



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 186



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 186 of Rice straw / *Oryza sativa* from Philippines 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	2	2
2014	4	4
2011	1	4
2008	2	3



Consensus Values IPE 186



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	1560	220	14.2	95	1540	150	28	1512	-	1601
Ba	mg/kg	24.5	1.65	6.7	45	24.3	1.15	0.31	24.0	-	25.0
Ca	g/kg	3.27	0.289	8.9	435	3.26	0.200	0.017	3.24	-	3.30
Cl (as Cl)	g/kg	4.17	0.236	5.7	78	4.16	0.161	0.033	4.12	-	4.23
Co	µg/kg	206	35.4	17.2	93	208	23.0	4.6	199	-	213
Cu	mg/kg	2.99	0.600	20.1	385	2.97	0.405	0.038	2.93	-	3.05
Fe	mg/kg	176	29.6	16.9	400	175	20.2	1.9	172.6	-	178.4
Hg	µg/kg	629	51.3	8.2	76	630	35.8	7.4	617	-	640
K	g/kg	16.0	1.72	10.8	441	15.9	1.20	0.10	15.80	-	16.12
Li	µg/kg	88.4	17.05	19.3	19	83.9	11.06	4.89	80.2	-	96.6
Mg	g/kg	1.15	0.117	10.2	444	1.14	0.080	0.007	1.14	-	1.16
Mn	mg/kg	344	44.1	12.8	412	342	29.9	2.7	340	-	348
Mo	µg/kg	2190	426	19.5	124	2240	296	48	2115	-	2266
N - Kjeldahl (as N)	g/kg	9.11	0.605	6.6	292	9.12	0.420	0.044	9.04	-	9.18
Na	mg/kg	83.2	19.38	23.3	222	84.1	13.60	1.63	80.7	-	85.8
P (as P)	g/kg	0.785	0.0667	8.5	445	0.790	0.0470	0.0039	0.779	-	0.791
Rb	µg/kg	15500	1000	6.4	21	15500	690	270	15090	-	15990
S (as S)	g/kg	0.818	0.0724	8.8	256	0.810	0.0500	0.0057	0.809	-	0.827
Sr	mg/kg	12.4	1.14	9.2	48	12.4	0.80	0.21	12.04	-	12.71
Ti	mg/kg	7.03	1.599	22.7	16	7.06	1.104	0.500	6.19	-	7.88
V	µg/kg	316	54.9	17.4	38	319	40.5	11.1	298	-	334
Zn	mg/kg	17.3	2.65	15.3	404	17.3	1.80	0.17	17.07	-	17.59

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
C - elementary	g/kg	380	11.5	3.0	143	381	7.9	1.2	377.7	-	381.5
N - elementary	g/kg	9.59	0.559	5.8	207	9.59	0.380	0.049	9.51	-	9.67

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	101	12.1	12.0	94	102	8.3	1.6	98.7	-	103.7

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
delta 13C	‰ V-PDB	-29.1	0.33	1.1	31	-29.1	0.23	0.07	-29.21	-	-28.97
delta 15N	‰ Air	3.57	0.606	17.0	35	3.55	0.450	0.128	3.36	-	3.78



Consensus Values IPE 186



Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Crude fibre	g/kg	302	17.1	5.6	22	303	11.5	4.5	295	-	310
Total ash	g/kg	212	7.1	3.4	43	212	5.1	1.4	210.0	-	214.4



Indicative Values IPE 186



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
B	mg/kg	11.7	4.12	35.2	298	12.4	2.70	0.30	11.2	-	12.2
Cr	µg/kg	9470	3569	37.7	106	9490	2435	433	8780	-	10150
Cs	µg/kg	56.4	3.21	5.7	9	56.8	2.20	1.34	54.0	-	58.8
I	µg/kg	600	62.7	10.5	14	610	42.1	20.9	564	-	636
Ni	µg/kg	6160	1685	27.3	109	6130	1153	202	5842	-	6482
Pb	µg/kg	342	115.0	33.6	102	363	82.5	14.2	319	-	365
Se	µg/kg	35.7	10.76	30.1	46	37.3	7.71	1.98	32.5	-	38.9
SO4 (as SO4)	g/kg	0.321	0.0895	27.9	11	0.350	0.0600	0.0337	0.262	-	0.381

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	125	39.4	31.5	43	118	24.8	7.5	113	-	137
Si	mg/kg	77500	2640	3.4	9	77100	2090	1100	75500	-	79480

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
ADF-ash-free	g/kg	365	23.5	6.4	12	361	16.0	8.5	350	-	380
NDF-ash-free	g/kg	610	15.4	2.5	11	611	10.0	5.8	600	-	620



Informative Values IPE 186

Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
Ag	µg/kg	5.85	5.130	5	50.00	5
Be	µg/kg	3.30	1.800	7	20.00	21
Bi	µg/kg	3.41	2.500	6	53.00	9
Br	mg/kg	11.1	2.43	6		
Cd	µg/kg	13.4	5.30	63	50.0	69
Ga	µg/kg	40.8	4.50	4		
N - NH4 (as N)	mg/kg	178	128.0	13		
N - NO3 (as N)	mg/kg	12.2	8.32	18	48.6	16
Sb	µg/kg	6.90	4.540	23	27.50	12
Sn	µg/kg	42.3	21.71	20	200.0	7

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	32400	30560	6

Method: Nutritional values

Element	Unit	Median	MAD	N
Total fat	g/kg	14.1	5.50	14