



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 198



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 198 of Banana / Musa paradisiaca from Senegal 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
2014	3	3
2010	3	1



Consensus Values IPE 198



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	194	46.3	23.9	37	195	33.0	9.5	178	-	209
B	mg/kg	25.4	2.79	11.0	173	25.3	1.90	0.27	24.9	-	25.8
Ba	mg/kg	13.8	2.49	18.1	29	13.6	1.79	0.58	12.8	-	14.7
Ca	g/kg	16.2	0.99	6.1	240	16.1	0.68	0.08	16.03	-	16.28
Cl (as Cl)	g/kg	4.98	0.311	6.2	46	5.00	0.216	0.057	4.89	-	5.08
Co	µg/kg	266	39.1	14.7	55	265	28.2	6.6	255	-	277
Cr	µg/kg	1590	315	19.8	63	1560	223	50	1512	-	1671
Cu	mg/kg	3.53	0.697	19.7	219	3.54	0.480	0.059	3.44	-	3.62
Fe	mg/kg	680	79.7	11.7	224	676	56.3	6.7	669	-	690
Hg	µg/kg	28.9	3.85	13.3	27	29.8	2.67	0.93	27.4	-	30.5
K	g/kg	14.1	0.85	6.1	240	14.0	0.59	0.07	13.98	-	14.19
Mg	g/kg	3.41	0.225	6.6	238	3.39	0.157	0.018	3.38	-	3.44
Mn	mg/kg	483	37.4	7.7	225	482	25.8	3.1	478	-	488
Mo	µg/kg	615	89.9	14.6	58	620	60.8	14.8	591	-	638
N - Kjeldahl (as N)	g/kg	8.84	0.619	7.0	156	8.85	0.430	0.062	8.74	-	8.94
N - NO3 (as N)	mg/kg	340	39.4	11.6	18	344	26.8	11.6	321	-	360
Na	mg/kg	631	63.6	10.1	140	634	45.0	6.7	621	-	642
Ni	µg/kg	1010	213	21.2	57	1020	150	35	949	-	1062
P (as P)	g/kg	0.956	0.0719	7.5	240	0.960	0.0500	0.0058	0.947	-	0.965
Pb	µg/kg	1080	168	15.5	64	1070	117	26	1040	-	1124
S (as S)	g/kg	1.54	0.120	7.8	138	1.54	0.081	0.013	1.52	-	1.56
Se	µg/kg	124	25.7	20.6	30	124	18.5	5.9	115	-	134
Sr	mg/kg	49.0	2.08	4.3	30	49.2	1.44	0.48	48.2	-	49.8
V	µg/kg	1500	349	23.3	27	1490	256	84	1359	-	1635
Zn	mg/kg	26.9	3.06	11.4	219	26.9	2.06	0.26	26.5	-	27.3

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	1430	141	9.8	26	1450	100	35	1377	-	1491
C - elementary	g/kg	450	8.0	1.8	64	450	5.5	1.3	447.9	-	451.9
N - elementary	g/kg	9.66	0.593	6.1	97	9.61	0.390	0.075	9.54	-	9.78

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	1270	209	16.5	50	1280	145	37	1209	-	1328



Consensus Values IPE 198

Method: Nutritional values

Element

Total ash

Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
g/kg	122	4.7	3.9	28	122	3.2	1.1	119.7	-	123.3



Indicative Values IPE 198



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Be	µg/kg	21.2	5.06	23.9	11	21.7	3.78	1.91	17.8	-	24.5
Cd	µg/kg	19.8	5.09	25.7	42	21.1	3.85	0.98	18.2	-	21.3
I	µg/kg	2400	274	11.4	9	2390	202	114	2190	-	2604
Li	µg/kg	454	24.9	5.5	11	446	18.0	9.4	438	-	471
Rb	µg/kg	18100	1500	8.3	11	18300	960	570	17130	-	19120
Sb	µg/kg	24.9	7.10	28.6	13	26.6	5.09	2.46	20.6	-	29.1
Sn	µg/kg	121	28.8	23.7	10	126	20.5	11.4	101	-	142

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
delta 13C	‰ V-PDB	-28.3	0.23	0.8	9	-28.4	0.15	0.09	-28.44	-	-28.10
delta 15N	‰ Air	11.4	0.54	4.8	9	11.5	0.39	0.23	11.01	-	11.83

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
ADF-ash-free	g/kg	378	8.0	2.1	8	379	5.6	3.5	371	-	384
Crude fibre	g/kg	313	11.6	3.7	9	316	8.1	4.8	305	-	322
Total fat	g/kg	78.7	8.94	11.4	8	75.7	6.45	3.95	71.4	-	85.9



Informative Values IPE 198



Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N
Ag	µg/kg	16.6	2.40	4
Bi	µg/kg	6.68	1.280	7
Br	mg/kg	20.6	4.80	7
Cs	µg/kg	77.5	7.40	5
N - NH4 (as N)	mg/kg	63.0	19.00	5
SO4 (as SO4)	g/kg	0.740	0.2500	7
Ti	mg/kg	29.8	18.16	18

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	24600	1820	5

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	7010	6216	3

Method: Nutritional values

Element	Unit	Median	MAD	N
NDF-ash-containing	g/kg	602	27.0	3
NDF-ash-free	g/kg	587	10.0	7