



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 234



Certificate of Analysis IPE 234

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 234 of Banana (leaf) / Musa sp., from Ecuador, 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
2024	3	2
2020	4	4
2017	1	1



Consensus Values IPE 234

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	28.1	2.52	8.9	227	28.1	1.60	0.209	0.742
Cu	mg/kg	8.63	0.889	10.3	283	8.67	0.610	0.066	0.765
Fe	mg/kg	185	17.2	9.3	279	184	10.1	1.28	0.696
Mn	mg/kg	599	43.8	7.3	284	596	28.0	3.25	0.542
Zn	mg/kg	25.9	1.98	7.6	276	25.9	1.15	0.149	0.575
As	µg/kg	61.8	13.3	21.4	47	63.0	6.40	2.42	3.91
Cd	µg/kg	91.0	14.3	15.7	75	92.8	8.82	2.07	2.27
Co	µg/kg	144	19.5	13.6	60	146	12.5	3.15	2.19
Cr	µg/kg	524	120	22.8	61	535	73.4	19.1	3.65
Hg	µg/kg	15.3	2.30	15.0	42	15.2	1.35	0.443	2.89
Mo	µg/kg	569	69.2	12.2	74	570	41.4	10.1	1.77
Ni	µg/kg	1595	223	14.0	64	1615	142	34.8	2.18
Pb	µg/kg	126	39.9	31.8	65	130	27.0	6.18	4.93
Se	µg/kg	156	34.2	21.8	45	161	25.3	6.37	4.07
Ba	mg/kg	14.1	0.937	6.6	30	14.2	0.650	0.214	1.52
V	µg/kg	468	68.0	14.5	24	460	47.2	17.3	3.71
Sr	mg/kg	33.6	1.89	5.6	24	33.6	1.11	0.483	1.44
Rb	µg/kg	4755	394	8.3	13	4800	185	137	2.87
Ca	g/kg	7.92	0.526	6.6	292	7.91	0.310	0.038	0.486
Cl (as Cl)	g/kg	12.2	0.831	6.8	48	12.1	0.450	0.150	1.23
K	g/kg	35.0	2.30	6.6	306	34.9	1.40	0.164	0.469
Mg	g/kg	3.56	0.208	5.9	296	3.55	0.130	0.015	0.425
N - Kjeldahl (as N)	g/kg	25.7	1.27	5.0	189	25.7	0.820	0.116	0.451
N - NO3 (as N)	mg/kg	47.9	7.14	14.9	14	48.8	4.12	2.39	4.99
Na	mg/kg	69.1	25.8	37.3	151	74.1	17.5	2.63	3.80
P (as P)	g/kg	1.72	0.104	6.0	304	1.73	0.068	0.007	0.433
S (as S)	g/kg	2.03	0.183	9.0	179	2.04	0.118	0.017	0.842

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	455	12.0	2.6	102	455	6.90	1.48	0.326
N - elementary	g/kg	26.9	0.905	3.4	145	26.9	0.603	0.094	0.349

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	104	24.3	23.3	61	105	17.6	3.89	3.73



Consensus Values IPE 234

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-27.1	0.216	0.8	14	-27.1	0.155	0.072	0.266
delta 15N	‰ Air	4.97	0.292	5.9	13	4.97	0.160	0.101	2.04

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	290	46.3	16.0	20	295	23.3	12.9	4.46
ADF-ash-free	g/kg	436	19.5	4.5	9	438	11.0	8.13	1.87
NDF-ash-free	g/kg	647	30.5	4.7	9	649	17.1	12.7	1.96
Total ash	g/kg	121	4.42	3.7	37	121	2.60	0.908	0.751



Indicative Values IPE 234

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
I	µg/kg	242	61.6	25.5	11	257	43.0	23.2	9.60
Li	µg/kg	274	84.0	30.6	15	264	36.0	27.1	9.88
Sb	µg/kg	8.93	3.12	35.0	9	9.22	1.93	1.30	14.6
Sn	µg/kg	83.7	27.9	33.3	10	82.8	14.2	11.0	13.2
Ti	mg/kg	5.89	1.79	30.4	11	6.35	1.36	0.676	11.5
Be	µg/kg	4.76	1.82	38.3	6	5.15	1.01	0.930	19.5
Cs	µg/kg	10.3	0.604	5.9	5	10.3	0.380	0.337	3.29

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	139	42.9	30.7	33	144	27.1	9.33	6.69
Si	mg/kg	14589	4437	30.4	8	14347	2677	1961	13.4

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Total fat	g/kg	37.4	12.9	34.5	17	37.9	7.90	3.91	10.5