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Baby corn (*Zea mays* L.) Performance as Vegetable-cum-fodder in Intercropping with Legume Fodders under Different Planting Patterns.

Key words : Baby corn, Intercropping, Planting patterns.

Baby corn cultivation provides avenues for crop diversification, value addition and revenue generation besides giving good quality green fodder, which adds enormously to the total economic returns (Pandey, 2004). Baby corn being a relatively new introduction in our country, requires development of production technology especially intercropping with legume fodders in realizing higher ear production with good quality fodder. When intercropping is practiced with the objective of realizing higher yield in food : fodder cropping system, adopting different planting pattern is another agronomic manipulation where two or more crops are accommodated. Advantages of cereal–legume intercropping systems are higher yields, greater land-use efficiency, and improvement of soil fertility through N fixation by the component legume. (Banik et al., 2006). In addition, legume intercrops are included in cropping systems because they reduce soil erosion (Giller and Cadisch, 1995) and suppress weeds. (Midya et al., 2005).Therefore, for increasing the profitability of land and fitting high yielding legumes as fodder crops in food : fodder cropping system, the crop : livestock production should be properly balanced (Mohapatra and Pradhan, 1992). Information quantifying the effect of fodder crops on baby corn both for ears as well as fodder purpose is very meager, hence the present study was undertaken.

The field experiment was conducted during the *rabi* season of 2006-07 at Agricultural College Farm, Bapatla. The soil of the experimental field was clay loam having pH 7.7, low in organic carbon content (0.32%) and available nitrogen (222 kg ha^{-1}) medium in available phosphorus (42 kg ha^{-1}) and high in available potassium (618 kg ha^{-1}). Absolutely there were no rains during crop growth period. The crop received four irrigations in addition to one pre sowing irrigation at 10, 30, 42 and 50 DAS. The experiment was laid out in Randomized Block Design, replicated thrice with eight treatments. The treatment details are T_1: Fodder corn sole, T_2: Baby corn sole, T_3: Fodder corn paired rows, T_4: Baby corn paired rows, T_5: T_4 + Cowpea intercrop, T_6: T_4 + Clusterbean intercrop, T_7: T_4 + Pillipesara intercrop, T_8: T_4 + Fodder corn intercrop. Baby corn (Mridula), Fodder corn (African tall), Cowpea (EC-4216), Clusterbean (Bundel guar-1) and Pillipesara (Local) were sown on 25-11-2006 as per the treatments. Baby corn and fodder corn sole crops were sown at 45 cm x 15 cm where as in paired row planting 30 cm between rows in a pair and 60 cm between two pairs was followed. For intercrops viz., cowpea, clusterbean, pillipesara and fodder corn 30 cm x10 cm was adopted in between two pairs of baby corn. Fertilizer schedule recommended to baby corn *i.*e., 150 : 75 : 40 kg N, P_2O_5 and K_2O ha^{-1} was adopted in the experimentation. Half of the nitrogen fertilizer and full dose of the phosphotic and potassic fertilizers were applied at the time of sowing. Remaining half of the nitrogenous fertilizer was applied as topdressing at 30 DAS. At 20, 40 and 60 DAS, all biometric observations were recorded from tagged plants. Detasseling was done immediately after the emergence of male inflorescence in the plant. The immature green ears were harvested at 2-3 days after silk emergence, weighed and marketed as fresh @ Rs. 7.00/-kg^{-1}. The crop was harvested as green fodder after complete ear picking and sold @ Rs. 0.30/-kg^{-1}. Green fodder yield of corn and intercrops was weighed separately and total green fodder was expressed in t ha^{-1}. The green fodder from the net plot area was dried in sun on the threshing floor till 12 per cent moisture level and the dry fodder yield was recorded and expressed in t ha^{-1}. The nitrogen percent in whole plant was determined by Modified micro-kjeldahl method (Jackson, 1973) and the percent crude protein was obtained by multiplying nitrogen percent with factor 6.25. The crude fibre content was estimated by the method described by Wright (1939). The data are analyzed statistically, when the original data consists of zero square root $\sqrt{(x+0.5)}$ transformation was used.

All the yield attributes were significantly influenced by different treatments. The data in Table 1 indicated that the highest number of ears (2.53 plant^{-1}) were found in baby corn sown in paired rows which was significantly superior to (1.66) baby corn + fodder corn intercropping. Except baby corn + fodder corn, all other treatments were comparable with one another. Ear weight with and without husk was the highest (43.04 g and 8.50 g) in paired rows of baby corn which was significantly superior to the remaining baby corn treatments, except baby corn sown in normal rows. Significantly the lowest ear weight with and without husk (26.21 g and 5.30 g) was observed in baby corn intercropped with fodder corn. When baby corn was sown in paired rows, there was an efficient utilization of soil, water, nutrients and light, which might had resulted in higher growth parameters. This increased growth could be the possible reason for higher yield attributes. Further, in a cereal legume combination, there could be a synergistic interaction between the cereal and legume may be due to their differential genetic and morphological make up and differential exploitation of natural resources and their efficient utilization. Higher growth and yield attributes in paired row planting of baby corn were also reported by Choudhary *et al*. 2006 and Panwar and Munda (2006). Further when baby corn was intercropped with fodder corn, intra-specific competition existed between baby corn and fodder corn, may be due to the similarities in their growth, morphology and physiology. This was reflected in lower growth parameters, which was result in significantly the lowest yield attributes in baby corn + fodder corn.

Ear yield with and without husk and ear equivalent yield was significantly influenced by different treatments (Table 1). Baby corn ear yield with and without husk was the highest (10848 kg ha^{-1} and 1849 kg ha^{-1}) in paired rows of baby corn and was comparable with sole baby corn in normal rows, where as the lowest ear yield was observed in paired rows of baby corn intercropped with fodder corn. Some favourable phenomena in corn + legume mixtures might be the reason for the better ear yield of baby corn intercropped with legume fodders. Mohaptra and Pradhan (1992) and Pandey *et al*. (1999) also observed the similar higher corn yield when intercropped with legumes. Baby corn intercropped with fodder corn recorded lower yields due to their competitive effects. Paradkar *et al*. (1993) also reported similar reduced yield in cereal + cereal intercropping.

Baby corn ear equivalent was the highest (11044 kg ha^{-1}) in baby corn + cowpea and was comparable with baby corn sown in paired and normal rows and baby corn intercropped with clusterbean and pillipesara. Significantly the lowest ear equivalent yield (2027 kg ha^{-1}) was recorded in fodder corn sole crop. Higher baby corn ear equivalent yield in baby corn + cowpea intercropping might be due to nitrogen fixing behaviour of legume and higher canopy cover resulting in the reduced evapo-trasnpiration and encouraging the baby corn to use the natural resources efficiently.

Data in Table 2 revealed that baby corn intercropped with fodder corn recorded the highest total green and dry fodder yields (68.1 and 13.2 t ha^{-1}) over all other treatments and was comparable with baby corn + cowpea intercropping (66.6 and 11.5 t ha^{-1}). The lowest green fodder yield (47.3 t ha^{-1}) was recorded in sole fodder corn in normal rows. It is reasonable to suggest that, two species of contrasting habit, with respect to branching, leaf distribution, height, root distribution, mineral uptake or other morphological or physiological characters, will together be able to exploit the total environment more effectively than a monoculture, and will there by give increased overall yield (Donald, 1963). Hence, baby corn intercropped with cowpea fodder could result in the higher green and dry fodder yields. Similar results of increased fodder yields in fodder corn intercropped with cowpea were also reported by Patel and Rajgopal (2001) and Kumar *et al.* (2005).

This study indicated that paired rows planting of baby corn resulted in higher ear yield and monetary returns. However, introducing cowpea as an intercrop in paired rows of baby corn was significant in realizing higher ear equivalent yield and total green fodder with good quality without any reduction in ear yield. Hence, it is suggested to cultivate baby corn along with fodder cowpea to realize higher ear yield as well as monetary returns.

Table 1. Yield attributes, baby corn yield and baby corn ear equivalent yield as influenced by different treatments.

Treatment	Number of ears plant^{-1}	With husk	Without husk	With husk	Without husk	Baby corn ear equivalent yield (kg ha^{-1})
T_1: Fodder corn sole	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	2027
T_2: Baby corn sole	1.72 (2.46)	6.29 (39.06)	2.84 (7.56)	102.16 (10437)	41.66 (1735)	10437
T_3: Fodder corn paired rows	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	2070
T_4: Baby corn paired rows	1.74 (2.53)	6.60 (43.04)	3.00 (8.50)	104.16 (10848)	43.01 (1849)	10848
T_5: T_4 + Cowpea intercrop	1.68 (2.33)	6.10 (36.75)	2.72 (6.90)	99.47 (9894)	40.95 (1676)	11044
T_6: T_4 + Clusterbean intercrop	1.66 (2.26)	5.99 (35.35)	2.70 (6.77)	98.18 (9638)	40.43 (1634)	10473
T_7: T_4 + Pillipesara intercrop	1.60 (2.06)	5.71 (32.05)	2.64 (6.48)	97.17 (9442)	39.53 (1562)	10142
T_8: T_4 + Fodder corn intercrop	1.47 (1.66)	5.17 (26.21)	2.41 (5.30)	66.16 (4376)	32.84 (1078)	6068
SE m ±	0.06	0.16	0.07	1.43	0.63	320.0
CD (P = 0.05)	0.20	0.48	0.21	4.34	1.93	970.7
CV (%)	8.13	5.83	5.46	3.48	3.68	7.0

The data are $\sqrt{(x+0.5)}$ transformed. The figures in parenthesis are the original values.

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Table 2. Green and Dry fodder yield (t ha^{-1}) of baby corn as influenced by different treatments.

Treatment	Green fodder yield			Dry fodder yield		
	Corn	**Intercrop	Total	Corn	**Intercrop	Total
T_1: Fodder corn sole	47.3	-	47.3	10.1	-	10.1
*T_2: Baby corn sole	53.7	-	53.7	9.7	-	9.7
T_3: Fodder corn paired rows	48.3	-	48.3	10.3	-	10.3
*T_4: Baby corn paired rows	54.7	-	54.7	9.9	-	9.9
*T_5: T_4 + Cowpea intercrop	50.5	16.1	66.6	8.8	2.7	11.5
*T_6: T_4 + Clusterbean intercrop	49.8	11.7	61.5	8.5	1.9	10.4
*T_7: T_4 + Pillipesara intercrop	48.8	9.8	58.6	8.4	1.6	10.0
*T_8: T_4 + Fodder corn intercrop	28.6	39.5	68.1	5.1	8.1	13.2
SE m ±	2.62	-	3.06	0.45	-	0.62
CD (P = 0.05)	7.96	-	9.28	1.38	-	1.90
CV (%)	9.52	-	9.24	8.86	-	10.15

* Green ear husk was also added to stover and represented as green fodder in baby corn.
** Data was not statistically analysed

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