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# Effect of crop geometry and topping practices on the productivity of baby corn (*Zea mays* L.) based intercropping systems

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**Abstract : Field experiments were conducted during the *kharif* season of 2006 and 2007 at Tamil Nadu Agricultural University, Coimbatore. The main plot treatments comprised of two factors *viz.*, crop geometry (60 x 20 cm and 75 x 16 cm) and intercropping systems (baby corn alone, baby corn + fenugreek (greens), baby corn + fodder cowpea). Four topping practices (detasseling alone, topping beyond 9$^{th}$ internode, topping beyond 10$^{th}$ internode and topping beyond 11$^{th}$ internode) were assigned to sub plots. Baby corn raised at 75 x 16 cm produced higher yield parameters and yield over 60 x 20 cm spacing. Intercropping of fenugreek and fodder cowpea did not reduce the yield of baby corn. Topping beyond 10$^{th}$ internode favourably influenced the yield parameters *viz.*, length, diameter of cobs and corns and green cob yield of baby corn.**

***Key words: Baby corn, crop geometry, intercropping systems, topping practices, yield parameters and yield.***

## Introduction

Maize is the third most important cereal crop next to rice and wheat and has the highest production potential among the cereals. There is a change in traditional usage of maize as food and increase in consumption of green ears as food, especially in and around cities and towns. The sweet succulent and delicious baby corn is a medium plant type and provides green ears within 65-75 days after sowing. As it is a new plant type, there is an emerging need to find out suitable agro-techniques for higher production and ultimately higher income of farmers.

Optimum crop geometry is one of the important factors for higher production, by efficient utilization of under ground resources and also harvesting as much as solar radiation and in turn better photosynthesis. Though the spacing requirements of grain and fodder maize were well defined, such study is meager in baby corn. Baby corn ends its life cycle within 75 days. Natural resources *viz.*, space, light, nutrients and moisture are under utilized. Such natural resources could effectively be used by introducing short duration legumes like fenugreek (greens) and fodder cowpea which complete their life cycle shortly and would not compete much with baby corn. Performance of fodder cowpea (Tripathy *et al.*, 1997 and Purushotham *et al.*, 2003) and fenugreek (Kumar and Singh, 2002) as intercrops under different cropping situations has been well documented. Tassels should be removed as and when they emerge to avoid pollination. If the silks get pollinated, the kernel would start developing within hours and the cob would become hard and unfit for baby corn purpose. Hence detasseling is essential to get

**Table 1. Influence of crop geometry, intercropping systems and topping practices on yield attributes of baby corn**

| Treatments | Length of corn (cm) | | | | Diameter of corn (cm) | | | | Weight of corn (g) | | | | No. of cobs in lakhs $ha^{-1}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I harvest | | V harvest | | I harvest | | V harvest | | I harvest | | V harvest | | | |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| Crop geometry | | | | | | | | | | | | | | |
| $S_1$ | 9.9 | 9.3 | 8.4 | 8.0 | 1.6 | 1.5 | 1.6 | 1.5 | 10.6 | 9.8 | 9.5 | 8.8 | 1.92 | 2.00 |
| $S_2$ | 10.5 | 10.0 | 8.9 | 8.6 | 1.7 | 1.6 | 1.7 | 1.6 | 11.1 | 10.0 | 9.9 | 9.2 | 2.00 | 2.00 |
| SEd | 0.1 | 0.1 | 0.1 | 0.1 | 0.02 | 0.01 | 0.02 | 0.01 | 0.1 | 0.1 | 0.1 | 0.1 | 0.07 | 0.06 |
| CD (P=0.05) | 0.3 | 0.2 | 0.2 | 0.2 | 0.04 | 0.03 | 0.04 | 0.03 | 0.3 | 0.2 | 0.2 | 0.2 | NS | NS |
| Intercropping systems | | | | | | | | | | | | | | |
| $C_1$ | 10.2 | 9.7 | 8.7 | 8.3 | 1.7 | 1.6 | 1.6 | 1.5 | 10.8 | 10.0 | 9.7 | 9.0 | 1.92 | 2.00 |
| $C_2$ | 10.4 | 9.7 | 8.7 | 8.4 | 1.7 | 1.6 | 1.6 | 1.5 | 10.9 | 10.1 | 9.7 | 9.0 | 2.00 | 2.00 |
| $C_3$ | 10.1 | 9.6 | 8.6 | 8.3 | 1.7 | 1.6 | 1.6 | 1.5 | 10.8 | 10.0 | 9.7 | 9.0 | 2.00 | 1.97 |
| SEd | 0.3 | 0.2 | 0.1 | 0.1 | 0.02 | 0.02 | 0.02 | 0.01 | 0.1 | 0.1 | 0.1 | 0.1 | 0.08 | 0.08 |
| CD (P=0.05) | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Topping practices | | | | | | | | | | | | | | |
| $T_1$ | 9.6 | 9.0 | 8.2 | 8.5 | 1.6 | 1.5 | 1.6 | 1.5 | 10.2 | 9.4 | 9.2 | 8.5 | 1.83 | 1.92 |
| $T_2$ | 10.6 | 9.9 | 9.0 | 9.3 | 1.8 | 1.7 | 1.7 | 1.6 | 11.2 | 10.4 | 10.1 | 9.3 | 2.00 | 1.92 |
| $T_3$ | 10.9 | 10.5 | 9.2 | 9.5 | 1.8 | 1.7 | 1.7 | 1.6 | 11.4 | 10.5 | 10.2 | 9.5 | 2.17 | 2.17 |
| $T_4$ | 9.8 | 9.2 | 8.3 | 8.6 | 1.6 | 1.5 | 1.6 | 1.5 | 10.5 | 9.7 | 9.4 | 8.6 | 1.92 | 2.00 |
| SEd | 0.2 | 0.2 | 0.1 | 0.2 | 0.03 | 0.03 | 0.03 | 0.02 | 0.3 | 0.3 | 0.3 | 0.2 | 0.13 | 0.15 |
| CD (P=0.05) | 0.4 | 0.4 | 0.3 | 0.4 | 0.06 | 0.06 | 0.06 | 0.05 | 0.6 | 0.6 | 0.6 | 0.4 | NS | NS |

Interaction Absent 1. *Kharif* 2006 2. *Kharif* 2007

Crop geometry

$S_1$ - 60 x 20 cm
$S_2$ - 75 x 16 cm

Intercropping systems

$C_1$ - Baby corn alone
$C_2$ - Baby corn + fenugreek (greens)
$C_3$ - Baby corn + fodder cowpea

Topping practices

$T_1$ - Detasseling alone
$T_2$ - Topping beyond $9^{th}$ internode
$T_3$ - Topping beyond $10^{th}$ internode
$T_4$ - Topping beyond $11^{th}$ internode

**Table 2. Influence of crop geometry, intercropping systems and topping practices on yield of baby corn**

| Treatments | Green cob yield (kg ha$^{-1}$) | | Green fodder yield (t ha$^{-1}$) | |
|---|---|---|---|---|
| | 2006 | 2007 | 2006 | 2007 |
| **Crop geometry** | | | | |
| $S_1$ | 7270 | 6566 | 35.8 | 33.6 |
| $S_2$ | 7777 | 6980 | 38.2 | 35.5 |
| SEd | 137 | 111 | 0.7 | 0.5 |
| CD (P=0.05) | 274 | 223 | 1.4 | 1.1 |
| **Intercropping systems** | | | | |
| $C_1$ | 7578 | 6788 | 37.0 | 35.0 |
| $C_2$ | 7610 | 6847 | 37.4 | 35.4 |
| $C_3$ | 7383 | 6683 | 36.7 | 34.7 |
| SEd | 163 | 135 | 0.8 | 0.6 |
| CD (P=0.05) | NS | NS | NS | NS |
| **Topping practices** | | | | |
| $T_1$ | 7109 | 6370 | 37.5 | 35.0 |
| $T_2$ | 7756 | 7018 | 36.5 | 34.2 |
| $T_3$ | 7951 | 7183 | 36.8 | 34.4 |
| $T_4$ | 7256 | 6520 | 37.2 | 34.8 |
| SEd | 223 | 205 | 0.9 | 0.6 |
| CD (P=0.05) | 457 | 416 | NS | NS |

Interaction Absent

| **Crop geometry** | **Intercropping systems** | **Topping practices** |
|---|---|---|
| $S_1$ - 60 x 20 cm | $C_1$ - Baby corn alone | $T_1$ - Detasseling alone |
| $S_2$ - 75 x 16 cm | $C_2$ - Baby corn + fenugreek (greens) | $T_2$ - Topping beyond 9$^{th}$ internode |
| | $C_3$ - Baby corn + fodder cowpea | $T_3$ - Topping beyond 10$^{th}$ internode |
| | | $T_4$ - Topping beyond 11$^{th}$ internode |

good quality baby corn (Prasanna *et al*., 1995 and Thavaprakaash *et al*., 2006). This wisdom has paved way for including topping practices as one of the important management strategies for getting quality baby corn. Topping refers to nipping or the removal of terminal portion from the uppermost node to induce better cob development. Information on the optimum crop geometry and suitable intercrops for higher productivity and profit per unit area is seldom available. No comprehensive treatise on the impact of topping on the yield of baby corn is available, though some preliminary work has been compiled in the past. Hence, this study has been contemplated.

## Materials and Methods

Field experiments were conducted during *kharif* 2006 and 2007 seasons at Eastern Block Farm, Tamil Nadu Agricultural University, Coimbatore. The experimental site is located at 11° N latitude, 77° E longitude and at an altitude of 426.7 m above MSL The soil of the experimental field was sandy clay loam in texture belonging to Typic Ustochrepts with alkaline pH; low in organic carbon (0.35 and 0.39%) and available nitrogen (232.5 and 242.6 kg $ha^{-1}$), medium in available phosphorus (14.2 and 16.5 kg $ha^{-1}$) and high in potassium (470.0 & 446.8 kg $ha^{-1}$) during *kharif* 2006 and 2007 seasons, respectively. The baby corn composite variety COBC 1 was chosen for the study. The CO 2 of fenugreek (greens) and CO(FC) 8 of fodder cowpea were used as intercrops during both the years. The experiments were laid out in split plot design with three replications. The main plot treatments comprised of crop geometry (60 x 20 cm and 75 x 16 cm) and intercropping systems (baby corn alone, baby corn + fenugreek (greens), baby corn + fodder cowpea) and topping practices (detasseling alone, topping beyond 9$^{th}$ internode, topping beyond 10$^{th}$ internode and topping beyond 11$^{th}$ internode) were assigned to sub plots. All the agronomic practices were carried out uniformly to raise the crop following the recommendation given by CPG (2005). Detasseling was done as and when emergence of tassel i.e., normally at 52-55 DAS. Topping beyond 9$^{th}$, 10$^{th}$ and 11$^{th}$ internode was done at 47, 50 and 52-55 DAS, respectively.

Immediately after emergence of the silk, cobs were harvested along with sheath periodically and a maximum of five to six harvests with an interval of two days were performed and the cumulative yield obtained. Length, diameter and weight of the cob from the representative plants were measured. Cob sheath peeled off and the length, diameter and weight of corn inside the sheath were measured. Total number of cobs harvested from the sampling plants was converted to the total population $ha^{-1}$ and expressed in cobs in lakhs $ha^{-1}$. Period from start of first harvest to the last harvest was recorded and expressed in days (Harvesting period). Young baby corn cobs should be carefully picked by hand pulling. After harvest of cobs, the baby corn stalks were harvested, weighed and expressed as green fodder yield (t $ha^{-1}$).

## Result and Discussion

In general the cob size was higher at the first harvest and gradualyy got reduced towards the fifth harvest. The results of first and fifth harvest is presented in Table 1 and 2.

Crop geometry had a positive influence on green cob yield of baby corn. Baby corn grown at wider row (75 x 16 cm) ($S_2$) spacing produced higher cob yield over narrow

row (60 x 20 cm) ($S_1$) spacing. The positive and significant correlation of LAI and TDMP can be related with enhanced green cob yield. Paulpandi *et al*. (1998) reported higher yield of maize under wider row spacing due to better availability of resources. This corroborates with the findings of Maddonni *et al.* (2006) in maize and Thavaprakaash *et al.* (2005a) in baby corn.

Intercropping fenugreek and fodder cowpea did not affect the performance of baby corn. This might be due to short duration, short plant stature, non-bushiness and also neither complementary nor competitive nature of intercrops. In fact the intercrops added additional revenue.

Topping practices had a profound influence on green cob yield of baby corn. Topping beyond 10$^{th}$ internode was significantly superior and produced higher green cob yield as compared to topping beyond 9$^{th}$ internode and detasseling alone but on par with topping beyond 11$^{th}$ internode. The possible reasons for the enhanced yield might be due to greater functioning of remaining leaves by arresting unnecessary growth as evident from LAI and also due to increased yield attributes like length, diameter and weight of cobs and corns. Thiagarajah *et al.* (1981) also reported that leaf situated one or two nodes above the ear is the principle source of assimilates for the ear development.

Raising baby corn at 75 x 16 cm crop geometry registered higher green fodder yield than 60 x 20 cm during the course of investigation. The favourable effect of wider row crop geometry in promoting the green fodder yield might be due to the fact that baby corn grown at wider row crop geometry had helped the individual plants to make better spatial utilization of moisture, nutrients and light which in turn increased the plant height, LAI, TDMP and ultimately green fodder yield as compared to narrow row crop geometry. This is in line with the findings of Thavaprakaash *et al.* (2005b) in baby corn. Green fodder yield of baby corn was not affected by the intercropping systems studied besides the intercrops produced additional green biomass either as greens or as fodder. There was no reduction in green fodder yield due to topping practices but cob yield varied due to the strategic positions of the leaves rather than its volume or weight.

The present investigation revealed that rising of baby corn at 75 cm row spacing combined with topping beyond 10$^{th}$ internode proved to be a better option for getting higher productivity baby corn. It was also seen intercropping like fenugreek did not affect the baby corn growth and yield.

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