The Andhra Agric. J 55(4):417-421 , 2008

Growth and Yield of Baby corn (*Zea mays* L.) as influenced by Intercropping with Fodders

T Kirankumar, B Venkateswarlu , P V N Prasad, P R K Prasad and R Veeraraghavaiah
Department of Agronomy, Agricultural College, Bapatla - 522 101, Andhra Pradesh.

ABSTRACT

A field experiment was carried out at the Agricultural College Farm, Bapatla to study the Baby corn (Zea mays L.) performance as Vegetable-cum-fodder in intercropping with fodders during rabi, 2006-07.Among all the treatments, paired row planting of baby corn resulted in significantly higher number of ears plant^{-1}, ear weight and baby corn yield and it was found to be on a par with normal row planting of baby corn. However, introducing cowpea as an intercrop in paired rows of baby corn was beneficial with higher baby corn ear equivalent yield, total drymatter accumulation and total green and dry fodder yields without any reduction in ear yield.

Key words : Baby corn, Fodder corn, Intercropping pattern.

Corn is the most important cereal food crop of the world next to wheat and rice. The productivity of corn is higher over other cereals hence it is popularly called as “Queen of cereals”. A recent development in corn cultivation is harvesting corn for young, fresh, sweet and tender ears for vegetable purpose, which is called as baby corn (Ramachandrappa *et al.*, 2004). Baby corn cultivation provides avenues for crop diversification, value addition and revenue genration 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 (Pandey *et al.,* 1999). In this context, an experiment was carried out during rabi season of 2006-07 at the Agricultural College Farm, Bapatla to study the Baby corn (*Zea mays* L.) performance as Vegetable-cum-fodder in intercropping with fodders.

MATERIAL AND METHODS

The field experiment was conducted during the rabi season of 2006-07 at the Agricultural College Farm, Bapatla. 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 a 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 treatmental 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 x 10 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 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 ten 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 and weighed and the crop was harvested as green

fodder after complete ear picking. 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 data are analyzed statistically and when the original data consists of zero, square root ($\sqrt{(x + 0.5)}$) transformation was used.

RESULTS AND DISCUSSION

Results in Table 1 revealed that paired row planting of fodder corn siginificantly produced taller plants (245.2 cm) followed by normal row planting of fodder corn (237.6 cm). Baby corn intercropping with legume fodders recorded significantly lower plant height. When plants were grown in association (intercropping), interaction between species occurs and is expressed as competition which is a kind of interference. It occurs when two plants draw a requirement (e.g light, nutrient) from the same limited pool. Competition for the natural resources could be the reason for lower plant height in intercropping situations. Similar results of significantly taller plants of African tall were reported by Rameshbabu *et al.* (1994) and Gangaiah (2004).

Results in Table 2 indicated that baby corn sown in paired rows with African tall, Cowpea and Clusterbean (T_8, T_5 and T_6 treatments) registered significantly higher total drymatter accumulation over the remaining treatments. Increase in drymatter yield in intercropping system might be owing to better utilzation of space and light interception coupled with nutrient contribution of legume fodder to cereal (Sunilkumar *et al.,*(2005). Current findings are in agreement with the reports of Kumar and Prasad (2003) and Singh *et al.,* (2004).

All the yield attributes such as number of ears $plant^{-1}$, ear weight with and without husk were significantly influenced by different treatments. The data in Table 1 indicated that the highest number of ears (2.53 $plant^{-1}$) was found in baby corn sown in paired rows which was significantly superior to baby corn + fodder corn intercropping (1.66 $plant^{-1}$). 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 cron. When baby corn was sown in paried rows, there was an efficient utilization of soil, water, nutrients and light, which might resulted in 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, intraspecific 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 resulted in significantly the lowest yiled attributes in baby corn + fodder corn intercropping.

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. The factors for which competition may occur among plants are water, nutrients, light and oxygen (Donald, 1963). He considered that of close spaced varieties display their susceptibilities to competitive effects, whereas at wide spacing they show their different capacity to use a more extensive environment. In paired row sown corn there was an efficient utilization of all natural resources and was expressed at increased growth and yield attributes. Choudhary *et al.* (2006) and Panwar and Munda (2006) also reported similar results. 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. Singh and Bajpai (1991) and 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 nonrmal 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

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

Treatment	Plant height (cm)	Number of ears plant^{-1}	Ear weight (g)		Yield (kg ha^{-1})		Baby corn ear equivalent yield (kg ha^{-1})
			With husk	Without husk	With husk	With out husk	
T_1: Fodder corn sole	237.6	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	203.2	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	245.2	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	207.1	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	201.5	1.68 (2.33)	6.10 (36.75)	2.72 (6.90)	99.47 (9894)	40.95 (1676)	11044
T_6: T_4 + Cowpea intercrop	199.6	1.66 (2.26)	5.99 (35.35)	2.70 (6.77)	98.18 (9638)	40.43 (1634)	10473
T_7: T_4 + Cowpea intercrop	196.3	1.60 (2.06)	5.71 (32.05)	2.64 (6.48)	97.17 (9442)	39.53 (1562)	10142
T_8: T_4 + Cowpea intercrop	205.2	1.47 (1.66)	5.17 (26.21)	2.41 (5.30)	66.16 (4376)	32.84 (1078)	6068
SE M±	108.6	0.06	0.16	0.07	1.43	0.63	320.0
CD (P = 0.05)	32.9	0.20	0.48	0.21	4.34	1.93	970.7
CV (%)	8.80	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.

might be due to nitrogen fixing behaviour of legume and higher canopy cover resulting in the reduced evapotrasnpiration and encouraging the baby corn to use the natural resources efficiently. Similar results of higher corn equivalent yield with legume intercropping were reported by Singh and Bajpai (1991) and Pandey *et al*. (1999).

Data in Table 2 revealed that baby corn intercropped with fodder corn recorded the highest total green and dry fodder yields (68.1 t ha^{-1} and 13.2 t ha^{-1}) over all other treatments and was comparable with baby corn + cowpea intercropping (66.6 t ha^{-1} 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 enviroment 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 was also reported by Mohapatra and Pradhan (1992), Patel and Rajgopal (2001) and Sunilkumar *et al.*, (2005).

Results of the study revealed that sowing baby corn in paired rows was advantageous, which resulted in higher ear yield. However, introducing cowpea as an intercrop in paired rows of baby corn was significant in realizing higher ear equivalent yield and total green fodder without any reduction in ear yield and hence can be recommended to dairy farmers to realize the yield as well as monetary advantage of the baby corn + fodder cowpea intercropping.

Table 2. Drymatter accumulation (kg ha^{-1}), green and dry fodder yield (t ha^{-1}) as influenced by different treatments

Treatment	Dry matter accumulation			Green fodder yield			Dry fodder yield		
	Corn	* Intercrop	Total	Corn	* Intercrop	Total	Corn	* Intercrop	Total
T_1: Fodder corn sole	8702	-	8702	47.3	-	47.3	10.1	-	10.1
*T_2: Baby corn sole	7751	-	7751	53.7	-	53.7	9.7	-	9.7
T_3: Fodder corn paired rows	9087	-	9087	48.3	-	48.3	10.3	-	10.3
*T_4: Baby corn paired rows	8230	-	8230	54.7	-	54.7	9.9	-	9.9
*T_5: T_4+ Cowpea intercrop	6653	2455	91.08	50.5	16.1	66.6	8.8	2.7	11.5
T_6: T_4+ Cowpea intercrop	6559	2246	8805	49.8	11.7	61.5	8.5	1.9	10.4
*T_7: T_4+ Cowpea intercrop	6376	1917	8293	48.8	9.8	58.6	8.4	1.6	10.0
*T_8: T_4 + Cowpea intercrop	3427	6433	9860	28.6	39.5	68.1	5.1	8.1	13.2
SE M±	328.4	-	399.2	2.62	-	3.06	0.45	-	0.62
CD (P = 0.05)	996.4	-	1210.9	7.96	-	9.28	1.38	-	1.90
CV (%)	8.0	-	7.9	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.

LITERATURE CITED

Choudhary V K Ramachandrappa B K and Nanjappa H V 2006. Effect of planting methods and Drip irrigation levels on growth, yield attributing characters and yield of baby corn (Zea mays L.) Mysore Journal of Agricultural Sciences 40 (3): 326-330.

Donald C M 1963. Competition among crop and pasture plants. Advances in Agronomy 15: 1-118.

Gangaiah B 2004. Fodder production potential of pure and intercropped cereal and legume forages under rainfed conditions. Annals of Agricultural Research New Series 25 (2): 229-232.

Kumar P and Prasad N K 2003. Biological and economical sustainability of forage maize (zea mays) + cowpea (Vigna ungiculata) intercrop. Indian Journal of Agricultural Sciences 73 (6): 341-342.

Mohapatra P K and Pradhan L 1992. Intercropping fodder legumes with maize in different planting patterns. Annals of Agricultural Research 13 (4): 366-371.

Pandey A K 2004. Production potential and economics of different sowing dates for baby com (Zea mays) production under mid hill conditions of North - Western Himalayas. Indian Journal of Agronomy 49 (3): 179-189.

Pandey A K, Prakash V, Singh R D and Mani VP 1999. Effect of intercropping pattern of maize (Zea mays) and soybean (Glycine max L. Merril) on yield and economic under mid-hills of NOrth Western Himalayas. Annals of Agricultural Research New series 22 (4): 457-461.

Panwar A S and Munda G C 2006. Response of Baby corn (Zea mays) to nitrogen and land configuration in mid hills of Meghalaya. Indian Journal of agricultural Sciences 76 (5) : 293-296.

Paradkar V K, Sharma R K, Rathor O P and Rastogi V K 1993. Performance of fodder maize(Zea mays) + grain maize intercropping system under rainfed conditions. Indian Jouranal of Agronomy 38 (3): 455-457.

Patel J R and Rajagopal S 2001. Production potential of forage maize (Zea mays) with legumes under intercropping system. Indian Journal of Agronomy 46 (2): 211-215.

Ramachandrappa B K, Nanjappa H V, Thimmegowda M N and Soumya T M 2004. Production mangement for profitable baby corn cultivation. Indian Farming 42: 25-27.

Rameshbabu, Subash Gumaste Jayannam Patil T C, Prabhakar A S and Meli S S 1994. Effect of mixing cowpea with maize genotypes on forage quality. Forage Research 20 (4) : 245-249.

Sunilkumar Rawat C R and Melkania N P 2005. Forage production potential and economics of maize (Zea mays) and cowpea (Vigna ungiculata) intercropping under rainfed conditions. Indian Journal of Agronomy 50 (3): 183-186.

Singh B, Dhukia R S and Singh B P 2004. Nutrient content and uptake of forage crops as affected by intercropping management. Forage Research 30 (3): 167-169.

Singh V K and Bajpai R P 1991. Intercropping in maize under rainfed condition. Indian Journal of Agronomy 36 (3): 398-399.

(Received on 29.03.2008 and revised on 25.06.2008)