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Growth and yield of baby corn (*Zea mays*) as influenced by intercropping, planting geometry and nutrient management*

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Maize (*Zea mays* L.) is the third most important cereal crop next to rice and wheat in India and also a predominant cereal in global agricultural economy. Being a C4 plant is an efficient converter of absorbed nutrients into food. Baby corn is high in folate, a B-vitamin, four ounces provides 31% of the RDA. It is a good source of several other nutrients. Space availability to the individual plant is necessary to use the soil resources effectively and to harvest the maximum possible solar radiation to attain higher yield. Though the spacing requirement of grain and fodder corn has been standardized, the information on the influence of spacing on yield and nutrient management of baby corn that too under intercropping situation is lacking. Baby corn enters into the reproductive phase from 45–55 DAS and ends its life-cycle within 65–75 DAS. Until that the space, light, moisture and nutrients in soil are underutilized. Such resources could effectively be utilized by introducing short-duration intercrops, which complete life-cycle within 50–55 DAS. Integrated nutrient management (INM) involving the best combination of available nutrient management technologies would facilitate in achieving the required productivity and sustainability by the efficient use of soil and applied plant nutrients. The main aim of the integrated nutrient approach is to tap the different sources of nutrients in a judicious way for their efficient use. The following objectives are to study the effect of plant population on the growth and yield of baby corn-based intercropping system, to find out the suitability of integration of organic manures with inorganic fertilizers for baby corn and to identify a suitable intercrop for baby corn.

The field experiments were conducted at Annamalai University, Annamalainagar (11 24'N latitude, 79 44'E longitude and altitude of ±5.79 m above mean sea level.), Chidambaram. The soil was clayey loam, low in organic matter (0.34 and 0.31%) and available N (258.5 and 253.5 kg/ha), medium in available P (17.3 and 16.8 kg/ha) and available K (310.0 and 305.5 kg/ha). The baby corn composite CoBC1 and blackgram ADT 3 and cowpea Co4 were chosen for the study. The experiments were laid out in a split-split plot design with three replications. Intercropping systems, viz. sole baby corn (C_1), baby corn + cowpea (C_2), baby corn + blackgram (C_3) (in main plots), two planting geometries, viz 60 × 15 cm (M_1), 45 × 25 cm (M_2) in sub-plots and three levels of nutrient recommended dose of NPK (S1), S_1 + vermicompost @ 5 tonnes/ha (S_2), S_1 + FYM @ 12.5 tonnes/ha (S_3) were assigned in sub-sub plots. FYM and vermicompost were applied as per the treatment and incorporated into the soil before ploughing. The seeds were soaked overnight in cold water and dibbled @ 3 seeds/hole at a depth of 2 cm. Blackgram or cowpea seeds were dibbled @2 seeds/hole. The experimental plots were irrigated immediately after sowing. Recommended dose of nitrogen (150 kg/ha) as urea, phosphorus (60 kg/ha) as single superphosphate and of potassium (40 kg/ha) muriate of potash was applied as per the treatment. Fifty per cent of N and K fertilizers along with full dose of P were applied as basal. Remaining half of the N and K were top-dressed at 25 DAS. The cobs from net plot area of each plot were harvested separately, weighed and expressed as green cob yield in kg/ha.

Different intercrops did not influence the growth parameters (plant height, leaf area index and dry matter production) of baby corn at flowering stage. This could be attributed to short duration, short plant stature, non-bushiness and also neither complementary nor competitive nature of intercrops were earlier reported by Thavaprakaash *et al.* (2005). Planting geometry had significant influence on growth characters of baby corn. Baby corn raised at 60 cm × 15 cm (M1) produced taller plants (179 and 155 cm), higher LAI (3.32 and 2.66) and more DMP (6 804 and 6 731 kg/ha)

*Short note

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during *kharif* 2007 and summer 20007 seasons, respectively than M2 (45 cm × 25 cm). Taller plants might be due to competition of light under M2 with closer plant-to-plant space for want of light. Taller plants under wider row spacing were also reported by Anirudh Manchanda *et al.* (2006) in maize. Better utilization of available resources might have

Table 1 Influence of intercrop, spacing and fertilizer practices on growth parameters of baby corn

Treatment	Plant height (cm)		LAI (flowering stage)		DMP (kg/ha)	
	Kharif	Summer	*Kharif*	Summer	*Kharif*	Summer
Intercrop						
C_1	176	153	3.01	2.33	6 191	6 118
C_2	178	154	3.25	2.54	6 612	6 538
C_3	177	154	3.16	2.51	6 526	6445
SEd	0.28	0.21	0.07	0.02	87.72	74.53
CD (*P*=0.05)	NS	NS	NS	NS	NS	NS
Spacing						
M_1	179	155	3.32	2.66	6 804	6 731
M_2	175	152	2.96	2.27	6 083	6 003
SEd	1.41	1.29	0.16	0.13	341.41	319.35
CD (*P*=0.05)	2.83	2.58	0.33	0.26	682.83	638.71
Fertilizer						
S_1	173	150	2.67	2.03	5 589	5 516
S_2	180	156	3.51	2.82	7 107	7 025
S_3	178	154	3.21	2.55	6 633	6 560
SEd	0.99	0.83	0.13	0.10	228.69	207.81
CD (*P*=0.05)	1.98	1.67	0.26	0.21	457.39	415.62

Intercrop
C_1, Baby corn (base crop)
C_2, Baby corn + cowpea
C_3, Baby corn + blackgram

Spacing
M_1, 60 × 15 cm
M_2, 45 × 25 cm

Fertilizer
S_1, Recommended NPK (150:60:40 kg of N, P_2O_5 and K_2O/ha)
S_2, Recommended NPK + vermicompost @ 5 tonnes/ha
S_3, Recommended NPK + FYM @ 12.5 tonnes/ha

Table 2 Influence of intercrop, spacing and fertilizer practices on yield attributes of baby corn

Treatment	No. of cobs/ plant		Cob length (cm)		Cob width (cm)		Cob weight (g)		Baby corn yield (kg/ha)	
	Kharif	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer
Intercrop										
C_1	2.23	2.02	21.24	20.11	2.32	2.22	30.37	25.80	6 989	5 298
C_2	2.39	2.18	22.17	21.04	2.48	2.35	31.80	27.17	7 070	5 379
C_3	2.34	2.16	22.11	21.00	2.44	2.32	31.51	26.93	7 051	5 360
SEd	0.08	0.05	0.18	0.13	0.05	0.04	0.58	0.51	35	31
CD (*P*=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Spacing										
M_1	2.48	2.27	22.62	21.48	2.56	2.44	32.42	27.78	7 119	5 415
M_2	2.16	1.96	21.05	19.95	2.26	2.13	30.03	25.49	6 954	5 274
SEd	0.13	0.12	22.62	0.69	0.14	0.12	0.78	0.74	80	65
CD (*P*=0.05)	0.26	0.24	1.42	1.38	0.28	0.24	1.56	1.48	160	131
Fertilizer										
S_1	2.01	1.81	20.15	19.03	2.05	1.94	28.64	24.02	6 839	5 175
S_2	2.60	2.39	23.18	22.04	2.69	2.57	33.31	28.69	7 195	5 477
S_3	2.36	2.16	22.18	21.09	2.49	2.38	31.73	27.19	7 075	5 385
SEd	0.10	0.08	0.48	0.43	0.08	0.06	0.70	0.66	57	44
CD (*P*=0.05)	0.20	0.17	0.96	0.87	0.17	0.14	1.41	1.32	115	89

Intercrop
C_1, Baby corn (base crop)
C_2, Baby corn + cowpea
C_3, Baby corn + blackgram

Spacing
M_1, 60 × 15 cm
M_2, 45 × 25 cm

Fertilizer
S_1, Recommended NPK (150:60:40 kg of N, P_2O_5 and K_2O/ha)
S_2, Recommended NPK + vermicompost @ 5 tonnes/ha
S_3, Recommended NPK + FYM @ 12.5 tonnes/ha

increased the functional leaves and in turn enhanced the LAI. Higher plant height and LAI joined together produced higher DMP. Similar results are also reported earlier (Jiotode *et al.* 2002). Application of recommended dose of NPK+ vermicompost @ 5 tonnes/ha registered taller plants (180 and 156 cm), higher LAI (3.51 and 2.82) and DMP (7 107 and 7 025 kg/ha) during *kharif* 2007 and summer 2007 seasons respectively. Samad *et al.* (2003) stated that application of 150% recommended dose of fertilizer along with vermicompost @ 2.0 tonnes/ha significantly increased growth parameters, viz plant height, leaf area index and dry matter production of soybean (Table 1).

Higher values of yield attributes were recorded during *kharif* than summer season. Wider spacing of 60 cm × 15 cm (M1) recorded the highest number of cobs/plant (2.48 and 2.27), maximum cob length (22.62 and 21.48 cm), higher cob width (2.56 and 2.44 cm), cob weight (32.42 and 27.78 g) and higher mean baby corn yield of 7 119 and 5 415 kg/ha in *kharif* and summer, respectively compared to 45 cm × 25 cm spacing. Similar findings were also reported by (Thavaprakaash *et al.* 2005). Application of recommended dose of NPK + vermicompost @ 5 tonnes/ha (S2) recorded the highest number of cobs/plant (2.60 and 2.39), higher cob length (23.18 and 22.04 cm), highest cob width (2.69 and 2.57 cm), cob weight (33.31 and 28.69 g) and higher baby corn yield (7195 and 5477 kg/ha) than S1 (recommended NPK alone). Singh *et al.* (2000) also concluded that increasing levels of N from 150 to 200 kg/ha resulted in significant increase in length and girth of cob, cob weight and number of grains/cob (Table 2).

No marked influence on nutrient uptake by baby corn was evident due to intercropping system in both the seasons. Generally, when the uptake of N is more, the crop would have a tendency to absorb more P and K. Similar results of increased uptake of NPK due to wider row spacing were reported by Thavaprakaash and Velayudham (2007) in baby corn. Uptake of NPK by baby corn was higher with the application of recommended NPK + vermicompost @ 5 tonnes/ha compared to recommended dose of fertilizer alone.

Baby corn intercropped with cowpea under wider row (60 cm) spacing applied with recommended NPK + vermicompost @ 5 tonnes/ha (C2 M1S2) resulted in realization of the highest mean net income of ₹ 60 727 and 58 985/ha and benefit: cost ratio of 4.65 and 4.55 in *kharif* and summer, respectively.

SUMMARY

The present investigation revealed that raising baby corn at 60 cm × 15 cm spacing with intercropping of blackgram or cowpea and recommended dose of fertilizers + vermicompost @ 5 tonnes/ha would produce maximum baby corn yield.

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