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Evaluation of Some Long Bean Lines Using Early and Late Produced Seeds in Two Soil Types

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RINGKASAN

Bijibenih kacang panjang yang dihasilkan awal dan lewat dari beberapa keturunan F_9 dari jenis asing telah dinilai di tanah gembur liat dan tanah lanar di ladang Universiti Pertanian, Serdang. Keputusan percubaan ini menunjukkan hasil kacang dan panjang kacangnya tidak berbeza antara bijibenih dari hasil awal atau lewat. Di antara genotaip-genotaip yang dikaji, hasil kacang tidak berapa tetap jika dibandingkan dengan sifat panjang kacangnya. Setengah keturunan dan jenis Taiwan Stripe Seed memberi penghasilan yang lebih besar berbanding dengan jenis tempatan, iaitu Local Long-1 pada kedua-dua jenis tanah.

SUMMARY

Early and late produced seeds of some F_9 lines and exotic cultivars of long beans were evaluated on clayey loam and alluvial soil in the University Farm at Serdang. The results showed that pod yield and pod length were not significantly different for seeds produced early or late. Among the genotypes studied, pod yield was more unstable than pod length. However, some lines and Taiwan Stripe Seed performed better than the local commercial variety, Local Long-1 in both soil types.

INTRODUCTION

Long bean (*Vigna sesquipedalis* Fruw.) is also known as asparagus bean or yard-long bean. It is a climbing plant and widely grown in Malaysia for its tender pods. In the past, most long bean varieties grown locally were land strains and were very variable. A breeding programme using different selection procedures was carried out in a 7×7 diallel cross population in 1973 with the object of developing high yielding varieties. Some of the results for this breeding programme have been reported earlier (Mak, 1973, Poh, 1976 and Yap *et. al,* 1976).

In the present studies some promising F_9 lines of the crop were evaluated under clayey loam and alluvial soil types at the University Farm in Serdang. The present studies also undertook to verify the belief that pods for seeds saved at the early stage of the fruiting period give a better yield than those saved at the later stage. Hence, in addition to the normal genotype evaluation, seeds harvested at the early and late stages of the fruiting period were included.

MATERIALS AND METHODS

Twelve F_9 lines together with three varieties of long bean were used in these studies. Seeds harvested during the early and late stages of the fruiting period were used. The early seeds were pods saved at the beginning of the fruiting period and the late seeds were pods saved 30 days later. Two trials were carried out in these studies. The first consisted of 12 F_9 lines and three varieties were grown on clayey loam in August, 1977, while the second was conducted on alluvial soil in September, 1977. These genotypes together with the two types of seeds were arranged in a randomized complete block design with three replications. However, due to insufficient seeds, line I/5–17–5–8 was not included in the second trial. The details for the development of the breeding lines have been reported elsewhere (Poh, 1976, Yap, *et al.*, 1976, 1977). The three varieties, Local Long-1, Taiwan Stripe Seed and Sabah are commercial varieties grown in Peninsular Malaysia, Taiwan and Sabah, respectively.

Each genotype was grown on a bed 20 ft (610 cm) long 3.5 ft (107 cm) wide and 0.5 ft

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(15.5 cm) high in two rows spaced 2.5 ft (76 cm) between rows and 1.5 ft (46 cm) between plants. Two seeds were sown per planting point and later thinned down to one plant per point three weeks after sowing. As long bean is a vine crop, sticks about 8 ft (244 cm) long were set adjacent to each seedling to provide support for the climbing vine. NPK 15: 15: 15 fertilizer at the rate of 500 kg/ha was applied at the first week and sixth week after sowing. Insecticides were sprayed at weekly intervals to control aphids, bean miners and pod borers.

Fresh pods were harvested when they reached marketable stage. Harvesting was carried out on alternate days until senescence of the plants.

The two characters reported here were fresh pod yield per plant and pod length. Pod yield per plant was the accumulative yield of fresh pods yield harvested throughout the fruiting period divided by the total number of plants in the bed. Pod length was the mean of 10 pods measured at the third week of harvest.

RESULTS

Analyses of variance for pod yield and pod length for the two trials are given in Table 1. Significant differences were found for pod length in the trials but in respect to pod yield only the second trial gave significant differences. Further partitioning of the sum of squares, however, showed that the yield differences among lines in the second trial contributed to the significant difference. In these studies, both trials showed that there was no significant difference in pod yield and pod length in the two types of seeds used for the trials. There was also no significant interaction effect between genotypes and different types of seeds.

Mean values of pod yield and pod length for the two types of the seeds were calculated and compared with Local Long-1, the commercial variety grown locally. The results showed that Taiwan Stripe Seed and many selected lines outyielded Local Long-1 slightly in both trials. Pod length, however, for most cases was shorter than Local Long-1 (Table 2).

DISCUSSION

From these studies, it is clear that seed yeild saved at the early and late stages of the fruiting period do not effect any difference in yield and pod length. This finding reveals that farmers could save pods for the next generation at the early or late stage of a fruiting period. It should be noted, however, that pods for seeds should be well-developed as is shown by the well-developed seeds from good pods used in the present trials. It is generally believed that flowering may be delayed and senescence hastened if mature pods are left unplucked during the fruiting period. If this were the case then it would be logical to keep good pods for seeds at the later stage so that more pods would be harvested for sale.

For the two characters studied, both trials showed that pod yield was more unstable than pod length. The correlations between the first and second trials for pod yield and pod length were 0.03 and 0.93 respectively, suggesting that pod yield was more susceptible to environmental changes than pod length. These results support the early findings that the heritability for pod yield was

TABLE 1

Mean squares for characters measured in long bean lines and varieties using early and late produced seeds in two trials

Source of variation	Degree of freedom		Pod yield		Pod length	
	I	II	I	II	I	II
Replications	2	2	24294	88525**	9.00	31.72**
Treatments	(29)	(27)	8715	15254*	69.82**	74.91**
Genotypes (G)	14	13	8923	19692*	134.88**	150.44**
Stages of seeds (S)	1	1	3591	282	9.02	2.29
G × S	14	13	8873	11169	9.09	4.98
Error	58	54	8900	9584	7.19	4.30

* $P \leq 0.05$
** $P \leq 0.01$
I : Trial I (clayey loam)
II : Trial II (alluvial soil)

TABLE 2

Mean values of characters measured in long bean lines and varieties using early and late produced seeds in two trials

Variety or line	Pod yield/plant (g)						Pod length (cm)					
	I			II			I			II		
	E	L	Mean	E	L	Mean	E	L	Mean	E	L	Mean
Local Long-1	343.8	306.7	325.2	340.6	348.3	344.4	47.0	51.2	49.1	52.2	55.0	53.6
Taiwan Stripe Seed	356.7	332.4	344.6	406.7	586.0	496.4	36.1	35.7	35.9	38.5	38.7	38.6
Sabah	254.0	327.8	390.0	319.0	318.9	319.0	43.5	41.4	42.4	43.0	44.6	43.8
I1 – 14 – 1 – 14	357.6	342.4	350.0	398.7	358.2	378.4	44.4	46.2	45.3	47.5	45.3	46.4
I1 – 20 – 3 – 4	353.8	289.0	321.4	493.4	452.2	472.8	47.6	48.5	48.0	48.0	49.1	48.6
I6 – 1 – 4 – 9	342.0	290.9	307.4	290.9	400.5	345.7	54.2	50.4	52.3	54.0	53.4	53.7
I7 – 5 – 4 – 4	365.3	245.7	255.5	389.9	352.7	371.3	37.6	41.7	39.6	43.2	40.3	41.8
I7 – 7 – 7 – 7	252.3	328.1	290.2	315.7	372.7	344.2	38.4	36.0	37.2	38.1	38.8	38.4
I9 – 7 – 3 – 5	384.8	338.2	361.5	347.2	274.5	310.8	41.8	43.7	42.8	40.5	42.1	41.3
V4 – 13 – 5 – 10	336.8	397.4	367.1	306.3	265.7	286.0	46.2	49.0	47.6	47.5	47.4	47.5
V6 – 1 – 9 – 1	326.1	289.0	307.6	300.7	408.6	354.6	48.3	47.5	47.9	48.1	51.6	49.8
V6 – 3 – 7 – 4	452.7	418.4	535.6	422.9	336.9	379.6	42.5	43.9	43.2	47.4	48.9	48.2
B4 – 10	336.5	387.5	362.0	428.6	272.2	350.4	38.3	39.1	38.7	41.4	40.2	40.8
I3 – 13 – 3 – 5	461.0	348.8	404.9	363.1	324.2	343.6	41.7	39.6	40.6	46.2	44.9	45.6
I5 – 17 – 5 – 8	277.1	459.7	368.4				42.9	45.8	44.4			
LSD 0.05	154.0		108.9	157.4		113.3	4.4		3.1	3.4		2.4
LSD 0.01	204.9		144.9	209.0		147.8	5.8		4.1	4.5		3.9

I : Trial I II : Trial II E : Early L : Late

very low compared to that of pod length. Although pod yield of the lines was very unstable under the two soil types, judging by the results of two trials, it was found that some lines performed better than the check variety, Local Long-1. In these studies, the exotic variety, Taiwan Stripe Seed, also performed quite well under local conditions.

The main aim for this breeding programme was to develop high yielding lines; it was found that the yielding ability varied in the two trials. It is necessary for further evaluation trials covering a range of environmental conditions to be carried out to sort out the yielding ability and adaptability of these promising lines. Several experiments have been conducted recently in various regions to evaluate these lines more rigorously. It is hoped that as a result of these experiments some relatively more stable and high yielding lines will emerge and be released for commercial production.

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