

P104

## Response of Sprout Soybean Cultivars with Flooding in Paddy Field

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### Objectives

This study was conducted to investigate the effects on yield and growth, and to determine critical drainage after flooding at V5~V6 growth stage of soybean.

### Materials and Method

Field studies were at the southwestern Korea (36° N lat) on a commerce silt loam soil on a paddy field using three soybean cultivars (*Glycine maxL.* cv. Pungsan-namulkong, cv. Sobaeg-namulkong and cv. Saebyeolkong).

Seeds were sowed with two and with the planting density of 70 x 10 cm on June 16, 2003. Fertilizer was applied prior to planting at a rate of 3.0 3.0 3.4 g (N P K) per m<sup>2</sup> by all basal fertilizations.

Experimental design was a split plot arrangement with three replications.

The flooding was done for 3, 5, 7 and 9 days, respectively when plants were at the vegetative (V5~V6) stages filled with tap water to 2 cm above the level of the soil surface by irrigation. The photosynthesis was carried out the 5th leaves of main stem on 1, 3, 5, 7 and 9 days after the removal of flooding.

### Results and Discussion

The flooding was done for 3, 5, 7 and 9 days, respectively when plants were at the vegetative (V5~V6) stages filled with tap water to 2 cm above the level of the soil surface by irrigation. After removal flooding, photosynthetic rate reduced in all flooding treatments except for 3 days flooding. Decrease of photosynthetic rate was relatively less in Saebyeolkong than any others.

Flooding decreased main stem length, number of node, and stem width of soybean at maturity. Seed yields of soybean flooded at V5~V6 growth stages were significantly affected by flood duration and cultivars. As the flood duration increased, yield decreased. Seed yield in three soybean cultivars reduced over 3 days flood duration except for Saebyeolkong.

The number of pod and seed decreased as flood duration increased. There was a significantly positive relationship between ratio of branch and main stem seed yield with flooding. Also, relationship between yield and relative yield with flooded soybean compared to non-flooded yield had a highly positive significance, and there was more significant difference in relative yield of branch stem ( $R^2 = 0.91^{**}$ ) than that of main stem ( $R^2 = 0.88^{**}$ ). There was a significant relationship ( $R^2 = 0.83^{**}$ ) between yield and photosynthetic rate at 9 days after removal flooding in three soybean cultivars.

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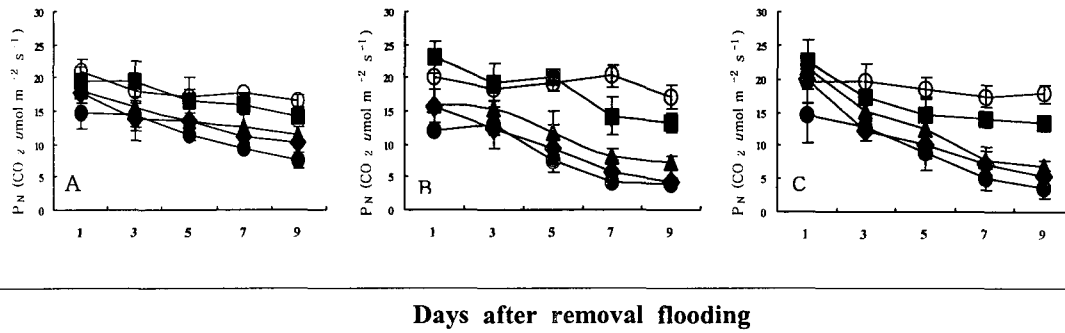


Fig. 1. Photosynthetic rate ( $\text{CO}_2 \mu\text{mol m}^{-2} \text{s}^{-1}$ ) of in three soybean cultivars after removal of flooding over different flooding stress at V5~V6 growth stages. DARF; Days after removal flooding,  $\circ$ ; non-flooding,  $\blacksquare$  3 days flooding,  $\blacktriangle$ ; 5 days flooding,  $\blacklozenge$ ; 7 days flooding,  $\bullet$ ; 9 days flooding. A; Saebyeolkong, B; Pungsan-namulkong, C; Sobaeg-namulkong. Means are shown  $\pm$ SE

Table 1. Yield and yield component of three soybean cultivars with different period of flooding at V5~V6 growth stages.

Cultivars	Period of flooding	Stem length (cm)	No. of node	Stem Width (mm)	No. of pod ( $\text{no.m}^{-2}$ )	No. of Seed ( $\text{no.m}^{-2}$ )	Yield ( $\text{g m}^{-2}$ )	100 seed Weight (g)
Saebyeolkong	Con.	57.3	11.6	4.43	39.2	73.7	216	14.5
	3	55.4	10.6	4.45	37.8	76.8	220	15.0
	5	50.9	10.5	4.31	34.4	66.5	195	14.6
	7	46.3	10.8	3.76	25.4	54.1	148	14.0
	9	44.1	10.8	3.65	19.2	43.7	134	16.0
Pungsan-Namulkong	Con.	46.3	13.9	4.16	46.4	96.1	221	11.4
	3	45.2	13.2	3.84	38.1	73.0	162	11.4
	5	44.1	13.1	3.64	36.4	64.9	150	11.2
	7	39.3	13.2	2.98	30.8	59.5	122	11.3
	9	40.5	12.9	2.77	27.3	50.5	123	12.1
Sobaeg-namulkong	Con.	34.1	11.7	4.46	57.4	104.2	237	10.1
	3	33.1	11.2	4.43	43.4	83.4	172	10.3
	5	32.1	11.4	4.01	35.6	66.0	132	10.1
	7	30.7	10.6	3.13	29.6	54.2	94	9.8
	9	29.8	10.8	4.01	21.2	39.9	89	10.0
Cultivars(A)		**	NS	NS	*	*	NS	*
Flood duration(B)		**	NS	*	**	**	**	NS
A $\times$ B		*	NS	NS	*	*	*	NS
CV, %		16.8	15.9	22.4	20.1	18.2	17.4	10.9