



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 229



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, the mean and standard deviation are calculated using all reported data when at least 4 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into two sections: Consensus Values and Indicative Values. The division is made on the reliability of the data. Consensus Values are based on at least 8 results and a maximum relative uncertainty of 6.25%. Indicative Values are based on a maximum relative uncertainty of 35% and a minimum of 4 and maximum of 7 results, or a relative uncertainty greater than 6.25% when there are at least 8 results.

For each determinand the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation), the uncertainty of the mean (consensus or indicative) value and the relative uncertainty.

All values, expressed on a weight basis (kg or %), are reported as oven-dried (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 229 of Tulip (flower/stem) / Tulipa sp., from PPO-Nergena, is prepared for the WEPAL proficiency programs. The sample has been 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
2025	2	2



Consensus Values IPE 229

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	16.6	2.05	12.4	79	16.7	1.18	0.289	1.74
Cu	mg/kg	5.76	0.561	9.7	91	5.76	0.340	0.074	1.28
Fe	mg/kg	119	13.5	11.3	91	120	8.80	1.76	1.48
Mn	mg/kg	63.9	4.45	7.0	91	63.7	2.40	0.583	0.912
Zn	mg/kg	55.0	4.18	7.6	91	55.0	2.66	0.548	0.995
As	µg/kg	82.5	10.9	13.2	20	81.0	7.00	3.05	3.69
Cd	µg/kg	804	46.7	5.8	29	800	26.7	10.8	1.35
Co	µg/kg	43.3	3.93	9.1	18	43.6	3.17	1.16	2.67
Cr	µg/kg	1989	373	18.7	25	1960	198	93.2	4.68
Hg	µg/kg	9.22	1.65	17.9	16	8.98	0.938	0.517	5.60
Mo	µg/kg	1213	93.3	7.7	32	1200	65.0	20.6	1.70
Ni	µg/kg	1035	144	13.9	24	1024	84.5	36.8	3.55
Pb	µg/kg	546	47.5	8.7	23	548	34.1	12.4	2.27
V	µg/kg	269	32.2	12.0	11	258	23.8	12.1	4.52
Sr	mg/kg	3.12	0.242	7.8	9	3.12	0.154	0.101	3.24
Ca	g/kg	3.60	0.293	8.1	95	3.58	0.183	0.038	1.04
Cl (as Cl)	g/kg	1.75	0.302	17.2	17	1.82	0.211	0.092	5.22
K	g/kg	22.2	1.46	6.6	100	22.1	0.935	0.182	0.821
Mg	g/kg	2.60	0.177	6.8	94	2.59	0.120	0.023	0.879
N - Kjeldahl (as N)	g/kg	21.5	1.05	4.9	58	21.4	0.659	0.172	0.801
Na	mg/kg	201	25.5	12.7	59	201	15.8	4.15	2.07
P (as P)	g/kg	3.20	0.210	6.6	100	3.19	0.132	0.026	0.822
S (as S)	g/kg	1.85	0.177	9.6	54	1.85	0.125	0.030	1.63

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	460	19.9	4.3	41	460	14.0	3.89	0.846
N - elementary	g/kg	22.8	1.00	4.4	58	22.7	0.625	0.164	0.722

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	102	16.6	16.2	20	102	12.5	4.64	4.54

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-28.0	0.170	0.6	12	-28.0	0.095	0.061	0.219
delta 15N	‰ Air	3.18	0.418	13.1	12	3.18	0.205	0.151	4.74



Method: Nutritional values

Element

Total ash

Consensus Values IPE 229



Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
g/kg	65.0	5.54	8.5	15	66.3	2.80	1.79	2.75



Indicative Values IPE 229

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Se	µg/kg	30.4	8.08	26.5	13	31.0	5.00	2.80	9.20
Ba	mg/kg	1.27	0.596	47.0	12	1.18	0.245	0.215	17.0
Sb	µg/kg	34.3	19.7	57.5	5	36.1	12.1	11.0	32.1

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	136	53.6	39.5	9	130	30.4	22.3	16.5
S - elementary	g/kg	1.70	0.134	7.9	5	1.75	0.050	0.075	4.39

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	124	22.0	17.8	6	125	12.2	11.2	9.09
Total fat	g/kg	25.4	5.12	20.2	6	25.0	2.05	2.61	10.3