WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 133

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 133

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 ºC and milled to pass a 0.5 mm sieve.

This IPE sample 133 of Maize / Zea mays from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 5 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	1	3
2010	4	1
2006	3	3
2003	2	3
1999	5	1

Consensus Values IPE 133

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
As	µg/kg	144	20.3	14.1	91	142	14.7	2.7	140 - 148
Ba	mg/kg	3.53	0.475	13.5	66	3.59	0.345	0.073	3.41 - 3.65
Ca	g/kg	1.87	0.155	8.3	609	1.87	0.108	0.008	1.85 - 1.88
Cd	µg/kg	259	28.6	11.0	204	259	20.0	2.5	255.0 - 262.9
Cl (as Cl)	g/kg	1.21	0.145	12.0	125	1.21	0.105	0.016	1.18 - 1.23
Co	µg/kg	81.3	10.96	13.5	111	81.0	7.70	1.30	79.2 - 83.3
Cu	mg/kg	6.51	0.665	10.2	568	6.50	0.470	0.035	6.45 - 6.56
Fe	mg/kg	190	20.1	10.6	571	189	13.9	1.1	188.5 - 191.8
Hg	µg/kg	5.37	0.819	15.3	88	5.40	0.595	0.109	5.19 - 5.54
K	g/kg	7.88	0.461	5.9	611	7.90	0.313	0.023	7.84 - 7.92
Mg	g/kg	1.15	0.078	6.8	611	1.15	0.054	0.004	1.14 - 1.16
Mn	mg/kg	122	7.8	6.4	596	121	5.3	0.4	121.3 - 122.6
Mo	µg/kg	171	28.4	16.6	108	175	20.0	3.4	165 - 176
N - Kjeldahl (as N)	g/kg	11.6	0.59	5.1	398	11.6	0.41	0.04	11.51 - 11.63
N - NO3 (as N)	mg/kg	206	25.8	12.5	64	209	18.9	4.0	200 - 213
Na	mg/kg	104	23.5	22.7	363	106	16.4	1.5	101.4 - 106.2
Ni	µg/kg	522	68.8	13.2	163	525	48.0	6.7	511 - 533
P (as P)	g/kg	1.49	0.099	6.7	609	1.50	0.069	0.005	1.48 - 1.50
Pb	µg/kg	920	91.6	10.0	182	921	63.0	8.5	906 - 933
Rb	µg/kg	3180	232	7.3	20	3210	159	65	3074 - 3290
S (as S)	g/kg	0.931	0.0854	9.2	342	0.930	0.0600	0.0058	0.922 - 0.940
Sr	mg/kg	3.32	0.299	9.0	64	3.34	0.210	0.047	3.24 - 3.39
V	µg/kg	403	43.6	10.8	58	409	29.5	7.2	392 - 414
Zn	mg/kg	47.6	3.55	7.5	596	47.6	2.46	0.18	47.28 - 47.85

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
C - elementary	g/kg	452	11.9	2.6	139	452	8.0	1.3	449.9 - 453.9
N - elementary	g/kg	12.0	0.64	5.3	239	12.0	0.45	0.05	11.95 - 12.11

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	83.7	14.98	17.9	107	83.0	10.60	1.81	80.8 - 86.5

Consensus Values IPE 133

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Crude fibre	g/kg	167	13.0	7.8	27	165	9.0	3.1	162 - 173
Total ash	g/kg	38.1	1.85	4.8	50	38.0	1.25	0.33	37.6 - 38.7

Indicative Values IPE 133

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
B	mg/kg	3.38	1.104	32.7	383	3.48	0.770	0.071	3.27 - 3.49
Be	µg/kg	7.05	3.409	48.4	23	7.50	2.500	0.889	5.58 - 8.52
Br	mg/kg	5.88	0.993	16.9	8	6.02	0.700	0.439	5.07 - 6.69
Cr	µg/kg	459	118.4	25.8	150	467	83.0	12.1	440 - 478
Li	µg/kg	78.9	21.50	27.2	20	80.0	14.95	6.01	68.9 - 89.0
Sb	µg/kg	31.2	9.16	29.3	28	32.2	6.00	2.16	27.7 - 34.8
Se	µg/kg	24.0	6.17	25.7	41	24.7	4.60	1.20	22.1 - 26.0
Sn	µg/kg	69.2	18.31	26.5	13	68.1	12.20	6.35	58.2 - 80.2

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
ADF-ash-free	g/kg	207	5.7	2.7	11	207	4.0	2.1	202.9 - 210.4
NDF-ash-free	g/kg	402	18.2	4.5	11	410	14.0	6.9	390 - 414
Total fat	g/kg	21.7	5.10	23.5	12	22.4	3.48	1.84	18.5 - 24.9

Informative Values IPE 133

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
Ag	µg/kg	6.87	3.130	7	10.00	7
Bi	µg/kg	7.42	3.950	10	12.40	9
Cs	µg/kg	15.6	1.00	7		
I	µg/kg	264	102.5	13		
N - NH4 (as N)	mg/kg	73.4	42.44	17		
SO4 (as SO4)	g/kg	0.160	0.0597	20		
Ti	mg/kg	2.92	1.280	16		

Method: Real totals

Element	Unit	Median	MAD	N
Al	mg/kg	147	72.5	49
Si	mg/kg	6080	614	6

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	825	823.8	10

Method: Other determinations

Element	Unit	Median	MAD	N
delta 13C	‰ V-PDB	-12.0	0.11	7
delta 15N	‰ Air	6.25	0.170	7

Method: Nutritional values

Element	Unit	Median	MAD	N
NDF-ash-containing	g/kg	440	18.0	3