

PRODUCTIVITY AND ECONOMICS OF MAIZE AND GREENGRAM INTERCROPPING AS INFLUENCED BY PLANTING PATTERN AND WEED MANAGEMENT UNDER FOOT HILL CONDITION OF MANIPUR

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ABSTRACT

Productivity and economics of a few maize intercropping systems were studied under the foot hill condition of Manipur, Green gram was grown as intercrop in between the rows of maize in 2 row ratios. For controlling weeds butachlor was also tried and compared against two hand weeding and a weedy check. The study revealed that intercropping maize with green gram in 1:2 ratio gave higher total maize equivalent yield and net return than that of either sole maize or 1:1 row ratio intercropping. Butachlor application was more profitable and feasible than hand weeding.

INTRODUCTION

Maize is the most important cereal crop next to rice in Manipur. The crop is grown in an area of 17 thousand hectare producing 34.1 thousand tones during 1999. As the valley area is occupied by rice, the crop is grown mostly in the foot hills and mid hills as mixed and intercrops along with green gram, black gram and colocasia. Mandal et. Al. (1990) reported that green gram in association with maize increased the profitability and nitrogen economy of the soil. But due to poor technology and profuse weed growth the productivity of the intercropping system is very low in Manipur. That is why, the present experiment was undertaken to study production potential and economics of maize and green gram intercropping systems under varied planting pattern and weed management practices.

MATERIALS AND METHODS

The experiment was conducted during rainy season of 1998 and 1999 at the foot hill of Langol hill, Manipur. The soil was well drained, red lateritic with pH 5.6 organic carbon 2.82% available N 539 kg/ha, P₂O₅ 46 kg/ha and K₂O 638 kg/ha. Nine-treatment combinations consisting 3 levels of planting geometry and 3 levels of weed control (Table 1) were laid out in split plot design with planting geometry in the main plot and weed control in sub plots and replicated 3 times. Maize (Navjot) was sown 75 cm apart in between rows and plant to plant distance was maintained at 20 cm. One row and 2 rows of greengram (var. Pusa Baishakhi) were sown in order to get 1:1 and 1:2 row ratio planting pattern of intercropping respectively. A uniform nutrient dose @60kg P₂O₅ and 30 kgK₂O per hectare was applied in all the treatments. For controlling weeds, Butachlor @1.5kg a.i./ha was applied 1 day before sowing and 2 hand weeding at 42 days after sowing (DAS) were done to compare against a weedy check. Observations on weed population using quadrat and weed dry weight after drying in oven were taken and weed control efficiency was calculated. Maize equivalent yield (MEY), net return and return per rupee investment were also calculated for economic study.

RESULTS AND DISCUSSION

Effect on weed growth

Intercropping maize with greengram increased the weed suppression by reducing weed population (Table 1). The densities of weed growth and their dry weight at harvest were reduced progressively by increasing row ratio of greengram from 1 to 2. The minimum weed population (6.4/m²) and weed dry weight (8.0g/m²) were recorded

at maize + greengram in 1:2 row ratio, while their respective values in sole cropping were 10.2/m² and 11.8g/m². The highest weed control efficiency (WCE) (53.15%) was also recorded in 1:2 row ratio intercropping system. Setty and Rao(1981) also reported similar effect in sorghum + moong intercropping system. With regard to weed control methods, hand weeding twice recorded lowest weed density and dry weight of weeds with highest WCE (86.9%) in comparison to other methods. This is in conformity with the findings of Kumar and Singh (1992).

Effect on maize equivalent yield (MEY)

The total MEY increased significantly with intercropping at 1:2 row ratio planting geometry (53.94 q/ha) when compared to other planting systems (Table 1). This might be due to higher grain yield of green gram without affecting much on the main crop, maize in this planting geometry. Similar finding was reported by Thakur and Bora (1987) in maize + blackgram intercropping and by Nimje (1996) in pigeonpea + soybean intercropping system.

With regard to weed control treatments, hand weeding twice recorded increase in grain yield of both the crops. An increase of 48.8% in the total MEY was recorded in this method over control while that of butachlor treatment was only 24.2%. The results of the present study were in accordance with the findings of Balyan and Singh (1986) in sorghum + soybean intercropping system.

Economics of intercropping and weed control

Among the intercropping systems, the highest net return of Rs. 12311/ha and return per rupee investment (1.84) were obtained from maize + greengram (1:2), while their respective values in 1:1 row ratio combination were Rs. 10481/ha and 1.78 (Table 2). The higher net returns from maize + greengram intercropping were primarily because of higher yield and return. Higher net return from maize intercropping than sole maize were also reported by Chandel et al.(1987).

Among the weed control methods the maximum net return of Rs. 10693/ha was obtained from butachlor application. Even though the highest MEY was recorded in two hand weeding, due to higher labour cost the net return was reduced to Rs. 9887/ha, while that of weedy check was Rs. 7033/ha. The return per rupee was also the highest in butachlor application (1.90), while it was the lowest in two hand weeding treatment (1.57).

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Table 1. Effect of planting geometry and weed control methods in maize and greengram intercropping on weed population, weed dry weight, weed control efficiency and maize equivalent yield (data pooled for 2 years)

Treatment	Weed Population / m ²	Weed Dry Weight (g/m ²)	Weed Control Efficiency (%)	Grain Yield(q/ha)		Total Maize Equivalent Yield (q/ha)	Increase over Solemaize or Weedy check (%)
				Maize	Greengram		
Cropping system							
C ₁ =Sole maize	10.2(109.5)	11.8(155.4)	-	33.94	-	33.94	-
C ₂ =Maize+Greengram(1:1)	7.3(60.6)	10.5(130.7)	15.9	34.39	3.34	47.77	40.7
C ₃ =Maize+Greengram(1:2)	6.4(44.6)	8.0(72.8)	53.15	34.95	4.82	53.94	58.9
C.D.p = 0.05	1.15	1.16		N.S.	0.53	1.11	
Weed Control method							
W ₁ =Weedy check	10.7(118.6)	14.56(217.9)	-	28.81	2.93	36.36	-
W ₂ =Butachlor	7.5(59.9)	10.5(112.4)	48.4	34.07	4.15	45.16	24.2
W ₃ =Hand weeding	5.8(36.2)	5.2(28.5)	86.9	40.39	5.15	54.13	48.8
C.D.p = 0.05	1.24	0.95		1.72	0.25	1.62	

All the interaction effects are non significant. Figures within parenthesis indicates the original value.

Table 2. Effect of planting geometry and weed control methods in maize and greengram intercropping on economics (mean data of two years)

Treatment	Cost of cultivation Rs/ha	Gross return Rs/ha	Net return Rs/ha	Return per rupee invested
Cropping system				
C ₁ = Sole maize	12150	16972	4822	1.39
C ₂ = Maize+Greengram (1:1)	13407	23888	10481	1.78
C ₃ = Maize+Greengram (1:2)	14663	26975	12312	1.84
Weed control methods				
W ₁ = Weedy check	11151	18184	7033	1.63
W ₂ = Butachlor	11889	22582	10693	1.90
W ₃ = Hand weeding	17181	27068	9887	1.57