leaf area was greater than the percentage at 85 F. Conversely, the yellow areas constituted a larger percentage of the leaf at 85 F than at 65 F.

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1. Seed protein percentage and sulfur-containing amino acid contents in wild soybean (Glycine soja Sieb. and Zucc.) strains native in Japan.

Japanese cultivated soybeans (G. max (L.) Merrill) have been known as protein-rich. However, as the world protein malnutrition problem has been urged to be solved, the development of much higher protein strains is considered to be an indispensable task for soybean breeders. Since the hybridizations of G. max x G. soja (= G. ussuriensis) by Williams (1948) and Weber (1950), G. soja has been regarded as a promising protein gene source in breeding of the G. max varieties with high protein. However, little information is available for the qualitative aspect of G. soja protein. The authors et al. (1972) have already published about the amino acid composition of the species, along with the other Glycine species. Subsequently, the present paper aims to elucidate the inter-strain variability of sulfur-containing amino acid contents in G. soja seed protein.

Twenty-nine G. soja strains were collected from various places of Japan in 1969 and grown in pots at Morioka, Iwate-ken, in 1970, including 8 representative G. max varieties as control. Based on morphological differentiation, the 36 strains were separately harvested and exploited for subsequent chemical analyses. From the seed meal of each strain, protein

percentage (N x 6.25) and sulfur-containing amino acid contents (g/16gN) were determined with two replications by macro-Kjeldahl method and micro-bioassay, respectively.

The average, maximum, and minimum values of protein percentage and sulfur-containing amino acid contents were indicated in Table 1. As the result of variance analyses, the significant inter-strain differences were indicated for protein percentage, cystine, and cystine plus methionine contents in G. soja. However, it should be strongly emphasized that G. soja generally shows not only higher protein percentage but also higher sulfur-containing amino acid content than G. max does. In addition, although not so distinctive, the protein percentages in G. soja strains slightly decreased with descending latitude of the places where they were originally collected. Similar tendency was noticed concerning sulfur-containing amino acid content, especially the cystine content.

The correlation coefficients between protein percentage and sulfur-containing amino acid content were not significant, i.e. 0.09 for methionine vs., 0.16 for cystine vs., and 0.09 for methionine plus cystine vs. protein percentage, respectively.

The authors et al. (1972) compared the amino acid composition of seed protein among the 6 Glycine species. As a result, no conspicuous differences were observed among the 3 species, G. max, G. gracilis, and G. soja, which belong to the same subgenus Soja. However, in G. max protein, likewise in the other leguminous seed protein, sulfur-containing amino acids are preferred to nutritionally limiting ones. Therefore, in the successful development of G. max varieties with higher protein by interspecific hybridization using G. soja, it would be critical to verify the superiority or non-inferiority for sulfur-containing amino acid content of G. soja to G. max. As was apparently proved in this paper, G. soja is just the case. Moreover, as the G. soja strains tested had been somewhat widely differentiated for protein percentage and sulfur-containing amino acid content even in natural condition, the selection of G. soja strains most suitable for protein breeding would be considered probably to be efficient and also prerequisite. In addition, the geographical distribution for these characters might offer a useful key in the collection and selection program of G. soja strains native in Japan.

Table 1

Protein percentage and sulfur-containing amino acid contents found in the G. soja strains and the G. max varieties in Japan

		Protein* (%)	S-containing amino acid (g/16gN)		
			Methionine	Cystine	Met. + Cys.
G. soja	collected from the northern districts (n_1 = 16)				
N=36 ($=n_1+n_2+n_3$)	Max.	48.2	1.02	1.15	2.15
	Avg.	45.5	0.95	1.04	1.99
	Min.	42.9	0.86	0.88	1.80
	collected from the middle districts (n_2 = 12)				
	Max.	48.1	1.01	1.10	2.08
	Avg.	43.9	0.96	1.02	1.98
	Min.	40.7	0.90	0.84	1.80
	collected from the southern districts (n_3 = 8)				
	Max.	47.4	1.04	1.01	1.97
	Avg.	44.5	0.95	0.92	1.87
	Min.	41.2	0.88	0.73	1.68
G. max N=8	Max.	40.6	0.88	1.02	1.89
	Avg.	39.6	0.81	0.98	1.79
	Min.	37.5	0.73	0.95	1.68

*Not moisture-free basis.

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