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Cropping Indices of Baby Corn based Intercropping Systems under Varying Crop Geometry

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A B S T R A C T

A field experiment was carried out during *kharif*, 2015-16 to evaluate the baby corn based intercropping systems under varying crop geometry. The experiment was laidout in split plot design and replicated thrice. The treatments consisted of three crop geometry levels *viz.*, S_1 (45 cm x 20 cm), S_2 (60 cm x 15 cm) and S_3 (90 cm x 10 cm), and four intercropping practices, *viz.*, C_1 (Sole baby corn), C_2 (Baby corn + Coriander), C_3 (Baby corn + Amaranthus) and C_4 (Baby corn + Fenugreek). The results revealed that the cropping indices viz., baby corn equivalent yield (BEY), land equivalent ratio (LER) and income equivalent ratio (IER) of baby corn were significantly influenced by crop geometry levels and intercropping systems. Area time equivalent ratio (ATER) of baby corn was not significantly influenced by crop geometry levels but intercropping has significant influence on area time equivalent ratio.

Introduction

Baby corn has the versatility to become commercial crop of this century. Baby corn is gaining popularity as a vegetable being a rich source of phosphorus, iron, vitamin A and C, high fibre content and no cholesterol (Nataraj *et al.*, 2011). Being a non conventional vegetable crop, it contributes towards employment through value addition and also food processing. Improved technology for baby corn can help to fetch higher economic returns as compared to grain corn. Also, early harvest of corn for baby corn gives nutritious green fodder for livestock. A possible means of increasing the productivity would be through the practice of intercropping.

Baby corn is a short duration crop and enters into reproductive phase at 45 – 50 DAS, until that the resources such as light, space, moisture and nutrients are under utilized. Such less utilized resources could be used effectively by introducing short duration

crops which end their life cycle before 45 DAS and not having much effect on main crop are selected to go with baby corn (Thavaprakash *et al.,* 2005). Short duration leafy vegetables can be grown in-between the agricultural crops is the recent advancement to fulfill the requirement of leafy vegetables without any reduction of agricultural area and to increase the income of the farmers. Baby corn is best suitable for intercropping system as it is a short duration crop, requires limited space due to single stem upright growing habit rather than spreading and thereby better sunlight and aeration are available to the companion crops (Adhikary *et al.,* 2015).

Optimum crop geometry is one of the important factor for higher production by efficient utilization of underground resources (water, nutrients etc.) and also harvesting as much as solar radiation and inturn better photosynthate formation (Rathika *et al.,* 2013). Space available to the individual plant is important which decides the utilization of soil resources and also harvest of solar radiation, both together, in turn decides the yield of baby corn. Though the spacing requirement of grain and fodder corn has been standardized, experimental evidence regarding the influence of spacing on green cob and fodder yield that too under intercropping situation and also suitable intercropping system is lacking for Southern Agro climatic Zone of Andhra Pradesh. Hence this study has been contemplated on baby corn based intercropping system under varying crop geometry.

Materials and Methods

The field experiment was conducted during *kharif*, at S.V. Agricultural college farm, Tirupati. The soil was sandy loam in texture, low in organic carbon (0.28 %) and available nitrogen (168 kg ha^{-1}), medium in available phosphorus (22 kg ha^{-1}) and potassium (217 kg ha^{-1}). Baby corn hybrid G-5414, amaranthus cv. Amaranthus special, coriander cv. Sindhu, fenugreek cv. Lam selection-1were chosen for the study. The experiment was laid out in split plot design and replicated thrice. The main plots comprised of three levels of crop geometry *viz*., S_1-45 cm x 20 cm, S_2-60 cm x 15 cm and S_3-90 cm x 10 cm and sub plots consisted of four intercropping practices *viz*., sole baby corn (C_1), baby corn + coriander (C_2), baby corn + amaranthus (C_3) and baby corn + fenugreek (C_4). Baby corn sown @ 2 seeds $hill^{-1}$and intercrops were sown as solid rows where in amaranthus seeds are mixed with sand in 1:10 ratio. Coriander seeds were rubbed against hard surface, split into two and sown in lines. Uniform dose of 80 kg P_2O_5 and 60 kg K_2O ha $^{-1}$ through Single super Phosphate and Muriate of potash, respectively were applied as basal to the crop in all the plots. Recommended dose of nitrogen at 250 kg ha^{-1} in three equal splits *viz.,* basal, 25 DAS and 35 DAS was applied. Due to intercropping, 25 percent more nitrogen than the recommended dose was applied. All the agronomic practices were carried out uniformly to raise the crop. Leaf yield of intercrops were taken from each net plot treatment and expressed in kg ha^{-1}. Multiple pickings taken from baby corn and expressed in kg ha^{-1}. The cropping indices were calculated by using the respective formulas and the results are given in the table 1.

Calculation of cropping indices

Baby corn Equivalent Yield

Leaf yield of intercrops was converted to baby corn equivalent yield on the basis of price of different crops involved in the treatments.

$$\text{Baby corn equivalent yield} = \frac{\text{Leaf yield of intercrop x leaf cost of intercrop}}{\text{Cost of baby corn}} + \text{Yield of baby corn}$$

Land Equivalent Ratio (LER)

Relative area of sole crop that would be required to produce the yield achieved by intercropping was calculated for each treatment.

$$LER = \frac{\text{Yield of baby corn in intercropping}}{\text{Yield of baby corn in sole cropping}} + \frac{\text{Yield of intercrop in intercropping}}{\text{Yield of intercrop in sole cropping}}$$

Income Equivalent Ratio (IER)

Relative area of sole crop that would be required to produce the gross income achieved by intercropping was calculated for each treatment.

$$IER = \frac{\text{Gross income of baby corn in intercropping}}{\text{Gross income of baby corn in sole cropping}} + \frac{\text{Gross income of intercrop in intercropping}}{\text{Gross income of intercrop in sole cropping}}$$

Area Time Equivalent Ratio (ATER)

It is the ratio of number of hectare - days required in sole cropping to the number of hectare - days used in intercropping to produce the same yield.

$$\textbf{ATER} = \frac{\text{LER of baby corn x Duration of baby corn} + \text{LER of intercrop x Duration of intercrop}}{\text{Total duration of intercropping system}}$$

Results and Discussion

Cropping indices

Baby corn Equivalent Yield (BEY)

Baby corn equivalent yield was significantly influenced by different crop geometry levels as well as intercropping while their interaction effect was not significant.

The highest baby corn equivalent yield was recorded with S_2 (60 cm x 15 cm).This was followed by S_3 (90 cm x 10 cm) which was comparable with S_1 (45 cm x 20 cm) which has resulted in the lowest baby corn equivalent yield. The increased BEY was solely due to higher yield of baby corn recorded with S_2 (60 cm x 15 cm). These findings were in close conformity with those of Thavaprakash and Velayudham (2008).

As regards the intercropping systems tried, the highest BEY was recorded with C_3 (Baby corn + Amaranthus) which was comparable with C_4 (Baby corn + Fenugreek) and significantly superior to C_2 (Baby corn + Coriander) where as, the lowest BEY was recorded with C_1 (Sole baby corn). This might be due to additional yield obtained from the intercrops with out reducing the main crop yield.

The increased BEY with C_3 (Baby corn + Amaranthus) might be due to increased yield obtained from amaranthus as compared to other intercrops. These findings were in close conformity with those of Thavaprakash and Velayudham (2008).

Land equivalent ratio

Land equivalent ratio was significantly influenced by different crop geometry levels as well as intercropping (Table 1). Interaction effect of crop geometry and intercropping on LER was found significant.

Among different crop geometry levels, the maximum LER (1.64) was recorded with S_3 (90 cm x 10 cm) which was significantly superior to all other treatments. This was followed by S_2 (60 cm x 15 cm) (1.50) and the lowest LER (1.37) was recorded with S_1 (45 cm x 20 cm). The increased LER under wider row spacing was due to increased yield obtained from intercrops as they were sown in three rows between the rows of baby corn where as, in S_2 (60 cm x 15 cm) and S_1 (45 cm

x 20 cm) the intercrops were sown in two rows and one row respectively. These results were in corroboration with those of Rathika *et al.,* (2014).

As regards the intercropping systems tried, the highest LER was recorded with C_3 (Baby corn + Amaranthus) (1.72) which was comparable with C_2 (Baby corn + Coriander) (1.67) and both the intercropping systems were significantly superior to C_4 (Baby corn + Fenugreek). The lowest LER was recorded with C_1 (Sole baby corn). The superiority of Baby corn + Amaranthus intercropping might be due to better performance of amaranthus under partial shade and also due to less competition to baby corn resulting in increased yield of baby corn and amaranthus. These findings were in close conformity with those of Rathika *et al.,* (2014).

Regarding the interaction effect of crop geometry and intercropping on LER, the highest LER was recorded with S_3C_3 (90 cm x 10 cm spacing in combination with Baby corn + Amaranthus), while the lowest LER was recorded with S_1C_1 (45 cm x 20 cm spacing in combination with sole baby corn). This might be due to wider row spacing and increased yield obtained from amaranthus without reducing the yield of baby corn under wider row spacing. These findings were in close conformity with those of Rathika *et al.,* (2014).

Table.1 Baby corn equivalent yield (BEY), Land equivalent ratio (LER), Area time equivalent ratio (ATER) and Income equivalent ratio (IER) of baby corn as influenced by crop geometry and intercropping

Treatments	Green cob yield of baby corn	BEY	LER	ATER	IER
Crop geometry					
S_1: 45 cm x 20 cm	5547	5696	1.37	1.16	**1.39**
S_2: 60 cm x 15 cm	6033	6250	1.50	1.20	**1.54**
S_3: 90 cm x 10 cm	5471	5763	1.64	1.24	**1.69**
SEm±	100.75	103.16	0.02	0.02	**0.02**
CD (P=0.05)	393	403	0.09	NS	**0.08**
Intercrops					
C_1: Sole baby corn	5471	5471	1.00	1.00	**1.00**
C_2: Baby corn + Coriander	5719	5884	1.67	1.31	**1.70**
C_3: Baby corn + Amaranthus	5865	6296	1.72	1.27	**1.78**
C_4: Baby corn + Fenugreek	5678	5961	1.61	1.23	**1.67**
SEm±	111.33	113.47	0.02	0.02	**0.03**
CD (P=0.05)	NS	337	0.07	0.06	**0.09**
Interaction					
tSEm±	NS	NS	0.14	NS	**0.15**
CD (P=0.05)	**NS**	**NS**	**0.14**	**NS**	**0.16**

Table.2 Yield of intercrops as influenced by crop geometry and intercropping

Treatment	Yield of intercrops (kg ha^{-1})
Sole Coriander	**970**
Sole Amaranthus	**2500**
Sole Fenugreek	**1865**
(Baby corn + Coriander) + S_1	**470**
(Baby corn + Amaranthus) + S_1	**1057**
(Baby corn + Fenugreek) + S_1	**706**
(Baby corn + Coriander) + S_2	**625**
(Baby corn + Amaranthus) + S_2	**1633**
(Baby corn + Fenugreek) + S_2	**992**
(Baby corn + Coriander) + S_3	**752**
(Baby corn + Amaranthus) + S_3	**2150**
(Baby corn + Fenugreek) + S_3	**1467**

S_1, S_2 and S_3 are 45 cm x 20 cm, 60 cm x 15 cm and 90 cm x 10 cm spacings of baby corn respectively

Area time equivalent ratio

Area time equivalent ratio was not significantly influenced by different crop geometry levels but intercropping systems had significant influence on ATER while, their interaction effect was not found significant (Table 1).

Crop geometry levels did not significantly influence the ATER. However, comparatively higher values of ATER were recorded with S_3 (90 cm x 10 cm), followed by S_2 (60 cm x 15 cm), while the lower values of ATER were recorded with S_1 (45 cm x 20 cm). These findings were in close conformity with those of Rathika *et al.,* (2014).

As regards the intercropping systems tried, the highest ATER was recorded with C_2 (Baby corn + Coriander) which was comparable with C_3 (Baby corn + Amaranthus) and the lowest ATER was recorded with C_1 (Sole baby corn). The highest ATER was recorded with baby corn + coriander intercropping might be due to more duration taken by coriander as compared to amaranthus and fenugreek. The results of the present study were in accordance with those of Rathika *et al.,* (2014).

Income equivalent ratio

Income equivalent ratio was significantly influenced by different crop geometry levels as well as intercropping systems (Table 1).

Among different crop geometry levels, the highest income equivalent ratio was recorded with S_3 (90 cm x 10 cm) which was significantly superior to all other treatments. This was followed by S_2 (60 cm x 15 cm) and the lowest income equivalent ratio was recorded with S_1 (45 cm x 20 cm).

As regards the intercropping systems tried, the highest IER was recorded with C_3 (Baby corn + Amaranthus) which was comparable with C_2 (Baby corn + Coriander) and the lowest IER was recorded with C_1 (Sole baby corn). This might be due to more increase in gross income obtained from both baby corn and amaranthus under intercropping system corresponding to the increase in gross income obtained from both the crops under sole cropping.

Regarding the interaction effect of crop geometry and intercropping on LER, the highest IER was recorded with S_3C_3 (90 cm x 10 cm spacing in combination with baby corn + amaranthus) while, the lowest IER was recorded with S_1C_1 (45 cm x 20 cm) spacing in combination with sole baby corn). This might be due to increased income obtained from amaranthus under wider row spacing as compared with other combinations.

Leaf yield of intercrops

Sole crop of intercrops sown under unreplicated plot recorded the highest leaf yield as compared to crops sown under intercropping. However, intercropping did not influence the leaf yield of intercrops (Table 2).

Among different crop geometry levels, S_3 (90 cm x 10 cm) registered the increased leaf yield of intercrops which might be due to increased light interception and better utilization of available resources under wider row spacing.

Among different intercrops, amaranthus recorded the highest leaf yield under different crop geomtry practices. This was closely followed by fenugreek and the lowest leaf yield was recorded with coriander. This can be attributed to suitability of amaranthus in sandy loam soils as compared to other intercrops.

In conclusion, the present study has revealed that raising of baby corn at optimum crop geometry of 60 cm x 15 cm along with amaranthus as an intercrop produced the highest baby corn equivalent yield, but land equivalent ratio, income equivalent ratio and area time equivalent ratio was recorded highest when baby corn intercropped with amaranthus at wider spacing of 90 cm x 10 cm in sandy loam soils of Southern Agro climatic Zone of Andhra Pradesh.

References

Adhikary, S., Koundinya, A.V.V., Pandit, M.K and Bhattacharya, B. 2015b. Evaluation of efficiency of baby corn based intercropping systems. *International Journal of Plant & Soil Science.* 5(6): 366-374.

Nataraj, D., Murthy, K.N.K and Viswanath, A.P. 2011. Economics of baby corn cultivation under sole and intercropped situation with leguminous vegetables. *Agricultural Science Digest*. 31(3): 211-213.

Rathika, S., Velayudham, K., Thavaprakash, N and Ramesh, T. 2013. Weed smothering efficiency and productivity as influenced by crop geometry and intercropping in baby corn (*Zea mays* L.). *Journal* of *Progressive Agriculture*. Vol.4, No. 1.

Rathika, S., Velayudham, K., Thavaprakash, N and Ramesh, T. 2014. Biological efficiency of legume intercrops in baby corn (*Zea mays* L.). *International Journal of Agriculture, Environment & Biotechnology*. 7(3): 627-633.

Thavaprakash, N., Velayudham, K and Muthukumar, V.B. 2005. Study of crop geometry, intercropping systems and nutrient management practices on weed density and yield of baby corn based intercropping systems. *Madras Agriculture Journal*. 92(7-9): 407-414.

Thavaprakash, N and Velayudham, K. 2008. Light interception and productivity of baby corn as influenced by crop geometry, intercropping system and integrated nutrient management practices. *Asian Journal of Scientific Research.* 1: 72-78.

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