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RESEARCH PAPER

Influence of crop geometry, intercropping and topping practices on green cob yield and fodder quality of baby corn (*Zea mays* L.)

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Abstract : A field experiments was conducted at Tamil Nadu Agricultural University, Coimbatore with an objective to study the effect of crop geometry, intercropping and topping practices on green cob yield and fodder quality of baby corn. Two levels of crop geometry (60 x 20 cm and 75 x 16 cm), two intercrops (baby corn alone, baby corn + fenugreek (greens), baby corn + fodder cowpea) and four topping practices (detasseling alone, topping beyond 9th, 10th and 11th internode) were studied in split plot design. Results revealed that crop geometry at 75 x 16 cm produced higher green cob and fodder yield over 60 x 20 cm spacing. There was no significant variation in green cob and fodder yield of baby corn under the intercropping system. Among the topping treatments, topping beyond 10th internode registered higher green cob yield over others. However, the green fodder yield of baby corn was not varied significantly due to topping practices. Neither crop geometry nor intercropping systems did influence on fodder quality of baby corn. But topping beyond 10th internode recorded the highest fodder quality (crude protein, crude fibre and NFE) followed by topping beyond 9th internode.

Key Words : Baby corn, Crop geometry, Intercropping, Topping, Green cob yield, Fodder quality

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INTRODUCTION

Baby corn is obsessed with high nutritive value comparable to many vegetables. The production and consumption of baby corn is gaining momentum in the world in general and in India in particular. The immature green cob is used as vegetable and the stalk has better fodder value. Since, it is a new introductory crop, development of suitable agro techniques *viz*., optimum crop geometry, suitable intercrop and topping practices are important to improve the green cob yield and fodder quality of baby corn. Crop geometry is a non-monitory input that plays a major role upon introduction of new plant types.

Space available in between the rows of baby corn has to be used effectively by raising suitable intercrop during initial stage to utilize the space, light, moisture and nutrients in soil. Such resources could be used effectively by introducing short duration intercrops like fenugreek and fodder cowpea which complete their life cycle within 50-55 days and not having much effect on main crop are selected to grow with baby corn. Manchanda *et al.* (2006) revealed that higher yield attributes and yield of maize was recorded with maize intercropped with cowpea compared to sole maize. Topping refers to nipping or the removal of terminal portion from the uppermost node to improve the yield through greater functioning of remaining leaves by arresting unnecessary growth, decreasing mutual shading of leaves, enhancing light interception, increasing nutrient uptake, decreasing competition between the tassel and cob for available plant nutrients, diverting plant nutrients to the reproductive part which aids in better source-sink relationship and better cob development (Esechie and Al-Alawi, 2002). In baby corn, research information on these aspects is seldom available, so the present study was undertaken.

MATERIAL AND METHODS

Field experiments were carried out during *Kharif* 2006 and 2007 at Eastern Block Farm, Tamil Nadu Agricultural University, Coimbatore. The experimental soil was sandy clay loam in texture belonging 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 and 446.8 kg ha^{-1}) during both the years, respectively. 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). Topping practices (detasseling alone, topping beyond 9^{th}, 10^{th} and 11^{th} internodes) were assigned to sub plots. Detasseling was done as and when emergence of tassel *i.e.*, normally at 52-55 DAS. Topping refers to nipping or the removal of terminal portion from the uppermost node to induce better cob development and to avoid fertilization of the cob. Topping beyond 9^{th}, 10^{th} and 11^{th} internodes was done at 47, 50 and 52-55 DAS, respectively. The baby corn composite COBC 1, CO 2 of fenugreek (greens) and CO(FC) 8 of fodder cowpea varieties were used under this study.

Green cob and fodder yields from net area of each plot were harvested separately, weighed and recorded as green cob yield (kg ha^{-1}). Crude protein content of baby corn fodder was computed by multiplying the N content (estimated from the di-acid digestion by micro-Kjeldahl method) with the factor 6.25 and expressed in percentage. Crude fibre were estimated by following the procedures described by Goering and Vansoest (1970) and expressed in percentage. NFE was calculated by subtracting the percentage contents of moisture, ether extract, crude protein, crude fibre and ash from 100 (Pathak and Jakhmola, 1983).

RESULTS AND DISCUSSION

The results of the present study have been presented and discussed under the following headings:

Green cob yield:

Crop geometry had a positive influence on green cob yield of baby corn (Table 1). Baby corn grown at wider row (75 x 16 cm) spacing produced higher cob yield over narrow row (60 x 20 cm) spacing. The percentage increase was 7.0 and 6.3 per cent higher in wider row spacing over narrow row spacing during both the years, respectively. Pooled analysis showed that the increment was 6.7 per cent higher under wider row spacing. This increase in yield was probably due to effective utilization of applied nutrients, increased sink capacity and nutrient uptake by the crop. Maddonni *et al.* (2006) reported higher yield of maize under wider row spacing due to better availability of resources.

There was no significant response on cob yield of baby corn due to intercropping systems. This might be due to short duration, short plant stature, non-bushiness and also neither complementary nor competitive nature of intercrops did not influence growth parameters of main crop. Similar results on yield have been reported earlier by Tiwari *et al.* (2002).

Among all the topping treatments, topping beyond 10^{th} internode was significantly superior and produced higher green cob yield as compared to topping beyond 9^{th} internode. The lowest green cob yield was registered with detasseling alone during 2006 and 2007, respectively. The percentage increase of topping beyond 10^{th} internode over detasseling alone was 11.8 and 12.8 during both the years, respectively. The pooled analysis of green cob yield also showed similar results. Based on pooled analysis, the yield increase due to topping beyond 10^{th} and 9^{th} internode over detasseling alone was 12.3 and 9.6 per cent, respectively. The possible reasons for this enhanced yield might be due to greater functioning of remaining leaves by arresting unnecessary growth, decreased mutual shading of leaves, higher light interception leading to increased photosynthesis and diverting plant nutrients to the reproductive part which aids in better source-sink relationship and better cob development. The present results are in agreement with the findings of Gaurkar and Bharad (1998).

Green fodder yield:

Raising baby corn at 75 x 16 cm crop geometry registered higher green fodder yield than 60 x 20 cm (Table 1). Higher 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.* (2005) in baby corn.

There was no significant response on green fodder yield of baby corn due to intercropping systems. Though, the green fodder yield was numerically higher under detasseling alone, but it did not differ statistically with other topping practices. A slight reduction in green fodder yield was observed due to other topping practices as compared to detasseling alone during both the years. This is in accordance with the findings of Gaurkar and Bharad (1998) in maize.

Fodder quality:

Crop geometry levels and intercropping systems of baby corn did not influence on quality of baby corn fodder (Table 2). This result is also in agreement with the findings of Thavaprakaash (2003) in baby corn.

Topping practices had marked effect on crude protein, crude fibre and NFE contents of baby corn fodder. Topping

beyond 10th internode recorded higher crude protein (7.30 and 6.98 %), crude fibre (40.73 and 39.85 %) and NFE contents (42.88 and 42.58 %) followed by topping beyond 9th internode during both the years, respectively. The enhancement in fodder quality could be justified that increased physiological and biochemical reaction (photosynthesis, CER, chlorophyll content and nitrate reductase activity) resulted in increased nutrient uptake which ultimately improved the fodder quality of baby corn. This is in line with the findings of Teyker *et al.* (1991) in maize.

Table 1 : Influence of crop geometry, intercropping systems and topping practices on green cob and fodder yields of baby corn

Treatments	Green cob yield (kg ha^{-1})			Green fodder yield (t ha^{-1})		
	2006	2007	Pooled	2006	2007	Pooled
Crop geometry						
S_1 - 60 x 20 cm	7270	6566	6918	35.8	33.6	34.7
S_2 - 75 x 16 cm	7777	6980	7379	38.2	35.5	36.9
S.E.±	137	111	118	0.7	0.5	0.8
CD (P=0.05)	274	223	236	1.4	1.1	1.6
Intercropping systems						
C_1 - Baby corn alone	7578	6788	7183	37.0	35.0	36.0
C_2 - Baby corn + fenugreek (greens)	7610	6847	7229	37.4	35.4	36.4
C_3 - Baby corn +fodder cowpea	7383	6683	7033	36.7	34.7	35.7
S.E.±	163	135	140	0.8	0.6	0.8
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS
Topping practices						
T_1- Detasseling alone	7109	6370	6740	37.5	35.0	36.3
T_2 - Topping beyond 9th internode	7756	7018	7387	36.5	34.2	35.4
T_3. Topping beyond 9th internode	7951	7183	7567	36.8	34.4	35.6
T_4- Topping beyond 11th internode	7256	6520	6888	37.2	34.8	36.0
S.E.±	223	205	212	0.9	0.6	0.8
C.D. (P=0.05)	457	416	435	NS	NS	NS

Interaction is not significant NS=Non-significant

Table 2 : Crude protein, crude fibre and NFE (%) of baby corn fodder as influenced by crop geometry, intercropping and topping practices

Treatments	*Kharif*, 2006			*Kharif*, 2007		
	Crude protein (%)	Crude fibre (%)	NFE (%)	Crude protein (%)	Crude fibre (%)	NFE (%)
Crop geometry						
S_1 – 60 x 20 cm	6.93	38.44	41.55	6.66	37.96	40.02
S_2 – 75 x 16 cm	6.98	38.60	41.78	6.68	38.12	40.26
S.E.±	0.06	0.21	0.24	0.04	0.18	0.20
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS
Intercropping systems						
C_1 – Sole baby corn	6.96	38.50	41.66	6.68	38.03	40.10
C_2 – Baby corn + fenugreek (greens)	6.98	38.60	41.80	6.70	38.11	40.32
C_3 – Baby corn + fodder cowpea	6.93	38.47	41.56	6.66	37.98	40.09
S.E.±	0.08	0.26	0.29	0.07	0.22	0.26
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS
Topping practices						
T_1 – Detasseling alone	6.65	36.45	39.78	6.46	36.18	38.45
T_2 – Topping beyond 9th internode	7.14	40.03	42.57	6.80	39.58	42.16
T_3 – Topping beyond 10th internode	7.30	40.73	42.88	6.98	39.85	42.58
T_4 – Topping beyond 11th internode	6.74	36.88	41.06	6.52	36.73	39.38
S.E.±	0.12	0.50	0.60	0.10	0.47	0.55
C.D. (P=0.05)	0.24	1.00	1.20	0.20	0.95	1.11

Interaction Absent NS=Non-significant

Conclusion:

Based on the experimental results, it could be concluded that raising of baby corn at wider row spacing (75 x 16 cm) improved the green cob and fodder yield. Growing of intercrops either fenugreek or fodder cowpea in baby corn did not influence the green cob and fodder yields. Topping of baby corn beyond 10th internode increased the green cob yield and fodder quality.

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