Biological Forum – An International Journal **15(10): 544-547(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Study on the Performance of Integrated Nutrient Management on Soil Fertility of Baby Corn (*Zea mays* L.)

M. Shiva Prasad[1*], J. Srinivas[2], J. Cheena[3], M. Sreenivas[4] and B. Naveen Kumar[5]

[1]M.Sc. Scholar, Department of Vegetable Science,
College of Horticulture, Rajendranagar, Hyderabad, SKLTSHU (Telangana), India.
[2]Assistant Professor, Department of Vegetable Science,
College of Horticulture, Mojerla,SKLTSHU (Telangana), India.
[3]Associate Dean, College of Horticulture, Malyal, SKLTSHU (Telangana), India.
[4]Assistant Professor (Hort.), College of Horticulture, Rajendranagar, Hyderabad, SKLTSHU (Telangana), India.
[5]Vice Principal, Horticulture Polytechnic College, Ramagirikhilla, SKLTSHU (Telangana), India.

(Corresponding author: M. Shiva Prasad)*

(Received: 03 August 2023; Revised: 30 August 2023; Accepted: 24 September 2023; Published: 15 October 2023)
(Published by Research Trend)

ABSTRACT: A field experiment on integrated nutrient management on soil fertility of baby corn (*Zea mays* L.) was carried out during *rabi* from December, 2022 to March, 2023 at College of Horticulture, Sri Konda Laxman Telangana State Horticultural University, Rajendranagar, Hyderabad. The experiment was laid out in a randomized block design with seven treatments in three replications. There are significant differences, which were observed in all the treatments. Among the seven treatments evaluated the revealed that the maximum available nitrogen (270.39 kg/ha), phosphorous (31.56 kg/ha) and potassium (276.13 kg/ha) in the soil after harvesting were recorded in treatment T_3 (75 % RDF + FYM (5 t/ha) + Vermicompost (1.5 t/ha) + *Azotobacter* (5 kg/ha)), maximum soil pH (7.41) in T_1 (75 % RDF + FYM (10 t/ha) + *Azotobacter* (5 kg/ha)) and maximum EC (1.66 dS/m) was recorded in T_7 (100 % RDF (150: 50: 50)). The incorporation of soil with additional organic manures such as *Azotobacter* treated Vermicompost and FYM along with 75% RDF resulted in the high productivity of baby corn.

Keywords: Baby corn, Integrated Nutrient Management, Treatments, Soil fertility and Yield.

INTRODUCTION

Baby corn (*Zea mays* L.) is a vegetable crop taken from sweet corn or standard maize (corn) plants, which is harvested early. It is a short-duration crop, belongs to the family Poaceae along with Sweet Corn and originated in Mexico. It is gaining popularity among vegetarian people as a vegetable, due to its nutritive value. Immature cobs of baby corn are harvested for vegetable purposes. It has a nutritive value similar to that of non-legume vegetables such as cauliflower, tomato, cucumber and cabbage.

In India, recently baby corn has gained popularity as a valuable vegetable in Delhi, Uttar Pradesh, Haryana, Maharashtra, Karnataka, Andhra Pradesh, Rajasthan, Gujarat and Meghalaya. Baby corn is dehusked maize ear, harvested young especially when the silk has either not emerged or just emerged and no fertilization has taken place or we can say the shank with unpollinated silk is baby corn. The economic product is harvested just after silk emergence (1-2 cm long). Baby corn is an important crop in Thailand and Taiwan.

Baby corn is a delicious, decorative and nutritious vegetable, without cholesterol. It is a low-calorie vegetable which is rich in fiber content. One Baby corn can be compared with an 'egg' in terms of minerals. Probably it is the only vegetable without any pesticide residues. Baby corn is free from insect pests and diseases and its nutritional value is comparable with other several high-priced vegetables (Pandey *et al*., 2000). Baby corn is gaining popularity as a vegetable being a rich source of phosphorous, iron, vitamins A and C, high fibre content and no cholesterol (Nataraj *et al*., 2011). Baby corn is highly nutritive as 100 g of baby corn contains 89.1% moisture, 0.2 g fat, 1.9 g protein, 8.2 mg carbohydrate, 0.06 g ash, 28.0 mg calcium, 86.0 mg phosphorus and 11.0 mg ascorbic acid (Thavaprakash *et al*., 2005). Importantly, its nutritional value is comparable to popular vegetables like cauliflower, cabbage, tomato and cucumber. It is consumed both raw and cooked. Cooking does not change its culinary and physical properties significantly. Baby corn ears can be canned in a two per cent brine solution. Pickles and canned baby corn ears have great potential for export in the European and American markets. Recently a fresh market for baby corn ears has developed in Europe. Its by-products such as tassel, young husk, silk and green stalks provide good cattle feed, which is also very nutritious.

Since baby corn is a short duration (65-75 days). Young cob corn has a short growth thus; a farmer can grow four or more crop cycles per year.

Maize (*Zea mays* L.) is the third most important cereal crop after rice and wheat and has the highest production potential among cereals. The dehusked young cob of maize harvested within 2-3 days of silk emergence is known as baby corn. It is an efficient converter of absorbed nutrients into food as a C4 plant. Baby corn is high in folate and vitamin B, and it also contains a variety of other nutrients (Singh *et al.,* 2010). Water and nutrients play a critical role in growth and productivity of baby corn. The spatial and temporal variability of rainfall and groundwater depletion has posed a challenge to crop production sustainability (Patil *et al.,* 2012; Sah *et al*., 2020). Water scarcity is becoming increasingly severe around the world as a result of climate change and population growth. Freshwater demand for domestic use is increasing at a faster rate, with agriculture accounting for approximately 91% of total demand (Kayatz *et al.*, 2019).

Baby corn is a profitable crop that allows diversification of production, aggregation of value and increased income (Pandey *et al*., 2002). It has become popular among growers in peri-urban areas in recent years due to its diverse utility and high net returns. Baby corn when grown as a sole crop produces significantly higher numbers of corn per hectare and baby corn yield as well as gross return and return/rupee investment in comparison to other intercropping systems (Barik *et al*., 2016).

MATERIAL AND METHODS

The experiment was carried out at College of Horticulture, Sri Konda Laxman Telangana State Horticultural University, Rajendranagar, Hyderabad during *rabi* from December, 2022 to March, 2023. The experimental site falls under a semiarid tropical climate with an average rainfall of 800 mm per annum located at an altitude of 536 m above mean sea level at latitude of 17°32′ and longitude of 78°40′. The soil was sandy loam with a pH of 7.3 and electrical conductivity of 0.168 dsm^{-1}. The soil had having good drainage facility with low water holding capacity. COBC-1 variety was taken for this experiment. The soil of the experiment site was sandy loam.

The experimental field underwent several preparatory steps. Initially, it was ploughed once using a tractor-drawn cultivator. This was followed by three subsequent ploughings, each carried out with a rotavator. During this process, the field was cleared of any weeds and stubbles from the previous crop. Afterwards, a secondary tillage operation was performed using a tractor-drawn rotavator. The field was then divided into plots according to the planned layout.

Sowing was carried out with a spacing of 45 cm between rows, and seeds were dropped manually to maintain a plant-to-plant distance of 20 cm. This was achieved by preparing ridges and carefully placing the seeds. The recommended seed rate for cultivating baby corn was 25 kg/ha.

The total experimental area was subdivided into 21-unit plots, designed to accommodate all seven treatment combinations, with each combination replicated three times. Irrigation channels, each measuring 1.0 meters in width, marked the boundaries of each replication and 0.5-meter-wide bunds separated each plot. Various tools such as tines, ropes, measuring tapes, and pegs were utilized in the layout preparation.

For soil enrichment, farmyard manure (FYM) and vermicompost were applied at rates of 10.0 t/ha and 5.0 t/ha, respectively, as a complete dose. These amendments were applied seven days prior to seed sowing. Fertilizers were also applied, with a dosage of 120:50:50 kg NPK/ha for this experiment. Nitrogen was administered in two split doses. Initially, 2/3 of the nitrogen, the full dose of phosphorus (P), and potassium (K) were applied as a basal treatment. The remaining 1/3 of the nitrogen was applied 30 days after sowing (DAS).

The crop was examined properly and irrigation was given as per crop need and irrigation was given to the crop before sowing and later for every 10 days interval.

RESULTS AND DISCUSSION

A. Soil Analysis

The effect of integrated nutrient management on the soil fertility of baby corn is depicted in Table 1 given below. The results showed that the maximum available nitrogen (270.39 kg/ha), in soil after harvesting was recorded in treatment T_3 (75 % RDF + FYM (5 t/ha) + Vermicompost (1.5 t/ha) + *Azotobacter* (5 kg/ha), which remained statistically at par with treatments T_1 (75% RDF + FYM (10t/ha) + *Azotobacter* (5 kg/ha)) with (265.53 kg/ha) and the lowest available nitrogen status (239.45 kg/ha) was recorded under treatment T_5 (50% RDF + Vermicompost (3t/ha) + *Azotobacter* (5 kg/ha) and in comparable with T_7 (100% RDF is NPK (150:50:50)) with (244.16 kg/ha).

Similar findings of Vermicompost applied organic manure resulting in more soil fertility were reported by Tetarwal *et al*. (2011); Sharma and Banik (2014); Ashish *et al.* (2015); Preetham *et al.* (2020).

The results showed that the maximum available phosphorus (31.56 kg/ha), in the soil after harvesting was recorded in treatment T_3 (75 % RDF + FYM (5 t/ha) + Vermicompost (1.5 t/ha) + *Azotobacter* (5 kg/ha)), which remained statistically at par with treatments T_1 (75% RDF + FYM (10t/ha) + *Azotobacter* (5kg/ha)) with (30.81 kg/ha) and the lowest available nitrogen status (23.32 kg/ha) was recorded under treatment T_5 (50% RDF + Vermicompost (3t/ha) + *Azotobacter* (5kg/ha)) and in comparable with T_7 (100% RDF is NPK (150:50:50) with (24.53 kg/ha).

Similar findings of Vermicompost applied organic manure resulting in more soil fertility were reported by Tetarwal *et al*. (2011); Sharma and Banik (2014); Ashish *et al.* (2015); Preetham *et al.* (2020).

The results showed that the maximum available potassium (276.13 kg/ha), in the soil after harvesting was recorded in treatment T_3 (75 % RDF + FYM (5 t/ha) + Vermicompost (1.5 t/ha) + *Azotobacter* (5 kg/ha)), which remained statistically at par with treatments T_1 (75% RDF + FYM (10t/ha) + *Azotobacter* (5kg/ha) with (273.94 kg/ha) and the lowest available nitrogen status (247.63 kg/ha) was recorded under treatment T_5 (50% RDF + Vermicompost (3t/ha) + *Azotobacter* (5kg/ha) and in comparable with T_7 (100% RDF is NPK (150:50:50) with (252.15 kg/ha).

Similar findings of Vermicompost applied organic manure resulting in more soil fertility were reported by Tetarwal *et al*. (2011); Sharma and Banik (2014); Ashish *et al.* (2015); Preetham *et al.* (2020).

The results showed that the maximum available soil pH (7.41), (75% RDF + FYM (10t/ha) + *Azotobacter* (5kg/ha) with (7.41) was on par with treatments T_4 (50% RDF + FYM (10t/ha) + *Azotobacter* (5kg/ha) with (7.36) and T_6 (50% RDF + FYM (5t/ha) + Vermicompost (1.5t/ha) + *Azotobacter* (5kg/ha) with (7.33) while significantly lowest pH in treatment T_7 (100% RDF is NPK (150:50:50)) with (6.94) and in comparable with T_2 (75% RDF + Vermicompost (3t/ha) + *Azotobacter* (5kg/ha)) with (7.03). The increase in pH in treatment T_1 (75 % RDF + FYM (10 t /ha) + *Azotobacter* (5 kg /ha) might be due to the release of more organic acids from the high application of organic manure (FYM).

The results showed that the maximum available soil EC observed in treatment T_7 [100% RDF is NPK (150:50:50)] with (1.66 ds/m) was on par with treatments T_2 [75% RDF + Vermicompost (3t/ha) + *Azotobacter* (5kg/ha)] with (1.31 ds/m) and T_3 [75% RDF + FYM (5t/ha) + Vermicompost (1.5t/ha) + *Azotobacter* (5kg/ha)] with (1.26 ds/m). While significantly lowest EC in treatment T_4 [50% RDF + FYM (10t/ha) + *Azotobacter* (5 kg/ha)] with (0.73) and in comparable with T_6 [50%RDF + FYM (5t/ha) + Vermicompost (1.5t/ha) + *Azotobacter* (5 kg/ha)] with (0.88). The increase in EC in treatment T_7 [100% RDF is NPK (150:50:50)] might be due to the release of more salts from high application of an only source of inorganic fertilizers.

Table 1 : Effect of INM treatments on the soil fertility of baby corn.

Treatments	Available Soil Nitrogen (kg /ha)	Available Soil Phosphorus (kg /ha)	Available Soil Potassium (kg /ha)	Soil pH	Soil EC (dS /m)
T_1	265.53	30.81	273.94	7.41	1.20
T_2	261.33	28.63	270.65	7.03	1.31
T_3	270.39	31.56	276.13	7.19	1.26
T_4	247.33	25.28	257.01	7.36	0.73
T_5	239.45	23.32	247.63	7.11	1.03
T_6	251.67	26.48	261.32	7.33	0.88
T_7	244.16	24.53	252.15	6.94	1.66
SE m (±)	2.03	0.74	0.42	0.03	0.05
CD @ 5 %	6.26	2.29	1. 28	0.08	0.15

T_1 - 75 % RDF + FYM (10 t/ha) + *Azotobacter* (5 kg/ha)
T_2 -75 % RDF + Vermicompost (3 t/ha) + *Azotobacter* (5 kg/ha)
T_3 - 75 % RDF + FYM (5 t/ha) + Vermicompost (1.5 t/ha) + *Azotobacter* (5 kg/ha)
T_4 - 50 % RDF + FYM (10 t/ha) + *Azotobacter* (5 kg/ha)
T_5 -50 % RDF + Vermicompost (3 t/ha) + *Azotobacter* (5 kg/ha)
T_6 - 50 % RDF + FYM (5 t/ha) + Vermicompost (1.5 t/ha) + *Azotobacter* (5 kg/ha)
T_7 - 100 % RDF (150:50:50)
[Note: - RDF is NPK (150:50:50)]

CONCLUSIONS

It could be concluded from the present investigation that, integrated nutrient management significantly influenced the soil fertility in baby corn (COBC-1). Among the different levels of integrated nutrient management maximum soil fertility parameters of baby corn was obtained from treatment T_3 (75 % RDF + FYM (5 t/ha) + Vermicompost (1.5 t/ha) + *Azotobacter* (5 kg/ha) even second highest treatment T_2 (75 % RDF + Vermicompost (3 t/ha) + *Azotobacter* (5 kg/ha) is also found better after the treatment T_3.

Acknowledgement. The authors sincerely thank to J. Srinivas, J. Cheena, B. Naveen Kumar and M. Sreenivas for their kind help in the research work. I am highly thankful to SKLTSHU, Mulugu, Siddipet, Telangana for providing all the facilities to complete this endeavour.
Conflict of Interest. None.

REFERENCES

Ashish, S., Mathukia, R. K., Takar, S. S., Bijarniya, A. L. and Kudi, R. K. (2015). Effect of fertility levels and fertilizer: Vermicompost proportions on yield content and uptake of nutrients and economics of baby corn (*Zea mays*). *Journal of Eco-friendly Agriculture, 10*(1), 36-38.

Barik, A. K., Karmakar, M. and Ghorai, S. K. (2016). Studies on the effect of crop geometry and nutrient management on productivity and economics of baby corn and cowpea (fodder) intercropping system. *International Journal of Bioresource and Stress Management*, *7*(2), 305−309.

Kayatz, B., Harris, F., Hillier, J., Adhya, T., Dalin, C., Nayak, D. and Dangour, A. D. (2019). More crop per drop: Exploring India's cereal water use since 2005. *Sci. Total Environ.*, *673*, 207–217.

Nataraj, D. K., Kalyanamurthy, K. N. and Vishwanath, A. P. (2011). Economics of baby corn cultivation under sole and intercropped situation with leguminous vegetables. *Agricultural Science Digest*, *31*(3), 211-213.

Pandey, A. K., Mani, V. P., Ved Prakash, Singh, R. D. and Gupta, H. S. (2002). Effect of varieties and plant densities on yield, yield attributes and economics of baby corn (*Zea mays*). *Indian Journal of Agronomy*, *47*(2), 221-226.

Pandey, A. K., Ved Prakash and Gupta, H. S. (2002). Effect of integrated weed management practices on yield and economics of baby corn (*Zea mays*). *Indian Journal of*

Agricultural Sciences, 72(4), 206-209.
Pandey, A. K., Ved Prakash, Mahi, V. P. and Singh, R. D. (2000). Effect of rate of nitrogen time of application as yield and economics of baby corn (*Zea mays*). *Indian Journal of Agronomy*, *45(*2), 338-343.
Patil, N. G., Pal, D. K., Mandal, C. and Mandal, D. K. (2012). Soil Water Retention Characteristics of Vertisols and Pedotransfer Functions Based on Nearest Neighbor and Neural Networks Approaches to Estimate AWC. *J. Irrig. Drain. Eng*., *138*, 177–184.
Preetham, R., Avil Kumar, K., Srinivas, A., Manohar Rao, A. and Ramprakash, T. (2020). Influence of INM practices on growth, yield and proximate characters of baby corn in baby corn (*Zea mays* L.) – hyacinth bean (*Lablab purpureus* var. *typicus*) cropping system. *International Journal of Bio-resource and Stress Management*, *11*(4), 327-334.
Sah, R. P., Chakraborty, M., Prasad, K., Pandit, M., Tudu, V. K., Chakravarty, M. K., Narayan, S. C., Rana, M. and Moharana, D. (2020). Impact of water deficit stress in maize: Phenology and yield components. *Sci. Rep*., *10*, 2944.
Sharma, R. C. and Banik, P. (2014). Vermicompost and fertilizer application: Effect on productivity and profitability of baby corn (*Zea mays* L.) and soil health. *Compost Science & Utilization*, *22*(2), 83-92.
Singh, M. K., Singh, R. N., Singh, S. P., Yadav, M. K. and Singh, V. K. (2010). Integrated nutrient management for higher yield, quality and profitability of baby corn (*Zea mays*). *Indian J. Agron*., *55,* 100–104.
Tetarwal, J. P., Baldev Ram and Meena, D. S. (2011). Effect of integrated nutrient management on productivity, profitability, nutrient uptake and soil fertility in rainfed maize (*Zea mays*). *Indian Journal of Agronomy*, *56,* 373-376.
Thavaprakash, N., Velayudham, K. and Muthukumar, V. B. (2005). Effect of crop geometry, intercropping system and integrated nutrient management practices on productivity of baby corn (*Zea mays* L.) based intercropping systems. *Research Journal of Agricultural and Biological Sciences*, *1*(4), 295–30.

How to cite this article: M. Shiva Prasad, J. Srinivas, J. Cheena, M. Sreenivas and B. Naveen Kumar (2023). Study on the Performance of Integrated Nutrient Management on Soil Fertility of Baby Corn (*Zea mays* L.). *Biological Forum – An International Journal, 15*(10): 544-547.