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## Effect of different sources of organic fertilizers on vegetative growth of Banana (*Musa paradisiaca* L.) under precision farming

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### Abstract

The present investigation was carried out at Research Farm of Precision Farming Development Centre (PFDC), Department of Fruit Science, College of Agriculture, IGKV, Raipur, Chhattisgarh during the year 2020-21 and 2021-22, respectively. An experiment was laid out in Randomized Block Design (RBD) and comprising eleven treatments combination with three replications. The results revealed that the treatment T<sub>8</sub>-80% RDF + Cow urine @ 4 Liter/plant in two split doses significantly maximum growth parameters pseudostem height (263.64 cm), pseudostem circumference (76.69 cm), number of green leaves per plant (12.74), peduncle length of male bud (46.68 cm), peduncle width of male bud (20.27 cm), male bud size (33.54 cm length and 32.74cm girth) and decreasing days taken from planting to shooting (241.38), days taken from inflorescence emergence to harvesting (97.03) and plant crop cycle (338.41). Followed by T<sub>7</sub> – 100% RDF + Cow urine @ 2 Liter/plant in two split doses and T<sub>6</sub> – 80% RDF + Vermiwash @ 4 Liter/plant in two split doses during both the years 2020-21 and 2021-22, respectively.

**Keywords:** Cow urine, cow dung slurry, FYM, vermicompost and vermiwash

### Introduction

Banana (*Musa paradisiaca* L.) is a large herbaceous perennial monocotyledonous and monocarpic plant. Banana belongs to family Musaceae in the order of scitamineae. Banana is known as “Apple of Paradise and Tree of Wisdom”. Its origin is the tropical region of South-East Asia. Banana crop has nutritional, medicinal and industrial values. Banana has been associated with man as food and is used for religious work. In addition, banana is one of the most important fruit crops of the world. Indeed many consider banana one of man’s first food. The area under banana in India is 883.8 thousand ha and production is 30807.5 thousand metric tonnes with a productivity of 34.9 metric tonnes/ha (Annonymous, 2019) [1]. Tamil Nadu is the leading state of banana production (3205.04 thousand metric tonnes), as well as area (82.63 thousand ha). Whereas, in Chhattisgarh, the area of banana is 26.57 thousand ha. With a production of 745.783 thousand metric tonnes with a productivity of 28.06 metric tonnes/ha. (Annonymous, 2018). The use of organic manures like farmyard manure (Kanamadi *et al.*, 2004) [7], vermicompost (Sabarad *et al.*, 2004) [13], vermiwash, cow urine and cow dung slurry resulted in encouraging yield, particularly in new/reclaimed soil through overcoming drought, salt and some pathogens stress as well as decreasing the applied fertilizers and increasing the availability of most macro and micro elements. Organic fertilizer is another option for supplying nutrient elements to banana production. The organic materials improve soil structure and reduce soil temperature, resulting in better root growth and more efficient use of water and nutrient (Casale *et al.*, 1995) [4] in banana.

### Materials and Methods

The present investigation was carried out during the year 2020-21 & 2021-22 at Research Farm of Precision Farming Development Centre (PFDC), Department of Fruit Science, College of Agriculture, IGKV, Raipur, chhattisgarh. An experiment was laid out in Randomized Block Design (RBD) and comprising eleven treatments with three replications. Treatments combinations involving different sources of organic fertilizers *viz.* T<sub>0</sub> (Control (100% RDF @ 160:300:160 g NPK/plant/year), T<sub>1</sub> (100% RDF + FYM 5 kg/plant in two split doses), T<sub>2</sub> (80% RDF + FYM 10 kg/plant in two split doses), T<sub>3</sub> (100% RDF + Vermicompost 2 kg/plant in two split doses), T<sub>4</sub> (80% RDF + Vermicompost 4 kg/plant in two split doses),

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T<sub>5</sub>- (100% RDF + Vermiwash @ 2 Liter/plant in two split doses), T<sub>6</sub> (80% RDF + Vermiwash @ 4 Liter/plant in two split doses), T<sub>7</sub> (100% RDF + Cow urine @ 2 Liter/plant in two split doses), T<sub>8</sub> (80% RDF + Cow urine @ 4 Liter/plant in two split doses), T<sub>9</sub> (100% RDF + Cow dung slurry (CDS) @ 2 Liter/plant in two split doses) and T<sub>10</sub> (80% RDF + Cow dung slurry (CDS) @ 4 Liter/plant in two split doses). Healthy and disease free tissue cultured plants of banana cv. Grand Naine was obtained for planting, adopting a size of pits 45 x 45 x 45 cm were dug at a distance of 1.8 x 1.8 m (Row to Row and Plant to Plant). The source of N, P, K were Urea, DAP and MOP respectively. The data recorded on growth parameters were analyzed statistically (Panse and Sukhatme, 1967) [11].

## Results and Discussion

The Effect of different sources of organic fertilizers on vegetative growth of banana reveals that the maximum pseudostem height (263.64 cm) was registered under the treatment T<sub>8</sub> (80% RDF + Cow urine @ 4 Liter/plant in two split doses) followed by (T<sub>7</sub>), (T<sub>6</sub>) and (T<sub>5</sub>) respectively, likewise poor performance was observed in T<sub>0</sub>-Control (100% RDF @ 160:300:160 g NPK/plant/year). The maximum pseudostem circumference (76.69 cm) was registered under the treatment (T<sub>8</sub>) followed by (T<sub>7</sub>), (T<sub>6</sub>) and (T<sub>5</sub>) respectively, while the minimum pseudostem circumference (56.27) was observed under the treatment (T<sub>0</sub>-Control) during both the year and pooled analysis. The other growth parameters of banana cv. Grande Naine in terms of maximum Number of green leaves plant<sup>-1</sup> (12.74), Maximum peduncle length of male bud (46.68) and effect of different sources of organic fertilizers shows significant on increase in peduncle width of male bud. Maximum peduncle width of male bud (20.27) was recorded under the treatment (T<sub>8</sub>) while, the minimum peduncle width of male bud was recorded under the treatment (T<sub>0</sub>-Control) during both the years and pooled study. The

maximum male bud size (33.54 cm length and 32.74 cm girth) was recorded under the treatment (T<sub>8</sub>) followed by (T<sub>7</sub>), (T<sub>6</sub>) and (T<sub>5</sub>) while, the minimum male bud size was noted under the treatment (T<sub>0</sub>-Control) during both the years and pooled mean data respectively. Minimum days taken from Planting to shooting was recorded under the treatment (T<sub>8</sub>) pooled mean data (241.38) followed by (T<sub>7</sub>), (T<sub>6</sub>) and (T<sub>5</sub>) while, the maximum days taken from Planting to shooting (310.47) was noted under the treatment (T<sub>0</sub>-Control). The minimum days taken from inflorescence emergence to harvesting pooled mean data (97.03) was recorded under the treatment (T<sub>8</sub>) followed by (T<sub>7</sub>) and (T<sub>6</sub>) while the maximum days taken from inflorescence emergence to harvesting pooled mean data (107.89) was observed under the treatment (T<sub>0</sub>) and minimum plant crop cycle (338.41) followed by (T<sub>7</sub>), (T<sub>6</sub>) and (T<sub>5</sub>) while, the maximum plant crop cycle (418.36) was noted under the treatment (T<sub>0</sub>) during both the years and pooled study. Poor performance was observed in T<sub>0</sub>-control). The organic fertilizer may have also been enhanced the soil fertility and the nutrient absorption may have increased plant height. These results are consistent with those of Mustaffa *et al.* (2002) [9], Naresh and Sharma (2005) [10], Hazarika *et al.* (2011) [6] and Baiea and EL-Gioushy (2015) [3]. Increase in the number of green leaves plant<sup>-1</sup> leads to increased total photosynthetic efficiency of the plant. The results are in agreement with findings of Parida *et al.* (1994) [12] in banana. The higher number of total leaves emerged having maximum number of green leaves might be due to combined effect of organic, inorganic combinations which might have resulted in the soil physical condition improvement and increased the plant growth by the increased availability of nutrients especially nitrogen as it had prominent role in leaf emissio, Mustaffa *et al.* (2002) [9], Hazarika *et al.* (2011) [6] and Kuttamani *et al.* (2013) [8], Baiea and EL-Gioushy (2015) [3] and Eissa (2019) [5].

**Table 1:** Effect of different sources of organic fertilizers on vegetative growth of banana (*Musa paradisiaca* L.) cv. Grande Naine

| Treatment       | Pseudostem height (cm) | Pseudostem circumference (cm) | Number of green leaves plant <sup>-1</sup> | Peduncle length of male bud (cm) | Peduncle width of male bud (cm) | Male bud length (cm) | Male bud girth (cm) | Days taken from planting to shooting | Days taken from Inflorescence emergence to harvesting | Days taken from Inflorescence emergence to harvesting |
|-----------------|------------------------|-------------------------------|--|----------------------------------|---------------------------------|----------------------|---------------------|--------------------------------------|---|---|
| (Pooled mean)   |                        |                               |  |                                  |                                 |                      |                     |                                      |   |   |
| T <sub>0</sub>  | 198.85                 | 56.27                         | 10.07                                      | 30.61                            | 10.26                           | 25.70                | 24.67               | 310.47                               | 107.89  | 418.36  |
| T <sub>1</sub>  | 219.63                 | 60.11                         | 10.37                                      | 33.79                            | 11.94                           | 28.16                | 25.41               | 290.83                               | 106.92  | 397.75  |
| T <sub>2</sub>  | 226.19                 | 61.19                         | 10.67                                      | 36.67                            | 12.49                           | 28.97                | 27.47               | 289.83                               | 106.11  | 395.94  |
| T <sub>3</sub>  | 241.02                 | 62.81                         | 11.65                                      | 36.72                            | 13.56                           | 29.24                | 28.11               | 285.72                               | 104.46  | 390.18  |
| T <sub>4</sub>  | 249.59                 | 64.24                         | 11.70                                      | 38.16                            | 14.38                           | 30.09                | 29.60               | 275.67                               | 104.95  | 380.62  |
| T <sub>5</sub>  | 252.01                 | 66.31                         | 11.91                                      | 40.56                            | 15.79                           | 30.49                | 29.78               | 273.26                               | 103.99  | 377.24  |
| T <sub>6</sub>  | 256.43                 | 68.68                         | 12.17                                      | 42.95                            | 16.59                           | 31.79                | 31.14               | 262.79                               | 101.75  | 364.53  |
| T <sub>7</sub>  | 260.65                 | 73.80                         | 12.34                                      | 44.85                            | 17.41                           | 32.75                | 32.35               | 255.62                               | 98.50   | 354.12  |
| T <sub>8</sub>  | 263.64                 | 76.69                         | 12.74                                      | 46.68                            | 20.27                           | 33.54                | 32.74               | 241.38                               | 97.03   | 338.41  |
| T <sub>9</sub>  | 230.89                 | 61.09                         | 11.10                                      | 37.72                            | 12.45                           | 29.94                | 29.02               | 287.38                               | 105.42  | 392.79  |
| T <sub>10</sub> | 233.55                 | 61.92                         | 11.36                                      | 38.94                            | 13.56                           | 29.57                | 28.84               | 284.32                               | 103.19  | 387.51  |
| S.E m ±         | 3.946                  | 1.094                         | 0.175                                      | 0.374                            | 0.222                           | 0.069                | 0.038               | 4.54                                 | 1.387   | 6.024   |
| CD at 5%        | 11.723                 | 3.251                         | 0.52                                       | 1.11                             | 0.66                            | 0.205                | 0.113               | 13.486                               | 4.119   | 17.896  |

## Conclusion

The present investigation entitled “Effect of different sources of organic fertilizers on vegetative growth of Banana (*Musa paradisiaca* L.) Under precision farming” was carried out at Research Farm of Precision Farming Development Centre (PFDC), Department of Fruit Science, College of Agriculture, IGKV, Raipur (Chhattisgarh) during the year 2020-21 and

2021-22. It was concluded that the highest vegetative growth like the maximum pseudostem height, pseudostem circumference, number of green leaves per plant, peduncle length of male bud, peduncle width of male bud, male bud size and decreasing days taken from planting to shooting, days taken from inflorescence emergence to harvesting and plant crop cycle were recorded with T<sub>8</sub>. Hence T<sub>8</sub> is the better

treatment for growth parameters than other all treatment combinations.

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