COULOMETRIC ESTIMATION OF SULFUR AS A SCREENING METHOD FOR ESTABLISHING TOTAL SULFUR CONTAINING AMINO ACIDS (CYSTINE AND METHIONINE) IN PEA SEEDS

Kurasz, I., M. Stencel, and B. Wolko
Plant Experiment Station, Wiatrowo, Poland

Seeds of 17 lines from the Wiatrowo pea collection were used to make the following determinations:

1. Percent protein content (Keil-Foss analyzer).
2. Cystine and methionine content expressed in percent of protein (Beckman, Multichrom B amino acid analyzer).
3. Sulfur content expressed in percent of seed flour (by Dohrmann sulfur analyzer). This was the first time that the apparatus was used for analyzing plant materials (according to information furnished by "Techmation", Schiphol, Amsterdam, Holland).

Amounts of sulfur-containing amino acids (percent of protein) were measured in pea seed flour. From these values the total sulfur content in the flour was calculated. This value was then compared with the estimate of sulfur obtained by the Dohrmann analyzer. The Dohrmann apparatus estimates reduced sulfur; it does not estimate sulfates. The reduced sulfur in pea represents almost exclusively sulfur amino acids as is evidenced by the data given in Table 1.

Conclusions:

1. The Dohrmann analyzer can be used to estimate total sulfur amino acids in pea seeds.
2. Total sulfur amino acid content varied from line to line but the ratio between the two sulfur-containing amino acids remained relatively constant.
3. The time required to make a single sulfur determination (5 min) is twelve times less than the time to determine cystine and methionine by the amino acid analyzer and the cost twenty times lower. Consequently, a large number of individuals can be screened, an important advantage from the point of view of breeding and selection.
4. The sulfur amino acids can be estimated indirectly by measuring reduced sulfur by the Dohrmann method.

A complete description of the method and results will soon be published in "Hodowla Roslin".

This short report is dedicated to Prof. Dr. W. Gottschalk (Institut fur Genetik der Universitat Bonn) as an acknowledgement for his cooperation in permitting us to visit and study in his laboratory at Bonn University.

Table 1. Percent protein, cystine, methionine, and the sulfur-"amino acid" content as estimated by Dohrmann apparatus in pea lines from Wiatrowo collection.

Wiatrowo line number	Percent protein	Cystine content in % protein	Methionine content in % protein	Cystine content in % of flour	Methionine content in % of flour	Sulfur calculated in flour (Beckman)	Sulfur analyzed in flour (Dohrmann)	Difference (calculated minus analyzed)
Wt 4042	20.4	1.92	1.69	0.392	0.345	0.179	0.184	-0.005
Wt 10263	23.3	1.74	1.53	0.405	0.357	0.185	0.192	-0.007
Wt 10763	23.0	1.99	1.70	0.458	0.391	0.206	0.218	-0.012
Wt 10892	22.6	1.78	1.59	0.402	0.359	0.184	0.192	-0.008
Wt 10893	24.6	1.66	1.51	0.408	0.371	0.188	0.203	-0.015
Wt 11144	25.0	1.72	1.53	0.430	0.383	0.197	0.179	+0.018
Wt 11795	24.8	1.75	1.65	0.434	0.409	0.204	0.198	+0.006
Wt 15106	22.6	1.79	1.66	0.405	0.375	0.189	0.189	±0.000
Wt 301	20.4	1.59	1.40	0.324	0.286	0.148	0.164	-0.016
Wt 16123	22.2	1.16	1.70	0.362	0.377	0.178	0.169	+0.009
Wt 15312	28.0	1.62	1.64	0.454	0.459	0.223	0.219	+0.004
Wt 16125	26.1	1.74	1.65	0.454	0.431	0.214	0.220	-0.006
Wt 1	25.4	1.89	1.65	0.480	0.419	0.218	0.193	+0.025
Wt 101	27.4	1.61	1.51	0.441	0.414	0.207	0.188	+0.019
Wt 807	27.4	1.53	1.49	0.419	0.408	0.200	0.184	+0.016
Wt 2185	24.2	1.70	1.75	0.411	0.424	0.201	0.193	+0.009
Wt 12670	29.2	1.53	1.52	0.447	0.444	0.214	0.210	+0.004
Average	24.5	1.61	1.60	0.419	0.391	0.196	0.194	+0.002
Correlation coefficient		r = 0.75			x_{min}	0.148	0.164	
Regression coefficient		b = 0.661			x_{max}	0.223	0.220	
				Variability coeff.		9.436	8.408	