



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 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 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 234 of Banana (leaf) / Musa sp. from Ecuador 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
2020	4	4
2017	1	1



Consensus Values IPE 234



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
B	mg/kg	28.2	2.45	8.7	152	28.2	1.70	0.25	27.77	- 28.55
Ba	mg/kg	14.2	0.91	6.4	22	14.3	0.65	0.24	13.78	- 14.58
Ca	g/kg	7.92	0.505	6.4	202	7.92	0.349	0.044	7.85	- 7.99
Cd	µg/kg	90.6	13.96	15.4	52	93.1	10.02	2.42	86.7	- 94.5
Cl (as Cl)	g/kg	12.3	0.81	6.6	33	12.3	0.55	0.18	11.96	- 12.54
Co	µg/kg	144	19.5	13.5	42	147	13.4	3.8	138	- 150
Cr	µg/kg	536	103.3	19.3	38	549	74.1	21.0	502	- 570
Cu	mg/kg	8.66	0.988	11.4	196	8.70	0.700	0.088	8.52	- 8.80
Fe	mg/kg	184	17.3	9.4	195	184	11.7	1.5	181.4	- 186.3
Hg	µg/kg	15.6	2.05	13.1	24	15.7	1.45	0.52	14.8	- 16.5
K	g/kg	35.1	2.34	6.7	212	35.0	1.62	0.20	34.78	- 35.41
Mg	g/kg	3.55	0.196	5.5	203	3.55	0.135	0.017	3.52	- 3.58
Mn	mg/kg	598	40.1	6.7	195	595	27.7	3.6	592	- 603
Mo	µg/kg	567	58.5	10.3	52	570	40.0	10.1	550	- 583
N - Kjeldahl (as N)	g/kg	25.7	1.20	4.7	131	25.7	0.82	0.13	25.47	- 25.89
Ni	µg/kg	1610	211	13.1	40	1620	144	42	1542	- 1676
P (as P)	g/kg	1.73	0.102	5.9	210	1.73	0.071	0.009	1.71	- 1.74
S (as S)	g/kg	2.04	0.175	8.6	121	2.04	0.121	0.020	2.01	- 2.07
Se	µg/kg	161	40.3	25.0	30	163	29.1	9.2	146	- 176
Sr	mg/kg	33.7	1.55	4.6	19	33.9	1.00	0.45	33.0	- 34.5
V	µg/kg	473	58.1	12.3	18	465	42.2	17.1	444	- 502
Zn	mg/kg	25.9	1.64	6.4	192	25.9	1.11	0.15	25.66	- 26.12

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
C - elementary	g/kg	456	8.6	1.9	69	455	6.0	1.3	453.7	- 457.9
N - elementary	g/kg	26.8	0.77	2.9	98	26.8	0.53	0.10	26.68	- 26.99

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	mg/kg	102	25.1	24.7	42	104	17.6	4.8	93.8	- 109

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Total ash	g/kg	121	3.6	3.0	25	121	2.4	0.9	119.2	- 122.1



Indicative Values IPE 234



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	58.7	20.74	35.3	30	63.7	14.66	4.73	50.9	-	66.4
I	µg/kg	247	59.9	24.3	9	257	43.0	25.0	202	-	292
Li	µg/kg	290	92.1	31.8	11	300	64.0	34.7	228	-	351
N - NO3 (as N)	mg/kg	47.6	6.24	13.1	11	48.4	4.62	2.35	43.4	-	51.7
Na	mg/kg	70.1	25.98	37.1	99	74.3	18.37	3.26	64.9	-	75.3
Pb	µg/kg	124	36.8	29.8	44	130	28.5	6.9	113	-	135
Rb	µg/kg	4740	362	7.6	10	4820	242	143	4481	-	4991
Ti	mg/kg	5.60	1.638	29.3	9	6.11	1.120	0.682	4.36	-	6.83

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	143	44.8	31.4	20	146	30.7	12.5	122	-	164

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
delta 13C	‰ V-PDB	-27.1	0.15	0.5	9	-27.1	0.09	0.06	-27.20	-	-26.98
delta 15N	‰ Air	5.01	0.106	2.1	8	5.01	0.074	0.047	4.93	-	5.10

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
ADF-ash-free	g/kg	434	14.3	3.3	8	434	10.3	6.3	423	-	446
Crude fibre	g/kg	290	40.4	13.9	15	296	29.3	13.0	268	-	312
NDF-ash-free	g/kg	645	25.9	4.0	8	646	19.1	11.4	624	-	666
Total fat	g/kg	38.3	13.51	35.2	11	37.9	9.10	5.09	29.4	-	47.3



Informative Values IPE 234



Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
Ag	µg/kg	14.7	9.89	6		
Be	µg/kg	5.45	1.060	5	60.00	7
Bi	µg/kg	6.43	4.090	4		
Cs	µg/kg	10.5	0.44	4		
Ga	µg/kg	37.2	14.20	4		
Sb	µg/kg	9.22	1.930	7	35.00	6
Sn	µg/kg	89.5	29.85	6		
SO4 (as SO4)	g/kg	2.19	1.348	5		

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	15300	2200	3

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	1640	1501	4