EXPLOITATION OF BIOLOGICAL POTENTIAL OF GRAM AND LENTIL UNDER VARYING INTERCROPPING SYSTEMS

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Investigations into the feasibility of intercropping of lentil in gram planted in strips of three rows (80 cm between strips and 20 cm between rows) were carried on a sandy clay loam soil. The treatments included: gram alone, lentil alone, gram + one row of lentil, gram + two rows of lentil and gram + three rows of lentil. The results revealed that pods/plant and seed yield were influenced significantly by various gram-lentil intercropping systems. Whereas, one, two and three rows of lentil in gram strips reduced the gram yield by 23.6, 28.4 and 39.1%, respectively over gram alone. However, this loss of gram yield was compensated by the additional harvest of 4.5, 6.1 and 6.7 quintals per hectare of one, two and three rows of lentil, respectively.

INTRODUCTION

Intercropping is considered to be an effective and potential mean of increasing crop production per unit area, particularly for farmers with small holdings who need to grow more than one crop to spread labour peaks and to guard against market risks. The common practice with the farmers is to grow leguminous and non-leguminous crops in association or intercropping vegetables with the field crops. Many researchers have pleaded the usefulness of cereal-legume intercropping systems in terms of increased crop production as reflected from the increased Land Equivalent Ratio (Ashraf, 1982; Khan, 1984).

There is dire need to increase the production of pulses in the country because we are deficient in proteins in our daily diet and huge amount of foreign exchange is being spent annually on the import of pulses.

Gram is an important rabi pulse grown on vast areas but unfortunately its production has dropped to a significant extent because of gram blight and other diseases. Therefore, the small farmers feel it imperative to practise intercropping in gram for compensating the loss to occur, if any. The present study was, therefore, carried out to evaluate the feasibility and productive efficiency of geometry of planting gram to develop a suitable intercropping system using lentil as an intercrop.

MATERIALS AND METHODS

The experiment was laid out using RCBD with four replications by maintaining a net plot measuring 3.6 m x 5 m. The treatments were: gram alone, lentil alone, gram + one row of lentil, gram + two rows of lentil and gram + three rows of lentil. Gram was planted in strips of three rows by maintaining 80 cm and 20 cm spacing between strips and rows, respectively. Gram cultivar (CM-72) and lentil cultivar (9-6) were planted during the third week of November, 1987. A basal dose 20-50 kg ha^{-1} of NP was applied. Observations on various growth and yield parameters were recorded during the course of the study. The data

Table 1. Yield and yield components of gram and lentil as influenced by gram-lentil intercropping system

Treatment	Number of pods/plant		1000-seed weight (g)		Biological yield (Q ha^{-1})		Grain yield (Q ha^{-1})		Harvest index (%)	
	Gram	Lentil	Gram	Lentil	Gram	Lentil	Gram	Lentil	Gram	Lentil
Gram alone	42.1 a	-	173.4	-	48.6 a	-	15.3 a	-	31.5 a	-
Lentil alone	-	71.1 a	-	19.7	-	28.7 a	-	10.8 a	-	38.3 a
Gram + One row of lentil	39.1 ab	69.8 a	173.7	19.2	48.1 a	14.4 d	11.7 b	4.5 c	24.3 b	31.4 ab
Gram + two rows of lentil	36.2 bc	66.9 ab	179.5	18.4	46.4 a	20.2 c	10.9 bc	6.1 b	23.7 b	28.6 b
Gram + Three rows of lentil	33.7 c	59.4 b	179.8	19.5	42.2 b	25.4 b	9.3 c	6.7 b	22.2 b	26.9 b

Figures followed by the same letters are statistically similar at P = 5%.

Table 2. Economic analysis of the gram-lentil intercropping systems (145 days duration)

Intercropping system	Income ha^{-1} (Rs) Gram/Lentil	Intercrop (Rs ha^{-1})	Gross Income (Rs. ha^{-1})	Total Expenditures (Rs ha^{-1})	Cost benefit ratio	Net Income (Rs ha^{-1}) (Rs)	Difference over no intercropping (Rs ha^{-1})	Net income per day (Rs)
Gram alone	6457	-	6457	2383.55	2.70	4073.45	-	28.09
Lentil alone	7616	-	7616	2528.15	3.01	5087.85	-	35.08
Gram + One row of lentil	5039.60	3115	8154.60	2769.90	2.94	5384.70	1311.25/296.85 32.19%/5.83%	37.13
Gram + two rows of lentil	4738.1	4256	899.10	2844.55	3.16	6149.55	2076.10/1061.70 50.96%/20.86%	42.41
Gram + three rows of lentil	4057.10	4704	8761.10	2978.95	2.99	5782.15	1708.7/694.3 41.94%/13.64%	39.87

Rate/40 kg of produce, Gram: Rs. 160/-, Lentil: Rs. 280/-, Gram Bhoosa: Rs. 4/-.

collected were analysed using analysis of variance technique and Duncan's Multiple Range test at 5% level of probability was employed for comparing the differences among the treatment means (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The number of pods per plant is a key factor in determining yield performance in leguminous crops. The number of pods per plant of gram ranged from 42.1 to 33.7 (Table 1) which exhibits a decreasing tendency as the number of rows of lentil increased within strips of gram. Similarly, number of pods per plant were also decreased in lentil with the increasing number of rows. This decrease in number of pods per plant may be due to mutual competition among the companion crops for the same soil and atmospheric resources.

There was no effect on 1000-grain weight. The biological yield of gram was reduced as the number of rows of intercrop were increased. Similarly the biological yield of intercrop (lentil) was influenced significantly when compared with lentil alone on the basis of number of rows.

The grain yield reveals that there was a trend of reduction in yield of both component crops under increased number of rows of intercrop. This might have happened because of competition between plants of component crops for the aerial and edaphic environments. Although there was reduction in yield of both component crops compared with sole crops,but the additional harvest of intercrop compensated the loss and increased the net income per unit area and hence established the economic feasibility of these intercropping systems (Table 2). These results support the findings of Akhtar (1983) and Ahmad (1984).

It can safely be concluded from the results that intercropping of lentil (two rows) in a strip of gram (three rows) can successfully be practised which gave 50.96 and 20.86% higher income than the sole gram and lentil crops, respectively.

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