



**WAGENINGEN EVALUATING PROGRAMS  
FOR ANALYTICAL LABORATORIES**

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**Certificate of Analysis**



**International Plant-Analytical Exchange**

**REFERENCE MATERIAL**

**IPE sample 164**

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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 164 of Chrysanthemum / Chrysanthemum.l from Netherlands is prepared for the WEPAL proficiency programs. The sample is used in 2 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
2009	1	2
2005	2	1



## Consensus Values IPE 164



### Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	311	33.5	10.8	50	310	23.5	5.9	302	-	321
B	mg/kg	29.6	2.91	9.8	177	29.7	2.00	0.27	29.2	-	30.1
Ba	mg/kg	3.25	0.394	12.1	30	3.29	0.276	0.090	3.10	-	3.40
Ca	g/kg	11.3	0.62	5.4	262	11.3	0.44	0.05	11.25	-	11.40
Cd	µg/kg	305	20.5	6.7	100	304	14.5	2.6	301	-	310
Cl (as Cl)	g/kg	4.77	0.300	6.3	60	4.82	0.207	0.048	4.69	-	4.85
Co	µg/kg	118	16.7	14.1	50	118	11.5	3.0	114	-	123
Cu	mg/kg	7.71	0.560	7.3	246	7.75	0.385	0.045	7.64	-	7.78
Fe	mg/kg	225	21.4	9.5	238	224	14.9	1.7	222.7	-	228.1
Hg	µg/kg	10.3	0.95	9.2	52	10.5	0.65	0.16	10.00	-	10.52
K	g/kg	42.9	2.37	5.5	264	42.8	1.66	0.18	42.58	-	43.15
Mg	g/kg	2.73	0.142	5.2	265	2.72	0.097	0.011	2.71	-	2.75
Mn	mg/kg	44.3	2.60	5.9	254	44.4	1.75	0.20	44.02	-	44.66
Mo	µg/kg	2710	290	10.7	65	2730	205	45	2642	-	2786
N - Kjeldahl (as N)	g/kg	25.2	1.93	7.7	177	25.1	1.33	0.18	24.92	-	25.49
N - NO <sub>3</sub> (as N)	mg/kg	9970	476	4.8	32	9880	349	105	9794	-	10137
Na	mg/kg	278	43.1	15.5	166	280	30.1	4.2	271	-	284
Ni	µg/kg	747	123.1	16.5	78	750	83.4	17.4	719	-	774
P (as P)	g/kg	4.03	0.193	4.8	260	4.02	0.132	0.015	4.01	-	4.05
Pb	µg/kg	1370	147	10.7	98	1360	102	19	1343	-	1403
S (as S)	g/kg	1.70	0.117	6.9	144	1.71	0.082	0.012	1.69	-	1.72
Sr	mg/kg	30.4	2.36	7.8	30	30.5	1.71	0.54	29.5	-	31.3
V	µg/kg	408	49.5	12.1	21	409	34.5	13.5	385	-	430
Zn	mg/kg	59.6	3.30	5.5	257	59.5	2.30	0.26	59.2	-	60.0

### Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
C - elementary	g/kg	423	7.8	1.8	54	424	5.0	1.3	421.3	-	425.5
N - elementary	g/kg	29.8	1.02	3.4	98	29.7	0.69	0.13	29.58	-	29.99

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

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	142	34.0	23.9	59	141	24.0	5.5	133	-	151



Method: Nutritional values

Element

Total ash

### Consensus Values IPE 164



Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
g/kg	131	8.4	6.4	20	131	6.0	2.3	126.9	-	134.8



## Indicative Values IPE 164



### Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Be	µg/kg	7.36	2.513	34.1	10	8.22	2.020	0.993	5.59	-	9.13
Cr	µg/kg	857	215.0	25.1	72	864	143.5	31.7	806	-	907
I	µg/kg	165	74.0	45.0	8	172	52.4	32.7	104	-	225
Li	µg/kg	408	27.6	6.8	11	400	18.4	10.4	390	-	426
N - NH4 (as N)	mg/kg	266	118.3	44.5	8	284	87.5	52.3	169	-	362
Rb	µg/kg	5630	518	9.2	9	5680	367	216	5235	-	6017
Sb	µg/kg	38.2	5.53	14.5	9	38.0	3.70	2.30	34.0	-	42.3
Se	µg/kg	17.1	6.94	40.6	20	20.1	5.24	1.94	13.9	-	20.3
Sn	µg/kg	114	30.2	26.4	8	122	22.5	13.3	89.7	-	139
SO4 (as SO4)	g/kg	1.88	0.468	24.9	10	1.83	0.328	0.185	1.55	-	2.21

### Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	mg/kg	310	68.3	22.0	14	320	40.5	22.8	271	-	349

### Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Crude fibre	g/kg	333	28.3	8.5	9	330	19.7	11.8	312	-	355



### Informative Values IPE 164

#### Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
Ag	µg/kg	6.40	1.600	5		
Bi	µg/kg	3.25	0.315	4	20.00	5
Br	mg/kg	26.4	0.20	4		
Cs	µg/kg	37.7	1.00	3		
Ga	µg/kg	148	8.8	3		

#### Method: Real totals

Element	Unit	Median	MAD	N
Si	mg/kg	5140	121	3

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

Element	Unit	Median	MAD	N
Si	mg/kg	770	769.4	3

#### Method: Nutritional values

Element	Unit	Median	MAD	N
ADF-ash-free	g/kg	429	11.2	6
NDF-ash-free	g/kg	528	14.8	6
Total fat	g/kg	26.0	6.05	4