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Sink source relationship and true harvest index response to cultivars in Soybean [*Glycine max* (L.) Merr.]

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Objectives

The objective of this study is to compare true and apparent harvest index and sink source relationship response to five soybean cultivars.

Material and Methods

Five soybean cultivars, Hwangkeumkong, Taekwangkong, Myungjunamulkong, Magellan and Maverick, were used. The experiment design was used split plot design. Plant density was used to 60x15 and 60x30cm. Dry weight was measured after oven-drying at 80°C for 48h (excluding roots). Seed partitioning rate was calculated dividing seed growth rate by crop growth rate and crop growth rate was calculated dividing dry weight difference by growth day. To collect fallen leaf and pod, nylon net was installed. Statistical analysis was used to SAS package and analysis of variance was conducted on the data using PROC ANOVA procedures.

Results and Discussion

Leaf weight ratio apart from other dry weights was significant among soybean cultivars. Leaf, pod and seed number were significant among cultivars. Pod water content also was significant by different in soybean cultivars but leaf water content was not. Crop growth rate was not significant among cultivars. Sink-source ratio showed correlation with harvest index and was significant among soybean cultivars. Harvest index was significantly different among soybean cultivars and apparent harvest index was higher than true harvest index according to soybean cultivars. Soybean cv., "Myungjunamulkong" showed the highest harvest index at high density and cv., "Magellan" showed the highest harvest index at low density. Seed yield per unit area among cultivars was not correlated with seed growth rate and seed partitioning rate but was more closely correlated with seed number, one of the soybean genotype characteristics. Harvest index of soybean cultivars were very close relation to seed yield than biological yield and Harvest index of a cultivar could be a characteristic apart from substantial differences in environmental conditions during plant growth and development. Moreover, it was observed that seed growth rate almost maximized at R6 and seed growth rate and sink activity showed the positive value for seed development stage from R5 to R6 through this experiment. Consequently, harvest index of a cultivar was strong correlation with sink size, in other words, seed size, and seed number. At this experiment, soybean cv., "Myungjunamulkong" having small seed size and many seed number, showed the highest seed yield and harvest index. As seed size and seed number were characteristics of a cultivar, seed yield could be dependent on cultivar, itself including environment effect such as plant density.

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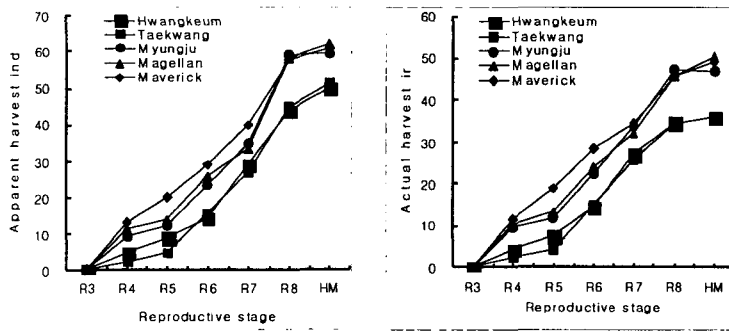


Fig. 1. Actual harvest index and apparent harvest index response to five soybean cultivars.

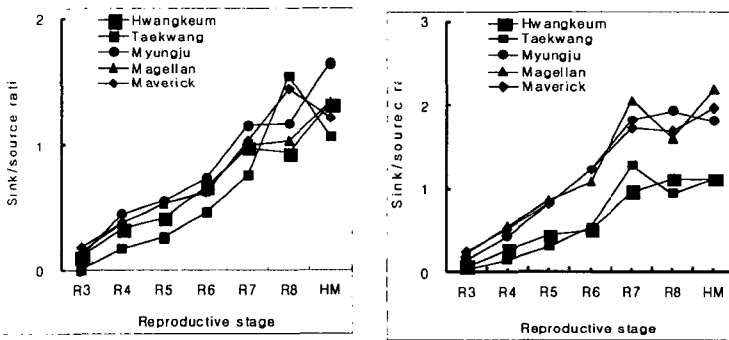


Fig. 2. Sink-source ratio response to five soybean cultivars at two plant densities.

Table 1. Least significant differences between true harvest index and apparent harvest index for five soybean cultivars.

Cultivar	True harvest index						
	Reproductive stage						
	R3	R4	R5	R6	R7	R8	HM
Hwangkeumkong	0.00	5.88	9.10	18.49	29.32	33.57	38.27
Taekwangkong	0.00	2.55	5.49	15.76	27.02	39.41	37.44
Myungjunamulkong	0.00	8.96	13.17	23.09	34.89	43.95	46.91
Magellan	0.00	9.21	12.80	22.17	31.79	41.21	46.14
Maverick	0.01	10.09	16.95	25.01	34.50	43.99	44.57
LSD _{0.05}	0.00	3.45	3.38	3.60	5.16	7.78	5.94
Cultivar	Apparent harvest index						
	Reproductive stage						
	R3	R4	R5	R6	R7	R8	HM
Hwangkeumkong	0.00	6.17	10.03	18.64	31.49	45.67	52.58
Taekwangkong	0.00	2.49	5.44	16.21	28.95	48.71	51.75
Myungjunamulkong	0.00	9.03	13.45	24.17	36.88	56.60	59.01
Magellan	0.00	9.92	13.86	23.82	34.03	52.43	58.82
Maverick	0.00	11.22	17.93	26.11	38.95	55.97	56.75
LSD _{0.05}	0.00	3.48	3.38	3.64	5.14	6.61	5.66