

## Barrier Factors Related to Machine Harvesting in Soybean

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### Objectives

To establish the optimum machine harvesting system through an analysis of several factors related with combine harvesting in soybean.

To obtain the basic information about the cultural practice and the characteristics of soybean to be adapted to combine harvesting in order to cope with mechanized farming in the future.

### Materials and Methods

The experiment was designed as farmer's field investigation and questionnaire in 2005. A total of 109 samples(Table1) were classified by two group(42 in large farm scale with more than 0.5ha, and 67 in small farm scale with less than 0.5ha from soybean farm households).

Table 1. Soybean field scale of farm investigated

Items	Small farm scale(hectare)		Large farm scale(hectare)	
	Less than 0.1	0.1 to 0.5	0.5 to 0.75	More than 0.75
Percent	26.9	73.1	21.4	78.6
Farm number	18	49	9	33

The questionnaire contents consisted of soybean cultivar, cultural practice, farm scale, harvesting method, and limiting factors of mechanized farming, etc.(Table2)

Table 2. Major factors related with mechanized harvesting

Cultivar	Cultural Practice	Machine operation	Farm scale
Pod setting, Seed size, Maturing habit	Planting date & density, Pest control	Seed damage & Marketing quality	farm scale suitable to mechanized harvesting

### Results and Discussion

In soybean harvesting, various methods are the mower, grain binder, combine, and hand. Almost farmers in Korea have harvested soybean by hand cutting because soybean field is small and the cost of combine is high. Owing to the high cost of the machine the combine is economical only when a comparatively large area of soybean is to be harvested. The greatest loss is due to low branches and lodged plants which are not picked up by the cutter bar. The types of harvest losses were pre-harvest loss, gathering loss, threshing loss, and combine. If soybeans are 2,000won per kg and the seed of 40kg are left unharvested at a hectare, the loss to the producers is eighty thousand won per hectare.

In Korea the green stem syndrome at harvest time is the most serious problem to be mechanized harvesting because the green stem stay succulent after suitable harvesting time when the pod turn brown and grain moisture decreased.

Table 3. Machine harvesting trouble to be occurred by characteristics of soybean cultivar

Items	Plant type	Seed shape	Maturing habit
Characteristics	Determinate(branching) Setting pod at low nod Susceptible lodging	Large seed size Thin seed coat	Stem stay green after the pod turn brown
Harvesting trouble	Stay succulent stem at harvesting time : cause of shattering, and seed coating of foreign dirty matter	Seed cracking & damage Reduce germination	Seed coating of foreign dirty matter Increasing shattering by delay in harvesting

Table 4. The moisture contents of seed stem at harvesting time

Items	Moisture content(%) in harvesting time					
	Cutting			Shelling		
	Optimum	cv. Hwangkeum	cv. Muhan	Optimum	cv. Hwangkeum	cv. Muhan
Seed	23 ~ 27	16.0	15.2	15 ~ 18	18.2	16.0
Stem	50 ~ 60	57.3	54.4	20 ~ 25	40.0	23.8

Table 5. Amount of seed losses according to combine harvest processing.

Items	Total losses of potential yield	Non-cutting	Shattering	Non-gathering
Percent	11.0	6.1	2.9	2.0
Loss(kg/ha)	257	142	67	48

Table 6. Comparison of harvesting methods according to soybean farm scale.

Items	Small farm scale			Large farm scale		
	Hand	Mower	Combine	Hand	Mower	Combine
Percent	88.1	8.5	3.4	66.7	30.9	2.4
No of farm	52	5	2	28	13	1

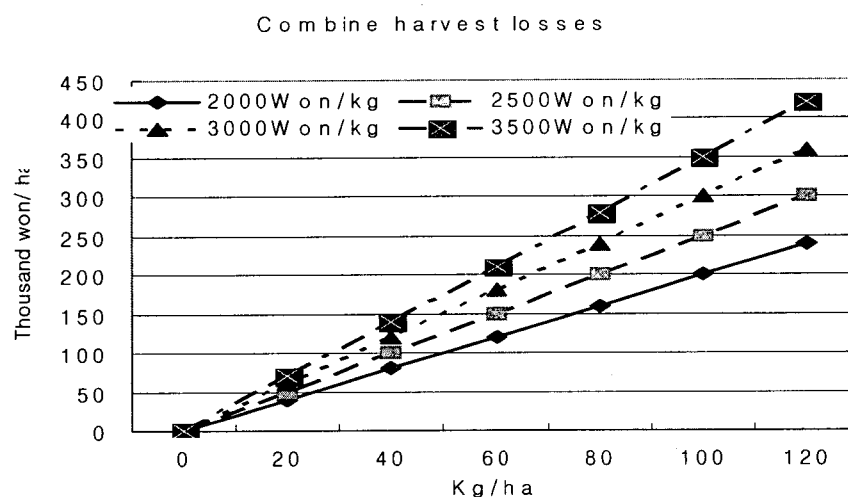


Fig 1. Combine harvest losses in economic value(won) per ha.

#### Literature Cited

NICS. 2005. Establishment of the Synthetic Cultivation Technology System for Soybean Production in Paddy Field. 3rd year report of NICS, RDA.