



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 181



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 181 of Mango (leaf) / *Mangifera indica* from Senegal is prepared for the WEPAL proficiency programs. The sample is used in 4 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
2019	1	3
2014	2	1
2010	1	2
2007	2	3



Consensus Values IPE 181



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
B	mg/kg	31.1	3.35	10.8	334	31.0	2.30	0.23	30.73	- 31.45
Ba	mg/kg	46.6	4.13	8.8	49	45.8	2.78	0.74	45.4	- 47.8
Be	µg/kg	29.5	3.18	10.8	23	30.0	2.10	0.83	28.1	- 30.9
Ca	g/kg	20.7	1.30	6.3	466	20.7	0.90	0.08	20.59	- 20.83
Cd	µg/kg	30.4	5.04	16.5	96	30.5	3.52	0.64	29.4	- 31.5
Cl (as Cl)	g/kg	1.13	0.165	14.6	85	1.15	0.119	0.022	1.10	- 1.17
Co	µg/kg	202	25.6	12.7	94	202	17.7	3.3	197	- 207
Cr	µg/kg	735	161.8	22.0	112	736	111.1	19.1	705	- 765
Cu	mg/kg	4.50	0.724	16.1	433	4.52	0.494	0.043	4.43	- 4.57
Fe	mg/kg	266	26.2	9.9	431	265	18.0	1.6	263.4	- 268.3
Hg	µg/kg	31.9	2.77	8.7	77	32.0	1.98	0.39	31.3	- 32.6
K	g/kg	6.66	0.506	7.6	479	6.65	0.350	0.029	6.61	- 6.70
Li	µg/kg	372	52.4	14.1	23	365	36.0	13.7	349	- 394
Mg	g/kg	1.77	0.120	6.8	477	1.77	0.080	0.007	1.76	- 1.78
Mn	mg/kg	650	49.2	7.6	444	647	33.7	2.9	645	- 655
Mo	µg/kg	226	44.1	19.5	106	233	32.2	5.3	217	- 234
N - Kjeldahl (as N)	g/kg	13.5	0.75	5.6	302	13.5	0.51	0.05	13.44	- 13.61
Na	mg/kg	382	39.1	10.2	277	382	27.7	2.9	377	- 386
Ni	µg/kg	1400	160	11.4	112	1400	110	19	1366	- 1426
P (as P)	g/kg	0.913	0.0605	6.6	479	0.913	0.0420	0.0035	0.907	- 0.918
Pb	µg/kg	669	77.0	11.5	126	672	53.5	8.6	655	- 682
Rb	µg/kg	18000	1280	7.1	16	17800	890	400	17330	- 18680
S (as S)	g/kg	1.30	0.101	7.8	272	1.30	0.070	0.008	1.29	- 1.31
Sr	mg/kg	57.6	3.95	6.8	51	58.0	2.70	0.69	56.5	- 58.7
V	µg/kg	628	56.5	9.0	42	630	39.0	10.9	610	- 645
Zn	mg/kg	17.3	1.65	9.6	438	17.4	1.12	0.10	17.15	- 17.46

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	mg/kg	520	58.5	11.2	37	512	41.1	12.0	501	- 540
C - elementary	g/kg	468	12.7	2.7	146	466	8.6	1.3	466.2	- 470.4
N - elementary	g/kg	14.0	0.61	4.3	215	14.0	0.42	0.05	13.95	- 14.12

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	mg/kg	454	73.0	16.1	98	452	50.9	9.2	440	- 469



Consensus Values IPE 181

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
delta 13C	‰ V-PDB	-28.3	0.40	1.4	19	-28.4	0.27	0.11	-28.54	-	-28.16
delta 15N	‰ Air	5.14	0.434	8.5	19	5.20	0.310	0.125	4.93	-	5.35

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Crude fibre	g/kg	237	35.2	14.9	22	235	24.3	9.4	221	-	253
Total ash	g/kg	101	5.2	5.1	45	100	3.6	1.0	99.5	-	102.6



Indicative Values IPE 181



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	77.1	37.81	49.0	68	79.3	26.00	5.73	67.9	-	86.2
Cs	µg/kg	238	13.8	5.8	8	243	10.0	6.1	227	-	249
I	µg/kg	1190	233	19.7	12	1150	159	84	1040	-	1333
N - NH4 (as N)	mg/kg	84.7	40.42	47.7	15	91.9	25.90	13.05	62.5	-	107
Se	µg/kg	275	79.2	28.8	55	281	55.7	13.3	254	-	296
Sn	µg/kg	34.6	15.97	46.2	20	37.5	11.05	4.46	27.1	-	42.0

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
ADF-ash-free	g/kg	289	25.1	8.7	8	287	17.3	11.1	268	-	309
NDF-ash-free	g/kg	406	73.1	18.0	8	406	51.9	32.3	346	-	466



Informative Values IPE 181

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
Ag	µg/kg	9.35	3.790	8	537.00	5
Bi	µg/kg	2.85	0.700	6	100.00	7
Br	mg/kg	14.1	2.90	3		
F	mg/kg	3.70	1.060	4		
Ga	µg/kg	240	97.0	3		
N - NO3 (as N)	mg/kg	15.3	6.07	22	34.5	16
Sb	µg/kg	7.68	3.430	22	25.00	13
SO4 (as SO4)	g/kg	0.545	0.2235	12		
Ti	mg/kg	10.50	5.000	21		

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	15100	440	6

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	1660	1171	9

Method: Nutritional values

Element	Unit	Median	MAD	N
Total fat	g/kg	45.1	13.90	17