



Research Article

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Study of Performance of Baby Corn at Different Combination Organic and Inorganic Fertilizers in Mid Hills of Nepal



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Abstract

A field experiment on Baby Corn was conducted at Boudgaun, Sindhupal chowk, Nepal to identify effect of different combination of organic and inorganic fertilizers on yield and yield attributes of baby corn during kharif season of 2017. The experiment was laid out in Randomized Complete Block Design (RCBD) with eight treatments and three replications. The treatments are different combination of vermicompost, farm yard manure and chemical fertilizers. Result revealed that yield and yield attributes are statistically different among treatments. Yield and yield attributing character viz. length and weight of baby corn with and without husk in first three harvest of baby corn were found significantly superior in treatment with 75% vermi-compost and 25% inorganic fertilizers. In contrast, root length and plant height of baby corn were found significantly superior in treatment with 75% FYM and 25% chemical fertilizers. The result signifies that performance of yield and yield attributes of baby corn is superior in organic source and best over application of vermicompost.

Keywords: Baby corn; Cob; Farm yard manure; Vermicompost

Abbreviations: RCBD: Randomized Complete Block Design; HPSEC: Humic Derivatives were Assessed by Elemental Analyses Size Exclusion Chromatography; NMR: Nuclear Magnetic Resonance; DOSY: Diffusion Order Spectroscopy

Introduction

Baby corn (*Zea mays L.*) is an off shoot of maize which is grown for its young, fresh, finger like green ears, harvested at the time of silk emergence and before pollination and fertilization. It is known as 'Queen of Cereals' [1]. It refers to whole, entirely edible cobs of immature corn harvested just before fertilization at the silk emergence stage [2]. It is rich in phosphorus content (86mg/100g) of edible portion in comparison to 21 to 57 mg phosphorus content in other commonly used vegetables [3]. As per the report of EIRI the nutritive value on dry weight basis is:

- Protein: 15-18%
- Sugar: 0.016-0.020%
- Phosphorus: 0.6-0.9%
- Potassium: 2-3%
- Fiber: 3-5%
- Calcium: 0.3-0.5%
- Ascorbic acid: 75-80 mg per 100g.

In addition, it is a rich source of thiamine, riboflavin and folic acid and it is an attractive low calories vegetable high in fiber without cholesterol. Baby corn is a nutritious food for the growing population for which its production is to be increased.

In the world it accounts for 8 and 25 per cent of the area and production of cereals, respectively. This venture proved enormously successfully in countries like Thailand, Taiwan, Sri Lanka and Myanmar [4]. The production of baby corn in Nepal is negligible. The production is not even started as baby corn is a very recent development and lacks standard cultivation practice for intensive farming. There is no knowledge of production technology, in addition suitable management practices such as time and amount of fertilizer, irrigation has not been discovered. The different levels of nutrition of maize plants greatly affected the yield and quality [5]. More than a minimum level of nitrogen supply is necessary for N from vegetative parts to contribute to the formation of seed protein [6]. For development of baby corn research on fertilization, spacing, variety should be prioritized.

Food insufficiency due to lower area for cultivation demands more production within the same field. Nutrient especially nitrogen is important for increasing productivity. Nitrogen as a constituent of protoplasm and chlorophyll; and is associated with the activity of every living cell. An increased response to applied nitrogen was observed in baby corn by Pandey, et al. [7]. Similarly, overall fertilization the amount of FYM, vermi-compost, urea, DAP, MoP effects the growth and production [8]. The increase in production due to production of higher amount and more efficient translocation of metabolites [9]. This ensures an optimum dose of fertilizer gives maximum production of the baby corn. The cultivation practices should have all aspect of production including efficient fertilization for profitable farming through higher productivity.

The cultivation practices with sound fertilization is a most for increasing the productivity of baby corn and give economic benefits thereby. From the local level research should be conducted for baby corn which aids for commencement of its farming in the country which can uplift the traditional farmer’s livelihood. The advancement in farming technology and suitable variety selection with a well-managed nutrition paves the way to commercial farming. “Baby corn” is a profitable crop that allows a diversification of production, aggregation of value, and increased income [7]. This research has focused in the nutrient management and fertilization package which would give optimum yield of

baby corn with sound benefit - cost ratios. The effect of different combination of fertilizers in growth parameters and the yield attributing characters are observed.

Materials and Method

The experiment was carried out at farmer’s field of Boudgaun, Sindhupal chowk, Nepal situated at 27043’36.12” N latitude, 85038’32.49”E longitude and altitude of 736 m above mean sea level. The different treatments are T₁ → Control, T₂→ 100% inorganic N, T₃→ 75% inorganic N and 25% FYM, T₄ → 75% inorganic N and 25% vermicompost, T₅→ 50% IN and 50% FYM, T₆→ 50% IN and 25% FYM, T₇→ 25% inorganic N and 75% FYM and T₈ → 25% IN and 75% vermicompost. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. Arun-2 Maize variety was planted in three blocks. Each block consisted of eight genotypes randomized and replicated within each block with geometry of PP 40cm ×RR 20cm. All necessary precautions were taken to maintain uniform plant population in each treatment per replication. All the recommended package of practices (earthing up, weeding, detasseling and irrigation) was followed along with necessary prophylactic plant protection measures to raise a good crop. Observations were recorded and the data was subjected to statistical analysis. Statistical analysis was done through Microsoft excel 2010, SPSS 16.0 and R 3.1.1 (Figure 1).

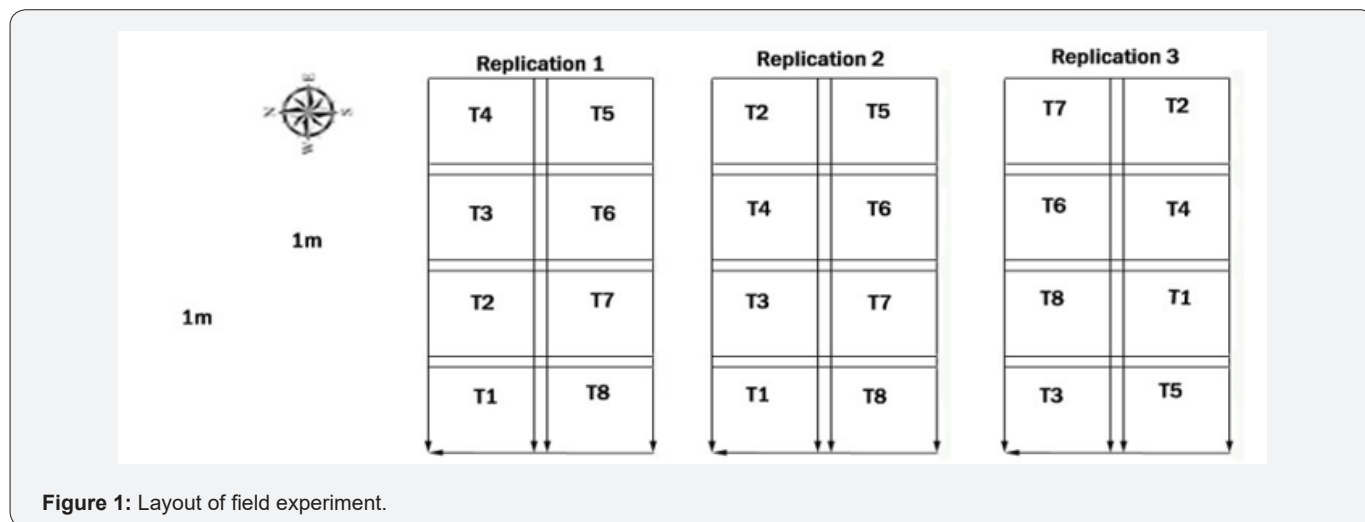


Figure 1: Layout of field experiment.

Results and Discussion

Growth parameters

Root length: Root length of T₈ [25% inorganic and 75% vermi-compost] is significantly superior than other treatment (Figure 4.1). Similar result is achieved in [10]. Lee-Joung et al. [11], opined that root length increased with the increase level of vermi-compost. In this research, the maximum root length is observed 36.35cm and minimum one is 21.8cm. Vermicompost improve the microbial activity, soil health and micronutrient availability [12], Effect of vermi-compost on plant growth and its relationship with soil properties). Chemical reaction (hydrolysis,

oxidation, reduction, methylation, alkyl compound detachment) were applied to modify the structure of humic substance isolated from vermicompost. Structural and conformational changes of the humic derivatives were assessed by elemental analyses, size exclusion chromatography (HPSEC), solid state nuclear magnetic resonance (13C CPMAS-NMR), and diffusion order spectroscopy (DOSY-NMR) where as their bioactivity was evaluated by changes in root architecture and proton pump activation in baby corn. Hydrophobic domain can preserve the bioactive molecules such as auxin and organic acid [13]. Vermicompost have large particulate surface areas that provide many micro sites for microbial activity and for the strong retention of nutrients. Vermicompost are rich

in microbial populations and diversity, particularly fungi, bacteria and actinomycetes. Due to their different production processes, compost and vermi-compost might exhibit different physical

and chemical features which might influence plant growth and morphology in diverse ways. Other treatment are statistically at par but significantly superior than control plot (Figure 2).

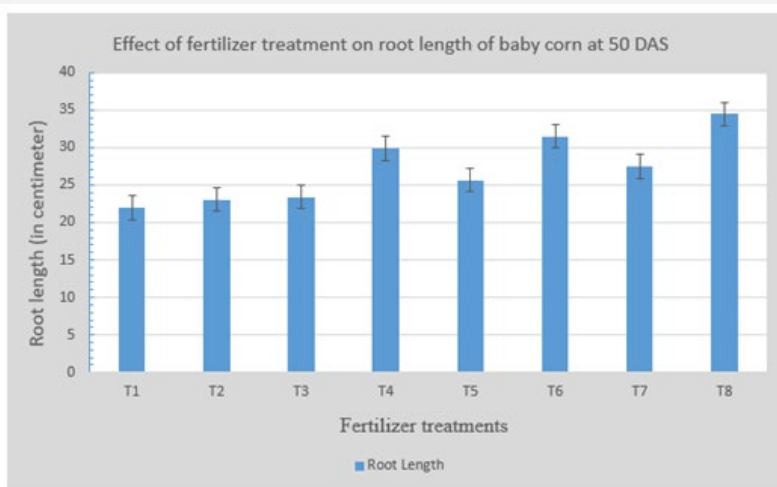


Figure 2 : Effect of fertilizer treatment on root length of baby corn at 50 DAS.

Shoot length: Shoot length of T_8 is statistically at par with T_6 and T_4 but significantly superior than other treatment. Dadarwal et al. [14] results showed that maximum plant height and dry matter accumulation were recorded under 75% NPK from 2.25 tons vermi-compost /ha. Similar result is also achieved by [15]. Cristina Lazcano et al. [16], results confirm that the use of organic

fertilizers such as vermi-compost has a positive effect on crop growth, yield and quality. The interactions between earthworms and microorganisms can produce significant quantities of plant growth hormones and humic acids which act as plant regulators [12] (Figure 3).

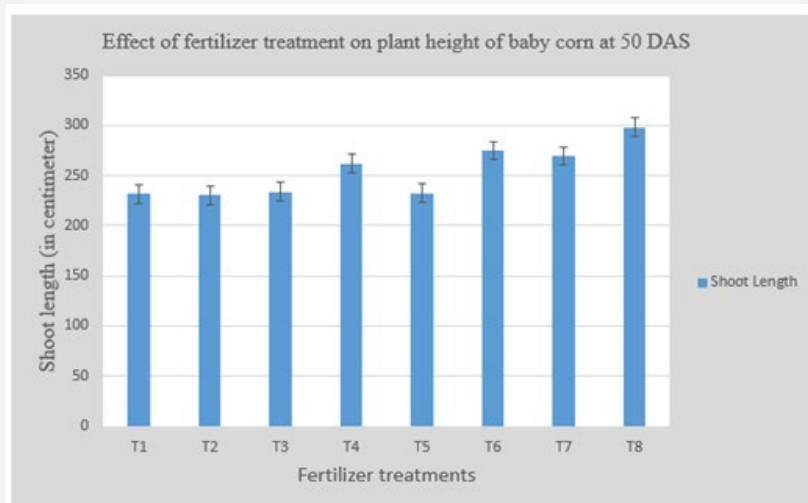


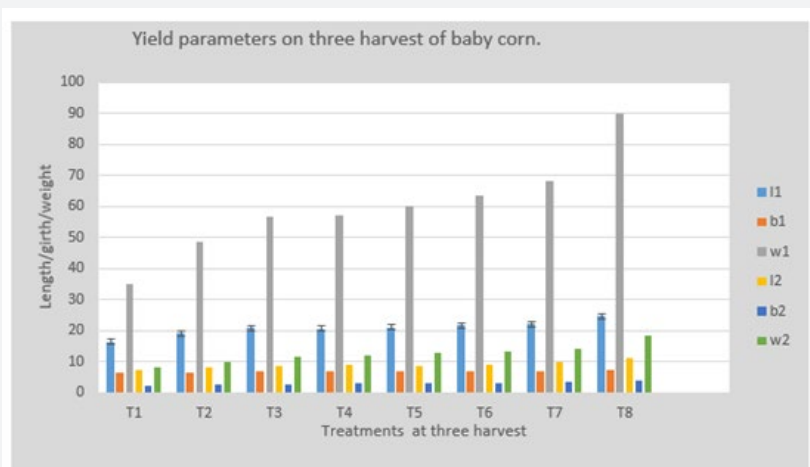
Figure 3: Effect of fertilizer treatment on root length of baby corn at 50 DAS.

Yield attributes: The study revealed that yield component viz. cob length, cob girth, cob weight, corn length, corn girth and corn weight influence significantly with different source of fertilizers. Yield of baby corn without husk in T_8 is significantly superior than other treatment (Figure 3). Its due to cob length, cob weight, cob breadth as well as corn length and corn weight are significantly superior than others (Figure 3&4). The research shows the maximum yield of baby corn is 1833kg/ha and minimum one is

1571kg/ha. Then T_7 , T_5 and T_6 are statistically at par on the basis of corn yield, cob length and cob weight. And these treatment are statistically superior to T_3 , T_4 , T_2 and T_1 . The present finding are in close agreement with the results obtained by [17]. They reported the application of 75% NPK from 2.25 t ha⁻¹ vermi-compost + bio fertilizers significantly increased net return, B:C ratio and uptake and available N, P, K status of soil after harvest of Baby corn. Thakur et al. [17] noticed increased number of baby corn cobs

plant-1 with higher doses of application of vermi-compost. These results corroborate the findings of [18]. FAI [19], recorded the significantly higher growth and yield attributes yield and fodder yield with the application of 75% of RDF from vermi-compost with

bio fertilizer. These are in close conformation with those of Patil & Bhilare [20]. Nazir khan Mohammadi and RM Pankhaniya, suggest the remarkable improvement in green cob yield by application of vermi-compost [21-26].



Where L1=cob length, B1=cob girth, W1=cob weight, L2=corn length, B2=corn girth, W2=corn weight

Figure 4: Yield parameters on three harvest of baby corn.

Conclusion

Our present study concluded that fertilizer source (75% vermi-compost (organic) with 25% chemical fertilizer) is most effective in achieving higher plant performance (growth parameters) and yield attributes (cob length, cob girth and cob weight) for the maize variety ARUN-2 planted in the loamy soil of Boudgaun, Sindhupal chowk.

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