



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 638



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 638 of Maize (plant) / Zea mays L. from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 3 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
1998	5	1
1997	6	3
1994	3	5



Consensus Values IPE 638



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	228	40.6	17.8	39	232	27.0	8.1	215	-	241
B	mg/kg	6.85	1.521	22.2	219	7.00	1.050	0.129	6.65	-	7.05
Ca	g/kg	4.04	0.288	7.1	383	4.05	0.200	0.018	4.01	-	4.06
Cd	µg/kg	109	22.8	20.9	91	111	16.0	3.0	104	-	114
Cl (as Cl)	g/kg	1.47	0.212	14.4	71	1.50	0.149	0.031	1.42	-	1.52
Co	µg/kg	89.9	21.52	23.9	43	92.0	15.30	4.10	83.3	-	96.5
Cr	µg/kg	1390	230	16.5	74	1450	160	33	1338	-	1445
Cu	mg/kg	3.71	0.732	19.8	343	3.77	0.500	0.049	3.63	-	3.79
Fe	mg/kg	418	59.6	14.3	348	417	41.3	4.0	412	-	424
K	g/kg	25.0	1.33	5.3	400	25.0	0.92	0.08	24.85	-	25.11
Mg	g/kg	2.04	0.120	5.9	386	2.03	0.081	0.008	2.02	-	2.05
Mn	mg/kg	27.1	2.73	10.1	370	27.0	1.90	0.18	26.78	-	27.34
Mo	µg/kg	916	132.8	14.5	48	908	91.5	24.0	877	-	954
N - Kjeldahl (as N)	g/kg	17.6	0.96	5.5	276	17.7	0.67	0.07	17.51	-	17.74
N - NO3 (as N)	mg/kg	2430	118	4.9	51	2420	84	21	2400	-	2467
P (as P)	g/kg	2.00	0.116	5.8	381	2.00	0.081	0.007	1.98	-	2.01
Pb	µg/kg	2660	486	18.3	100	2670	332	61	2561	-	2754
S (as S)	g/kg	1.47	0.112	7.7	163	1.48	0.077	0.011	1.45	-	1.48
Se	µg/kg	19.2	4.14	21.6	17	20.0	3.00	1.26	17.1	-	21.3
Sr	mg/kg	7.85	0.444	5.7	26	7.83	0.310	0.109	7.67	-	8.03
V	µg/kg	580	88.6	15.3	25	570	60.0	22.1	544	-	617
Zn	mg/kg	48.6	3.66	7.5	370	48.6	2.51	0.24	48.25	-	49.00

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
C - elementary	g/kg	432	14.4	3.3	27	430	10.0	3.5	426	-	438
N - elementary	g/kg	18.8	1.43	7.6	107	18.8	0.98	0.17	18.55	-	19.09



Indicative Values IPE 638



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Ba	mg/kg	1.96	0.508	25.9	24	1.98	0.370	0.130	1.75	-	2.18
Be	µg/kg	8.65	4.096	47.4	8	9.55	2.750	1.810	5.31	-	12.0
Hg	µg/kg	10.9	3.26	29.8	36	11.5	2.32	0.68	9.82	-	12.0
Li	µg/kg	186	81.1	43.6	9	188	59.0	33.8	125	-	247
Ni	µg/kg	491	168.5	34.3	71	488	113.0	25.0	451	-	531
Sb	µg/kg	71.8	29.88	41.6	15	73.3	21.10	9.64	55.4	-	88.3
SO4 (as SO4)	g/kg	1.74	0.592	34.0	16	1.77	0.423	0.185	1.43	-	2.06
Ti	mg/kg	3.30	0.933	28.3	9	3.65	0.750	0.389	2.60	-	4.00



Informative Values IPE 638



Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N
Ag	µg/kg	136	107.5	4
Br	mg/kg	6.21	0.690	4
F	mg/kg	6.00	0.900	5
N - NH4 (as N)	mg/kg	42.0	32.22	7
Na	mg/kg	110	40.9	239
Rb	µg/kg	8180	750	4
Sn	µg/kg	147	41.0	3

Results smaller than (<)

Median of <	N
115	14

Method: Nutritional values

Element	Unit	Median	MAD	N
Crude fibre	g/kg	310	10.0	3
Total ash	g/kg	87.9	3.20	6