

## Effect of organic manures on floral attributes of tuberose (*Polianthes tuberosa* L) cv Phule Rajani

SUCHISMITA PATTNAIK, GANDAMALLA MADHURI and SIDDHARTH KUMAR PALAI\*

Department of Floriculture and Landscaping

\*All India Coordinated Research Project on Floriculture

Orissa University of Agriculture and Technology, Bhubaneswar 751003 Odisha, India

Email for correspondence: madhuri.gandamalla@gmail.com

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### ABSTRACT

A study was conducted to determine the effect of organic manures on floral attributes of tuberose (*Polianthes tuberosa* L cv Phule Rajani). The experiment was laid out in randomized block design with ten treatments and three replications. Bulbs of tuberose cv Phule Rajani were planted at a spacing of 30 x 30 cm in plots of size 1.5 x 1.5 m accommodating twenty five bulbs per plot. The different treatments were T<sub>1</sub> (Control), T<sub>2</sub> (Vermicompost 2 kg/m<sup>2</sup>), T<sub>3</sub> (Mustard oil cake 500 g/m<sup>2</sup>), T<sub>4</sub> (Karanja oil cake 500 g/m<sup>2</sup>), T<sub>5</sub> (Neem oil cake 500 g/m<sup>2</sup>), T<sub>6</sub> (Groundnut oil cake 500 g/m<sup>2</sup>), T<sub>7</sub> (Vermicompost 1 kg/m<sup>2</sup> + mustard oil cake 250 g/m<sup>2</sup>), T<sub>8</sub> (Vermicompost 1 kg/m<sup>2</sup> + Karanja oil cake 250 g/m<sup>2</sup>), T<sub>9</sub> (Vermicompost 1 kg/m<sup>2</sup> + neem oil cake 250 g/m<sup>2</sup>) and T<sub>10</sub> (Vermicompost 1 kg/m<sup>2</sup> + groundnut oil cake 250 g/m<sup>2</sup>). The results revealed that organic manures showed significant differences for floral attributes of the plant. Among all the organic manures and their combinations treatment T<sub>3</sub> (Mustard oil cake 500 g/m<sup>2</sup>) recorded significantly minimum days for the early opening of first flower from planting (149.88 days), spike length (97.36 cm), rachis length (26.52 cm) and diameter of spike (0.52 cm) compared to other treatments. Maximum number of spikes per plant (5.77), number of florets per spike (50.88), floret length (5.81 cm), floret diameter (3.70 cm), bloom life (22.22 days), vase life (15.77 days) and water uptake by cut spike in vase (51.3 ml) were recorded in treatment T<sub>8</sub> (Vermicompost 1 kg/m<sup>2</sup> + Karanja oil cake 250 g/m<sup>2</sup>) compared to other treatments. For getting better quality of spike under organic farming treatments T<sub>3</sub> (Mustard oil cake 500 g/m<sup>2</sup>) and T<sub>8</sub> (Vermicompost 1 kg/m<sup>2</sup> + Karanja oil cake 250 g/m<sup>2</sup>) are recommended in tuberose cv Phule Rajani.

**Keywords:** Organic manures; oil cakes; application; flowering; tuberose

### INTRODUCTION

Tuberose (*Polianthes tuberosa*) occupies a very special position among flowers because of its attractive, elegant and fragrant white flowers. The flowers remain fresh for pretty long period, stand long distance transport and fill a useful place in the flower market (Patil et al 1999). Besides its demand as cut flower tuberose also has great economic potential in essential oil industry (Alan et al 2007). The long spikes of tuberose are used for vase decoration, bouquet preparation and the florets for making artistic garlands, ornaments and button holes. The tuberose flowers emit a delightful fragrance and are the source of essential oil. The natural flower oil of tuberose is one of the most expensive raw materials of perfume industry.

The important objectives of commercial flower production include increased flower production and quality of flowers. The quality of cut flowers is greatly influenced by climatic, geographical and nutritional factors. Tuberose requires more nutrients for proper growth and development. To achieve the escalating target of good quality tuberose production, proper fertilization is of prime need. On the other hand continuous use of inorganic fertilizers in crop field not only deteriorates the soil health but also reduces the soil microbial activities, soil organic content and may cause environmental imbalance (Alan et al 2007). In contrast the use of green manures and other organic matter can improve soil structure, improve nutrient exchange and maintain soil health and that is why interests have been raising in organic farming (Mitra

2010). In the present investigations have been undertaken to know the effects of organic manures on floral attributes in tuberose cv Phule Rajani.

## MATERIAL and METHODS

The experiment was carried out at Biotechnology cum Tissue Culture Centre, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha during 2015 to 2016. The experiment was laid out in randomized block design with ten treatments and three replications. Tuberose cv Phule Rajani bears greenish white colour buds which is its special attribute. It flowers approximately in 88 days and yields 8 spikes per bulb. A standard spike measures 85 cm long and bears 48 flowers per spike. The flowers are 7.5 cm long which are longer as compared to local single cultivars. The flower spikes exhibit 7 days vase life under ambient conditions. Bulbs of tuberose cv Phule Rajani were planted at a spacing of 30 x 30 cm in plots of size 1.5 x 1.5 m. Twenty five bulbs were planted per plot. The different treatments were  $T_1$  (Control),  $T_2$  (Vermicompost 2 kg/m<sup>2</sup>),  $T_3$  (Mustard oil cake 500 g/m<sup>2</sup>),  $T_4$  (Karanja oil cake 500 g/m<sup>2</sup>),  $T_5$  (Neem oil cake 500 g/m<sup>2</sup>),  $T_6$  (Groundnut oil cake 500 g/m<sup>2</sup>),  $T_7$  (Vermicompost 1 kg/m<sup>2</sup> + mustard oil cake 250 g/m<sup>2</sup>),  $T_8$  (Vermicompost 1 kg/m<sup>2</sup> + Karanja oil cake 250 g/m<sup>2</sup>),  $T_9$  (Vermicompost 1 kg/m<sup>2</sup> + neem oil cake 250 g/m<sup>2</sup>) and  $T_{10}$  (Vermicompost 1 kg/m<sup>2</sup> + groundnut oil cake 250 g/m<sup>2</sup>). Manures were applied and mixed in the soil thoroughly. The quantity and type of manure applied were as per the treatments of respective plots. Cultural practices were kept uniform for all the treatments and standard practices of cultivation were adopted. Observations on floral attributes viz days taken for the early opening of first flower from planting (days), spike length (cm), rachis length (cm), diameter of spike (cm) number of spikes per plant, number of florets per spike, floret length (cm), floret diameter (cm), bloom life (days), vase life (days) and water uptake by cut spike in vase (ml) were recorded from five randomly selected plants of each replication using standard procedure.

## RESULTS and DISCUSSION

Among the ten treatments  $T_3$  (Mustard oil cake 500 g/m<sup>2</sup>) showed significantly minimum number of days (149.88) for the early opening of first flower from planting followed by  $T_{10}$  (Vermicompost 1 kg/m<sup>2</sup> + groundnut oil cake 250 g/m<sup>2</sup>) (150.33 days) and were statistically at par with each other. Highest spike length

was recorded in  $T_3$  (97.36 cm) followed by  $T_6$  (Groundnut oil cake 500 g/m<sup>2</sup>) (95.16 cm) both being at par. Highest rachis length was recorded in  $T_3$  (26.52 cm) followed by treatment  $T_8$  (Vermicompost 1 kg/m<sup>2</sup> + Karanja oil cake 250 g/m<sup>2</sup>) (25.74 cm) both being at par. Highest spike diameter was also recorded in  $T_3$  (0.52 cm) followed by treatment  $T_{10}$  (0.49 cm) the two being at par (Table 1).

Highest number of spikes per plant (5.77) was recorded in treatment  $T_8$  followed by  $T_4$  (Karanja oil cake 500 g/m<sup>2</sup>) (5.55) and the treatments were statistically at par. Significantly highest number of florets per spike (50.88) was recorded in treatment  $T_8$  followed by  $T_4$  (Table 1). Improvement in number of florets per spike was also obtained by application of vermicompost with other organic manures by Padaganur et al (2005), Kabir et al (2011) and Munikrishnappa et al (2011) in tuberose.

Highest floret length (5.81 cm) was recorded in treatment  $T_8$  followed by  $T_4$  (5.78 cm) both being statistically at par (Table 1). Similar improvement in floret length obtained by application of vermicompost with other organic manures or fertilizers was reported by Padaganur et al (2005), Kabir et al (2011) and Shirsat et al (2015) in tuberose. Highest floret diameter (3.70 cm) was recorded in treatment  $T_8$  followed by  $T_4$  (3.55 cm) the two treatments being statistically at par (Table 1).

Maximum bloom life (22.22 days) was recorded in treatment  $T_8$  followed by treatment  $T_3$  (21.66 days) and the treatments were statistically at par (Table 2). Bloom life was more in the field which might be due to more number of florets per spike when vermicompost was applied (Padaganur et al 2005) in tuberose. Maximum vase life (15.77 days) was recorded in treatment  $T_8$  followed by treatment  $T_7$  (Vermicompost 1 kg/m<sup>2</sup> + mustard oil cake 250 g/m<sup>2</sup>) (13.55 days) and the treatments were statistically at par. Significantly maximum water uptake by cut spike in vase was recorded in treatment  $T_8$  (51.3 ml) followed by  $T_7$  (46.80 ml). This might be due to more uptake of water by the cut spikes of treatments with vermicompost (1 kg/m<sup>2</sup>) + Karanja oil cake (250 g/m<sup>2</sup>) while they were in vase because of low microbial clogging. Chopde et al (2007), Srivastava et al (2007) and Shirsat et al (2015) in tuberose and Nethra et al (1999) and Chaitra and Patil (2007) in China aster also reported the increase in vase life and water uptake by application of vermicompost.

Table 1. Effect of organic manures on floral attributes of tuberose (*Polianthes tuberosa* L) cv Phule Rajani

| Treatment          | Days taken from planting to first flower opening | Spike length (cm) | Rachis length (cm) | Spike diameter (cm) | Number of spikes/plant | Number of florets/spike | Floret length (cm) | Floret diameter (cm) |
|--------------------|--|-------------------|--------------------|---------------------|------------------------|-------------------------|--------------------|----------------------|
| T1                 | 177.33   | 87.62             | 22.22              | 0.32                | 4.00                   | 36.22                   | 5.20               | 2.82                 |
| T2                 | 151.33   | 92.36             | 22.62              | 0.43                | 4.22                   | 39.33                   | 5.77               | 2.94                 |
| T3                 | 149.88   | 97.36             | 26.52              | 0.52                | 4.66                   | 46.22                   | 5.33               | 3.45                 |
| T4                 | 188.33   | 92.55             | 23.56              | 0.43                | 5.55                   | 47.77                   | 5.78               | 3.55                 |
| T5                 | 209.77   | 90.82             | 21.03              | 0.48                | 4.44                   | 43.00                   | 5.27               | 3.18                 |
| T6                 | 189.77   | 95.16             | 21.22              | 0.47                | 4.00                   | 38.88                   | 4.85               | 2.90                 |
| T7                 | 203.88   | 91.48             | 22.58              | 0.44                | 4.77                   | 41.77                   | 5.71               | 3.13                 |
| T8                 | 218.55   | 94.11             | 25.74              | 0.44                | 5.77                   | 50.88                   | 5.81               | 3.70                 |
| T9                 | 212.88   | 91.96             | 20.05              | 0.42                | 4.00                   | 42.66                   | 5.52               | 3.08                 |
| T10                | 150.33   | 92.75             | 23.25              | 0.49                | 5.11                   | 43.22                   | 5.53               | 3.26                 |
| CD <sub>0.05</sub> | 2.859  | 3.427             | 2.746              | 0.078               | 0.995                  | 2.347                   | 0.228              | 0.245                |
| SEm $\pm$          | 1.361  | 1.631             | 1.307              | 0.037               | 0.473                  | 1.117                   | 0.108              | 0.116                |

T<sub>1</sub> (Control), T<sub>2</sub> (Vermicompost 2 kg/m<sup>2</sup>), T<sub>3</sub> (Mustard oil cake 500 g/m<sup>2</sup>), T<sub>4</sub> (Karanja oil cake 500 g/m<sup>2</sup>), T<sub>5</sub> (Neem oil cake 500 g/m<sup>2</sup>), T<sub>6</sub> (Groundnut oil cake 500 g/m<sup>2</sup>), T<sub>7</sub> (Vermicompost 1 kg/m<sup>2</sup> + mustard oil cake 250 g/m<sup>2</sup>), T<sub>8</sub> (Vermicompost 1 kg/m<sup>2</sup> + Karanja oil cake 250 g/m<sup>2</sup>), T<sub>9</sub> (Vermicompost 1 kg/m<sup>2</sup> + neem oil cake 250 g/m<sup>2</sup>), T<sub>10</sub> (Vermicompost 1 kg/m<sup>2</sup> + groundnut oil cake 250 g/m<sup>2</sup>)

Table 2. Effect of organic manures on keeping quality of tuberose (*Polianthes tuberosa* L) cv Phule Rajani

| Treatment          | Bloom life (days) | Vase life (days) | Water uptake in vase (ml) |
|--------------------|-------------------|------------------|---------------------------|
| T1                 | 17.66             | 9.55             | 36.2                      |
| T2                 | 20.00             | 13.44            | 46.1                      |
| T3                 | 21.66             | 10.77            | 39.3                      |
| T4                 | 20.33             | 12.55            | 41.2                      |
| T5                 | 21.55             | 12.88            | 42.5                      |
| T6                 | 19.22             | 9.77             | 37.6                      |
| T7                 | 20.88             | 13.55            | 46.8                      |
| T8                 | 22.22             | 15.77            | 51.3                      |
| T9                 | 17.11             | 10.77            | 39.4                      |
| T10                | 20.55             | 11.88            | 40.5                      |
| CD <sub>0.05</sub> | 1.660             | 2.268            | 1.721                     |
| SEm $\pm$          | 0.790             | 1.08             | 0.819                     |

T<sub>1</sub> (Control), T<sub>2</sub> (Vermicompost 2 kg/m<sup>2</sup>), T<sub>3</sub> (Mustard oil cake 500 g/m<sup>2</sup>), T<sub>4</sub> (Karanja oil cake 500 g/m<sup>2</sup>), T<sub>5</sub> (Neem oil cake 500 g/m<sup>2</sup>), T<sub>6</sub> (Groundnut oil cake 500 g/m<sup>2</sup>), T<sub>7</sub> (Vermicompost 1 kg/m<sup>2</sup> + mustard oil cake 250 g/m<sup>2</sup>), T<sub>8</sub> (Vermicompost 1 kg/m<sup>2</sup> + Karanja oil cake 250 g/m<sup>2</sup>), T<sub>9</sub> (Vermicompost 1 kg/m<sup>2</sup> + neem oil cake 250 g/m<sup>2</sup>), T<sub>10</sub> (Vermicompost 1 kg/m<sup>2</sup> + groundnut oil cake 250 g/m<sup>2</sup>)

Vermicompost which is a nutritive fertilizer increases the level of macro and micronutrients in soil and improves the level of growth promoting substances. As a result its application stimulates the vegetative and reproductive growth of the plant. The improvement in flowering parameters might be attributed to the greater leaf area and more number of leaves per plant as well as plant spread that would have resulted in production and accumulation of maximum photosynthates leading to production of more number of flowers with

bigger size. The results are in accordance with the earlier findings of Asrey et al (2002) in gladiolus, Bhalla et al (2007) in carnation, Waheeduzzama et al (2007) in anthurium and Shankar et al (2010) in tuberose.

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