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Effect of Fertigation and Consortium of Biological Inputs on Flower Characteristics of Edward Rose

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A B S T R A C T

An experiment was conducted to evaluate the effect of fertigation and consortium of biological sources on flower characteristics of Edward Rose in Coimbatore during 2015 to 2020. The treatment combination consisted of three levels of the recommended dose of fertilizer through fertigation (RDFTF) gradients (125,100 and 75 percent NPK), (RDF @ 178: 178: 356 kg NPK ha^{-1}), recommended dose of Microbial Consortium which contains Azospirillum and Phosphobacteria (MC) @ 12.5 kg ha^{-1}, foliar spray of Panchagavya (3 and 4%) and humic acid (0.4 and 0.5%) were laid out in Randomized Block Design and replicated twice. The results revealed that the flower characters viz., number of flower buds $plant^{-1}$ (12.88), open flower diameter (6.51 cm), number of petals $flower^{-1}$ (77.88), days to 50 per cent flowering (121.50), number of days to shoot emergence (6.75), number of days for bud emergence (43.14), stem girth (0.92 cm), pedicel length (3.68 cm), receptacle diameter (0.98 cm) and petal: receptacle ratio (3.0) were significantly high in the plants treated with 100 percentage of RDFTF + MC @ 12.5 kg ha^{-1}+ 4 per cent Panchagavya + 0.5 per cent Humic acid (T_{12}) when compared to the Control (T_{19}). The treatment which received 100 per cent of RDFTF + MC @ 12.5 kg ha^{-1} + 3 per cent Panchagavya + 0.5 per cent Humic acid (T_{10}) was observed to be on par with the best treatment (T_{12}). T_{12} treatment is found to be the best among all the other treatments.

***Key words*:** Edward rose, Fertigation, Microbial Consortium, Panchagavya, Humic acid, Flower characteristics

India has a long tradition of floriculture. Our Indian History has a long and traditional association with roses which goes back to over 5000 years. We can find references to flowers and gardens in ancient time starting from the Sanskrit classics. It is being commercially grown for loose flower purposes such as pot plant, garden flower for aesthetic value and cut flowers for decoration and it add charm to different occasions like marriage ceremonies and symbol of love [1]. Applying fertilizer through an efficient method offers a vast potential for more accurately and timely crop nutrition and it provides an accurate and uniform application of nutrients to the wet areas, where the active roots are concentrated [2]. Hence, the present research work has been undertaken to study the effect of fertigation, microbial consortium, Panchagavya and humic acid on flower characteristics of Edward Rose. Though it is cultivated and produced commercially, the vase life of the flowers after it is harvested and also after it is made as a garland is of very much important aspect of the farmer, merchant, customer and also to any rose researcher.

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MATERIALS AND METHODS

The experiment was conducted to evaluate the effect of fertigation and consortium of biological inputs with bio stimulants on various flower characteristics of Edward Rose in Coimbatore during 2015 to 2020. The flower characteristics observed were number of flower buds $plant^{-1}$, open flower diameter, number of petals, days to 50% flowering, number of days to shoot emergence, number of days for bud emergence, stem girth, pedicel length, receptacle diameter and petal - receptacle ratio. The treatment combination consisted of three levels of the recommended dose of fertilizer through fertigation (RDFTF) gradients (125, 100 and 75% NPK), recommended dose of Microbial Consortium with Azospirillum and Phosphobacteria (MC) @ 12.5 kg ha^{-1}, foliar spray of Panchagavya (3 and 4%) and humic acid (0.4 and 0.5%) were laid out in randomized block design and replicated twice. All the data were collected and statistically analyzed and interpreted. The geographical details of the experimental location are with a Latitude of 110 02" N, Longitude of 76057" East and Altitude of 1348 feet (411 MSL) and with the weather details of Maximum temperature of 35°C (95°F), Minimum temperature of 18°C (64°F), Mean annual rainfall of 790 millimeters and Average relative humidity of 68 per cent. The data thus obtained were subjected to statistical analysis as suggested by Panse and Sukhatme [3]. The critical difference was worked out at five per cent ($p<0.05$) probability level.

Treatment no.	Treatment details
Treatment - 1	125% Recommended dose of fertilizers through fertigation (RDFTF)
Treatment - 2	125% RDFTF + Microbial consortium (MC) @ 12.5 kg ha^{-1}
Treatment - 3	125% RDFTF + MC @ 12.5 kg ha^{-1} + 3% Panchagavya + 0.4% Humic Acid
Treatment - 4	125% RDFTF + MC @ 12.5 kg ha^{-1} + 3% Panchagavya + 0.5% Humic Acid
Treatment - 5	125% RDFTF + MC @ 12.5 kg ha^{-1} + 4% Panchagavya + 0.4% Humic Acid
Treatment - 6	125% RDFTF + MC @ 12.5 kg ha^{-1} + 4% Panchagavya + 0.5% Humic Acid
Treatment - 7	100% RDFTF
Treatment - 8	100% RDFTF + MC @ 12.5 kg ha^{-1}
Treatment - 9	100% RDFTF + MC @ 12.5 kg ha^{-1} + 3% Panchagavya + 0.4% Humic Acid
Treatment - 10	100% RDFTF + MC @ 12.5 kg ha^{-1} + 3% Panchagavya + 0.5% Humic Acid
Treatment - 11	100% RDFTF + MC @ 12.5 kg ha^{-1} + 4% Panchagavya + 0.4% Humic Acid
Treatment - 12	100% RDFTF + MC @ 12.5 kg ha^{-1} + 4% Panchagavya + 0.5% Humic Acid
Treatment - 13	75% RDFTF
Treatment - 14	75% RDFTF + MC @ 12.5 kg ha^{-1}
Treatment - 15	75% RDFTF + MC @ 12.5 kg ha^{-1} + 3% Panchagavya + 0.4% Humic Acid
Treatment - 16	75% RDFTF + MC @ 12.5 kg ha^{-1} + 3% Panchagavya + 0.5% Humic Acid
Treatment - 17	75% RDFTF + MC @ 12.5 kg ha^{-1} + 4% Panchagavya + 0.4% Humic Acid
Treatment - 18	75% RDFTF + MC @ 12.5 kg ha^{-1} + 4% Panchagavya + 0.5% Humic Acid
Treatment - 19	100% RDF as Soil application – CONTROL

RDF (Recommended dose of fertilizers): NPK 178:178:356 kg ha^{-1}

RESULTS AND DISCUSSION

The results (Table 1) revealed that the flower characters viz., number of flower buds plant^{-1} (12.88), open flower diameter (6.51 cm), number of petals (77.88), days to 50 per cent flowering (121.50), number of days to shoot emergence (6.75), number of days for bud emergence (43.14), stem girth (0.92 cm), pedicel length (3.68 cm), receptacle diameter (0.98 cm) and petal: receptacle ratio (3.0) were significantly highest in the plants treated with 100 percentage of RDFTF + MC @ 12.5 kg ha^{-1} + 4 per cent Panchagavya + 0.5 per cent Humic acid (T_{12}) when compared to the Control (T_{19}), which recorded the least values of flower characters viz., number of flower buds plant^{-1} (8.50), open flower diameter (5.69 cm), number of petals (41.75), days to 50 per cent flowering (148.50), (Table 1). Number of days to shoot emergence (16.25), number of days for bud emergence (53.93), stem girth (0.6 cm), pedicel length (1.70 cm), receptacle diameter (0.82 cm) and petal: receptacle ratio (2.04) (Table 2). The results were found to be on par with the treatment T_{10}, which received 100 per cent of RDFTF + MC @ 12.5 kg ha^{-1}+ 3 per cent Panchagavya + 0.5 per cent Humic acid. Maximum number of flowers plant^{-1} (35.22) flower diameter (5.13 cm) and flowering duration (37.45 days) were observed with higher dose of nitrogen with 300 kg ha^{-1} followed by 250 kg ha^{-1} and plants receiving higher dose of phosphorus took less time to produce first flower bud (54.05 days) as compared to other levels of fertilizer in China Aster [4].

Table 1 Effect of fertigation and biological sources on Flower parameters in Edward Rose

	No. of flower buds plant^{-1}	Open flower diameter (cm)	No. of petals flower^{-1}	Days to 50 per cent flowering
T_1	9.00	5.84	45.88	143.00
T_2	9.81	5.90	52.25	134.00
T_3	10.63	6.09	62.88	128.50
T_4	10.75	6.12	65.88	127.50
T_5	10.88	6.10	64.25	128.00
T_6	10.81	6.12	67.88	127.00
T_7	9.94	5.80	47.38	140.50
T_8	10.44	5.92	53.88	133.00
T_9	11.38	6.20	69.00	126.50
T_{10}	12.00	6.32	73.88	124.50
T_{11}	11.63	6.24	71.88	125.50
T_{12}	12.88	6.51	77.88	121.50
T_{13}	9.56	5.69	43.88	145.50
T_{14}	10.06	5.86	50.00	135.00
T_{15}	11.00	5.99	57.00	131.00
T_{16}	10.81	6.05	58.88	130.00
T_{17}	11.00	6.02	57.38	130.50
T_{18}	11.06	6.06	60.25	129.00
T_{19}	8.50	5.69	41.75	148.50
Mean	10.64	6.03	59.05	132.05
SE(m)	0.67	0.05	1.74	1.066
SE(d)	0.95	0.07	2.46	1.507
C.D.	2.08	0.15	5.20	3.191

Table 2 Effect of fertigation and biological sources on flower quality parameters in Edward Rose

	Flower quality parameters					
	No. of days for shoot emergence	No. of days for bud emergence	Stem girth (cm)	Pedicel length (cm)	Receptacle diameter (cm)	Petal-receptacle ratio
T_1	14.50	52.83	0.64	1.84	0.84	2.20
T_2	13.75	49.54	0.66	1.92	0.85	2.37
T_3	12.00	47.75	0.73	2.14	0.86	2.50
T_4	11.75	46.81	0.76	2.25	0.87	2.55
T_5	12.00	47.09	0.73	2.19	0.87	2.54
T_6	11.75	46.56	0.78	2.41	0.88	2.66
T_7	14.00	51.92	0.65	1.89	0.84	2.32
T_8	13.00	49.30	0.68	1.96	0.85	2.40
T_9	11.00	46.26	0.78	2.51	0.89	2.69
T_{10}	9.75	45.39	0.88	3.02	0.91	2.80
T_{11}	10.25	46.04	0.81	2.69	0.89	2.77
T_{12}	6.75	43.14	0.92	3.68	0.98	3.00
T_{13}	15.00	53.17	0.63	1.81	0.83	2.12
T_{14}	13.75	49.63	0.66	1.90	0.84	2.35
T_{15}	12.75	49.22	0.68	1.98	0.85	2.40
T_{16}	12.50	48.58	0.69	2.02	0.85	2.43
T_{17}	12.75	48.75	0.68	2.00	0.85	2.42
T_{18}	12.25	47.96	0.69	2.10	0.86	2.44
T_{19}	16.25	53.93	0.60	1.70	0.82	2.04
Mean	12.41	48.62	0.72	2.21	0.86	2.47
SE(m)	0.368	0.964	0.019	0.144	0.009	0.072
SE(d)	0.52	1.363	0.027	0.203	0.013	0.102
C.D.	1.101	2.886	0.057	0.43	0.027	0.216

The influence of various levels and sources of N fertigation on flowering of cut rose cv. First Red was studied under protected conditions and it was observed that ammonium nitrate at 150 ppm resulted the highest values for bud circumference (6.09 cm), flower diameter (7.33 cm), petal length (4.01 cm), petal breadth (3.84 cm) and flower yield (153 m^{2-1}) [5]. Fertigation has potential for more timely and accurate crop nutrition leading to increased yield and enhanced quality in gerbera [6]. In increasing the quality attributes and yield in gladiolus, biostimulants like humic acid and Panchagavya had a significant role [7]. In pot culture, application of humic acid enhanced the growth and flowering in tuberose [8]. Cytokinin and auxin present in Humic acid increased the antioxidant levels [9]. The application of 100 per cent RDF along with 0.004 per cent MN Mixture and 0.2 per cent humic acid had significantly influenced the flower length, flower girth and flower diameter. The plants recorded the highest flower length (55.31 cm), flower girth (2.69 cm) and flower diameter (12.41 cm) than the control [10] in gerbera. Viradia and Singh [11] applied nitrogen at 0, 20, 40 and 60 g $plant^{-1}$ to cut rose cv. Gladiator and reported that the application of nitrogen at 40g $plant^{-1}$ produced the highest number of cut flowers $plant^{-1}$ (97.20), number of petals $flower^{-1}$ (72.83) and flower diameter (10.34).

In rose cv. Gruss-An-Tepliz, application of 60 g of N m^{2-1} significantly increased the yield of flowers m^{2-1} $year^{-1}$ [12-15]. Two split application of 800 kg N ha^{-1} significantly increased the number of petals $flower^{-1}$ and yield of flowers ha^{-1} in rose cv. Gruss-An-Tepliz [16]. Application of NPK at 50, 40 and 30 g m^{2-1} recorded maximum number of flowers $plant^{-1}$ (26.16), weight of flowers $plant^{-1}$ (138.50 g), diameter of flower (9.26 cm) and number of petals $flower^{-1}$ (46.00) [17].

CONCLUSION

The overall findings have led to the inference that the flower characters viz., number of flower buds $plant^{-1}$, open flower diameter, number of petals, days to 50 per cent flowering, number of days to shoot emergence, number of days for bud emergence, stem girth, pedicel length, receptacle diameter and petal - receptacle ratio were significantly high in the plants treated with 100 per cent RDFTF along with MC @ 12.5 kg ha^{-1} and 4 per cent Panchagavya and 0.5 per cent Humic acid besides other growth, yield and quality attributes.

LITERATURE CITED

1. Tabassum R, Ghaffoor A, Waseem K, Nadeem MA. 2002. Evaluation of Rose cultivars as cut flower production. *Asian Jr. Plant Science* 1: 668-669.
2. Kafkafi U, Kant S. 2004. Fertigation. *In*: Encyclopaedia of Soils in the Environment, Volume 2: D. Hillel (Eds). Academic Press. NY. pp 1-9.
3. Panse VG, Sukhatme PV. 1985. *Statistical Methods for Agricultural Workers*. ICAR, New Delhi. pp 134-192.
4. Kumar R, Singh GN, Mishra RL. 2003. Effect of boron, calcium and zinc on Gladiolus. *Journal of Ornamental Horticulture* 6(2): 104-106.
5. Ashok A, Arun D, Rengasamy P. 1999. Influence of different levels and sources of N fertigation on flowering of Cut Rose cv. "First Red" under protected conditions. *South Indian Horticulture* 47: 115-118.
6. Palanisamy K, Kannan D, Sharma R, Bhatt SS, Singh A. 2015. Fertigation studies on gerbera (*Gerbera jamesonii* Bolus Ex Hooker F.) for growth and yield under cover in southern hills (Shevaroy). *International Journal of Tropical Agriculture* 33(1): 31-36.

7. Sankari A, Anand M, Arulmozhiyan R. 2015. Effect of biostimulants on yield and post-harvest quality of Gladiolus Cv. White prosperity. *The Asian Journal of Horticulture* 10(1): 86-94.
8. Hadi G, Mehdi R, Hamid-Reza Asghari, Hassan Ghorbani-Ghouzhdi, Sharififar A. 2016. Cultivation of tuberose in pot and field with humic acid treatments under a semi-arid climate. *Indian Jr. Hort.* 73(3): 391-395.
9. Zhang X, Schmidt RE. 2000. Hormone-containing products impact on antioxidant status of tall fescue and creeping Bentgrass subjected to drought. *Crop Science* 40(5): 1344-1349.
10. Palanisamy S. 2011. Influence of fertigation and foliar spray of micronutrients mixture and humic acid on growth, yield and quality of Gerbera (*Gerbera jamesonii* Bolus ex Hooker F.) cv. Palm beach. *M. Sc. (Hort.)* dissertation submitted to Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu.
11. Viradia RR, Singh SP. 2004. Quality production of cut roses Cv. Gladiator as influenced by nutrient, plant density and water management. *Jr. Orn. Horticulture* 7(3/4): 171-176.
12. Singh AK, Kavita K, Shiva J. 2004. Response of nitrogen on growth and flowering parameters in Rose. *Journal of Ornamental Horticulture* 7(1): 90-94.
13. Cabrera RI, Sonneved C, Berhoyen MNJ. 2000. Evaluating yield and quality of roses with respect to nitrogen fertilization and leaf nitrogen status. *Acta Hort*. 511: 133-140.
14. Mukeshkumar, Chattopadhyay TK. 2001. Effect of nitrogen, phosphorus and potassium on growth and flowering or Rose cv. Montezuma. *Environment and Ecology* 19(4): 932-934.
15. Singh AK, Bijimol G. 2003. Effect of spacing and nitrogen on Rose. *Journal of Ornamental Horticulture* 6(1): 73-75.
16. Solomon, Singh AK. 2004. Influence of various levels and split doses of nitrogen on flowering attributes in Rose. *Progressive Horticulture* 36(2): 286-289.
17. Singh AK. 2007. Response of integrated nutrient management on growth, flowering attributes in Rose. *Journal of Ornamental Horticulture* 10(1): 58-60.