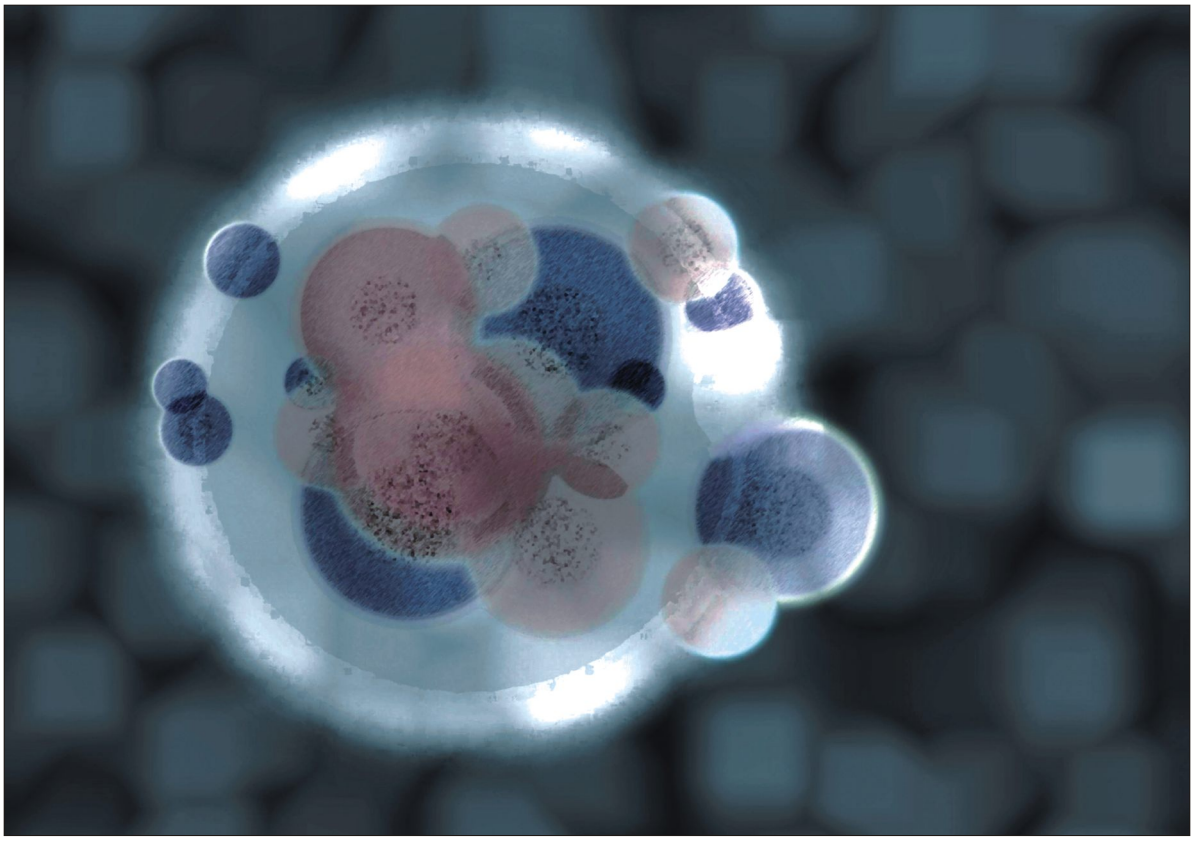

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Agro-technology of Intercropping Guara (Syamopsis Psoraliodes) and Mungbean (*Vigna radiata*)

Himayatullah Khan, Khalil Ahmad, M. Qasim and M. Ayub
Faculty of Agriculture, Gomal University, D.I. Khan, Pakistan

Abstract: An experiment was conducted to study the feasibility of intercropping Mungbean in Guara sown at 30, 45, 60 and 75 cm spaced single, double, triple and four row strips, respectively. Guara sown at 45 cm spaced double-row strips with two rows of Mungbean produced significantly more number of branches, grain and stalk yield ha^{-1} while number of branches and stalk yield of mungbean were not effected significantly. However, the grain yield of Mungbean was increased significantly in the intercropping system. Among the different planting patterns, guara planted in 45 cm spaced double-row strips in association with two rows of mungbean gave the highest land equivalent ratio (LER) of 1.55.

Key words: Agro-technology, land equivalent ratio

Introduction

Guara (*Syamopsis psoraliodes*) and Mungbean (*Vigna radiata*) belongs to family Leguminosae and play a vital role in the maintenance of soil fertility, animals feed and human diet (Anonymous, 1990). Being rich in protein they meet the major protein requirements of both animals and human beings.

Intercropping i.e., raising more than one crop simultaneously on the same piece of land has long been recognized as a common practice in developing areas of the world. Its popularity among small growers are attributed to increase farm income by utilizing all available resources to their optimum level. It is a unique practice in tropical and sub-tropical areas and particularly popular among small farmers (Finlay, 1974). But most of the research work in the world have been done on intercropping legumes with cereals and very little research information are available on intercropping legumes + legumes. Miah and Carangal (1980) concluded that the cultivars of mung which gave better yield under mono culture, yielded better also in intercropping system of mung plus maize (Willey *et al.,* 1983). The prevailing agro-technology of planting tall plants in double-row, triple-row and four-rows strips by decreasing the space between the rows which has exhibited good yield potential are to be tested in intercropping system also. Consequently, the present study was designed to test the tall growing guara in association with short statured mungbean in different intercropping geometrical patterns.

Materials and Methods

An experiment was laid out to ascertain the feasibility of intercropping guara and mungbean at the Agronomic research area, Faculty of Agriculture, Gomal University, D.I. Khan. It was designed in a Randomized Complete Block with four replications, keeping a net plot size of 3.6×5 m. The Guara (base crop) and Mungbean (Intercrop) were planted in different geometrical patterns as below:

1. 30 cm spaced single rows of Guara
   (with single rows of mungbean)

2. 45 cm spaced double-row strips of Guara
   (with two rows of Mungbean)

3. 60 cm spaced triple-row strips of Guara
   (with three rows of Mungbean)

4. 75 cm spaced four-row strips of Guara
   (with four rows of Mungbean)

The crops were planted in summer on clay loam soil using standard seed rate of 20 Kg ha^{-1}. Nitrogen at the rate of 20 Kg and Phosphorus at the rate of 50 Kg ha^{-1} was applied to all the plots at the time of seed bed preparations. Recommended dose of fungicide "Balyton" was sprayed on mungbean at the initial growth stage as a precautionary measures against any fungal disease. All other cultural practices were kept constant and normal. Data on the following parameters were recorded during the course of study.

1. Branches per plant of Guara and Mungbean (No)
2. Grain yield of Guara and mungbean (q)
3. Stalk yield of Guara and Mungbean (q)
4. Land equivalent ratio (LER)

LER was obtained by applying the following formula:

$$\text{LER} = \text{La+Lb} = \frac{\text{Ya}}{\text{Sa}} + \frac{\text{Yb}}{\text{Sb}} \text{(Crookston and Hill, 1979)}$$

Where, La and Lb = LER's of the individual crops a and b.
Ya and Yb = Individual crop yield in intercropping.
Sa and Sb = Yield of a and b as sole crops.

The data were analysed statistically by using analysis of Variance techniques (Steel and Torrie, 1980).

Results and Discussion

Number of Branches per Plant: The data pertaining to the number of branches per plant of guara and mungbean are presented in Table 1. The data revealed that significantly maximum number of branches per plant of guara (12.58) were recorded from the treatment where it was planted at 45 cm spaced double-row strips with two rows of intercropped mungbean while number of branches produced by the mungbean were not significantly effected by the various intercropping systems. However, their mean values indicated that two rows of mungbean sown between 45 cm spaced double-row strips of guara produced maximum number of 5.50 branches per plant as compared to other intercropping patterns. The results revealed that 45 cm spaced double-row strips of guara easily facilitate two rows of mungbean.

Identical findings were reported by Umrani and Shinde (1985) who stated that paired row sowing in intercropping system is more efficient in using natural resources due to better root development and sun light interception.

Table 1: Number of Branches per plant of Guara and Mungbean as affected by intercropping with different geometrical patterns

Comparison of Individual Means

Treatments	Means	
	Guara	Mungbean^{NS}
30 cm spaced single rows of Guara (with single rows of mungbean).	11.14 AB	4.20
45 cm spaced double-row strips of Guara (with two rows of Mungbean).	12.58 A	5.50
60 cm spaced triple-row strips of Guara (with three rows of Mungbean).	10.41 B	4.25
75 cm spaced four-row strips of Guara (with four rows of Mungbean).	11.25 AB	4.25
L.S.D. Value at 0.05 P.	1.69	1.80

Means not sharing a letter in common differ significantly
NS = Non-Significant

Table 2: Grain Yield of Guara and Mungbean as affected by intercropping with different geometrical Patterns

Comparison of Individual Means

Treatments	Means	
	Guara	Mungbean
30 cm spaced single rows of Guara (with single rows of mungbean).	24.35 B	3.98 B
45 cm spaced double-row strips of Guara (with two rows of Mungbean).	29.47 A	4.39 A
60 cm spaced triple-row strips of Guara (with three rows of Mung bean).	23.93 B	4.12 AB
75 cm spaced four-row strips of Guara (with four rows of Mung bean).	23.94 B	3.95 B
L.S.D. Value at 0.05 P.	4.09	0.42

Means not sharing a letter in common differ significantly

Table 3: Stalk yield of guara and mungbean as affected by intercropping with different geometrical patterns

Comparison of Individual Means

Treatments	Means	
	Guara	Mungbean^{NS}
30 cm spaced single rows of Guara (with single rows of mungbean).	74.01 AB	16.37
45 cm spaced double-row strips of Guara (with two rows of Mungbean).	85.79 A	16.33
60 cm spaced triple-row strips of Guara (with three rows of Mung bean).	69.39 B	16.36
75 cm spaced four-row strips of Guara (with four rows of Mung bean).	74.81 AB	16.39
L.S.D. Value at 0.05 P.	13.91	3.33

Means not sharing a letter in common differ significantly
NS = Non-Significant

Table 4: Land Equivalent ratio of different Intercropping Systems

Comparison of Individual Means

Treatments	Comparison of Treatment's Means
Mungbean alone single row.	1.00
Guara alone single row	1.00
Guara double-row strips + mungbean	1.55
Guara triple-row strips + mungbean	1.33
Guara four-row strips + mungbean	1.24

Grain Yield (quintals ha^{-1}): The data showing the grain yield ha^{-1} of guara and mungbean as effected by intercropping and planting geometries are presented in Table 2. Significantly highest grain yield ha^{-1} (29.47 q) was obtained from Guara when planted at 45 cm spaced double-row strips with two rows of intercrop Mungbean.

Similarly, the grain yield ha^{-1} of Mungbean was also effected significantly by various planting geometries in the intercropping systems. The table revealed that two rows of mungbean sown between 45 cm spaced double-row strips of guara produced maximum grain yield of 4.39 quintals ha^{-1}. It is evident from the mean table that paired planting of each crop produced significantly maximum grain yields as compared to single triple and tetra-rows planting patterns. Identical findings were reported by Rathore *et al.* (1979) and Rao and Willey (1981). They concluded that maize and sorghum grown in paired rows pattern and intercropped with Vigna mungo and pigeonpea, respectively gave the highest grain yields of maize crops. Wide rows are preferred from the crop management point of view.

Stalk Yield (Quintals ha^{-1}): The stalk yield ha^{-1} of guara and mungbean as effected by planting geometries in the intercropping system are presented in Table 3. The data showed that significantly maximum stalk yield of guara (85.79 q ha^{-1}) was recorded from the treatment where it was planted at 45 cm spaced double-row strips with two rows of component crop mungbean. However, various planting patterns did not significantly effect the stalk yield of mungbean intercropped in guara. There were non countable differences among the stalk yields of all treatments. The results showed that mungbean plants sown in different planting patterns are equally efficient in utilizing natural resources for its development. Beets (1977) and Willey *et al.* (1983) concluded that association of maize with soybean or legume with non-legume intercropping system utilized the land more intensively by using environmental resources more usefully over time or space.

Land Equivalent Ratio: Land equivalent ratio (The relative area of a sole crop or sole crops required to produce the yield of yields achieved in intercropping) was calculated to study yield advantages in intercropping compared with sole cropping.

The data regarding LER given in Table 4 revealed that total LER (combined LER of guara and intercropped mungbean sown in different patterns) ranged between 1.24 and 1.55. This indicated that there were 24 to 55% yield advantage from planting pattern and intercropping systems. Among the different planting patterns, guara planted in 45 cm spaced double-row strips and in association with mungbean gave the highest LER of 1.55. The results are in agreement with those of Zada *et al.* (1988) who stated that although the yield of maize and soybean in mixture was relatively lower than their monoculture, yet total yield of the intercrop system and LER was significantly higher than monoculture soybean during both the years of study.

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