WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 185

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 185

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 185 of Oil Palm (leaf) / Elaeis guineensis 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
2019	1	2
2014	1	2

Consensus Values IPE 185

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
As	µg/kg	164	37.3	22.7	37	165	26.2	7.7	152 - 177
B	mg/kg	15.8	1.83	11.6	165	15.8	1.28	0.18	15.49 - 16.05
Ba	mg/kg	4.50	0.483	10.7	26	4.48	0.320	0.118	4.31 - 4.70
Ca	g/kg	7.32	0.593	8.1	223	7.32	0.409	0.050	7.24 - 7.40
Cl (as Cl)	g/kg	6.25	0.358	5.7	36	6.20	0.240	0.075	6.13 - 6.37
Co	µg/kg	169	20.8	12.3	44	170	14.5	3.9	163 - 175
Cr	µg/kg	1150	170	14.8	53	1160	117	29	1108 - 1202
Cu	mg/kg	4.21	0.593	14.1	202	4.20	0.414	0.052	4.13 - 4.29
Fe	mg/kg	548	55.2	10.1	207	542	38.4	4.8	540 - 555
Hg	µg/kg	52.1	5.61	10.8	30	52.2	4.04	1.28	50.1 - 54.2
K	g/kg	3.39	0.316	9.3	224	3.38	0.219	0.026	3.35 - 3.43
Li	µg/kg	504	125.3	24.9	17	484	90.7	38.0	440 - 568
Mg	g/kg	4.08	0.286	7.0	226	4.07	0.195	0.024	4.04 - 4.12
Mn	mg/kg	104	8.3	8.0	212	103	5.6	0.7	102.9 - 105.1
Mo	µg/kg	361	37.9	10.5	58	367	27.1	6.2	351 - 371
N - Kjeldahl (as N)	g/kg	12.6	0.60	4.7	140	12.6	0.41	0.06	12.52 - 12.72
Na	mg/kg	1360	133	9.8	137	1350	94	14	1333 - 1378
Ni	µg/kg	978	170.4	17.4	47	988	122.0	31.1	928 - 1028
P (as P)	g/kg	0.949	0.0619	6.5	227	0.957	0.0430	0.0051	0.941 - 0.957
Pb	µg/kg	338	49.8	14.7	53	346	36.0	8.6	325 - 352
S (as S)	g/kg	1.24	0.093	7.5	135	1.25	0.063	0.010	1.23 - 1.26
Se	µg/kg	196	44.3	22.6	30	199	31.0	10.1	179 - 212
Sr	mg/kg	20.3	1.13	5.5	26	20.3	0.77	0.28	19.9 - 20.8
V	µg/kg	924	121.3	13.1	22	933	87.5	32.3	871 - 978
Zn	mg/kg	10.3	1.53	14.8	201	10.3	1.05	0.13	10.12 - 10.55

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	676	69.2	10.2	22	676	47.8	18.4	646 - 707
C - elementary	g/kg	483	13.1	2.7	68	482	8.9	2.0	480.0 - 486.3
N - elementary	g/kg	13.1	0.53	4.1	101	13.1	0.37	0.07	13.00 - 13.21

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Al	mg/kg	568	97.3	17.1	49	558	66.1	17.4	540 - 596

Consensus Values IPE 185

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Total ash	g/kg	75.4	2.21	2.9	30	75.6	1.45	0.51	74.6 - 76.3

Indicative Values IPE 185

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Be	µg/kg	26.3	5.06	19.2	12	25.9	3.65	1.83	23.1 - 29.5
Cd	µg/kg	10.9	3.06	28.2	41	11.6	2.25	0.60	9.90 - 11.8
Rb	µg/kg	5670	421	7.4	8	5740	273	186	5328 - 6014
Sb	µg/kg	7.12	2.774	38.9	10	7.12	1.930	1.097	5.17 - 9.08

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits
Crude fibre	g/kg	316	23.6	7.4	13	316	15.6	8.2	302 - 330
Total fat	g/kg	27.7	9.87	35.6	9	28.0	7.00	4.11	20.3 - 35.1

Informative Values IPE 185

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<) Median of <	N
Ag	µg/kg	8.41	1.760	6		
Bi	µg/kg	4.10	1.185	4	53.00	5
Cs	µg/kg	126	4.0	3		
Ga	µg/kg	176	27.0	3		
I	µg/kg	2180	319	6		
N - NH4 (as N)	mg/kg	56.3	13.39	4		
N - NO3 (as N)	mg/kg	17.5	6.28	10	74.2	6
Sn	µg/kg	66.9	24.95	11	100.0	8
SO4 (as SO4)	g/kg	0.455	0.3350	3		
Ti	mg/kg	15.0	8.20	12		

Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	19000	190	3

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	16700	950	5

Method: Other determinations

Element	Unit	Median	MAD	N
delta 13C	‰ V-PDB	-28.6	0.08	7
delta 15N	‰ Air	2.22	0.230	7

Method: Nutritional values

Element	Unit	Median	MAD	N
ADF-ash-free	g/kg	411	11.0	6
NDF-ash-free	g/kg	560	40.5	6