



**WAGENINGEN EVALUATING PROGRAMS  
FOR ANALYTICAL LABORATORIES**

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**Certificate of Analysis**



**International Plant-Analytical Exchange**

**REFERENCE MATERIAL**

**IPE sample 605**



## 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 605 of Summer Barley (grain) / *Hordeum vulgare* 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
1993	5	4



## Consensus Values IPE 605

### Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Cl (as Cl)	g/kg	2.15	0.248	11.5	28	2.16	0.177	0.059	2.05	-	2.24
Cu	mg/kg	6.00	1.126	18.8	125	6.00	0.790	0.126	5.80	-	6.20
K	g/kg	5.29	0.405	7.7	130	5.34	0.274	0.044	5.22	-	5.36
Mg	g/kg	1.20	0.124	10.3	129	1.20	0.088	0.014	1.18	-	1.22
Mn	mg/kg	19.8	2.93	14.8	126	20.0	2.00	0.33	19.3	-	20.3
N - Kjeldahl (as N)	g/kg	17.2	0.89	5.2	101	17.3	0.60	0.11	17.03	-	17.39
P (as P)	g/kg	3.28	0.179	5.4	135	3.28	0.124	0.019	3.25	-	3.32
S (as S)	g/kg	1.33	0.124	9.3	49	1.33	0.083	0.022	1.29	-	1.36
Zn	mg/kg	43.9	4.48	10.2	124	44.0	3.05	0.50	43.1	-	44.7

### Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
N - elementary	g/kg	17.5	1.15	6.5	30	17.3	0.78	0.26	17.1	-	18.0



## Indicative Values IPE 605



### Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
As	µg/kg	158	36.9	23.3	8	160	21.5	16.3	128	-	189
Ca	g/kg	0.509	0.1380	27.1	128	0.541	0.1002	0.0152	0.485	-	0.534
Cd	µg/kg	93.1	36.23	38.9	25	90.0	26.00	9.06	78.1	-	108
Fe	mg/kg	87.3	26.52	30.4	116	86.6	18.45	3.08	82.4	-	92.1
Mo	µg/kg	907	105.7	11.6	10	880	75.0	41.8	833	-	982
Na	mg/kg	195	57.0	29.2	88	204	39.8	7.6	183	-	207
Pb	µg/kg	512	224.2	43.8	22	582	153.0	59.8	413	-	611



## Informative Values IPE 605



### Method: Inorganic Chemical Composition

Element	Unit	Median	MAD	N
B	mg/kg	2.99	1.010	63
Ba	mg/kg	3.90	0.100	3
Co	µg/kg	49.0	24.00	5
Cr	µg/kg	328	154.0	10
Hg	µg/kg	9.50	3.625	10
N - NH4 (as N)	mg/kg	31.5	5.60	4
N - NO3 (as N)	mg/kg	21.0	10.30	16
Ni	µg/kg	238	88.0	11
Se	µg/kg	20.0	16.00	5
SO4 (as SO4)	g/kg	0.297	0.1364	4