

## Activity Variation of ADP-Glucose Pyrophosphorylase in Developing Soybean Seeds

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### Objectives

To know the relationship between ADP-glucose pyrophosphorylase (AGP) activity and the characteristics of related pod setting in developing seed of soybean cultivars.

### Materials and Methods

Materials : 4 soybean varieties

Methods :

- AGP activity: Modified by Sowokinos(1976) & Huber(1983)'s method
- Extraction buffer (20 mM HEPES, 10 mM MgCl<sub>2</sub>, 1 mM DTT, PI)
- Reaction buffer(75 mM HEPES, 5 mM MgCl<sub>2</sub>, 1 mM 3-phosphoglycerate, 100 µg/ml BSA, 1.5 mM ADP-glucose, 0.6 mM NAD<sup>+</sup>, 2 Unit phosphoglucomutase, 2 Unit glucose 6-phosphate dehydrogenase, enzyme) add to 0.15M NaPPi
- Measured by Spectrophotometer(340 nm) for 5 min intervals.
- Immunoblotting by Western blot
  - : SDS-PAGE, 1st antibody(potato AGP small subunit, x1,000),
  - 2nd antibody (rabbit HRP, x1,000)

### Results and Discussion

The relationship between ADP-glucose pyrophosphorylase (AGP) activity and the characteristics of related pod setting in developing seed of soybean cv. Pungsannamulkong, Iksannamulkong, Geumjeongkong #1 and Danpaheug was studied. AGP activity during the accumulate of the majority of dry matter in all cultivars suggest that this enzyme may be associated with this process. At the Vn and R1 stages, AGP activity of full-grown leaves of Pungsannamulkong, Iksannamulkong, Geumjeongkong #1 which showed high seed weight on the 31th of August, was the highest and then decreased progressively. However AGP activity of Danpaheug was the lowest and also had poor seed weight. So regulation of matter accumulation in developing soybean seeds may also depend on AGP activity. AGP capacities as expressed by AGP activity seem to have a good predicting value for the dry matter of leaf and seed at R1 to R5 stages in our series of genotypes. Western blots probed with antibody specific to the subunit of potato AGP revealed a single 60 KD immunoreactive band that changed in intensity during the growth cycle in association with changes in total AGP activity.

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Table 1. Characteristics of related pod setting in developing seed of soybean

| Cultivar         | Pod weight | Leaf weight | Stem weight | Seed dry weight | Upper dry weight | Seed/stem dry weight |
|------------------|------------|-------------|-------------|-----------------|------------------|----------------------|
|                  | g          | g           | g           | g               | g                | %                    |
| Pungsannamulkong | 9.1        | 11.9        | 20.5        | 18.2            | 59.7             | 30.5                 |
| Iksannamulkong   | 5.6        | 6.8         | 10.7        | 15.8            | 38.9             | 40.6                 |
| Geumjeongkong#1  | 9.5        | 13.2        | 25.9        | 12.6            | 61.2             | 20.6                 |
| Danpaheug        | 0.2        | 10.8        | 21.6        | 9.8             | 42.4             | 23.1                 |
| Average          | 6.1        | 10.7        | 19.7        | 14.1            | 50.6             | 28.7                 |
| CV(%)            | 18.7       | 7.8         | 13.3        | 9.7             | 23.7             | 13.4                 |

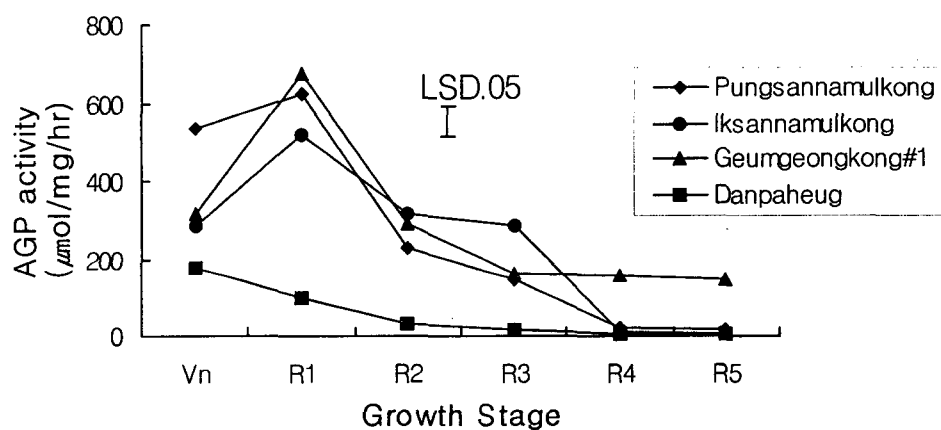


Fig. 1. Changes of AGP activity of leaves at different growth stages in soybean.

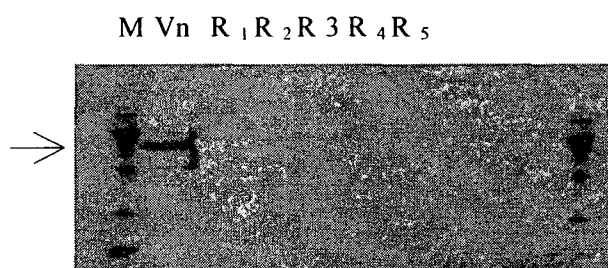


Fig. 2. Western blot analysis in soybean (cv. Pungsannamulkong).  
M: protein marker; Vn : vegetable stage R : reproductive stages.