WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 238

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 238

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 238 of Banana (leaf) / Musa sp. from Philippines is prepared for the WEPAL proficiency programs. The sample is used in 2 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
2021	3	2
2017	3	1

Consensus Values IPE 238

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
B	mg/kg	26.0	2.09	8.0	166	25.8	1.42	0.20	25.66 - 26.30
Ba	mg/kg	25.3	2.55	10.1	36	25.2	1.72	0.53	24.5 - 26.2
Br	mg/kg	17.5	1.91	10.9	23	17.3	1.33	0.50	16.7 - 18.3
Ca	g/kg	7.08	0.413	5.8	227	7.08	0.282	0.034	7.02 - 7.13
Cl (as Cl)	g/kg	9.81	0.572	5.8	45	9.80	0.400	0.107	9.64 - 9.99
Co	µg/kg	76.4	9.57	12.5	61	77.7	6.68	1.53	73.9 - 78.8
Cs	µg/kg	41.6	8.17	19.6	16	42.3	5.90	2.55	37.3 - 46.0
Cu	mg/kg	11.0	0.74	6.8	204	11.0	0.50	0.07	10.92 - 11.13
Fe	mg/kg	93.7	8.63	9.2	222	94.1	5.90	0.72	92.5 - 94.8
K	g/kg	39.0	2.66	6.8	244	39.0	1.82	0.21	38.65 - 39.33
Mg	g/kg	3.07	0.177	5.8	225	3.08	0.122	0.015	3.05 - 3.10
Mn	mg/kg	913	61.7	6.8	220	912	42.6	5.2	905 - 921
Mo	µg/kg	350	33.2	9.5	58	350	22.7	5.4	342 - 359
N - Kjeldahl (as N)	g/kg	29.3	1.20	4.1	132	29.2	0.82	0.13	29.09 - 29.50
Na	mg/kg	94.6	19.60	20.7	131	95.6	14.08	2.14	91.2 - 97.9
Ni	µg/kg	646	61.3	9.5	41	650	42.2	12.0	626 - 665
P (as P)	g/kg	2.10	0.130	6.2	221	2.10	0.090	0.011	2.08 - 2.12
Rb	µg/kg	11700	1000	8.6	26	11700	670	250	11317 - 12125
S (as S)	g/kg	2.37	0.193	8.2	125	2.36	0.135	0.022	2.33 - 2.40
Sr	mg/kg	21.1	2.04	9.7	32	21.1	1.40	0.45	20.4 - 21.8
V	µg/kg	67.7	13.26	19.6	17	70.0	10.07	4.02	60.9 - 74.5
Zn	mg/kg	22.7	1.66	7.3	226	22.7	1.13	0.14	22.49 - 22.92

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
C - elementary	g/kg	461	11.6	2.5	70	461	8.0	1.7	458.2 - 463.8
N - elementary	g/kg	30.9	0.87	2.8	101	30.9	0.60	0.11	30.71 - 31.05

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	31.9	6.10	19.1	39	32.1	4.10	1.22	29.9 - 33.9

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Total ash	g/kg	106	4.4	4.1	33	105	2.9	0.9	104.2 - 107.3

Indicative Values IPE 238

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
As	µg/kg	13.0	6.20	47.6	28	14.9	4.31	1.46	10.6 - 15.4
Cd	µg/kg	7.06	3.420	48.4	34	7.49	2.492	0.733	5.87 - 8.26
Cr	µg/kg	622	160.3	25.8	63	638	110.3	25.2	582 - 663
Hg	µg/kg	7.47	2.122	28.4	27	7.72	1.523	0.511	6.64 - 8.31
I	µg/kg	124	28.8	23.3	8	127	21.5	12.7	100 - 147
Pb	µg/kg	61.7	30.83	50.0	44	69.6	22.92	5.81	52.3 - 71.0
Se	µg/kg	40.6	15.41	38.0	24	42.5	11.03	3.93	34.1 - 47.1
Ti	mg/kg	1.57	0.597	37.9	9	1.73	0.454	0.249	1.12 - 2.02

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	33.8	11.12	32.9	29	36.1	8.17	2.58	29.6 - 38.1

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
delta 13C	‰ V-PDB	-26.3	0.22	0.8	9	-26.2	0.16	0.09	-26.45 - -26.12
delta 15N	‰ Air	5.67	0.174	3.1	9	5.64	0.128	0.072	5.54 - 5.80

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
ADF-ash-free	g/kg	392	20.8	5.3	9	388	14.1	8.7	376 - 408
Crude fibre	g/kg	283	31.1	11.0	14	279	21.6	10.4	265 - 301
NDF-ash-free	g/kg	707	16.7	2.4	8	702	11.2	7.4	693 - 720
Total fat	g/kg	33.0	10.30	31.2	11	33.0	7.00	3.88	26.2 - 39.9

Informative Values IPE 238

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
Ag	µg/kg	5.61	4.005	5		
Be	µg/kg	3.37	1.160	3	20.00	5
Bi	µg/kg	2.00	1.445	3		
Ga	µg/kg	-	-	0	106	5
Li	µg/kg	37.7	22.02	11		
N - NO3 (as N)	mg/kg	51.4	7.08	6		
Sb	µg/kg	14.5	5.30	19	40.0	6
Sn	µg/kg	79.5	51.05	7		

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	4000	101	3

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	275	135.9	7