



## Research Article

# YIELD, NITROGEN UPTAKE AND ECONOMICS OF BABY CORN (*Zea mays L.*) AS INFLUENCED BY VARIED LEVEL OF NITROGEN AND INTERCROPPING

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**Abstract:** A field experiment was conducted at the Agricultural College Farm, Bapatla, to study effect of varying levels of nitrogen and intercropping on growth, yield attributing characters and yield of baby corn (*Zea mays L.*). The treatments consisted of C<sub>1</sub>: Sole baby corn, C<sub>2</sub>: Baby corn in paired row, C<sub>3</sub>: Baby corn in paired row + Soybean, C<sub>4</sub>: Baby corn in paired rows + Blackgram, C<sub>5</sub>: Baby corn in paired rows + Greengram in factor - A and N<sub>1</sub>= 100 % RDN, N<sub>2</sub>= 75% RDN and N<sub>3</sub>= 125% RDN in factor -B of Randomized Block Design with factorial concept and the treatments were replicated thrice. Significantly the highest baby corn cob yield (17048 kg ha<sup>-1</sup>), ear yield (5597 kg ha<sup>-1</sup>), husk yield (11450 kg ha<sup>-1</sup>), green fodder yield (58.8 t ha<sup>-1</sup>), nitrogen uptake (192.54 kg ha<sup>-1</sup>), were recorded in Baby corn in paired rows + Greengram. Application of 125% RDN gave the highest baby corn cob yield (17048 kg ha<sup>-1</sup>), ear yield (5597 kg ha<sup>-1</sup>), husk yield (11450 kg ha<sup>-1</sup>), green fodder yield (58.8 t ha<sup>-1</sup>), nitrogen uptake (207.77 kg ha<sup>-1</sup>). Gross and net return registered the lowest and highest gross & net returns (Rs. 1,38,146 & 110809) and (Rs. 2,24,880 & 195651) in baby corn sole crop with 75% RDN and baby corn + greengram with 125%,RDN respectively.

**Keywords-** Baby corn, Intercropping, Nitrogen, Yield, Nitrogen uptake, Gross & net returns

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## Introduction

Baby corn is a type of maize, which is commonly cultivating for vegetable purpose. It is young fresh, tasty sweet and crisp nature. Finger like green ears are harvested before pollination or at the time of silk emergence [1]. Taiwan, Thailand and china are important baby corn producing countries. Which earn substantial forex from exporting baby corn. The production of baby corn is expanding in India near metros and big cities. Baby corn cultivation generates employment for the rural poor. It gives good quality fodder, which is very important for dairy sector [2]. It is rich in phosphorus content (86 mg/100 g edible portion in comparison to 21 to 57 mg phosphorus content in other commonly used vegetables).

Inter crops are known to help in residual nutrient build up of the soil. Deliberate introduction of legumes as inter crops in baby corn not only takes care of the weed suppression but also help in the utilization of atmospheric nitrogen being fixed by it in the current growing season [3]. Corn being an exhaustive crop and its requirement for fertilizers especially for nitrogen is prominent. Nitrogen is the essential constituent of chlorophyll, protoplasm and enzymes.

## Materials and Methods

A field experiment was conducted during *kharif* of 2013 at the Agricultural College Farm, Bapatla. On a sandy loam soil which was, slightly alkaline in reaction with pH 7.4, medium-in organic carbon (0.52 %) and low in available nitrogen (258 kg ha<sup>-1</sup>), high in available phosphous (53.9 kg ha<sup>-1</sup>) and high in available potassium (539.8 kg ha<sup>-1</sup>).

The treatments consisted of C<sub>1</sub>: Sole baby corn, C<sub>2</sub>: Baby corn in paired row, C<sub>3</sub>: Baby corn in paired row + Soybean, C<sub>4</sub>: Baby corn in paired rows + Blackgram, C<sub>5</sub>: Baby corn in paired rows + Greengram in factor - A and N<sub>1</sub>= 100 % RDN, N<sub>2</sub>=

75% RDN and N<sub>3</sub>= 125% RDN in factor -B. The experiment was laid out in a Randomized Block Design with factorial concept and replicated thrice. Baby corn hybrid variety (G-5414) was sown along with intercrops in lines according to the specific row arrangements on 9<sup>th</sup> July, 2013 by adopting a spacing of 45 cm X 20 cm. Nitrogen through urea as per treatments and uniform dose of phosphorous and potassium @50 kg P<sub>2</sub>O<sub>5</sub> and 60 kg K<sub>2</sub>O per hectare through Single superphosphate and Muriate of potash, respectively was applied to the plots. Entire quantity of phosphorus and potassium was applied as basal whereas nitrogen was applied in two equal splits i.e. one at the time of sowing and the other 30 days after sowing. Additional quantity of fertilizer was not applied to intercrops. The crop was maintained adopting by normal package of practices and data are collected and analysed statistically by adopting the standard procedures as suggested by [4].

## Results and Discussion

Significantly the highest baby corn cob yield and ear yield (17048 kg ha<sup>-1</sup> and 5597 kg ha<sup>-1</sup>) were observed in baby corn pairs +greengram, (16416 kg ha<sup>-1</sup> and 5418 kg ha<sup>-1</sup>) in baby corn pairs + blackgram, and (15603 kg ha<sup>-1</sup> and 5225 kg ha<sup>-1</sup>) in baby corn pairs + soybean were statistically superior to the (13228 kg ha<sup>-1</sup> and 4548 kg ha<sup>-1</sup>) in sole baby corn. Better growth parameters, higher dry matter accumulation high yield attributes in intercropping treatments might have resulted in more baby corn yield and ear yield too. Similar results of higher baby corn yield and fodder with intercropping was also reported by [5-8]. The highest baby corn cob yield and ear yield (17369 kg ha<sup>-1</sup> and 6064 kg ha<sup>-1</sup>), were found in the treatment receiving 125% of RDN and was followed by (15269 kg ha<sup>-1</sup> and 5105 kg ha<sup>-1</sup>) in the treatment receiving 100% RDN. Significantly the

lowest baby corn cob yield and ear yield (13457 kg ha<sup>-1</sup> and 4322 kg ha<sup>-1</sup>) was registered in the treatment receiving only 75% RDN. The liberal fertilization and enhanced nitrogen uptake might have resulted in the improvement of growth

parameter dry matter production and the yield attributes resulting in increased cob yield and fodder yield. The present findings are in agreement with those of [9-12].

**Table-1 Cob yield, ear yield, husk yield, fodder yield and nitrogen uptake of baby corn as influenced by nitrogen level and intercropping**

Treatment	Baby corn Cob yield kg ha <sup>-1</sup>	Baby corn ear yield kg ha <sup>-1</sup>	Baby corn husk yield kg ha <sup>-1</sup>	Fodder yield (t ha <sup>-1</sup> )	Nitrogen uptake at harvest
<b>Intercropping</b>					
(C <sub>1</sub> )Sole baby corn	13228	4548	8680	47.8	138.81
(C <sub>2</sub> )Baby corn in paired row	14530	5029	9501	52.6	160.59
(C <sub>3</sub> )Baby corn in paired row + Soybean	15603	5225	10377	55.4	174.91
(C <sub>4</sub> )Baby corn in paired row + Blackgram	16416	5418	10999	57.3	185.56
(C <sub>5</sub> )Baby corn in paired row + Greengram	17048	5597	11450	58.8	192.54
S.Em±	511	180	378	2.79	5.0
CD (P = 0.05)	1481	521	1097	7.0	14.6
<b>Nitrogen levels (kg ha<sup>-1</sup>)</b>					
N <sub>1</sub> 100% RDN	15269	5105	10164	54.3	169.63
N <sub>2</sub> 75% RDN	13457	4322	9136	47.9	136.84
N <sub>3</sub> 125% RDN	17369	6064	11305	59.9	207.77
S.Em±	396	139	293	1.92	3.90
CD (P = 0.05)	1147	403	849	5.5	11.3
<b>Interaction (P X N)</b>					
S.Em±	885	311	657	5.02	8.70
CD (P = 0.05)	NS	NS	NS	NS	NS
CV (%)	10.9	11.6	12.1	14.8	10.4

The maximum of husk yield and green fodder yield (11450 kg ha<sup>-1</sup>&58.8 t ha<sup>-1</sup>) were registered in baby corn in pairs + greengram followed by (10999 kg ha<sup>-1</sup> &57.3 t ha<sup>-1</sup>) in baby corn in pairs + blackgram. Significantly, the lowest (8680 kg ha<sup>-1</sup>&47.8 t ha<sup>-1</sup>) were registered in sole baby corn. Similar results were also reportedly by [5&6] .The highest husk yield and fodder yield (11305 kg ha<sup>-1</sup> and 59.9 t ha<sup>-1</sup>),were found in the treatment receiving 125% of RDN and was followed by (10164 kg ha<sup>-1</sup> and 54.3 t ha<sup>-1</sup>) in the treatment receiving 100% RDN. Significantly, the lowest baby corn cob yield and ear yield (9136kg ha<sup>-1</sup> and 47.9 t

ha<sup>-1</sup>) were registered in the treatment receiving only 75% RDN. This increased green fodder yield higher nitrogen levels might be due to the cumulative effect of substantial improvement in growth character like plant height and dry matter accumulation through efficient metabolic activity and increased photosynthesis at higher level of nitrogen [13]. Nitrogen being a major constituent of chlorophyll molecule, which might have played a positive role in increasing the photosynthetic activity, accelerated meristematic activity and ultimately increased the vegetative growth. These results are in conformity with the findings of [10, 14].

**Table-2 Gross return (Rs. ha-1), Net return (Rs. ha-1) and Return per rupee investment as influenced by different treatments**

Treatment	Cost of cultivation (Rs)	Gross returns (Rs)	Net returns (Rs)	Returns per rupee investment (Rs)
C <sub>1</sub> N <sub>1</sub>	27589	155934	128345	4.65
C <sub>2</sub> N <sub>1</sub>	28341	169636	141295	4.98
C <sub>3</sub> N <sub>1</sub>	29562	183863	154301	5.21
C <sub>4</sub> N <sub>1</sub>	28849	191828	162979	5.64
C <sub>5</sub> N <sub>1</sub>	28977	198621	169644	5.85
C <sub>1</sub> N <sub>2</sub>	27337	138146	110809	4.05
C <sub>2</sub> N <sub>2</sub>	28089	152178	124089	4.41
C <sub>3</sub> N <sub>2</sub>	29310	162096	132786	4.53
C <sub>4</sub> N <sub>2</sub>	28597	168934	140337	4.88
C <sub>5</sub> N <sub>2</sub>	28725	176072	147347	5.12
C <sub>1</sub> N <sub>3</sub>	27841	176593	148752	5.34
C <sub>2</sub> N <sub>3</sub>	28593	198031	169438	5.92
C <sub>3</sub> N <sub>3</sub>	29814	209891	179377	6.01
C <sub>4</sub> N <sub>3</sub>	29101	217646	188545	6.47
C <sub>5</sub> N <sub>3</sub>	29229	224880	195651	6.69

Baby corn in paired rows + greengram registered 192.54 kg ha<sup>-1</sup>, respectively nitrogen uptake which was the highest and significantly superior to 138.81 kg nitrogen uptake per hectare recorded in sole cropping during at harvest, respectively. Higher nitrogen uptake in intercropping treatments might be due to the contribution of higher symbiotic nitrogen supplied through root nodule secretion and release into rhizosphere of baby corn by the legume intercrops

which resulted in higher nitrogen content and dry matter accumulation leading to higher nitrogen uptake. Sole baby corn was not having this prelease of symbiotic nitrogen release and hence might have resulted in to lower nitrogen content in plant associated with lower dry mater yield leading to lower nitrogen uptake. The current findings are in accordance with the findings of [13, 14].

The highest nitrogen uptake by baby corn (207.77 kg ha<sup>-1</sup>), was found in the

treatment receiving 125% of RDN and was followed by (169.63 kg ha<sup>-1</sup>) in the treatment receiving 100% RDN. Significantly, the lowest nitrogen uptake by baby corn (136.84 kg ha<sup>-1</sup>) was registered in the treatment receiving only 75% RDN. The increasing level of nitrogen nutrient might have increased plant growth with more photosynthetic pigments in leaves, resulting in more photosynthesis, more dry matter accumulation and higher nitrogen concentration in plant leading to higher nitrogen uptake. Similar results were also reported by [15,16]. The data on economics of difference treatments are presented in [Table-2]. Cost of cultivation ranged (27,337) the lowest in sole maize along with 75% RDN and highest (29,229) in baby corn pairs + greengram along with 125% RDN. Increased level of nitrogen resulted in increased cost of cultivation and hence the highest cost of cultivation at the highest level of nitrogen. Gross return also followed the same trend and registered the lowest and highest gross returns Rs. 1,38,146 and 2,24,880 in baby corn sole crop with 75% RDN and baby corn + greengram with 125%,RDN respectively. The lowest and highest yield recorded in these treatments could be the reason for such results. The net return, return per rupee investment also followed the similar trend that was observed in gross returns. The net return and return per rupee investment was the lowest 1,10,809 and 4.05 were in sole baby corn + 75% RDN where as the highest net return 1,95,651 and the highest return per rupee investment i.e. 6.69 was registered in the treatments with paired rows of baby corn + greengram along with 125% RDN. The lower and higher yields in these treatments was the reason for lower and higher values of net return and return per rupee investment [11, 17, 18].

## Conclusion

Among the intercrops treatments, paired row planting of baby corn + greengram intercropping system (C5) manifested the superior performance with significant increase in the baby corn cob yield, ear yield, husk yield, fodder yield, nitrogen uptake, gross & net returns, and return per rupee investment. Application of 125% RDN was significantly superior on 100% RDN recorded baby corn cob yield, ear yield, husk yield, fodder yield, nitrogen uptake, gross & net returns, and return per rupee investment.

## Conflict of Interest: None declared

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