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# Response of Baby Corn Genotypes to Organic Manures on Growth, Yield and Economics

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**ABSTRACT**

A field experiment was conducted at the Wetland Farm of S.V. Agricultural College, Tirupati during *rabi* 2008-09 to study the effect of different sources of organic manures on growth, yield and economics of baby corn genotypes. The highest values of growth parameters, yield components, yield and economics were recorded with the genotype G-5414 ($G_3$), while these were lowest with the genotype Golden baby ($G_1$). Among the manurial practices, the recommended dose of fertilizers ($T_1$) resulted in the higher values of growth parameters, yield components, yield and economics and the lowest values were recorded with application of vermicompost ($T_7$).

**Key words :** Baby corn, Economics, Growth, Yield.

Maize is one of the important cereal crops next to wheat and rice in the world and is used as food, feed and fodder as well as for large number of industrial uses. As baby corn is gaining popularity, attention is now being paid to explore its potential in India. Growing baby corn is a profitable venture. Baby corn is the immature, fresh, finger-like green ear harvested just at the time of silk emergence (1-3 cm) and before fertilization.

In modern commercial agriculture, usage of high analysis fertilizers in an unbalanced manner impose additional problems of soil health such as acidity, alkalinity, multiple nutrient deficiencies etc., especially the micro and secondary nutrients. So, we should concentrate on organics, as the chemical farming may impart deleterious traits, due to which it may not be acceptable in the international market. Cultivation of baby corn by using organic manures might be the most feasible way to get the best quality produce for competitive international markets. Hence, the present study on response of baby corn genotypes to organic manures was undertaken.

## MATERIAL AND METHODS

A field experiment was conducted during *rabi* 2008 - 09 at S. V. Agricultural college, Tirupati in a split plot design, replicated thrice and the treatments consisted of three genotypes *viz.,* golden baby ($G_1$), G-5406 ($G_2$) and G-5414 ($G_3$) allotted to main plots and seven manurial sources *viz.,* recommended dose of fertilizer ($T_1$), farm yard manure ($T_2$), sheep manure ($T_3$), poultry manure ($T_4$), green leaf manure ($T_5$), neem cake ($T_6$) and vermicompost ($T_7$) assigned to the sub plots. The soil was sandy loam in texture with pH 7.8, low in organic carbon (0.25%) and available nitrogen (179.0 kg $ha^{-1}$) and medium in available phosphorus (19.0 kg $ha^{-1}$) and potassium (170 kg $ha^{-1}$).

The recommended dose of fertilizers used was 150 kg N, 75 kg $P_2O_5$ and 40 kg $K_2O$ $ha^{-1}$. Fertilizer nitrogen was applied as per treatment through urea in two equal splits *viz.,* first half at the time of sowing and the remaining half as top dressing at 30 DAS. The nitrogen content in different sources of manures *viz.,* farm yard manure, sheep manure, poultry manure, green leaf manure, neem cake and vermicompost were analysed. The different manures were applied as per treatmental schedule on equal nitrogen basis. Manures were added to the soil and thoroughly incorporated 15 days prior to sowing of the crop. Entire quantity of phosphorus and potassium was applied as a basal dose through single super phosphate and muriate of potash respectively. Recommended agronomic practices and plant protection measures were followed. Pre and post harvest observations in respect of growth and yield parameters were recorded following standard procedures.

## RESULTS AND DISCUSSION

The results indicate that the growth parameters such as plant height, number of leaves, leaf area index and drymatter production, yield attributes, grain and fodder yields, net returns and B:C ratio were significantly influenced by genotypes and manures.

Table 1. Growth parameters of baby corn as influenced by genotypes and manurial practices at harvest stage of crop growth.

| Treatments | Plant height at tasselling stage (cm) | Number of leaves plant$^{-1}$ | Leaf area index | Drymatter production (kg ha$^{-1}$) |
|---|---|---|---|---|
| **Genotypes** | | | | |
| $G_1$: Golden baby | 139.4 | 9.05 | 2.57 | 5215 |
| $G_2$: G-5406 | 146.7 | 9.27 | 2.85 | 5594 |
| $G_3$: G-5414 | 152.5 | 9.80 | 3.02 | 5115 |
| SEm ± | 0.84 | 0.05 | 0.03 | 62 |
| CD(P=0.05) | 3.30 | 0.02 | 0.10 | 243 |
| **Manures** | | | | |
| $T_1$: Recommended dose of fertilizer | 181.6 | 11.40 | 3.81 | 6989 |
| $T_2$: Farm yard manure | 139.8 | 8.80 | 2.64 | 5376 |
| $T_3$: Sheep manure | 141.2 | 9.00 | 2.77 | 5477 |
| $T_4$:Poultry manure | 152.6 | 9.60 | 3.13 | 6006 |
| $T_5$:Green leaf manure | 147.5 | 9.50 | 2.96 | 5853 |
| $T_6$: Neem cake | 139.3 | 8.80 | 2.60 | 5318 |
| $T_7$: Vermicompost | 120.6 | 8.43 | 1.78 | 3950 |
| SEm ± | 2.13 | 0.063 | 0.06 | 110 |
| CD(P=0.05) | 6.13 | 0.19‘ | 0.18 | 317 |

Table 2. Yield attributes of baby corn as influenced by genotypes and manurial practices.

| Treatments | Number of cobs plant$^{-1}$ | Cob length (cm) | Cob girth (cm) | Cob weight (g) |
|---|---|---|---|---|
| **Genotypes** | | | | |
| $G_1$: Golden baby | 2.46 | 7.26 | 1.33 | 7.18 |
| $G_2$: G-5406 | 2.68 | 7.40 | 1.36 | 7.51 |
| $G_3$: G-5414 | 2.92 | 7.70 | 1.41 | 8.05 |
| SEm ± | 0.035 | 0.026 | 0.014 | 0.085 |
| CD(P=0.05) | 0.12 | 0.10 | 0.06 | 0.32 |
| **Manures** | | | | |
| $T_1$: Recommended dose of fertilizer | 3.25 | 8.08 | 1.52 | 8.54 |
| $T_2$: Farm yard manure | 2.60 | 7.28 | 1.32 | 7.37 |
| $T_3$: Sheep manure | 2.70 | 7.35 | 1.34 | 7.49 |
| $T_4$:Poultry manure | 3.02 | 7.76 | 1.44 | 7.90 |
| $T_5$:Green leaf manure | 2.91 | 7.66 | 1.40 | 7.23 |
| $T_6$: Neem cake | 2.51 | 7.19 | 1.32 | 7.78 |
| $T_7$: Vermicompost | 1.84 | 6.84 | 1.23 | 6.87 |
| SEm ± | 0.072 | 0.055 | 0.02 | 0.09 |
| CD(P=0.05) | 0.20 | 0.16 | 0.05 | 0.28 |

**Performance of Baby corn genotypes**

The highest plant stature at tasseling stage was recorded by the genotype G-5414 ($G_3$) followed by G-5406 (G-$_2$) while the lowest plant height was observed with Golden baby ($G_1$).

The highest number of leaves and largest leaf area index were recorded by genotype G-5414 which was superior to other genotypes. This was followed by G-5406 ($G_2$) while significantly lowest number of leaves and lowest leaf area index were recorded with Golden baby ($G_1$) (Table 1). This might be due to its genetic character has resulted in more number of leaves of larger size and higher leaf area index compared to other genotypes.

The G-5406 ($G_2$) produced maximum dry matter followed by Golden baby ($G_1$) while the genotype G-5414 ($G_3$) accounted for significantly least drymatter production (Table 1), which may be attributed to taller plants, more number of leaves with larger area, which consequently had greater photosynthetic efficiency under favourable environmental conditions. The lowest dry matter accumulation was observed in Golden baby ($G_1$) which was inferior to other genotypes in case of all the growth characters.

The maximum number of cobs plant$^{-1}$, longest cobs, and highest cob weight were produced with the genotype G-5414 ($G_3$) followed by G-5406 ($G_2$). The largest cob girth of was recorded in genotype G-5414 ($G_3$) and was on par with genotype G-5406 ($G_2$) (Table 2). This might be due to effective translocation of photosynthates from source to the cobs (sink) and also the genetic potential of that genotype. The lowest number of cobs plant$^{-1}$, shortest stature of cobs, smallest cob girth, and lowest cob weight were obtained with Golden baby ($G_1$).

Among the genotypes tested, G-5414 ($G_3$) produced significantly highest cob yield and fodder yield followed by G-5406 ($G_2$). The genotype Golden baby ($T_1$) accounted for significantly inferior cob yield and fodder yield (Table 3). The highest fodder yield was recorded with genotype G-5414 which was due to taller plants and more number of leaves coupled with higher drymatter production. Similar findings were observed by Thakur *et al.,* (1997), Thakur and Sharma (1999), Raja (2000), Arun Kumar (2006) and Tejeswara Rao (2006).

Higher values of net returns and benefit cost ratio were recorded with G-5414 (G3) compared to other genotypes as a result of the higher cob and fodder yield, while these values were lesser with Golden baby ($G_1$) ( Table 3 ).

**Effect of organic manures and fertilizers**

Among the manurial practices recommended dose of fertilizer ($T_1$) resulted in maximum plant height, more number of leaves, largest leaf area index and highest dry matter production which were significantly superior to all other treatments. This was followed by application of poultry manure ($T_{-4}$) and green leaf manure ($T_5$) which were significantly superior to rest of the treatments ($T_3$, $T_2$, $T_6$ and $T_7$) ( Table 1). Significantly shortest plants, less number of leaves, smallest leaf area index, lowest dry matter production were produced with vermicompost ($T_7$).

Under the recommended dose of fertilizer, the nitrogen applied in two splits would have been taken up by the crop matching with the physiological needs of the crop. This might have resulted in greater absorption of nitrogen compared to the other organic manures. Nitrogen being a constituent of protoplasm plays a positive role through increased cell division and multiplication, resulting in taller plants and higher leaf area index leading to increased dry matter production. Similar findings were reported by Muthuswamy *et al*., (1990) and Singh and Sharma (1994).

With respect to manurial practices, application of recommended dose of fertilizer ($T_1$) resulted in the highest number of cobs plant$^{-1}$, longest cobs, largest cob girth and highest cob weight. This was followed by application of poultry manure ($T_4$) and green leaf manure ($T_5$) which were significantly superior to rest of the treatments ($T_3$, $T_2$ and $T_6$). The lowest number of cobs plant$^{-1}$, shortest stature of cobs, smallest cob girth and lowest cob weight were recorded with application of vermicompost ($T_7$) (Table 2). This might be due to higher dry matter accumulation and effective partitioning of the assimilates to the sink as a result of availability of nitrogen matching the physiological needs of the crop. Similar findings were observed by Vadivel *et al*., (2000), Mehta *et al*., (2005), Arun Kumar (2006) and Tejeswara Rao (2006).

The lower level of yield attributes with organic manures might be due to reduced availability of nitrogen to the crop and hence the trend of yield formation followed the trend of growth.

Among the manurial practices, application of the recommended dose of fertilizer ($T_1$) resulted in the highest cob yield and fodder yield, which was significantly superior to all other treatments. This was followed by application of poultry manure ($T_4$) and green leaf manure ($T_5$) which were comparable to each other but significantly superior to rest of

Table 3.Yield and economics of baby corn as influenced by genotypes and manurial practices.

| Treatments | Husked yield (kg ha$^{-1}$) | Dehusked yield (kg ha$^{-1}$) | Fodder yield (kg ha$^{-1}$) | Net returns (Rs ha$^{-1}$) | B : C Ratio |
|---|---|---|---|---|---|
| **Genotypes** | | | | | |
| $G_1$: Golden baby | 6430 | 1736 | 9940 | 12278 | 1.83 |
| $G_2$: G-5406 | 7544 | 2037 | 11321 | 15879 | 1.95 |
| $G_3$: G-5414 | 8716 | 2418 | 13182 | 20309 | 2.17 |
| SEm ± | 275 | 72 | 309.45 | 969 | 6.06 |
| CD(P=0.05) | 1080 | 283 | 1241 | 3803 | 0.24 |
| **Manures** | | | | | |
| $T_1$: Recommended dose of fertilizer | 10464 | 2825 | 16870 | 30376 | 2.96 |
| $T_2$: Farm yard manure | 6605 | 1783 | 9814 | 9496 | 9.48 |
| $T_3$: Sheep manure | 7135 | 1926 | 10638 | 15716 | 2.0 |
| $T_4$:Poultry manure | 8491 | 2443 | 13197 | 23666 | 2.51 |
| $T_5$:Green leaf manure | 8435 | 2278 | 9631 | 20512 | 2.27 |
| $T_6$: Neem cake | 6432 | 1737 | 12196 | 9762 | 1.52 |
| $T_7$: Vermicompost | 5382 | 1453 | 8021 | 3552 | 1.17 |
| SEm ± | 303 | 84 | 367.8 | 1315 | 0.07 |
| CD(P=0.05) | 870 | 241 | 1051 | 3773 | 0.2 |

the treatments ($T_3$, $T_2$ and $T_6$). The lowest cob yield and fodder yield were recorded with vermicompost ($T_7$) which was inferior to all other manurial practices (Table 3).

The highest net returns and benefit cost ratio from baby corn were realized with the recommended dose of fertilizer ($T_1$). This was followed by poultry manure ($T_4$) and green leaf manure ($T_5$) both of which were superior to rest of the treatments. The treatments *viz.,* sheep manure ($T_3$), farm yard manure ($T_2$) and neem cake ($T_6$) were the next best (Table 3). Higher cob yield and fodder yield were recorded with recommended dose of fertilizer ($T_1$). This obviously gave higher economic returns. On the other hand, the lowest gross returns, net returns and benefit cost ratio were recorded with the application of vermicompost ($T_7$), due to the lower cob and fodder yields.

From these regults it can be concluded that the performance of the genotype G-5414 under recommended dose of fertilizer was found to be superior over the rest of the treatment combinations. Since the present study pertains to response of baby corn genotypes to organic manures, the next best alternative is to grow the G-5414 genotype with the application of poultry manure ($T_4$) or green leaf manure($T_5$) for obtaining a better yield and higher economic returns of baby corn.

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