WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 212

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 212

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 212 of Oil palm leaves / Elaeis guineensis, from Colombia, is prepared for the WEPAL proficiency programs. The sample has been 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
2023	1	4
2020	1	2
2016	4	4
2012	3	4

Consensus Values IPE 212

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	18.0	2.11	11.7	309	18.0	1.30	0.150	0.833
Cu	mg/kg	5.95	0.979	16.4	394	5.93	0.570	0.062	1.04
Fe	mg/kg	87.0	10.8	12.4	391	87.4	6.86	0.682	0.784
Mn	mg/kg	457	46.5	10.2	401	454	29.1	2.90	0.636
Zn	mg/kg	16.2	2.13	13.1	393	16.2	1.25	0.134	0.828
As	µg/kg	69.6	25.0	36.0	59	73.9	15.3	4.08	5.86
Cd	µg/kg	40.9	7.26	17.8	94	41.1	4.41	0.937	2.29
Cr	µg/kg	269	89.5	33.3	77	280	53.0	12.7	4.74
Hg	µg/kg	27.3	5.38	19.7	59	28.0	2.83	0.876	3.20
Mo	µg/kg	127	34.3	27.0	88	129	18.9	4.56	3.60
Ni	µg/kg	1049	139	13.2	80	1060	77.5	19.4	1.85
Pb	µg/kg	198	48.2	24.4	87	204	33.6	6.46	3.27
Se	µg/kg	388	76.4	19.7	60	387	44.5	12.3	3.18
Ba	mg/kg	9.20	2.19	23.8	38	9.07	1.58	0.443	4.82
V	µg/kg	180	34.6	19.2	30	181	18.0	7.91	4.38
Sr	mg/kg	18.4	1.06	5.7	37	18.5	0.710	0.217	1.18
Be	µg/kg	20.6	2.52	12.2	10	21.4	1.20	0.994	4.82
Rb	µg/kg	11693	1268	10.8	15	11540	960	409	3.50
Ca	g/kg	7.19	0.610	8.5	416	7.18	0.387	0.037	0.520
Cl (as Cl)	g/kg	6.30	0.421	6.7	74	6.30	0.216	0.061	0.971
K	g/kg	10.0	0.761	7.6	429	10.0	0.500	0.046	0.459
Mg	g/kg	3.01	0.233	7.7	423	3.00	0.150	0.014	0.471
N - Kjeldahl (as N)	g/kg	24.7	1.25	5.1	266	24.7	0.765	0.096	0.389
Na	mg/kg	71.4	21.1	29.6	210	72.3	12.5	1.82	2.55
P (as P)	g/kg	1.60	0.109	6.8	426	1.60	0.073	0.007	0.413
S (as S)	g/kg	1.76	0.161	9.2	252	1.76	0.100	0.013	0.721

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	479	14.2	3.0	128	479	8.20	1.56	0.327
Al	mg/kg	79.0	15.9	20.2	41	79.1	8.51	3.11	3.93
Si	mg/kg	21519	2142	10.0	10	21850	1595	847	3.93
N - elementary	g/kg	25.8	0.881	3.4	195	25.8	0.583	0.079	0.306

Consensus Values IPE 212

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	63.1	12.9	20.5	85	63.2	7.84	1.75	2.78

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-29.5	0.333	1.1	15	-29.5	0.250	0.107	0.364
delta 15N	‰ Air	3.30	0.158	4.8	14	3.32	0.096	0.053	1.60

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	213	21.8	10.2	26	217	14.7	5.33	2.50
ADF-ash-free	g/kg	332	39.1	11.8	20	325	28.0	10.9	3.30
NDF-ash-free	g/kg	508	40.3	7.9	16	509	22.6	12.6	2.48
Total ash	g/kg	86.9	3.16	3.6	59	86.9	1.93	0.514	0.591

Indicative Values IPE 212

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
F	mg/kg	8.51	1.08	12.7	7	8.66	0.560	0.510	6.00
Co	µg/kg	31.6	13.2	41.8	67	33.2	6.80	2.02	6.38
Ga	µg/kg	61.8	29.3	47.4	4	69.9	19.7	18.3	29.7
I	µg/kg	165	39.2	23.8	11	161	21.0	14.8	8.96
Li	µg/kg	65.8	27.7	42.1	16	65.8	14.0	8.65	13.1
Bi	µg/kg	2.72	0.771	28.4	4	3.20	0.215	0.482	17.7
Sb	µg/kg	5.27	4.24	80.6	14	5.51	3.49	1.42	26.9
Sn	µg/kg	41.7	46.5	111.4	11	41.2	41.2	17.5	42.0
Ti	mg/kg	2.66	1.59	59.7	17	2.73	1.16	0.481	18.1
Ag	µg/kg	17.8	14.4	81.2	9	19.0	7.60	6.02	33.8
Cs	µg/kg	109	17.1	15.6	5	107	9.00	9.54	8.72
N - NO3 (as N)	mg/kg	8.25	7.89	95.7	11	7.50	4.70	2.97	36.1

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
NDF-ash-containing	g/kg	522	144	27.5	5	478	65.3	80.3	15.4
Total fat	g/kg	24.4	9.90	40.6	23	24.5	5.99	2.58	10.6