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Intercropping in Pigeon Pea *

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ABSTRACT

Field experiment conducted to ascertain the effect of intercrops on the yield performance of pigeon pea revealed that intercropping of other legumes with pigeon pea adversely affected the yield of main crop, though the extent of effect varied with the intercrop. Despite the reduction in the yield of pigeon pea, the total production per unit area (pigeon pea equivalent) was higher with intercropping treatments in comparison to that obtained from a solid stand of pigeon pea. Green gram, blackgram and groundnut appeared to be compatible intercrops with pigeon pea.

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INTRODUCTION

Grain legumes are a chief source of proteins in the predominantly vegetarian diet of the people of India. But the pulse production has not kept pace with the increase in human population in our country. Our requirement for pulses by the end of the present century would be around 24 million tonnes. To raise the pulse production to this level, it is imperative to increase either area or the yield per hectare of these crops. There is little scope of increasing the area with the present system of crop production. Availability of larger acreages of fertile irrigated lands for pulses also seem to be out of consideration. The only way left out is to incorporate short duration legumes in intercropping.

Growing of pigeon pea alone or with some other crops, like maize, sorghum, pearl millet etc. is being practised even today in certain parts of the country. But intercropping of other legumes with piegeon pea is relatively a new development and has become possible very recently with the breeding of number of short duration varieties of pulse crops, which are harvested well before the pigeon pea starts its growth (Saxena, 1972). The growth of pigeon pea plants is comparatively very slow for the first two months which provides sufficient place for inclusion of suitable short duration intercrops (Saraf *et al.*, 1975; Roy Sharma *et al.*, 1975; Hegde, 1977; Reddy *et al.*, 1977, Faroda and Singh, 1978; Panwar, 1978; Saxena and Yadav, 1979; Singh *et al.*, 1978; Singh *et al*, 1979 and Yaseen and Satyanarayan, 1979). The present experiment was conducted to know the feasibility of intercropping pigeon pea with more number of legumes.

MATERIALS AND METHODS

Field experiments were conducted during *kharif* seasons of the years 1977-78

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and 1978-79 on the sandy loam soils of the Indian Agricultural Research Institute, New Delhi in a randomised block design with seven treatments comprising pigeon pea alone (Prabhat) and pigeon pea intercropped with green gram (PS-16), black gram (T-9), cowpea grain (779), cowpea fodder (EC 4216), soyabean (Bragg) and groundnut (M-13). Each treatment was replicated thrice.

Pigeon pea was sown at a distance of 50 cm with a seed rate of 25 kg seeds per hectare. The intercrops were sown in between two rows of pigeon pea in 1: 1 row proportion with recommended seed rate. A common dose of 100 kg diammonium phosphate per hectare was applied before sowing of the crops. The crops were sown with the onset of monsoon and were harvested when maturity attained for each crop except cowpea fodder which was harvested 1½ months after sowing.

RESULTS AND DISCUSSION

The data on grain and stalk yields of pigeon pea and intercrops are presented in table-1. It is revealed that significantly the highest grain yield (16.4 q/ha) and fodder yield (71.3 q/ha) were obtained by the pure stand of pigeon pea. There was a redution in the yield of pigeon pea as a result of intercropping. Even the best intercrop (groundnut) brought about 20% reduction in grain yield. The other intercrops in order of merit were cowpea (fodder), green gram, black gram, and cowpea (grain). Soyabean did not come out to be a good intercrop with piegeon pea and recorded the lowest

TABLE 1

Grain and straw yields of pigeon pea and intercrops and the pigeon pea equivalents (two years average data).

Sr. No.	*Treatment*	*Grain Yield (q/ha)*		*Straw Yield (q/ha)*		*Pigeon pea equivalent (q/ha)†*
		Pigeon pea	*Inter crops*	*Pigeon pea*	*Inter crops*	
1	Pigeon pea alone	16.4	–	71.3	–	16.4
2	Pigeon pea + Green gram	12.6	6.1	48.7	14.5	19.3
3	Pigeon pea + Black gram	12.8	6.1	48.4	15.0	18.4
4	Pigeon pea + Cowpea (grain)	11.5	7.1	42.1	16.0	18.1
5	Pigeon pea + Cowpea (fodder)	14.2	–	57.0	116.7*	18.8
6	Pigeon pea + Soyabean	8.9	18.6	30.9	49.8	17.6
7	Pigeon pea + Groundnut	13.9	7.4	53.3	43.0	19.7
	S.Em.±	0.3	–	2.2	–	–
	C.D.(5%)	1.0	–	5.1	–	–

*Green fodder yield.

†Pigeon pea equivalent (q/ha) = weight of pigeon pea grain (q/ha) + $\frac{\text{Weight of inter crop grain (q/ha)} \times \text{Price of inter crop grain (Rs./q)}}{\text{Price of pigeon pea grain (Rs/q)}}$

piegeon pea yields. This was due to its dense canopy, tall growing habit and long duration. This finding is in agreement with those of Hegde (1977) and Singh *et al.* (1979), but in contrast to those of Saraf *et al.* (1975), Faroda and Singh (1978) and Saxena and Yadav (1979), who did not observe any reduction in the yield of pigeon pea due to intercropping. Since various intercrops took sufficient amount of plant nutrients initially, it was natural that intercrops must compete with pigeon pea for plant nutrients. Further, it is clear from the data that among the intercrops, pigeon pea yields were higher when the latter was grown intercropped with cowpea (fodder) and the groundnut. This might possibly be due to high nitrogen fixation by cowpea (fodder) and groundnut, which was sufficient enough to meet the nitrogen requirement of both pigeon pea and the intercrops. This is in agreement with the findings of Roy Sharma *et al.* (1975) and Reddy *et al.* (1977), but in contrast to the findings of Singh *et al.* (1979) and Yaseen and Satyanarayan (1979). The lower yields of pigeon pea, especially when intercropped with soyabean could be explained on the basis of comparatively longer growing season, higher grain yield and higher nitrogen uptake by soyabean in comparison to green gram, black gram and cowpea (grain). Moreover, soyabean being errect in habit, grew tall and competed with piegeon pea for light. Thus, soyabean competed with pigeon pea very strongly and caused reduction in the yield of the latter crop very heavily. Saraf *et al.* (1975) and Panwar (1978) also observed adverse effect of soyabean when intercropped with pigeon pea.

These studies, however, demonstrate very clearly the beneficial role of short duration legumes used as intercrops. Although the yield of main crop (pigeon pea) is slightly reduced, the total production is much higher as it is clear from the pigeon pea equivalent of each cropping system (Table-1). This is because of better utilization of land and sunlight and higher uptake of nitrogen, part of which was fixed by the intercrops. These results are in agreement with the findings of Hegde (1977).

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