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Integrated nutrient management in baby corn (*Zea mays*)

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Baby corn (*Zea mays* L.) is dehusked maize ear, harvested within 2–3 days of silk emergence, ie prior to fertilization. It is gaining importance due to diversification, value-addition and growth of food processing industry. The productivity of a crop is controlled by many factors, of which the mineral nutrition is by and large the most important one but the application of all the needed nutrients through chemical fertilizers had deleterious effect on soil fertility leading to unsustainable yields (Jat *et al.* 2006). No single source of nutrients is capable of supplying plant nutrients in adequate and balanced proportion. Hence, the present investigation was undertaken to study the effect of integrated nutrient management involving inorganic nutrients (NPK), vermicompost and biofertilizers in baby corn.

A field experiment was conducted during rainy (*kharif*) season, 2007 at Instructional Farm, Rajasthan college of Agriculture, Udaipur (24°34' N latitude, 73°42' E longitude and 582.2 m above mean sea level). The soil was clay loam, having *p*H 7.8 (soil:water ratio 1:2.5), 0.56 dS/m electrical conductivity, 0.74% organic carbon, 260.40 kg/ha available nitrogen, 18.26 kg/ha available phosphorus and 283.30 kg/ha available potassuim. The experiment consisted of 12 treatments, viz T_1, 100% NPK; T_2, 125% NPK; T_3, 150% NPK; T_4, 3.00 tonnes vermicompost/ha; T_5, 3.75 tonnes vermicompost/ha; T_6, 4.50 tonnes vermicompost/ha; T_7, 50% NPK+1.50 tonnes vermicompost/ha; T_8, 62.5% NPK + 1.875 tonnes vermicompost/ha; T_9, 75% NPK + 2.25 tonnes vermicompost/ha; T_{10}, 50% NPK + 1.50 tonnes vermicompost/ha + biofertilizers; T_{11}, 62.5% NPK + 1.875 tonnes vermicompost/ha + biofertilizers and T_{12}, 75% NPK + 2.25 tonnes vermicompost/ha + biofertilizers These treatments were evaluated under randomized block design with three replications. 'HM 4' baby corn was sown during last week of July and harvested in the third week of September 2007. The recommended doses of NPK(100%) were 120:40:30 kg/ha. Half dose of N, full doses of P and K and vermicompost as per treatments were applied at the time of sowing and remaining half N was top-dressed at knee high stage. The sources of nutrients taken were urea, diammonium phosphate and muriate of potash, respectively, for N, P and K. Crop was inoculated with *Azotobacter* and phosphate-solubilizing bacteria @ 600 g/ha each at the time of sowing as per treatments. The crop was raised under conditions with one life saving irrigation at knee-high stage. Intercultural operations were carried out as per requirement of crop. The total rainfall received during the crop period was 293.90 mm.

The immature cobs were harvested at 2–3 days of silk emergence stage and marketed as fresh @ Rs 10/kg after dehusking . The crop was harvested as green fodder after the completion of picking and sold @ Rs 50/100 kg. The crop was evaluated in terms of plant height, dry matter accumulation, dehusked cob (baby corn) and green fodder yeilds as well as nutrient status after harvest of baby corn. The economics of baby corn production was also worked out by calculating the operational costs, gross returns, net returns and benefit:cost.

Application of 75% NPK + 2.25 tonnes vermicompost/ha along with biofertilizers inoculation recorded significantly highest plant height (239.9 cm) at harvest over rest of the treatments applied either alone or in combinations with and without biofertilizers except 150% NPK, 4.50 tonnes vermicompost/ha and 75% NPK + 2.25 tonnes vermicompost/ha while the lowest plant height (165.2 cm) was recorded under 3.00 tonnes vermicompost/ha (Table 1). The increase in plant height was attributed to availability of energy sources for prolonged time from integrated sources of nutrients. Choudhary and Gautam (2007) and Sharma *et al.* (2007) also reported similar findings. Dry matter accumulation/plant increased significantly with the application of 75% NPK + 2.25 tonnes vermicompost/ha + biofertilizers over rest of the treatments and registered 16.7

*Short note

Based on complete information of M Sc (Agriculture) thesis of the first author submitted to MPUAT, Udaipur during 2008.

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and 8.0% increase over 50% NPK + 1.50 tonnes vermicompost/ha + biofertilizers and 62.5% NPK + 1.875 tonnes vermicompost/ha + biofertilizers, respectively. The larger canopy development and increased plant height under integrated nutrient treatment might have increased interception, absorption and utilization of radiant energy which in turn increased overall growth, photosynthesis and finally accumulation of dry matter/plant. Chaudhari *et al*. (2006) also found that application of 120 N/ha to maize, 1/4 of which was applied through different organic manures and 3/4 applied through urea + biological N-fixer recorded significantly higher dry matter production than other treatments.

The results further indicated (Table 1) that application of 75% NPK + 2.25 tonnes vermicompost/ha + biofertilizers significantly improved dehusked cob (baby corn) yield (2 641kg/ha) and green fodder yield (30 133 kg/ha) over rest of the treatments and registered an increase of 38.1 and 15.6, 28.2 and 15.1% over the 50% NPK + 1.50 tonnes vermicompost/ha + biofertilizers and 62.5% NPK + 1.875 tonnes vermicompost/ha + biofertilizers, respectively. On the other hand, the lowest values were obtained under 3.00 tonnes vermicompost/ha. It showed that combined effect of inorganic nutrients (NPK), vermicompost and biofertilizers played very important role due to their synergistic effect. This indicated that baby corn responded well to integrated nutrient management, especially to vermicompost which might be owing to favourable effect on soil condition and synchronized release of plant nutrients throughout the crop-growth period and inorganic nutrients have positive influence on source-sink relationship as evident from remarkable improvement in plant height and dry matter accumulation

Table 1 Efect of integrated nutrient management on plant height , dry matter accumulation, dehusked cob (baby corn) yield, green fodder yield and available nutrient status of soil as well as net returns and benefit : cost in baby corn

Treatment	Plant height (cm)	Dry matter accumulation (g/plant)	Dehusked cob yield (kg/ha)	Green fodder yield (kg/ha)	Available nutrient status (kg/ha)			Net returns (Rs/ha)	Benefit: cost
					Nitrogen	Phosphorus	Potassium		
100% NPK (RDF)	177.0	54.78	1 422	19 433	278.32	20.28	300.11	12 145	2.03
125% NPK	207.0	60.83	1 841	21 500	289.82	24.15	313.31	16 814	2.36
150% NPK	227.2	64.68	2 048	22 667	298.59	28.22	325.81	18 910	2.47
3.00 tonnes vermicompost/ha	165.2	45.57	1 167	17 833	252.46	17.96	286.98	6 513	1.46
3.75 tonnes vermicompost/ha	189.0	51.65	1 575	19 933	263.40	21.39	300.11	10 518	1.69
4.50 tonnes vermicompost/ha	225.6	58.51	1 983	22 333	275.05	24.09	316.62	14 673	1.90
50% NPK + 1.50 tonnes vermicompost/ha	187.1	62.18	1 492	20 400	269.14	19.25	297.53	12 187	1.94
62.5% NPK + 1.875 tonnes vermicompost/ha	203.1	67.08	1 893	22 833	273.70	22.55	306.23	16 574	2.20
75% NPK + 2.25 tonnes vermicompost/ha	233.3	74.34	2 258	24 839	289.15	27.33	318.72	20 384	2.40
50% NPK + 1.50 tonnes vermicompost/ha + biofertilizers	192.9	68.60	1 913	23 500	283.13	22.90	306.23	17 898	2.38
62.5% NPK + 1.875 tonnes vermicompost/ha + biofertilizers	206.1	74.14	2 284	26 167	292.19	25.30	318.72	22 101	2.60
75% NPK + 2.25 tonnes vermicompost/ha + biofertilizers	239.9	80.08	2 641	30 133	308.23	30.41	333.61	26 815	2.83
SEm±	9.3	1.74	88.12	655.16	2.87	0.73	2.68	976	0.07
CD (*P*=0.05)	27.3	5.12	258.5	1 921.6	8.41	2.14	7.78	2 864	0.21

RDF, Recommended doses of fertilizers

and ultimately yields were increased. Biofertilizers inoculation increased N-fixation and availability of P in the soil. They perform better when soil is well supplied with nutrients. The results are in line with those reported by Chaudhari *et al*. (2006) and Choudhary and Gautam (2007).

Application of 75% NPK + 2.25 tonnes vermicompost/ha + biofertilizers recorded significantly highest available nitrogen (308.23 kg/ha), phosphorus (30.41 kg/ha) and potassium status (333.61 kg/ha) while significantly lowest values were recorded under 3.00 tonnes vermiconpost/ha over rest of the treatments. Similar were the findings of Bodake *et al*. (2006).

Economic analysis of the treatments showed that significantly highest net returns (Rs 26 815/ha) and benefit : cost (2.83 : 1) were obtained with 75% NPK + 2.25 tonnes vermicompost/ha + biofertilizers over rest of the treatments.

Thus, it can be concluded that application of 75% NPK + 2.25 tonnes vermicompost/ha + biofertilizers significantly improved dehusked cob (baby corn) yield, green fodder yield, net returns and benefit : cost ratio as well as soil nutrient status and can be recommended for sub-humid southern plains and Aravalli hills zone of Rajasthan.

SUMMARY

A field experiment was conducted during rainy (*kharif*) season, 2007 at instructional farm, Rajasthan College of Agriculture, Udaipur to evaluate the effect of integrated nutrient management in baby corn (*Zea mays* L.). Results showed that maximum plant height and dry matter accumulation were recorded under 75% NPK + 2.25 tonnes vermicompost /ha along with biofertilizers over rest of the treatments. Significantly highest dehusked cob (baby corn) and green fodder yield were also obtained by applying 75% NPK + 2.25 tonnes vermicompost/ha + biofertilizers followed by 62.5% + 1.875 tonnes vermicompost/ha + biofertilizers and registered increase of 38.1 and 15.6, 28.2 and 15.1% over 50% NPK + 1.50 tonnes vermicompost/ha + biofertilizers and 62.5% NPK + 1.875 tonnes vermicompost/ha +biofertilizers, respectively. Application of 75% NPK along with 2.25 tonnes vermicompost/ha + biofertilizers significantly increased the available N, P and K status of soil after harvest of baby corn and recorded significantly higher net returns (Rs 26 815/ha) and benefit : cost (2.83 :1) over the rest of treatments.

REFERENCES

Bodake P S, Patil Y J, Hile R B and Patil H M. 2006. Response of N, P and K application on productivity and soil fertility in maize-wheat cropping system. *Journal of Farming Systems Research & Development* **12** (1&2): 107–8.

Chaudhary P M, Patil H E and Hankare R H. 2006. Effect of integrated nitrogen management in maize (*Zea mays* L.) on pattern of leaf area and dry matter production. *International Journal of Plant Sciences* **1**: 17–21.

Chaudhary R. 2006. 'Effect of plant population and fertility levels on yield quality of baby corn (*Zea mays* L.)'. M Sc (Ag) thesis, Maharana Pratap University of Agriculture and Technology Udaipur.

Choudhary R S and Gautam R C. 2007. Effect of nutrient management practices on growth and yield of pearl millet (*Pennisetum glaucum*). *Indian Journal of Agronomy* **52**: 64–6.

Jat N L, Jain N K and Choudhary G R. 2006. Integrated nutrient management in fenugreek (*Trigonella foenum-graecum*). *Indian Journal of Agronomy* **51**: 331–3.

Sarma A, Singh H and Nanwal R K. 2007. Effect of integrated nutrient management on productivity of wheat (*Triticum aestivum*) under limited and adequate irrigation supplies. *Indian Journal of Agronomy* **52**: 120–3.