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Changes of protein fractions in black-coated soybean (*Glycine max*) during seed development

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Objectives

The aims of this study was to know the changes in chemical components with emphasis on the storage proteins in grains of black medicinal soybean and to verify the relationship between the protein content and the level of sugar and starch in leaves during seed maturation.

Materials and Methods

Plant materials

Black-coated soybean (*Glycine max*) was planted and grown according to the conventionally recommended practices.

Methods

- o Protein quantification : micro-kjeldahl method using the factor of 6.25
- o Sugars & starch : anthrone method at 630 nm
- o Electrophoresis : SDS-PAGE with 12.5% gel
- o Quantification of protein fractions : Relative amount of each fraction was determined using a image analysis software (Kodak D1, Kodak, USA)

Results and Discussion

There was no further increase in pod length after 29 DAF. Pod weight persistently increase until 73 DAF, thereafter, the weight was slightly decreased. The accumulation of seed storage proteins was occurred conspicuously as the increasing rate of pod weight was mitigated. Leaf starch level was increased until 66 DAF and then decreased. The sugar content in leaves, however, showed decreasing tendency over seed development from 29 DAF to harvest. The relative composition of 7S proteins was higher in early stage from 29 DAF to 61 DAF. The 11S protein fractions was accumulated later as compared to 7S proteins. The proportion of 7S α fractions were decreased as seeds develop. On the other hands, the β fraction was increased up to 7.7 %. The overall profile of proteins fractions at 61 DAF was similar to that from harvest. The result showed that the onset of declining of starch level in leaves was consistent with the independent-accumulation of protein fractions in soybean seeds during seed development.

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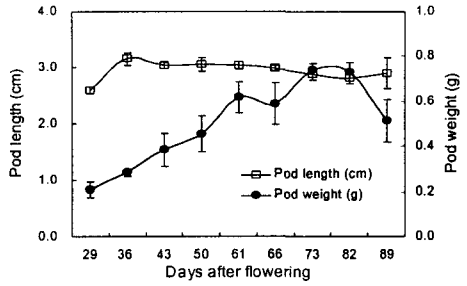

Fig. 1. Changes of pod length and pod weight from 29 days after flowering (DAF) to harvest (89 DAF).

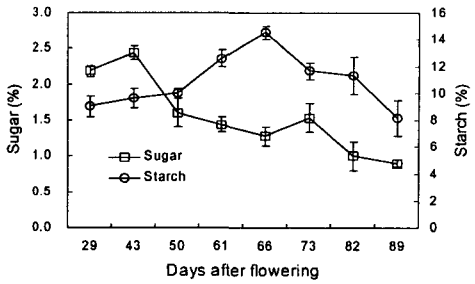

Fig. 2. Changes of soluble sugars and starch content in leaves of soybean from 29 days after flowering to harvest.

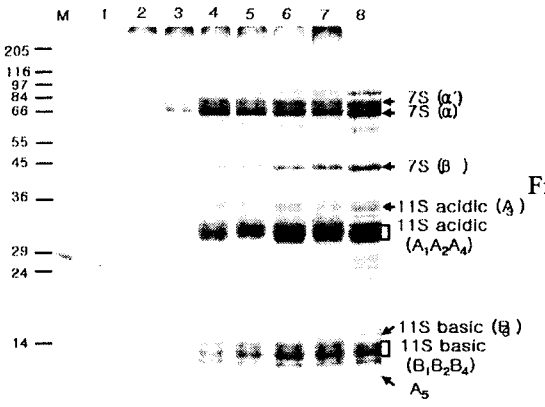

Fig. 3. Electrophoresis profile of total storage proteins of soybean grain with respect to the seed maturing period. Lane M: molecular marker, 1: 29 days after flowering (DAF), 2: 42 DAF, 3: 50 DAF, 4: 61 DAF, 5: 66 DAF, 6: 73 DAF, 7: 82 DAF, 8: 89 DAF.

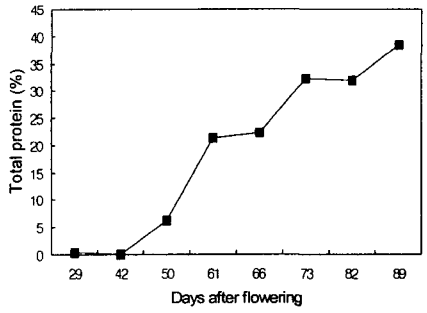

Fig. 4. Changes of total protein content in developing seeds of soybean. The content was calculated from the total nitrogen content with a factor of 6.25.

Table 1. Percent of each protein fraction separated by SDS-PAGE and quantified based on the densitometric intensity

Stage (DAF)	7S		11S	
	α	β	Acidic	Basic
42	100	0.0	0.0	0.0
50	49.7	2.5	19.1	10.1
61	32.6	4.7	29.9	15.2
66	28.4	5.0	31.0	22.0
73	24.9	4.8	33.9	30.7
82	20.7	7.5	33.1	23.6
89	18.4	7.7	21.5	19.9