Madras Agric. J., 2018; doi:10.29321/MAJ 2018.000191

RESEARCH ARTICLE

Effect of Different Organic Manures on the Yield, Nutrient Uptake and Quality of Baby Corn

M. Vinoth Kumar*[1] and A. Velayutham[2]

[1]Department of Agronomy, AC & RI, Killikulam, Vallanadu – 628 252.

[2]Water Technology Centre, Tamil Nadu Agricultural University, Coimbatore – 641 003.

Received : 25th June, 2018

Revised : 28th August, 2018

Accepted : 28th August, 2018

Abstract

A field experiment was conducted at Agricultural College and Research Institute, Killikulam during Purattasipattam (September - October) of 2017 to study the effect of different organic manures on the yield, nutrient uptake and quality of baby corn. Baby corn G 5414 was used as test variety. The experiment was laid out in randomized block design with three replications. Treatments consisted of three different organic manures *viz.,* farmyard manure, poultry manure and vermicompost with or without panchagavya as foliar spray. Significantly, the highest green cob and green fodder yield was obtained with the application of 100% N through poultry manure (10920 kg ha^{-1} and 29797 kg ha^{-1}, respectively) and it is superior to the rest of treatments. Application of 100% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage recorded higher green cob and green fodder yield (10418 kg ha^{-1} and 28636 kg ha^{-1}, respectively). This was followed by the application of 50% N through farmyard manure + 50% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage and application of 50% N through farmyard manure + 50% N through poultry manure which registered higher green cob and green fodder yield (10401 kg ha^{-1} and 28498 kg ha^{-1}, respectively, 10354 kg ha^{-1} and 28389 kg ha^{-1}, respectively). These treatments were on par with each other. Higher nutrient uptake (NPK) and quality of baby corn was obtained with the application of 100% N through poultry manure. Higher gross return, net return and B: C ratio was recorded with the application of 100% N through poultry manure (₹ 248197 ha^{-1}, ₹ 199647 ha^{-1} and 5.1, respectively). Application of 100% N through poultry manure was found to be the desirable organic nutrient management practice for realizing higher yield, nutrient uptake and quality of baby corn.

Keywords*: Baby corn, Organic manures, Nutrient uptake, Yield and Quality*

Introduction

Maize *(Zea mays* L) is the most versatile and emerging crop with wide range of adaptability under different agro-climatic conditions. Across the globe it is famous as queen of cereals since it possess higher genetic yield potential among other cereal crops like rice, wheat, oat, millets *etc.* In most of the developing countries maize contributes major share for food security. In India, maize is the third most important crop followed by rice and wheat. Its significance lies in the way that it is not only utilized for human consumption and animal feed, but also it is utilized by the industries for the production of corn starch, corn oil *etc*. Countries like Thailand and Taiwan achieved successful results due to the cultivation of baby corn. Later more attention is given on the cultivation of maize by the researchers and agriculturists to tap its potentialities for earning more foreign revenue in addition to get maximum returns to the producers. Baby corn is not a genetically dwarf maize as the name suggests, it is the immature ear of normal maize. Matured maize ear are too hard so, can't be used as vegetables. Whereas baby corn ear are soft and consumed as vegetable by human being (Jinjala *et al*., 2016). The young baby corn was harvested during silking stage. After harvesting, the external sheath was removed and the ear was used for vegetable purpose *viz.*, salad, soup, pickles etc (Muthukumar *et al.*, 2005). Baby corn is a delicious, decorative, low caloric nutritious vegetable without cholesterol and is rich in fibre content. It is free from pests and diseases and it contains protein up to 15 to 18 per cent, sugar 0.016 to 0.020 per cent,

Corresponding author's email: vinothkumarmb367@gmail.com

phosphorus 0.6 to 0.9 per cent, potassium 2 to 3 per cent, fibre 3 to 5 per cent, calcium 0.3 to 0.5 per cent and ascorbic acid 75 to 80 mg 100 g^{-1}. As green fodder, it is the best suited for milch animals since it has lactogenic properties (Reena rani *et al*., 2017). For the past few decades increased use of synthetic fertilizer reduced the usage of organic manures which affected the soil fertility and productivity. Organic way of crop production enhanced the sustainability and soil health without affecting the ecosystem.

Material and Methods

A field experiment was conducted at Agricultural College and Research Institute, Killikulam during Purattasipattam (September - October) of 2017. The experiment was laid out in randomized block design and replicated thrice using three different organic manures with or without panchagavya spray as per the treatment schedule *viz.,* Control (T_1), 100% N through farmyard manure (T_2), 100% N through poultry manure (T_3), 100% N through vermicompost (T_4), 100% N through farmyard manure + 3% Panchagavya spray at vegetative and tasseling stage (T_5), 100% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage (T_6), 100% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_7), 50% N through farmyard manure + 50% N through poultry manure (T_8), 50% N through farmyard manure + 50% N through vermicompost (T_9), 50% N through poultry manure + 50% N through vermicompost (T_{10}), 50% N through farmyard manure + 50% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage (T_{11}), 50% N through farmyard manure + 50% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_{12}) and 50% N through poultry manure + 50% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T13). Organic manure was applied as basal and panchagavya was sprayed at vegetative and tasseling stages. Baby corn G 5414 seeds were sown by adopting the seed rate of 25 kg ha^{-1} with a spacing of 45 x 25 cm. Farmyard manure (0.52, 0.21 and 0.51 per cent N, P and K), Poultry manure (3.05, 2.59 and 1.45 per cent N, P and K) and Vermicompost (1.94, 1.01 and 0.66 per cent N, P and K) were used as organic source of N and applied as per the treatments. For control, recommended quantity of fertilizer (150:60:40 kg NPK ha^{-1}) was applied. Whereas, 50% of recommended dose of N and 100% recommended dose of P and K were applied as basal. The remaining 50% N was applied as top dressing on 25 DAS.

Results and Discussion

Yield attributes and yield

Yield attributes and yield of baby corn were significantly affected by different organic manures and foliar application of panchagavya (Table 1).

Table 1. Effect of different organic manures on yield and yield parameters of baby corn

Treatments	No. of baby corn plant^{-1}	Cob weight (g)	Cob length (cm)	Cob girth (cm)	Green cob yield (kg ha^{-1})	Green fodder yield (kg ha^{-1})
T_1	2.4	45.9	19.4	9.5	9900	27184
T_2	2.3	44.8	19.0	9.3	9801	26899
T_3	2.5	51.6	23.9	11.4	10920	29797
T_4	2.1	31.8	13.7	6.1	7710	18901
T_5	2.3	37.2	16.2	7.9	8656	22867
T_6	2.5	48.9	22.4	10.7	10418	28636
T_7	2.3	35.4	14.8	6.9	8199	21198
T_8	2.5	48.1	21.9	10.3	10354	28389
T_9	2.3	38.1	17.1	8.3	8792	23635
T_{10}	2.3	36.5	16.0	7.6	8309	21999
T_{11}	2.5	48.5	22.3	10.5	10401	28498
T_{12}	2.2	41.9	17.5	8.5	9241	24989
T_{13}	2.4	43.2	18.2	8.9	9498	26011
SEd	0.1	0.8	0.4	0.2	190	510
CD P=0.05)						

Control (T_1), 100% N through farmyard manure (T_2), 100% N through poultry manure (T_3), 100% N through vermicompost (T_4), 100% N through farmyard manure + 3% Panchagavya spray at vegetative and tasseling stage (T_5), 100% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage (T_6), 100% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_7), 50% N through farmyard manure + 50% N through poultry manure (T_8), 50% N through farmyard manure + 50% N through vermicompost (T_9), 50% N through poultry manure + 50% N through vermicompost (T_{10}), 50% N through farmyard manure + 50% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage (T_{11}), 50% N through farmyard manure + 50% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_{12}) and 50% N through poultry manure + 50% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_{13}).

Significantly increased cob weight, cob length, cob girth, green cob yield and green fodder yield of baby corn were obtained with the application of 100% N through poultry manure and it is superior to the rest of treatments. Application of 100% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage was the next best treatment which recorded higher cob weight, cob length, cob girth, green cob yield and green fodder yield of baby corn.

Table 2. Effect of different organic manures on nutrient uptake and quality parameters of baby corn

Treatments	N	P	K	Crude protein	Crude fibre
	(kg ha^{-1})			(%)	
T_1	199	26.6	157	12.0	4.2
T_2	194	25.9	155	11.6	4.0
T_3	229	31.9	179	13.8	5.1
T_4	132	17.7	108	8.5	2.5
T_5	165	23.5	135	10.2	3.5
T_6	217	29.5	170	13.1	4.8
T_7	145	19.9	121	9.2	2.9
T_8	211	28.8	166	12.7	4.6
T_9	172	24.0	139	10.5	3.6
T_{10}	159	21.8	130	9.9	3.3
T_{11}	215	29.1	168	12.9	4.7
T_{12}	179	24.2	144	10.9	3.7
T_{13}	188	25.1	148	11.2	3.8
SEd	4	0.4	3	0.3	0.1
CD (P=0.05)	9	0.9	6	0.5	0.2

Control (T_1), 100% N through farmyard manure (T_2), 100% N through poultry manure (T_3), 100% N through vermicompost (T_4), 100% N through farmyard manure + 3% Panchagavya spray at vegetative and tasseling stage (T_5), 100% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage (T_6), 100% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_7), 50% N through farmyard manure + 50% N through poultry manure (T_8), 50% N through farmyard manure + 50% N through vermicompost (T_9), 50% N through poultry manure + 50% N through vermicompost (T_{10}), 50% N through farmyard manure + 50% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage (T_{11}), 50% N through farmyard manure + 50% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_{12}) and 50% N through poultry manure + 50% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_{13}).

It was followed by the application of 50% N through farmyard manure + 50% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage and application of 50% N through farmyard manure + 50% N through poultry manure. These treatments were on par with each other. The number of baby corn plant^{-1} was found to increase with each increase in organic manures and panchagavya but it did not differ significantly. However, well decomposed poultry manure either alone or combination with foliar application of panchagavya increased the yield and yield components of baby corn. Poultry manure contains high amount of nitrogen and panchagavya have growth promoting substance which might have helped to produce higher yield and yield components. Enujeke, (2013) also observed similar results.

Nutrient uptake

Nutrient uptake by baby corn was significantly influenced by the application of different organic manures and foliar application of panchagavya. The uptake of N, P and K by plants increased significantly due to poultry manure application (Table 2). This increase was mainly due to increased green cob and green fodder yield and higher concentrations of respective applied nutrients (NPK). Findings of Maravi (2006), Waniyo (2013) and Keerthirani (2015) confirmed these results.

Table 3. Effect of different organic manures on economics of baby corn

Treatments	Cost of cultivation (₹ ha^{-1})	Gross return (₹ ha^{-1})	Net return (₹ ha^{-1})	B:C ratio
T_1	55640	225184	121628	4.0
T_2	57070	222919	165849	3.9
T_3	48550	248197	199647	5.1
T_4	135070	173101	38031	1.3
T_5	61918	195987	134069	3.2
T_6	53398	236996	183598	4.4
T_7	139918	185178	45260	1.3
T_8	54444	235469	181025	4.3
T_9	96070	199475	103405	2.1
T_{10}	91810	188179	96369	2.0
T_{11}	57658	236518	178860	4.1
T_{12}	100918	209809	108891	2.1
T_{13}	96658	215971	119313	2.2

Data not statistically analyzed

Control (T_1), 100% N through farmyard manure (T_2), 100% N through poultry manure (T_3), 100% N through vermicompost (T_4), 100% N through farmyard manure + 3% Panchagavya spray at vegetative and tasseling stage (T_5), 100% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage (T_6), 100% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_7), 50% N through farmyard manure + 50% N through poultry manure (T_8), 50% N through farmyard manure + 50% N through vermicompost (T_9), 50% N through poultry manure + 50% N through vermicompost (T_{10}), 50% N through farmyard manure + 50% N through poultry manure + 3% Panchagavya spray at vegetative and tasseling stage (T_{11}), 50% N through farmyard manure + 50% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_{12}) and 50% N through poultry manure + 50% N through vermicompost + 3% Panchagavya spray at vegetative and tasseling stage (T_{13}).

Quality parameters

The quality parameters varied significantly due to different organic manures. The quality parameters *viz*. crude protein and crude fibre in baby corn was increased with the application of 100% N through poultry manure (Table 2). The highest crude protein and fibre content was obtained with treatment receiving 100% N through poultry manure. Ghafoor Ahmed Mam Rasul *et al*., (2015) reported the highest protein content of corn with the application of poultry manure, because poultry manure contain more amount of nitrogen, phosphorus and potassium that acted beneficially in the higher uptake of water and nutrients. This resulted in higher quality parameters.

Economics

Gross return, net return and benefit cost ratio was significantly influenced by different sources of organic manures. Application of 100% N through poultry manure registered higher gross return, net return and benefit cost ratio of baby corn (Table 3). Similar observation was earlier made by Maravi, (2006) and Almaz, Halim and Martini, (2017).

Conclusion

Based on the above results it is concluded that application of 100% N through poultry manure was found to be the best organic nutrient management practice for maximizing yield, nutrient uptake and quality of baby corn.

References

Almaz, M. G., R. A. Halim and M. Y. Martini. 2017. Effect of combined application of poultry manure and inorganic fertiliser on yield and yield components of maize intercropped with soybean. *Pertanika J. Trop. Agric. Sci.* **40 (1)**: 174 - 184.

Enujeke, E.C. 2013. Effects of poultry manure on growth and yield of improved maize in asaba area of delta state, Nigeria. *J. agri and vet sci*. **4 (5)**: 24 - 30.

Ghafoor Ahmed Mam Rasul, Sarkawet Taha Ahmedand and Mohammed Qadiar Ahmed. 2015. Influence of different organic fertilizer on growth and yield of wheat. *American-Eurasian J. Agric. & Environ. Sci*. **15 (6)**: 1123 -1126.

Jinjala, V. R., H.M. Virdia, N.N. Saravaiya and A.D. Raj. 2016. Effect of integrated nutrient management on baby corn (*Zea mays* L.). *Agric. Sci. Digest.* **36 (4)**: 291 - 294.

Keerthirani, D.S. 2015. Influence of organic sources of nutrients on growth, productivity and quality of baby corn. M.Sc. (Ag.) Thesis. University of Agricultural Sciences.Bengaluru.

Maravi, K. S. 2006. Integrated nutrient management in maize (*Zea mays*). M.Sc. (Ag.) Thesis. Jawaharlal Nehru Krishi Vishwa Vidyalaya College of Agriculture, Indore (M.P.).

Muthukumar, V. B., K. Velayudham and N. Thavaprakash. 2005. Effect of plant growth regulators and time of nitrogen application on quality and green cob yield of baby corn (*Zea mays* L.). *Madras Agric. J.* **92 (7-9)**: 545 - 548.

Reena Rani, R.K. Sheoran, Pooja Gupta Soni, Sakshi Kaith and Arpita Sharma. 2017. Baby corn: A wonderful vegetable. *International Journal of Science, Environment and Technology*, **6(2)**: 1407 - 1412.

Waniyo, U.U., M.M. Sauwa, A.L. Ngala, G.A. Abubakar and E.C. Anelo. 2013. Influence of Sources and Rates of Manure on Yield and Nutrient Uptake of Maize (*Zea mays* L.) in Maiduguri, Nigeria. *Nigerian Journal of Basic and Applied Science*. **21(4)**: 259 - 265.