



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 143



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 143 of Valerian Root / *Valeriana officinalis* 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
2003	4	3



Consensus Values IPE 143



Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
As	µg/kg	1100	159	14.4	29	1090	111	37	1041	- 1162
B	mg/kg	15.5	3.42	22.0	88	15.7	2.35	0.46	14.8	- 16.3
Ca	g/kg	2.23	0.188	8.4	140	2.23	0.132	0.020	2.20	- 2.26
Cd	µg/kg	154	22.7	14.8	51	156	16.0	4.0	147	- 160
Co	µg/kg	325	68.2	21.0	26	320	48.0	16.7	297	- 352
Cr	µg/kg	2520	572	22.7	47	2570	391	104	2351	- 2687
Cu	mg/kg	10.2	1.02	10.0	127	10.2	0.70	0.11	10.03	- 10.39
Fe	mg/kg	2960	437	14.8	122	2950	296	49	2877	- 3034
K	g/kg	21.7	1.07	4.9	139	21.8	0.74	0.11	21.53	- 21.89
Mg	g/kg	1.85	0.101	5.4	143	1.85	0.070	0.011	1.83	- 1.87
Mn	mg/kg	69.2	5.84	8.4	134	69.2	3.95	0.63	68.2	- 70.2
Mo	µg/kg	429	34.4	8.0	25	426	24.0	8.6	415	- 443
N - Kjeldahl (as N)	g/kg	31.5	1.48	4.7	90	31.4	1.02	0.20	31.20	- 31.82
Na	mg/kg	472	67.4	14.3	94	483	47.1	8.7	458	- 486
Ni	µg/kg	1680	276	16.4	48	1660	198	50	1601	- 1761
P (as P)	g/kg	5.78	0.410	7.1	137	5.76	0.279	0.044	5.72	- 5.85
Pb	µg/kg	2710	388	14.3	58	2730	265	64	2607	- 2811
S (as S)	g/kg	2.12	0.117	5.5	73	2.13	0.077	0.017	2.10	- 2.15
Zn	mg/kg	57.8	4.30	7.4	136	58.2	2.95	0.46	57.1	- 58.6

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
C - elementary	g/kg	429	7.6	1.8	21	429	5.0	2.1	425.3	- 432.2
N - elementary	g/kg	33.3	1.74	5.2	47	33.3	1.20	0.32	32.8	- 33.8

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	mg/kg	652	61.2	9.4	35	639	41.0	12.9	631	- 673



Indicative Values IPE 143

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Ba	mg/kg	17.4	2.12	12.2	11	17.8	1.57	0.80	16.0	-	18.8
Cl (as Cl)	g/kg	1.58	0.426	27.0	31	1.61	0.308	0.096	1.42	-	1.73
Hg	µg/kg	9.51	2.526	26.6	25	10.20	1.920	0.632	8.47	-	10.6
N - NO3 (as N)	mg/kg	83.6	27.93	33.4	15	82.1	19.47	9.02	68.3	-	99.0
Se	µg/kg	69.9	14.42	20.6	10	70.7	10.00	5.70	59.8	-	80.1
Sr	mg/kg	14.3	0.84	5.9	12	14.4	0.60	0.30	13.8	-	14.8
V	µg/kg	3110	485	15.6	11	3080	338	183	2792	-	3436

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Total ash	g/kg	112	7.0	6.2	8	110	5.3	3.1	106	-	118



Informative Values IPE 143



Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N
Be	µg/kg	20.8	1.00	5
Li	µg/kg	407	33.5	4
N - NH4 (as N)	mg/kg	369	101.6	4
Rb	µg/kg	9380	516	4
Sb	µg/kg	79.9	8.80	5
SO4 (as SO4)	g/kg	2.25	0.130	6

Method: Real totals

Element	Unit	Median	MAD	N
Al	mg/kg	1330	108	5
Si	mg/kg	7120	5905	3

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N
Si	mg/kg	568	567.2	3

Method: Nutritional values

Element	Unit	Median	MAD	N
Crude fibre	g/kg	94.5	14.50	5