Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 7 [SPL1] 2018 : 04-10

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.876
Universal Impact Factor 0.9804
NAAS Rating 4.95

ORIGINAL ARTICLE **OPEN ACCESS**

Effect of Integrated Nutrient Management on Growth of Dahlia (*Dahlia variabilis* L.) cv. Kenya orange.

Sankara Hari Prasad.D, V.M. Prasad, G. Sunil Kumar, B.Subash Chandra Bose
Department of Horticulture, Allahabad School of Agriculture
Sam Higginbottom Institute of Agriculture Technology and Sciences
Allahabad (U.P) India-211007
Email: dshprasad12@gmail.com

ABSTRACT

A field experiment entitled "Effect of Integrated Nutrient Management on Growth of Dahlia (Dahlia variabilis L.) cv. Kenya orange" was carried out on Experimental field, Department of Horticulture, Sam Higginbottom Institute of Agricultural Technology and Sciences during Rabi season of 2015-2016. The experiment was laid out in randomized block design (RBD) with three replications. Thirteen treatments having one variety were tried in the experimental design. Different treatment combinations were made with different percentages of Recommended Dose Fertilizer (RDF) for Dahlia 100:120:100 kg of Nitrogen (N), Phosphorus (P) and Potassium (K) per hectare, along with organic fertilizers like FYM, Vermicompost, Poultry manure and Bio fertilizers like Azotobacter. Observation to be recorded Maximum plant height (109.54 cm), plant spread (53.27 cm), number of branches (10.87) and number of leaves (38.53) was produced by T_4 (75% RDF+ Vermicompost @1.25 t/ha) whereas minimum was recorded in treatment T_0 (control). At all the growth stages, treatment comprising of T_4 (75% RDF+ Vermicompost @1.25 t/ha) was superior for all other treatments.

Keywords – *Dahlia, INM, Kenya orange, RDF*, Growth parameters.

Received 12.05.2018 Revised 29.05.2018 Accepted 02.06.2018

INTRODUCTION

Dahlia (*Dahlia variabilis*) is one of the most popular bulbous flowers grown in many parts of the world for its beautiful ornamental blooms of varying shades of colours for the beautification of gardens and cut flowers. It is a tuberous rooted, half-hardy herbaceous perennial belonging to the family Asteraceae or Compositae. Dahlias are easy to grow both in field and in pot and are extensively used for exhibition, garden display and home decoration. For exhibition and garden display all types of dahlias are used. Dwarf growing types are suitable for beds and borders (pure / mixed borders). Large flowering dahlias in pots are popular for terrace garden or verandas display. The long stemmed flowers of various forms and colours are used in flower arrangement. Cut flowers of pompon and miniature types stay fresh in flower vases for many days and also better to make moderately good garlands. Dahlia is used with advantage for making bouquets and wreaths or vase decorations. There are certain medicinal and nutritional uses of dahlia. Tubers of this plant contain significant amount of insulin and fructose and small quantities of medicinally active compounds such as phytin and benzoic acid [4].

Integrated nutrient management refers to the maintenance of soil fertility and plant nutrient supply at an optimum level for sustaining the desired productivity through optimization of the benefits from all possible sources of organic, inorganic and biological components in an integrated manner. Concept of Integrated Nutrient Management is Regulated nutrient supply for optimum crop growth and higher productivity. Improvement and maintenance of soil fertility. Zero adverse impact on agro- ecosystem quality by balanced fertilization of organic manures, inorganic fertilizers and bio-inoculants. Advantages of Integrated Nutrient Management are enhances the availability of applied As well as native soil nutrients, synchronized the nutrient demand of the crop with nutrient Supply from native and applied sources provides balanced nutrition to crops and minimizes the antagonistic effects resulting from hidden deficiencies and nutrient imbalance. Improves and sustains the physical, chemical and biological

functioning of soil. Minimizes the Deterioration of soil, water and ecosystem by promoting carbon sequestration, reducing Nutrient losses to ground and surface water bodies and to atmosphere [5, 8].

MATERIALS AND METHODS

A field experiment entitled "Effect of Integrated Nutrient Management on Growth of Dahlia (*Dahlia variabilis* L.) cv. Kenya orange'' was carried out on Experimental field, Department of Horticulture, Sam Higginbottom Institute of Agricultural Technology and Sciences(SHIATS) during Rabi season of 2015-2016. Geographically, Allahabad is located at of $20^0 15'$ North latitude, 60^0 3' East longitude. The experiment was laid out in randomized block design (RBD) with three replications. The treatments in each replication were allotted randomly. Thirteen treatments having one variety were tried in the experimental design. Different treatment combinations were made with different percentages of Recommended Dose Fertilizer (RDF) for Dahlia 100:120:100 kg of Nitrogen (N), Phosphorus (P) and Potassium (K) per hectare, along with organic fertilizers like FYM, Vermicompost, Poultry manure and Bio fertilizers like *Azotobacter* (Sabah 2014). Treatments are 13 viz, T_0- control, T_1- 75% RDF + Azotobacter @2.5 kg/ha, T_2-75%RDF + Poultry manure@0.83 t/ha, T_3- 75% RDF+FYM@5 t/ha, T_4-75% RDF + Vermicompost @ 1.25 t/ha, T_5- 50% RDF+ Azotobacter @5kg/ha, T_6-50% RDF+ Poultry manure@1.66 t/ha, T_7- 50% RDF + FYM @ 10 t/ha, T_8- 50% RDF + Vermicompost @ 2.5t/ha, T_9- 25% RDF + Azotobacter @ 7.5 kg/ha, T_{10}-25% RDF+ Poultry manure@2.5t/ha, T_{11}- 25% RDF + FYM @ 15 t/ha,T_{12}- 25%RDF+ Vermicompost@3.75 t/ha. The observations were recorded regarding the growth parameters like height of the plant, spread of plant, number of leaves and number of branches.

RESULTS AND DISCUSSION

Growth parameters to be recorded

Plant height (cm)

Plant height was recorded at 30, 60, 90 and 120 DAT. Table 1 shows the height of plant at successive stages of growth under different treatments.

At 30 DAT, maximum plant height (29.31 cm) was recorded with treatment T_4 (75%RDF+ Vermicompost @ 1.25 t/ha) closely followed by T_8 (50%RDF+ Vermicompost @ 2.5 t/ha, 27.13 cm) and minimum plant height (17.02 cm) was recorded with treatment T_0 (Control). At 60 DAT, maximum plant height (60.34 cm) was recorded with treatment T_4 followed by T_8 (53.51 cm) and minimum plant height (40.83 cm) was recorded with treatment T_0 (Control). At 90 DAT, maximum plant height (103.28 cm) was recorded with treatment T_4 followed by T_8 (94.45 cm) and minimum plant height (77.29 cm) was recorded with treatment T_0 (Control). At 120 DAT, maximum plant height (109.54 cm) was recorded with treatment T_4 closely followed by T_8 (103.27 cm) and minimum plant height (81.03 cm) was recorded with treatment T_0 (Control). It was observed that plant height in all the treatments increased at all successive stage of growth. Maximum plant height was produced by T_4 (75%RDF+Vermicompost @1.25 t/ha) whereas minimum remained with treatment T_0 (control). At all the growth stages, treatment comprising of (75% RDF+ Vermicompost @ 1.25 t/ha) was superior for all other treatments.

The increase in the plant height in treatment T_4 might be due to the beneficial effect of Vermicompost along with 75% recommended dose of fertilizers (RDF), while the decrease in plant height may be due to unavailability of sufficient nutrients at critical stages to plant for its luxuriant growth. Similar findings were reported by Chaitra [1] in China aster and Sheergojri *et al.* [6] in Dahlia.

Table 1: Effect of integrated nutrient management on plant height (cm) DAT of Dahlia (*Dahlia variabilis* L.) cv. Kenya orange.

Treatments		30 DAT	60 DAT	90 DAT	120 DAT
T_0	Control	17.02	40.83	77.29	81.03
T_1	75% RDF + *Azotobacter* @ 2.5 kg/ha	21.33	47.62	81.05	89.35
T_2	75% RDF+ Poultry manure@ 0.83 t/ha	23.97	51.06	91.73	102.40
T_3	75% RDF + FYM@5 t/ha	24.00	46.31	82.33	88.51
T_4	75% RDF + Vermicompost @ 1.25 t/ha	29.31	60.34	103.38	109.54
T_5	50% RDF +*Azotobacter* @ 5 kg/ha	22.20	47.01	81.91	86.12
T_6	50% RDF + Poultry manure @ 1.66 t/ha	21.05	43.61	82.49	91.63
T_7	50% RDF + FYM @10 t/ha	22.77	45.38	84.99	89.64
T_8	50% RDF + Vermicompost @2.5 t/ha	27.13	53.51	94.45	103.27
T_9	25% RDF + *Azotobacter*@ 7.5 kg/ha	22.46	46.15	81.87	87.26
T_{10}	25% RDF + Poultry manure @2.5 t/ha	25.05	36.65	84.79	87.95
T_{11}	25% RDF + FYM @15 t/ha	35.55	46.55	84.55	87.88
T_{12}	25% RDF + Vermicompost @3.75 t/ha	25.55	48.03	86.90	91.36
F- test		NS	S	S	S
S. Ed. (±)		4.744	1.129	2.332	2.245
C. D. (P = 0.05)		9.791	2.331	4.812	4.634

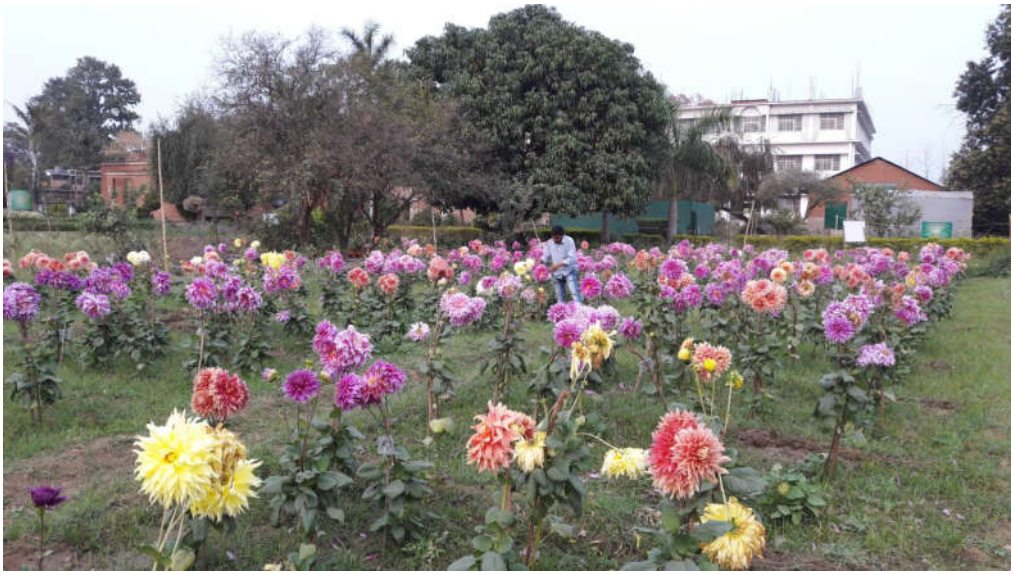
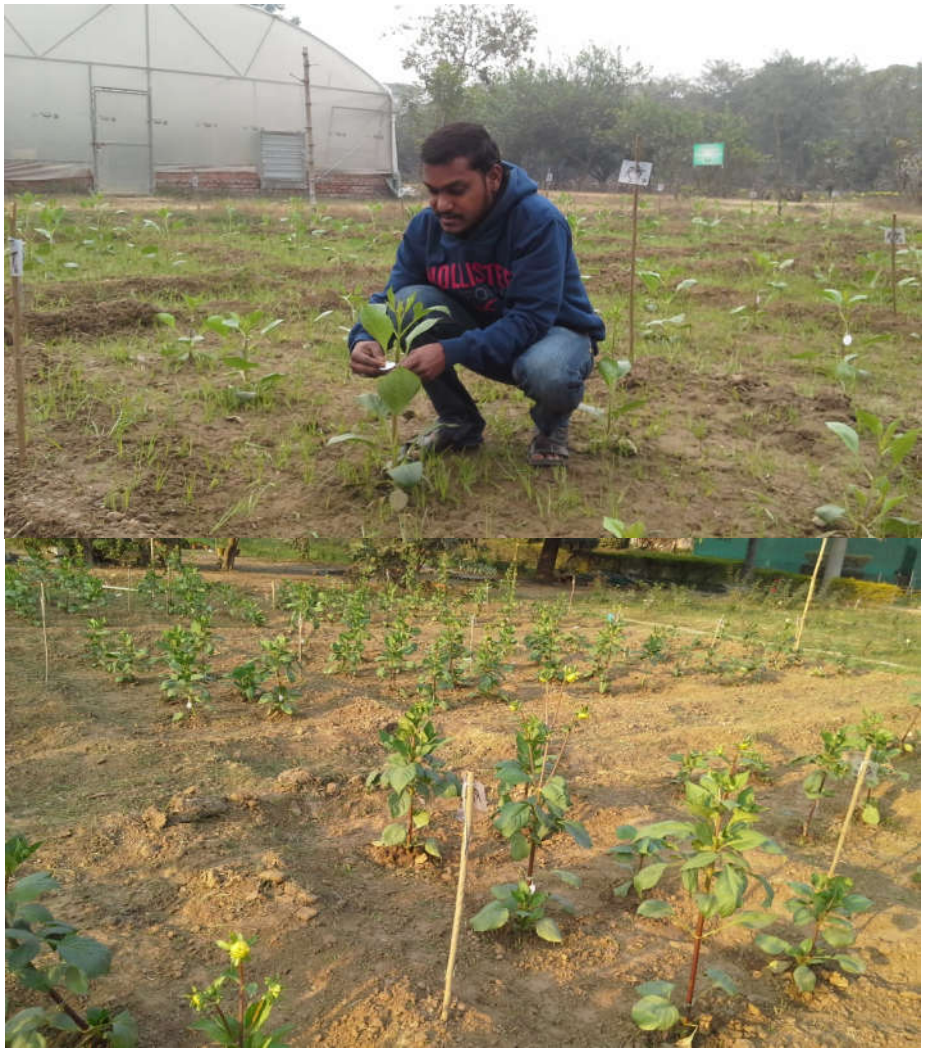


Table 2: Effect of integrated nutrient management on Plant spread (cm) of Dahlia (*Dahlia variabilis* L.) cv. Kenya orange.

Treatments		30 DAT	60 DAT	90 DAT	120 DAT
T_0	Control	17.63	31.04	41.07	42.29
T_1	75% RDF + *Azotobacter*@ 2.5 kg/ha	20.38	36.32	44.00	43.61
T_2	75% RDF+ Poultry manure@ 0.83 t/ha	20.31	39.47	48.09	47.18
T_3	75% RDF + FYM@5 t/ha	21.69	40.41	44.39	49.36
T_4	75% RDF + Vermicompost @ 1.25 t/ha	23.86	43.20	52.14	53.27
T_5	50% RDF +*Azotobacter*@ 5 kg/ha	21.35	38.87	43.23	45.69
T_6	50% RDF + Poultry manure @ 1.66 t/ha	19.82	39.41	43.97	45.47
T_7	50% RDF + FYM @10 t/ha	21.57	41.27	46.85	45.49
T_8	50% RDF + Vermicompost @2.5 t/ha	22.28	39.83	49.09	48.31
T_9	25% RDF + *Azotobacter*@ 7.5 kg/ha	18.94	36.71	45.19	45.85
T_{10}	25% RDF + Poultry manure @2.5 t/ha	20.50	39.70	42.95	45.22
T_{11}	25% RDF + FYM @15 t/ha	21.27	39.14	45.42	47.21
T_{12}	25% RDF + Vermicompost @3.75 t/ha	20.29	38.18	44.79	46.47
F- test		S	S	S	S
S. Ed. (±)		1.380	1.848	1.721	0.830
C. D. (P = 0.05)		2.848	3.814	3.552	1.714



30 days after transplanting

Table 3. Effect of integrated nutrient management on Number of branches per plant of Dahlia (*Dahlia variabilis* L.) cv. Kenya orange.

Treatments		30 DAT	60 DAT	90 DAT	120 DAT
T_0	Control	1.53	2.60	4.53	6.67
T_1	75% RDF + *Azotobacter*@ 2.5 kg/ha	2.07	3.27	5.40	8.00
T_2	75% RDF+ Poultry manure@ 0.83 t/ha	1.83	3.53	5.60	7.80
T_3	75% RDF + FYM@5 t/ha	2.37	3.13	5.33	8.67
T_4	75% RDF + Vermicompost @ 1.25 t/ha	2.47	4.33	6.40	10.87
T_5	50% RDF + *Azotobacter* @ 5 kg/ha	2.17	3.27	5.13	7.80
T_6	50% RDF + Poultry manure @ 1.66 t/ha	2.00	3.27	5.47	8.27
T_7	50% RDF + FYM @10 t/ha	2.00	3.13	4.93	8.00
T_8	50% RDF + Vermicompost @2.5 t/ha	2.25	3.93	6.00	9.40
T_9	25% RDF + *Azotobacter* @ 7.5 kg/ha	2.17	3.13	5.20	8.60
T_{10}	25% RDF + Poultry manure @2.5 t/ha	2.00	3.00	5.13	8.00
T_{11}	25% RDF + FYM @15 t/ha	2.00	3.07	5.00	8.27
T_{12}	25% RDF + Vermicompost @3.75 t/ha	2.10	3.20	5.07	8.00
F- test		S	S	S	S
S. Ed. (±)		0.192	0.255	0.175	0.415
C. D. (P = 0.05)		0.397	0.527	0.361	0.856

Plant spread (cm)

Plant spread was recorded at 30, 60, 90 and 120 DAT. Table 4.2 and Fig. 4.2 shows the spread of plant at successive stages of growth under different treatments.

At 30 DAT, maximum plant spread (23.86 cm) was recorded with treatment T_4 (75%RDF+ Vermicompost @ 1.25 t/ha) closely followed by T_8 (50%RDF+ Vermicompost @2.5 t/ha, 22.28 cm) and minimum plant spread (17.63 cm) was recorded with treatment T_0 (Control). At 60 DAT, maximum plant spread (43.20

cm) was recorded with treatment T_4 closely followed by T_7 (50%RDF+ FYM @ 10 t/ha, 41.27 cm) and minimum plant spread (31.04cm) was recorded with treatment T_0 (Control). At 90 DAT, maximum plant spread (52.14 cm) was recorded with treatment T_4 closely followed by T_8 (49.09 cm) and minimum plant spread (41.07 cm) was recorded with treatment T_0 (Control). At 120 DAT, maximum plant spread (53.27 cm) was recorded with treatment T_4 (75%RDF+ Vermicompost @1.25 t/ha) closely followed by T_3 (75%RDF+ FYM @ 5 t/ha) (49.36 cm) and minimum plant spread (42.29 cm) was recorded with treatment T_0 (Control).

Table 4. Effect of integrated nutrient management on Number of leaves per plant of Dahlia (*Dahlia variabilis* L.) cv. Kenya orange.

Treatments		30 DAT	60 DAT	90 DAT	120 DAT
T_0	Control	6.20	15.40	23.93	28.33
T_1	75% RDF + AZ@ 2.5 kg/ha	7.47	18.60	27.87	31.33
T_2	75% RDF+ Poultry manure@ 0.83 t/ha	9.07	19.47	31.47	31.60
T_3	75% RDF + FYM@5 t/ha	10.00	22.00	30.73	32.47
T_4	75% RDF + Vermicompost @ 1.25 t/ha	12.07	25.47	35.80	38.53
T_5	50% RDF +AZ@ 5 kg/ha	9.93	20.00	27.80	31.33
T_6	50% RDF + Poultry manure @ 1.66 t/ha	9.60	19.40	28.93	29.87
T_7	50% RDF + FYM @10 t/ha	8.13	19.67	32.27	32.47
T_8	50% RDF + Vermicompost @2.5 t/ha	11.00	24.60	32.67	33.53
T_9	25% RDF + AZ@ 7.5 kg/ha	8.93	20.00	29.53	29.73
T_{10}	25% RDF + Poultry manure @2.5 t/ha	8.47	22.07	29.47	31.00
T_{11}	25% RDF + FYM @15 t/ha	9.13	22.27	29.33	31.47
T_{12}	25% RDF + Vermicompost @3.75 t/ha	8.93	20.60	30.00	31.93
F- test		S	S	S	S
S. Ed. (±)		0.885	1.567	2.149	1.693
C. D. (P = 0.05)		1.826	3.234	4.436	3.495

It was observed that the plant spread in all the treatments increased at all successive stage of growth. Maximum plant spread was produced by T_4 whereas minimum remained with treatment T_0 (control). At all the growth stages, treatment comprising of (75% RDF+ Vermicompost @ 1.25 t/ha) was superior for all other treatments. The increase in the plant spread in the treatment T_4 might be due to the beneficial effect of Vermicompost along with 75% recommended dose of fertilizers (RDF), while the decrease in plant spread may be due to unavailability of sufficient nutrients at critical stages to plant for its luxuriant growth. Similar findings were reported by Warade *et al*. [7] in Dahlia and Longchar [2] in gerbera.

Number of branches

Number of branches was recorded at 30, 60, 90, and 120 DAT. Table 4.3 and Fig. 4.3 shows the Number of branches at successive stages of growth under different treatments.

At 30 DAT, maximum number of branches (2.47) was recorded with treatment T_4 closely followed by T_8 (2.25), and minimum number of branches (1.53) was received with treatment T_0 (Control). At 60 DAT, maximum number of branches (4.33) was recorded with treatment T_4 closely followed by T_8 (3.93) and minimum number of branches (2.60) was obtained with treatment T_0 (Control). At 90 DAT, maximum number of branches (6.40) was recorded with treatment T_4 closely followed by T_8 (6.00) and minimum number of branches (4.53) was received with treatment T_0 (Control). At 120 DAT, maximum number of branches (10.87) was recorded with treatment T_4 closely followed by T_8 (9.40) and minimum number of branches (6.67) was recorded with treatment T_0 (Control). Maximum number of branches was produced by T_4 (75%RDF+ Vermicompost @1.25 t/ha) whereas, the minimum remained with treatmentT_0 (control). At all the growth stages treatment comprising of (75%RDF+ Vermicompost @1.25 t/ha) was superior to all other treatments.

The increase in the number of branches per plant in the treatment T_4 might be due to the beneficial effect of Vermicompost with 75% recommended dose of fertilizers (RDF), optimum nutrients provided to plants might accelerated rate of photosynthesis thereby enhancing the vegetative growth of plants. Similar findings were reported by Sheergojri *et al.* [6] in Dahlia.

60 days after transplanting

Number of leaves

Number of leaves per plant counted and recorded under different treatments at 30, 60, 90 and 120 DAT is shown in Table 4.4 and Fig. 4.4 shows the Number of leaves at successive stages of growth under different treatments.

At 30 DAT, maximum number of leaves per plant (12.07) was recorded with treatment T_4 closely followed by T_8 (50%RDF+ Vermicompost @ 2.5 t/ha, 11.00), and minimum number of leaves per plant (6.20) was recorded with treatment T_0 (Control). At 60 DAT, maximum number of leaves per plant (25.47) was recorded with treatment T_4 (75%RDF+ Vermicompost @1.25 t/ha) closely followed by T_8 (50%RDF+ Vermicompost @ 2.5 t/ha, 24.60) and minimum number of leaves (15.40) was received with treatment T_0 (Control). At 90 DAT, maximum number of leaves per plant (35.80) was recorded with treatment T_4 (75%RDF+ Vermicompost @1.25 t/ha) closely followed by T_8 (50%RDF+ Vermicompost @ 2.5 t/ha, 32.67) and minimum number of leaves (23.93) was recorded with T_0 (Control). At 120 DAT, maximum number of leaves per plant (38.53) was recorded with treatment T_4 closely followed by T_8 (33.53) and minimum number of leaves (28.33) was recorded with treatment T_0 (Control). It was observed that number of leaves per plant in all the treatments increased at all successive stage of growth. Maximum number of leaves was produced by T_4 (75% RDF+ Vermicompost @1.25 t/ha) whereas minimum remained with treatment T_0 (control). At all the growth stages, treatment comprising of (75% RDF+ Vermicompost @1.25 t/ha) was superior for all other treatments. The increase in the number of leaves per plant in the treatment T_8 might be due to the beneficial effect of Vermicompost with 75% recommended dose of fertilizers (RDF).Optimum nutrients provided to plants might accelerated rate of photosynthesis thereby enhancing the vegetative growth of plants. Similar findings were reported by Warade *et al.* (2007) in Dahlia.

120 days after transplanting

CONCLUSION

Maximum plant height (109.54 cm) was recorded in T_4 (75% RDF + Vermicompost @1.25 t/ha) followed by T_8 (103.27 cm, 50%RDF+Vermicompost @2.5 t/ha). Minimum plant height (81.03cm) was recorded in T_0 (control). Maximum plant spread (53.27cm) was recorded in T_4 (75%RDF+Vermicompost@1.25 t/ha) followed by T_3 (49.36 cm, 75%RDF+FYM @ 5 t/ha). Minimum plant spread (42.29 cm) was recorded in T_0 (control). Maximum number of leaves per plant (38.53) was recorded in T_4 (75% RDF + Vermicompost @1.25 t/ha) followed by T_8 (33.53, 50%RDF+Vermicompost @2.5 t/ha). Minimum number of leaves per plant (28.33) was recorded in T_0 (control). Maximum number of branches per plant (10.87) was recorded in T_4 (75% RDF+Vermicompost@1.25 t/ha) followed by T_8 (9.40, 50%RDF+Vermicompost@2.5 t/ha). Minimum number of branches per plant (6.67) was recorded in T_0 (control).

REFERENCES

1. Chaitra,R., Patil V.S., *(2007)*. Integrated Nutrient Management Studies in China Aster (*Callistephus chinensis* L.) growth and flowering of Potted Gerbera (*Gerbera jamesonil* H. Bolus) cv. Cabana. *Karnataka Journal of Agricultural Sciences:* 20 (3):689-690.
2. Longchar, A. and R. Keditsu, R. (2013). Flower yield and vase life of Gerbera in response to planting time and organic manures on Alfisol*. Scientific Journal of Agril..*2(3): 124-128.
3. Sabah, S.S. (2014). Effect of Different Organic and Inorganic Manure on Flower Yield and Tubers Yield of Dahlia *(dahlia variabilis* L.) cv. Glory of India as Intercropping with Damask Rose *European Academic Research* 4*.*
4. Singh, A. K., (2006). Flower crops cultivation and management. *New india publishing agency* p.101-117.
5. Sultana, S. Khan, F. N. Haque, M. A. Akhter, and Noor, S. (2006). Effect of NPK on growth and flowering in tuberose. *J. Subtropical Agricultural Research and Development.* **4 (2):** 111-113.
6. Sheergojri G.A., Rather Z. A., Khan F.U., Nazki I .J., and Qadriz. A. (2013). Effect of chemical fertilizers and Bio-inoculants on growth and flowering of Dahlia *(Dahlia variabilis, Desf.*)cv. Pink Attractions*.*
7. Warade, A.P., Golliwar, V.J., Chopde, N., Lanje, P.W. and Thakre, S.A.(2007). Effect of organic manures and bio-fertilizers on growth, flowering and yield of dahlia*. J. Soils and Crops,* 17 (2): 354-355.
8. Zhang W. L., Jian W. J. and Yayi Z. W. (2010). Effects of nitrogen, phosphorus, and potassium fertilizer on the growth, blossom, and N, P, K uptake in Calendula officinalis L. *J. Wuhan Botanical Research*. 28 (4): 491-496.