

Original Research Article

Productivity Potential of Maize (*Zea mays*) and Soybean (*Glycine max*) Intercropping System in Western Uttar Pradesh

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ABSTRACT

A field experiment was conducted during the rainy seasons of 2003 and 2004 to study the productivity potential of inter-cropping of maize (*Zea mays* L.) and soybean [*Glycine max* (L.) Merr.]. All inter-cropping system were superior in terms of maize-equivalent yield over yield values of all sole crops under trial. Among intercropping systems of maize (15.1q/ha) and soybean (7.2 q/ha), paired maize rows + 2 rows of soybean gave highest total yield and maize equivalent yield (29.5 q/ha). Trials was reported in 2009-10. Protein Contents increased in seed slightly in combination of legumes.

Keywords

Productivity, maize, soybean, inter-cropping, Proteins, seed

Introduction

Soybean is an important oilseed feed crop and grown in northern central parts of the country. Generally, crop is grown as mixed with maize. This system of growing soybean crop mixed with maize crop together is not efficient because of improper spatial arrangement in the field for efficient resource utilization. Inter-cropping is the only option to increase the cropping intensity through introduction of some variable planting pattern in the region (Pandey *et al.*, 1999). Intercropping not only provides insurance against biotic and environmental stress but also gives extra yield advantage by simple expedient of growing crops. Paired row technique is a simple way of exploiting land resources to harness, the maximum yield

advantage in intercropping system. Present study was conducted to assess the feasibility of maize and soybean intercropping system in Rohilkhand region of Uttar Pradesh.

Materials and Methods

The experiment was conducted during the rainy seasons of 2003 and 2004 on farmers field in Nawabganj tehsil of Bareilly district in Uttar Pradesh. The soil was well drained, Sandy loam. The soil had pH 7.5, organic carbon 0.48%, total N, 0.048%, available P 23.5 kg/ha and exchangeable K 135.5 kg/ha. A set of 6 treatments, comprising sole crops of maize and soybean and their intercropping system in paired maize (30/90 cm) + soybean in 2 : 1 row ratios, paired maize (45/90 cm) + soybean in 2 :2 row ratio; 1 additional maize

row after every 2 rows of sole soybean in (45 cm) and maize (60cm) + soybean (45 cm) in 2 : 1 ratio, was laid down in randomized block design with 4 replication. Crops were planted in lines as per treatment “Kanchan” cultivar of maize and cv. “P.K. 562” were used @ 20kg/ha and 75 kg/ha seed, respectively. 100% recommended dose of plant nutrients (N:P:K) were applied; out of 50% dose were supplied with organic manures (Vermi compost, FYM and bio-fertilizers). The data of 2 years were pooled for analyses to draw conclusion. The trials were repeated in 2011-12 to evaluate seed yield and quality.

Crop Equivalent Yields (CEY)

The yields of different crop/crops are converted into equivalent yield of any one crop based on price of the produce.

$$CEY = C_y + C_3Y.PC$$

CEY is the crop equivalent yield; C_y is the yield of the main crop, the yield of other crops converted to its equivalent and PC is its respective price; C_1y , C_2y are yields of intercrops /other crops which are to be converted to equivalent of main crop yield and PC1 and PC2 are their respective prices. Yield of one crop is converted into yield of other crop for gross income by this formula. Net income is not considered from CEY application. This pan indices for intercropping/cropping systems.

Results and Discussion

Maize yield under all intercropping systems was significantly lower than a sole crop of maize in both the years. Among different intercropping systems, paired maize rows

(30/90 cm) + soybean (2:1) (28.4q/ha) at par with paired maize rows + soybean (2 : 2) (203.5 q/ha) in 30/90 or in 45/90 cm recorded significantly higher maize yield over other planting patterns. More number of maize plants per unit area with low competition under paired maize geometry might be reason for higher maize yield. Higher yield of maize under sole stand than intercropping was also reported by Kholá *et al.*, (1999). Soybean yield under intercropping patterns also decreased significantly than the sole soybean.

Among different intercropping patterns, paired maize rows in 30/90 or in 45/90 cm soybean (2:2) gave significantly higher soybean yield (maize + soybean) of the system was maximum in paired rows 45/90 + soybean (2 : 2) (26.4 q/ha) and paired maize rows 30/90 cm + soybean (2:1). Sole soybean gave the lowest total yield (22.4). This low yield of soybean than that of maize might be reason of lower yield of system under sole soybean. The results are conformity with findings of Singh *et al.*, (2001). All intercropping with maize and soybean had more maize equivalent yield than sole maize(26.4 q/ha Vs 24.3q/ha). Results are similar to Singh and Singh *et al.*, (1995) and Tomar S. K. and others (2001).

A study in Central Mallvi found that intercropping maize and pigeon peas under conservation agriculture almost double the vegetative biomars, and in drier years 33 percent more grown maize, yield than conventionally field maize monocropping.

Relay cropping is practiced in Brazil, Colombia and Central America where maize is planted in May-June and beans are sown between the maize plants in August-September.

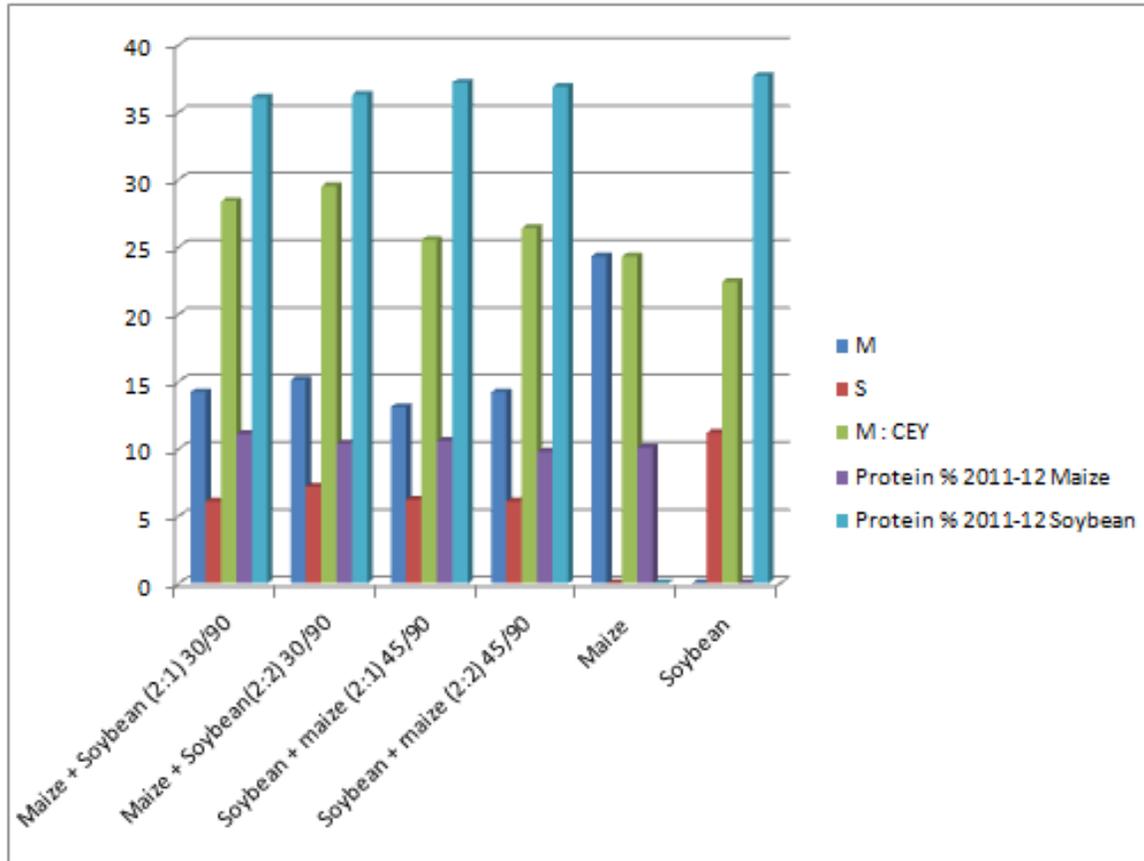
Table.1 Effect of intercropping on seed yield of maize and soybean

	M	S	M : CEY	Protein % 2011-12	
				Maize	Soybean
Maize + Soybean (2:1) 30/90	14.2	6.1	28.4	11.1	36.1
Maize + Soybean(2:2) 30/90	15.1	7.2	29.5	10.4	36.3
Soybean + maize (2:1) 45/90	13.1	6.2	25.5	10.6	37.2
Soybean + maize (2:2) 45/90	14.2	6.1	26.4	98	36.9
Maize	24.3	-	24.3	10.1	-
Soybean	-	11.2	22.4	-	37.7
CD _{0.05}	2.12	3.10	3.15	3.40	3.48

Fig.1 On farm Trials on Farmers' Field in adopted villages



Fig.2 Effect of intercropping on seed yield of maize and soybean



Intercropping of maize and soybean with paired rows of soybean may be grown for highest total yield of maize in paired maize rows. The paired rows of maize and soybean gave higher crop production. On an average, maize following legumes had higher crop yield compared to maize after fallow maize after maize, respectively. Similarly, legume rotation results in significant increase in total N uptake compared to continuous maize.

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