187

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 187 of maize (grain) / Zea mays, from Austria, is prepared for the WEPAL proficiency programs. The sample has been used in 3 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
2016	2	3
2013	2	1
2008	2	4

Consensus Values IPE 187

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	2.48	0.905	36.5	188	2.55	0.550	0.083	3.33
Cu	mg/kg	2.18	0.423	19.5	288	2.20	0.243	0.031	1.43
Fe	mg/kg	25.1	4.97	19.8	295	25.2	3.20	0.362	1.44
Mn	mg/kg	6.04	1.03	17.1	290	6.01	0.595	0.076	1.26
Zn	mg/kg	23.1	2.12	9.2	301	23.1	1.38	0.153	0.661
Mo	µg/kg	335	37.9	11.3	81	332	22.0	5.27	1.57
Ni	µg/kg	211	52.3	24.8	50	218	31.0	9.24	4.38
Se	µg/kg	49.0	9.31	19.0	38	49.6	5.08	1.89	3.85
Rb	µg/kg	471	44.8	9.5	13	465	33.0	15.5	3.30
Ca	g/kg	0.071	0.041	57.4	253	0.080	0.030	0.003	4.51
Cl (as Cl)	g/kg	0.403	0.145	36.0	54	0.413	0.082	0.025	6.12
K	g/kg	3.73	0.296	7.9	320	3.74	0.203	0.021	0.554
Mg	g/kg	1.27	0.104	8.2	322	1.27	0.069	0.007	0.573
N - Kjeldahl (as N)	g/kg	13.3	0.866	6.5	224	13.3	0.598	0.072	0.545
P (as P)	g/kg	3.28	0.211	6.4	325	3.28	0.130	0.015	0.445
S (as S)	g/kg	1.03	0.103	10.0	180	1.02	0.070	0.010	0.931

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	449	16.4	3.7	113	448	10.9	1.93	0.430
N - elementary	g/kg	13.7	0.602	4.4	159	13.7	0.400	0.060	0.436

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-11.3	0.401	3.5	35	-11.3	0.230	0.085	0.750
delta 15N	‰ Air	1046	33.7	3.2	45	1041	15.3	6.28	0.600

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Total ash	g/kg	14.7	0.918	6.3	28	14.8	0.496	0.217	1.48

Indicative Values IPE 187

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	µg/kg	14.3	9.33	65.2	33	16.0	6.00	2.03	14.2
Cd	µg/kg	5.70	2.65	46.4	42	6.38	1.57	0.510	8.96
Co	µg/kg	6.05	6.16	101.9	34	6.94	3.51	1.32	21.8
Cr	µg/kg	111	102	92.0	41	136	89.0	19.9	18.0
Hg	µg/kg	0.763	1.01	132.5	24	1.30	0.815	0.258	33.8
Li	µg/kg	7.05	7.97	113.0	11	7.17	4.37	3.00	42.6
Pb	µg/kg	34.8	42.1	120.9	39	47.5	35.5	8.43	24.2
Ba	mg/kg	0.243	0.091	37.4	27	0.250	0.041	0.022	8.99
Sb	µg/kg	3.23	3.06	94.8	15	4.49	2.59	0.988	30.6
Sn	µg/kg	47.3	68.0	143.7	12	57.5	49.5	24.5	51.9
Ti	mg/kg	1.02	1.36	132.6	13	1.41	1.05	0.471	46.0
V	µg/kg	29.2	44.9	153.7	17	66.6	58.6	13.6	46.6
Sr	mg/kg	0.135	0.077	57.2	31	0.140	0.048	0.017	12.8
N - NH4 (as N)	mg/kg	43.2	28.7	66.4	10	53.5	16.5	11.3	26.3
N - NO3 (as N)	mg/kg	8.98	14.4	160.6	10	8.10	6.03	5.70	63.5
Na	mg/kg	13.2	16.3	123.3	114	17.0	12.3	1.91	14.4
SO4 (as SO4)	g/kg	0.172	0.130	75.4	12	0.181	0.079	0.047	27.2

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	3.22	3.54	109.8	22	3.91	2.41	0.942	29.3

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	2.27	1.97	87.0	42	2.42	1.10	0.381	16.8

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	12.2	6.60	54.0	16	12.8	4.09	2.06	16.9
ADF-ash-free	g/kg	18.1	2.71	15.0	9	18.1	1.49	1.13	6.26
NDF-ash-free	g/kg	66.8	12.5	18.7	9	67.0	8.60	5.21	7.81
Total fat	g/kg	46.2	10.1	21.9	10	44.3	6.70	4.00	8.66