Selection for Vegetable Soybean and Development of Its Production Techniques in Korea

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Introduction and Methods

With the gradual increase in area for vegetable soybean production, the growing importance of vegetable soybean has recognized for export and for the domestic market in Korea (Hong et al., 1994). In order to expand the market of vegetable soybean and enhance the profit of soybean farmers, it is necessary to improve the vegetable soybean varieties and to establish of its production techniques.

To solve the difficulties of soybean farmers in Korea, a series of studies were carried out for three years from 1997 to 1999 supported by Agricultural R & D Promotion Program of Ministry of Agriculture and Forestry, Korea.

Results

Selection for Vegetable Soybean

The National Crop Experiment Station in Korea has been concerned with producing vegetable soybean plants that mature early, mid, and late, and have larger and greener pods with good appearance including high quality.

Eighty-four vegetable soybean lines or varieties, introduced from Taiwan, Japan, and improved in Korea, were screened for vegetable soybean on the basis of maturing date, plant type, growth, green pod yield, and the pod quality for export. Ten lines of them, 2 lines from Taiwan, 3 lines from Japan, and 5 lines from Korea, were thought to be suitable for vegetable soybean adaptable to Korean environment as early and medium-late maturity types. Those selected lines would be useful to improve good vegetable soybean varieties as a breeding material.

Development of Production Techniques for Vegetable Soybean

To produce the high quality and yield of vegetable soybean, several independent studies were carried out to determine optimum planting density, altitude for good seed production as well as to establish cultural techniques including year-round production system.

In field condition, the planting density of 40×20 cm, one- or two-plant per hill for vegetable

soybean production was verified to be the best out of four different ones tested on the basis of quality and yield of green pod produced.

Table 1. Effect of planting density on growth and yield of vegetable soybean, 1999.

Planting space	Seeds per Hill	Standard pod		No. of standard pods/500 g	Yield of Standard pod (ton/ha)
		Length (cm)	Width (mm)		
40cm	1-seed	5.2	12.7	150	6.62
	2-seed	5.3	12.9	171	7.04
	mean	5.3	12.8	161	6.83
50cm	1-seed	5.4	13.3	165	6.06
	2-seed	5.1	12.7	165	4.35
	mean	5.2	13.0	165	5.21

● LSD not significant at 5% level.
* LSD not significant at 5% level.

Table 2. Yield trial at three different altitude for 2 years, from 1997 to 1998 (data were averaged over years).

Altitude (m)	Standard pod		No. of Standard Pods/500 g	Yield (ton/ha)	
	Length (cm)	Width (mm)		Standard pod wt.	Seed*
150	5.2	13.2	187	10.54	2.63
250	5.1	12.8	195	10.46	2.91
400	5.1	12.8	196	10.53	3.04

* Data from 1998 experiment.
** LSD not significant at 5% level.

To determine the optimum environment for the seed production of virus-free and high quality vegetable soybean, two vegetable soybeans were cultivated at three different levels of altitude, 150m, 250m, and 400m. The results showed that there was no significant difference for yield of green pod at three different altitudes. However, the highest seed yield with high quality was recorded at 400m of altitude.

To solve the on-farm difficulties of ‘Cheongsongjidu’, a farming union corporation, which is the only factory that produces the frozen vegetable soybeans in Korea, a series of experiments were carried out for three years from 1997 to 1999. The main objective was the development of partner crops which can be planted before the vegetable soybeans in the early spring so that they bring more farm income and lengthen the operation period of the factory thus release managemental liabilities.

The six cropping systems, pod-edible peas + summer type soybeans, pod-edible peas + autumn type soybeans, green peas + summer type soybeans, green peas + autumn type soybeans, full season cropping of summer type soybeans, and full season cropping of autumn type soybeans were experimentally practiced to increase farm income, to prolong the operation period of factory, and lowering the purchasing price of vegetable soybeans from farmers thus enhance the competitive power at foreign market.

Table 3. Practical operation period for freezing facilities by different cropping systems.

Cropping systems	Monthly plan of crop cultivation and processing											
	J	F	M	A	M	J	J	A	S	O	N	D
Pod edible pea + Summer soybean			Shirohana				Seokryangputkong					
Pod edible pea + Autumn soybean			Shirobana				Suwon 201					
Green pea + Summer soybean			Superkle				Seokryang-putkong					
Green pea + Autumn soybean			Superkle				Suwon 201					
Monocropping of summer soybean					Seokryangputkong							
Monocropping of autumn soybean						Suwon 201						
Operation period of factory						47 days			109 days			

Operation period of freezing facility (factory) for peas and soybeans

The gross farm income from the on-farm practice of six cropping systems experimentally tested, pod-edible peas + summer type soybeans, pod-edible peas + autumn type soybeans, green peas + summer type soybeans, and green peas + autumn type soybeans were 63.2 mill. won/ha, 57.0 mill. won/ha, 23.5 mill. won/ha, and 17.3 mill. won/ha, respectively, which were equivalent to 661%, 596%, 246%, and 181% income increase compared with that of conventional mono cropping of Seokryangputkong, 9.6 mill. won/ha.

Table 4. Management results from different cropping systems, 1999.

Cropping system	Pod-edible pea (Shirohana)		Green pea (Superkle)		Summer soybean (Seokryang-putkong)		Autumn soybean (Suwon 201)		Total income (mill. won)
	Yield (ton/ha)	Revenue (mill. won)	Yield (kg/10a)	Revenue (mill. won)	Yield (kg/10a)	Revenue (mill. won)	Yield (kg/10a)	Revenue (mill. won)	
Pod-edible pea + summer soybean	8.00	50.9	-	-	8.18	12.3	-	-	63.2 (661)*
Pod-edible pea + autumn soybean	8.00	50.9	-	-	-	-	4.06	6.1	57.0 (596)
Green pea + summer soybean	-	-	15.00	11.3	8.18	12.3	-	-	23.5 (246)
Green pea + autumn soybean	-	-	15.00	11.3	-	-	4.06	6.1	17.3 (181)

Full season Cropping of Summer soybean	-	-	-	-	8.50	9.6ⓘ	-	-	9.6 (100)
Full season Cropping of Autumn soybean	-	-	-	-	-	-	7.20	8.1	8.1 (85)

*Total income percentage for full season cropping of summer type soybean.
Whole sale price for pod-edible pea at Tokyo Market in May : 6,364won/kg
Whole salle price for green pea at Karakdong Market, Korea, on June : 750won/kg
ⓘWhole sale price for summer type soybean at Karakdong Market, Korea, on August : 1,125won/kg
Whole sale price for autumn type soybean at Karakdong Market, Korea, on Sept. 13 : 1,500won/kg

Summary

Consumer demands for high quality vegetable soybean has become stronger. To produce high quality vegetable soybeans, a series of studies were carried out for three years from 1997 to 1999. Among 84 vegetable soybean lines or varieties tested, 10 lines of vegetable soybeans were selected for vegetable soybean adaptable to Korean environment. The planting space of 40x20cm, one- or two-plant per hill was the best for high quality production of vegetable soybean. There was no difference for yield of green pod at three different altitudes. Introduction of six cropping systems can prolong operation period for frozen factory from 40 days to 156 days. The gross income of pod-edible peas + summer type soybeans was the highest among six cropping systems.

Reference

Hong, E.H. et al. 1994. Research on the exportable vegetable soybean production and marketing system. Rural Development Administration, Suwon, Korea. p. 163.