



**WAGENINGEN EVALUATING PROGRAMS  
FOR ANALYTICAL LABORATORIES**

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**Certificate of Analysis**



**International Plant-Analytical Exchange**

**REFERENCE MATERIAL**

**IPE sample 152**

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## 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 152 of Lucerne/ Medicago sativum from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 1 period (or round). The results on which the values in this report are based were taken from the period given in the following table.

Year	Round	Number
2004	4	1



## Consensus Values IPE 152



### Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	254	29.3	11.5	27	258	20.0	7.0	243	-	266
B	mg/kg	40.7	3.54	8.7	95	40.7	2.40	0.45	40.0	-	41.5
Ca	g/kg	14.7	1.03	7.0	139	14.7	0.72	0.11	14.57	-	14.92
Cd	µg/kg	68.6	7.18	10.5	45	70.0	5.00	1.34	66.4	-	70.7
Cl (as Cl)	g/kg	5.13	0.342	6.7	31	5.10	0.248	0.077	5.01	-	5.26
Co	µg/kg	205	31.7	15.5	24	200	23.0	8.1	192	-	218
Cr	µg/kg	2010	224	11.2	47	2000	158	41	1942	-	2074
Cu	mg/kg	10.6	0.89	8.4	134	10.6	0.60	0.10	10.48	-	10.78
Fe	mg/kg	553	42.0	7.6	128	554	28.5	4.6	546	-	561
Hg	µg/kg	8.04	1.429	17.8	24	8.13	1.060	0.365	7.44	-	8.65
K	g/kg	35.2	1.63	4.6	143	35.2	1.09	0.17	34.95	-	35.49
Mg	g/kg	1.90	0.110	5.8	141	1.90	0.075	0.012	1.88	-	1.92
Mn	mg/kg	27.5	2.21	8.0	137	27.7	1.50	0.24	27.13	-	27.88
Mo	µg/kg	3140	239	7.6	33	3130	165	52	3060	-	3229
N - Kjeldahl (as N)	g/kg	29.6	1.10	3.7	97	29.6	0.73	0.14	29.39	-	29.84
N - NO3 (as N)	mg/kg	335	31.2	9.3	16	340	22.4	9.8	319	-	352
Na	mg/kg	279	56.0	20.0	89	283	38.9	7.4	268	-	291
Ni	µg/kg	1280	172	13.4	50	1290	118	30	1234	-	1332
P (as P)	g/kg	3.27	0.137	4.2	140	3.28	0.093	0.014	3.24	-	3.29
Pb	µg/kg	8210	824	10.0	60	8270	569	133	7998	-	8424
S (as S)	g/kg	4.17	0.359	8.6	72	4.17	0.244	0.053	4.09	-	4.25
Zn	mg/kg	58.9	3.46	5.9	135	59.2	2.40	0.37	58.3	-	59.5

### Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
C - elementary	g/kg	442	15.6	3.5	23	442	10.5	4.1	435	-	449
N - elementary	g/kg	30.8	1.31	4.3	53	30.8	0.88	0.22	30.41	-	31.13

### Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	461	94.0	20.4	37	469	67.0	19.3	430	-	493



## Indicative Values IPE 152



### Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Ba	mg/kg	7.18	0.782	10.9	13	7.32	0.540	0.271	6.71	-	7.65
Se	µg/kg	32.4	9.44	29.1	12	33.1	6.75	3.41	26.4	-	38.3
Sr	mg/kg	47.1	1.30	2.8	13	47.1	0.87	0.45	46.4	-	47.9
V	µg/kg	2060	230	11.2	11	2080	160	87	1907	-	2213



## Informative Values IPE 152



### Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N
Be	µg/kg	21.2	1.20	7
Li	µg/kg	800	74.0	5
N - NH4 (as N)	mg/kg	506	142.9	5
Rb	µg/kg	17500	650	3
Sb	µg/kg	60.7	2.30	3
SO4 (as SO4)	g/kg	6.55	0.163	4

### Method: Real totals

Element	Unit	Median	MAD	N
Al	mg/kg	702	83.0	5
Si	mg/kg	4860	667	3

### Method: Nutritional values

Element	Unit	Median	MAD	N
Crude fibre	g/kg	323	12.1	4
Total ash	g/kg	125	1.0	7