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Effect of nutrient sources and weed control methods on yield and economics of baby corn (*Zea mays*)

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ABSTRACT

Results of the field experiment conducted at New Delhi during *kharif* season of 2008 showed that baby corn can be grown profitably with application of 120 kg N through vermicompost and two hand weeding at 20 and 40 DAS or pre-emergence tank mix application of atrazine @ 0.5 kg + pendimethalin @ 0.75 kg/ha.

Key words: Baby corn, Green fodder yield, Root volume, Root weight, Weed control index, Weed index

Due to changing food preferences in Indian life style, the urban population is switching to new food items; the 'Baby corn (*Zea mays* L.)' is a new addition to Indian foods. Being a short duration crop, it easily fits in an intensive cropping system and in addition to baby cob it provides delicious green fodder to cattle (Das *et al.*, 2008). Owing to congenial weather conditions and wider row spacing 'baby corn' crop suffers heavily due to severe weed infestation (Malviya and Singh, 2007). Baby corn heavily fertilized and it further accelerates the weed problem. Therefore, the present investigation was carried out to assess the effect of nutrient sources and weed control measures on growth, yield and quality of baby corn. Organic sources were included in the present study because of the increasing demand for organic food (Prasad, 2005 and Prasad and Mishra, 2001).

A field experiment was conducted during *kharif* season of 2008 at Division of Agronomy, Indian Agricultural Research Institute, New Delhi, on sandy loam soils, poor in organic carbon, low in available N (162 kg/ha), medium in available P (16.2 kg/ha) and K (198.2 kg/ha) and neutral in reaction (pH 7.6). Crop received 342.8 mm precipitation in 17 rainy days. The experiment was laid out in a factorial randomized block design and replicated thrice with the combination of 4 nutrient sources (120-26.4-41.7 kg N-P-K/ha through fertilizers, 120 kg N through FYM, 120 kg N through leaf compost and 120 kg N through vermicompost) and 4 weed management practices: (unweeded control, weed free check, two hand weeding at 20 and 40 days after sowing), and a pre-emergence application of a mixture of atrazine @ 0.5 kg and pendimethalin @ 0.75 kg/ha. Maize 'PEHM 2' was sown on the ridges spaced at 60 cm with a plant to plant spacing of 20 cm to maintain the plant population of 83,444 plants/ha using 20 kg seed/ha. In the treatment receiving chemical fertilizer 120 kg N /ha was applied in the form of urea, 26.4 kg P/ha through SSP and 41.7 kg K/ha through MOP. The 1/3 portion of nitrogen and full amount of P, K were applied as basal. Remaining amount of nitrogen was applied in two equal splits at knee high and at tasseling stages. In treatments receiving organic manures well decomposed farmyard manure (FYM) containing 0.44% N, 0.24% P and 0.53% K, leaf compost containing 1.29% N, 0.95% P and 1.4% K and vermicompost containing 2.80% N, 1.10% P and 1.45% K were applied one week prior to sowing. An amount of 27.27, 9.30 and 4.29 t/ha of FYM, leaf compost and vermicompost, respectively was applied to supply 120 kg N/ha. Standard agronomic practices were followed to raise the crop. The leaf area was measured from the leaves of five sampled plants by using the leaf area meter (Model LI-COR-3100) and leaf area index was worked out. The baby corn ears were harvested just after at the time of silk emergence. The samples of roots were collected at different stages and baby corn and straw collected at harvest were oven dried at 65^0 C for 48 hours for dry matter estimation. Root volume was estimated by wa-

***Short note**

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ter displacement method. Economic return was calculated on prevailing market price of produce and inputs. The weeds were collected from 0.25m^2 area and were first sun dried and kept later in an electrical oven at 70^o C till the weight became constant. The weed control index (WCI) was calculated by using the formula: WCI = (DMC–*DMT*)/DMC, where, DMC = Dry mater of weeds in unweeded control and DMT = Dry matter of weeds in a treatment. The Weed index (WI) was worked out using the following formula: WI = (X–Y)/X×100, where, X=Yield from weed free plot and Y= Yield from a treated plot.

The growth parameters *viz.* leaf area index (LAI), root dry weight and root volume as well as yield attributes *viz.* cobs/plant, and cob length, girth and weight, cob and green fodder yields were significantly more with organic manures as compared to chemical fertilizers (Tables 1 and 2). A significant difference between chemical fertilizer and organic manures was, however, not recorded for dry matter production. All the organic manures were equally effective in respect of growth characters, yield attributes and cob and fodder yields. As regards net returns, it was the highest with vermicompost, followed by chemical fertilizers, leaf compost and FYM, in the order. B:C ratio was nearly same for vermicompost and chemical fertilizers, which was higher than leaf compost. B:C ratio was the least with FYM. This was mainly due to more amount of FYM required, which resulted in higher cost of cultivation. Pawar and Patil (2007) also noticed increase in cob yield due to favourable effect of vermicompost application.

Nutrient sources did not differ significantly in respect of weed dry matter accumulation (WDMA) (Table 3). WDMA was most in un-weeded control and least in weed free check. WCI was 100% in weed free check and zero in un-weeded control. On the contrary WI was zero in weed free check and 22.93% in un-weeded control. The two weed control treatments, namely, manual and herbicidal were equally effective and had higher WDMA, WCI and WI. These results show that two hand-weeding can effectively control weeds in baby corn field and will be desirable for its organic production. These results are in accord with those of Thimmegowda *et al*. (2007) and Malviya and Singh, (2007). In respect to the efficiency of herbicides our results are in accord with those of Dixit and Gautam (1996) and Pandey *et al.* (2002).

As regards the effect of weed control measures on baby corn, manual and herbicidal weed control and weed free check were equally effective in respect of dry matter, LAI, root weight and volume, yield attributes, cob and green fodder yield, net return and B:C ratio. These results provide a choice of manual or herbicidal control of weeds in baby corn. However, if baby corn is produced organically, it permits of manual control. The results obtained in the present study show that baby corn can be profitably grown using organic manures and manual weeding. However, in the areas of labour shortage, equally good yield can be obtained with the organic manures and herbicidal weed control.

Table 1. Effect of nutrient sources and weed control measures on dry matter accumulation and leaf area index, root dry weight and root volume of baby corn at different growth stages

Treatment	Dry matter accumulation (g/plant)			Leaf area index			Root dry weight (g/plant)			Root volume (cm^3/plant)		
	Knee high	Tasseling	Harvest	Knee high	Tasseling	Harvest	Knee high	Tasseling	Harvest	Knee high	Tasseling	Harvest
Nutrient sources												
Chemical fertilizers	23.3	39.2	51.4	2.0	2.8	3.0	5.1	6.5	7.0	10.4	35.6	38.3
FYM	25.3	42.5	53.1	2.4	3.1	3.3	6.0	7.9	9.2	15.8	45.4	53.5
Leaf compost	25.0	42.4	52.8	2.3	3.1	3.2	5.9	7.9	9.1	13.1	42.	52.8
Vermicompost	26.8	42.7	53.9	2.6	3.2	3.4	6.2	8.6	9.3	14.3	44.6	52.9
SEm±	1.4	2.3	1.1	0.1	0.1	0.1	0.2	0.4	0.7	0.9	2.0	4.9
CD (*P*=0.05)	NS	NS	NS	0.3	0.3	0.2	0.6	1.2	1.9	2.7	5.6	13.9
Weed control measures												
Unweeded control	21.5	38.3	49.1	2.0	2.8	3.0	4.6	6.0	7.0	10.5	32.5	35.5
Weed free check	27.1	43.8	54.3	2.5	3.3	3.4	6.7	8.9	9.1	14.9	46.4	56.9
Manual(Two hand weeding at 20 & 40 DAS)	25.5	41.2	53.1	2.3	3.1	3.3	5.8	7.7	9.0	14.1	44.4	53.2
Herbicidal (Atrazine @ 0.5 kg + pendimethalin @ 0.75 kg/ha as PE)	26.2	43.3	53.4	2.4	3.2	3.3	6.1	8.2	9.0	14.2	45.0	53.5
SEm±	1.4	2.3	1.1	0.1	0.1	0.1	0.2	0.4	0.7	0.9	2.0	4.9
CD (value)	3.9	NS	3.1	0.3	0.3	0.2	0.6	1.2	1.9	2.7	5.6	13.9

Table 2. Effect of nutrient sources and weed control measures on yield attributes, cob yield, green fodder yield, economics, weed dry matter accumulation (WDMA) at 50 DAS, weed control index (WCI) and weed index (WI)

Treatment	Yield attributes				Yield (t/ha)			Economic returns (×10^3 ₹/ha)			50 days after sowing		
	Cobs/ plant	Cob length (cm)	Cob girth (cm)	Cob weight (g)	Husked cobs	Dehusked cobs	Green fodder	Cost of cultivation	Net returns	B:C ratio	WDMA (g/m^2)	WCI	WI
Nutrient sources													
Chemical fertilizers	1.5	12.0	4.9	20.4	3.30	1.80	21.50	27.9	50.1	2.8	7. 31 (66.6)		
FYM	1.8	13.8	6.0	25.5	3.80	2.09	27.27	52.5	37.2	1.7	7. 23 (68.1)		
Leaf compost	1.8	13.3	5.9	25.1	3.67	2.01	26.14	39.2	44.7	2.1	7.34 (68.3)		
Vermicompost	2.0	14.0	6.1	26.2	4.43	2.15	28.05	33.8	58.5	2.7	7. 30 (68.1)		
SEm±	0.10	0.40	0.28	1.50	0.11	0.08	1.6				0.06		
CD (*P*=0.05)	0.29	1.17	0.81	4.40	0.32	0.24	4.62				NS		
Weed control measures													
Unweeded control	1.5	11.8	5.0	19.9	3.05	1.68	21.07	35.9	35.6	2.1	10.59(111.8)	0	22.93
Weed free check	2.0	14.4	6.1	26.8	4.29	2.18	30.22	41.2	55.5	2.5	0.71 (0.0)	100	0
Manual (Two hand weeding at 20 & 40 DAS)	1.8	13.3	5.9	25.4	3.92	2.08	26.32	39.3	49.2	2.4	8.90 (78.9)	29.42	4.58
Herbicidal (Atrazine @0.5 kg+ pendimethalin @ 0.75 kg/ha as PE)	1.8	13.7	5.9	24.9	3.94	2.09	25.75	37.0	50.3	2.5	8.99 (80.4)	28.08	4.12
SEm±	0.10	0.40	0.28	1.50	0.11	0.08	1.60				0.06	-	-
CD (*P*=0.05)	0.29	1.17	0.81	4.40	0.32	0.24	4.62				0.16	-	-

Baby corn ₹ 30/kg, and Green fodder ₹1,000/t; *Square-root transformed values $\sqrt{(x+0.5)}$; Original values are in parenthesis; WDMA : Weed dry matter accumulation

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