

Table 1. The effect of ozone on protein content of bean seeds (7% seed moisture basis).

	Control	Ozone Concentration	
		40 pphm	80 pphm
Protein (%)	25.79	25.75	25.90

There was no effect of a single dose of 40, and 80 pphm concentration of ozone on protein content of bean seeds. The effect of repeated applications of low dosages of ozone and sulfur dioxide on bean pod and seed protein is being studied.

ADAPTATION OF SNAP BEAN TO FRONTAL MECHANICAL HARVEST

G. Eteve and G. Fouilloux
 Laboratoire de Génétique et d'Amélioration des Plantes - I.N.R.A.
 Estrées-Mons (Somme), France

In a few years, French snap bean processors have replaced their in-row harvesters by frontal machines more performant and easier to employ. Unfortunately, most snap bean varieties are not adapted to this new type of machine and one has to contend with large losses during the harvest (sometimes in excess of 25 percent).

To breed adapted cultivars to mechanical harvest (i.e. to decrease the losses) is not easy because the selection must be made based on large machine harvested trials, i.e. very late in a breeding cycle. Our aim is to search for visually applicable components of this adaptation in order to be able to make selections in early generations. For this, we have studied the relations between the different kinds of losses occurring during the mechanical harvest and some morphological characteristics of the cultivars.

Materials and Methods

The study was undertaken at the I.N.R.A. Station of Mons en Chaussée, near Peronne in the north of France, during the summers of 1977 and 1978 on yield trials (30 lines or cultivars, 4 replications, 10 rows per plot and 5 harvests of 2 rows at each date).

These trials were harvested with a little frontal machine, a reduction of our current machine (Ploeger).

The unpicked pods (loss n°1) and pods dropped onto the soil (loss n°2) were observed, counted and weighed.

We also weighed the harvested pods and measured their quality (diameter, dry matter).

On each trial, some morphological characteristics of a different line or cultivar were measured on fifty plants taken at random out of two repli-

cations:

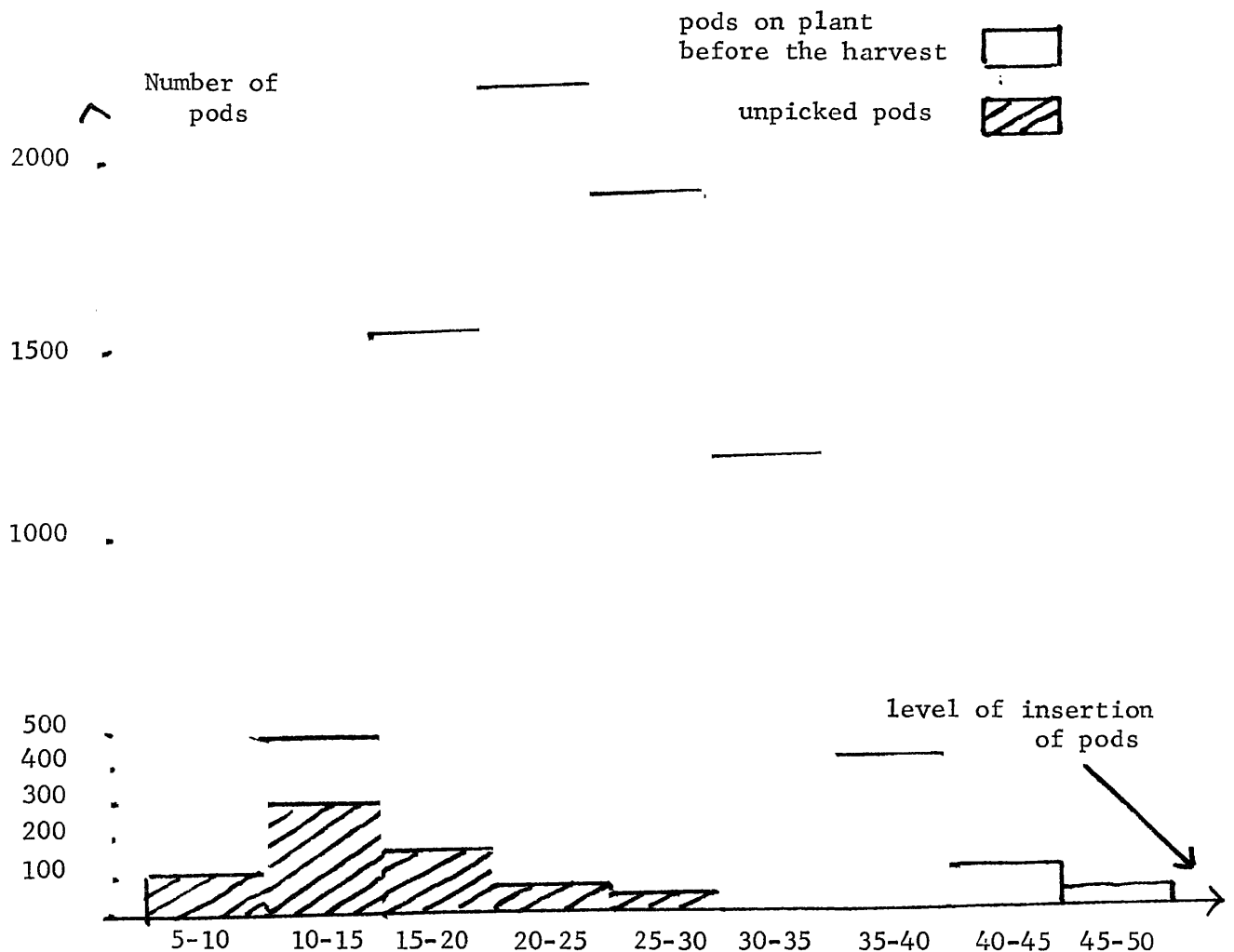
- Plant height
- Foliage height
- Number of pods attached at each level of the plant (levels are 0-5 cm, 5-10 cm, 10-15 cm, etc.).

This last datum gives an evaluation of pod dispersion on each cultivar by the standard deviation of the distribution of pods above the 20 cm level.

Results and Discussion

The results obtained during both years are similar. Nevertheless, the correlations presented during 1978 are not as strong as those in 1977.

1) The rate of unpicked pods is important when their level of attachment is low. Practically, all pods attached below 10 cm are lost as well as half of the pods at the level 10-15 cm.



2) There are significant correlations between the morphological characteristics studied and both types of losses.

	Plant height	Foliage height	Pod dispersion
Unpicked pods (loss n°1)	- 0,364*	- 0,542***	0,607***
Dropped pods (loss n°2)	- 0,628***	- 0,767***	0,753***
Total losses	- 0,703***	- 0,695***	0,730***

* Signification at level : 0,05
 ** Signification at level : 0,01
 r limit = 0,361 with 28 df

Losses are less important when plant and foliage heights are large. It confirms the observations made by farmers and processors. The correlation concerning the foliage height is more important because only few pods are attached below the foliage.

A strong correlation exists between the dispersion of pods and the losses. This was an unexpected result but it is likely to be due to a less complete picking of pods too concentrated in the middle of the plant, which induce great losses by falling down onto the soil.

There have been made also other observations but these are of minor interest for the plant breeder.

In particular, the number of plants pulled out or stems broken off and the number of clusters (more than two pods attached at one site on the stem) increase with the age of the harvested plants. Old pods are more strongly bound to the plant or stems of old plants become more brittle.

Conclusion

In order to increase the chance to obtain an adapted cultivar to frontal mechanical harvesting, it seems to be necessary in early generations of a breeding cycle to choose plants with:

- a great rate of pods attached above 15 cm
- a total and a foliage height sufficiently large
- a great dispersion of pods on the plants

In these conditions, it is necessary on one hand to watch over the lodging resistance during selection and, on the other hand, a great dispersion of pods risks to harm the good homogeneity of the production.