Effect of Fertigation and Consortium of Biological Sources on Growth Parameters of Edward Rose

S. Ramkumar and S. Ganesh

Research Journal of Agricultural Sciences
An International Journal

P- ISSN: 0976-1675
E- ISSN: 2249-4538

Volume: 13
Issue: 02

Res. Jr. of Agril. Sci. (2022) 13: 446–449

CARAS

Res. Jr. of Agril. Sci. (Mar-Apr 2022)
13(2): 446–449

ISSN: 0976-1675 (P)
ISSN: 2249-4538 (E)

www.rjas.org

Full Length Research Article

Effect of Fertigation and Consortium of Biological Sources on Growth Parameters of Edward Rose

S. Ramkumar*[1] and S. Ganesh[2]

Received: 12 Jan 2022 | Revised accepted: 06 Mar 2022 | Published online: 25 Mar 2022

A B S T R A C T

An experiment was conducted to evaluate the effect of fertigation and consortium of biological sources on growth parameters, yield attributes and flower yield of Edward Rose in Coimbatore during 2015 to 2020. The treatments consisted of three levels of the recommended dose of fertilizer through fertigation (RDFTF) gradients (125,100 and 75 per cent 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 morphological characters viz., plant height(112.25 cm), number of primary branches (12.75), number of secondary branches (51.88), plant spread (251.50 cm), internodal length (4.76 cm), number of leaves (429.88), single leaf area (10.75 cm^2), total leaf area (4936.85 cm^2) and leaf area index (0.2468) were highest in the treatment with 100 per cent of RDFTF + MC @ 12.5 kg ha^{-1} + 4 per cent Panchagavya + 0.5 per cent Humic acid when compared to the Control, which recorded the least values of plant height (75.25 cm), number of primary branches (5.00), number of secondary branches (15.38), plant spread (139.75 cm), internodal length (4.24 cm), number of leaves (115.15), single leaf area (8.81 cm^2), total leaf area (1027.56 cm^2) and leaf area index (0.0514). 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.

***Key words*:** Edward rose, Fertigation, *Azotobacter*, *Azospirillum*, Growth parameters

"Say it with a flower" is an important phrase widely used by the common people during any kind of functions or during a memorable occasion. It reinforces the importance of flowers as well as the function. Rose is one of the most popular loose flower crops of domestic and international markets [1]. It is very much appreciated for its colour, fragrance, form, size and value-added products [2]. Cut flowers have the inherent properties and methods to increase its shelf life and vase life by many pulsing techniques and chemicals added to the vase solutions, whereas the loose flowers especially the Edward roses are having poor shelf life when compared the Andhra Red rose type flowers. Edward roses can be grown easily in all the climatic zones especially in the open field conditions [3]. The initial costs and other maintenance costs are very low and it is very easy and comfortable for all the farmers to undertake its cultivation. Mostly the flowers are used as loose flowers and they need to be utilized on the same day of the harvest or on the next day. Fertigation allows the plant roots to take up an adequate amount of the applied nutrients to meet their actual nutritional requirements, necessary for the appropriate growth and yield, throughout the growing season [4]. Fertigation method has an integral role in fertilization of various horticultural and floricultural crops for increasing the water and fertilizer use efficiency, restricting the incorporation of nutrients in the soil [5]. 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 [6]. Therefore, the objective of the present study was to investigate the fertigation and consortium of biological sources on growth parameters of Edward Rose.

* **S. Ramkumar**
✉ ramkumarhorti@gmail.com

[1-2] School of Agriculture and Animal Sciences, Gandhigram Rural Institute (Deemed to be University), Gandhigram - 624 302, Dindigul, Tamil Nadu, India

MATERIALS AND METHODS

The present experiment was conducted to evaluate the effect of fertigation, consortium of biological sources on various growth parameters of Edward Rose at Coimbatore from 2015 to 2020. The growth parameters observed were plant height, number of primary branches, number of secondary branches, plant spread, internodal length, number of leaves, single leaf area, total leaf area and leaf area index. The treatment consisted of three levels of the recommended dose of fertilizer through fertigation (RDFTF) gradients (125,100 and 75 per cent NPK), 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 with two replications. All the data were collected and statistically analyzed and interpreted. The geographical details of the experimental location were with a Latitude of 110 02" N, Longitude of 76057" East and Altitude of 1348 feet (411 meters above 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. Biometrical observations were measured in each treatment and replication wise and averaged. The data thus obtained were subjected to statistical analysis as suggested by Panse and Sukhatme [7]. The critical difference was worked out at five per cent ($p < 0.05$) probability level and tabulated.

Treatment details

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}

Table 1 Effect of fertigation and biological sources on plant height and branches of Edward Rose

Treatment	Growth parameters				
	Plant height (cm)	No. of primary branches	No. of secondary branches	Plant spread (cm)	Internodal length (cm)
T_1	80.63	6.13	19.25	162.75	4.34
T_2	85.00	6.75	24.63	170.25	4.39
T_3	89.63	8.88	35.00	202.63	4.52
T_4	96.38	9.63	37.88	208.13	4.57
T_5	94.88	9.38	36.63	207.75	4.54
T_6	100.63	10.25	38.88	213.50	4.59
T_7	88.38	5.75	21.25	164.00	4.36
T_8	81.88	6.88	26.88	179.00	4.42
T_9	98.50	10.00	41.88	214.50	4.65
T_{10}	107.63	11.13	30.88	230.50	4.72
T_{11}	102.88	10.88	45.38	221.00	4.69
T_{12}	112.25	12.75	51.88	251.50	4.76
T_{13}	81.63	5.00	17.88	151.00	4.30
T_{14}	84.13	6.88	23.38	169.38	4.38
T_{15}	86.25	7.13	28.00	185.00	4.45
T_{16}	89.75	7.38	49.00	192.38	4.47
T_{17}	90.88	7.50	29.38	186.88	4.45
T_{18}	94.25	8.38	33.25	197.75	4.50
T_{19}	75.25	5.00	15.38	139.75	4.24
Mean	91.62	8.19	31.93	191.980	4.49
SE(m)	2.27	0.44	0.89	5.446	0.03
SE(d)	3.21	0.62	1.25	7.702	0.05
CD (p= 0.05)	5.69	1.31	2.66	16.305	0.10

RESULTS AND DISCUSSION

The results (Table 1) revealed that the morphological characters viz., plant height (112.25 cm) (Chart.1), number of primary branches (12.75), number of secondary branches (51.88), plant spread (251.50 cm), internodal length (4.76 cm), number of leaves (429.88), single leaf area (10.75 sq.cm), total leaf area (4936.85 sq.cm) and leaf area index (0.2468) (Table 2) were highest in the treatment (T_{12}) which received 100 per cent of the recommended dose of fertilizer through fertigation (RDFTF) + MC @ 12.5 kg ha^{-1} + 4 per cent Panchagavya + 0.5 per cent Humic acid when compared to the Control (T_{19}), which

recorded the least values of growth parameters viz., plant height(75.25 cm), number of primary branches (5.00), number of secondary branches (15.38), plant spread (139.75 cm), internodal length (4.24 cm), number of leaves (115.15), single leaf area (8.81 sq.cm), total leaf area (1027.56 sq.cm) and leaf area index (0.0514). 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). Application of microbial consortium along with Panchagavya and humic acid had a greater role in improving the growth parameters by making the nutrients available to the plants and also in giving desirable yields.

Table 2 Effect of fertigation and biological sources on leaf related growth parameters of Edward Rose

Growth parameters				
Treatment	No. of leaves	Single leaf area (cm^2)	Total leaf area (cm^2)	Leaf area index
T_1	193.38	9.08	1779.50	0.0890
T_2	242.63	9.33	2305.83	0.1153
T_3	288.75	9.97	2983.00	0.1491
T_4	327.50	10.08	3420.72	0.1710
T_5	300.38	10.00	3111.38	0.1556
T_6	342.13	10.24	3654.29	0.1827
T_7	205.00	9.23	1933.73	0.0967
T_8	250.75	9.39	2404.49	0.1202
T_9	375.50	10.29	4036.42	0.2018
T_{10}	403.38	10.58	4543.16	0.2272
T_{11}	387.75	10.32	4181.89	0.2091
T_{12}	429.88	10.75	4936.85	0.2468
T_{13}	142.88	8.97	1291.80	0.0646
T_{14}	224.38	9.29	2131.60	0.1066
T_{15}	256.75	9.52	2512.07	0.1256
T_{16}	274.00	9.78	2764.56	0.1382
T_{17}	264.88	9.69	2642.83	0.1321
T_{18}	281.25	9.87	2865.70	0.1433
T_{19}	115.13	8.81	1027.56	0.0514
Mean	279.28	9.75	2869.86	0.1435
SE(m)	6.64	0.11	44.66	0.0027
SE(d)	9.39	0.15	63.17	0.0043
CD (p= 0.05)	19.88	0.32	133.73	0.0087

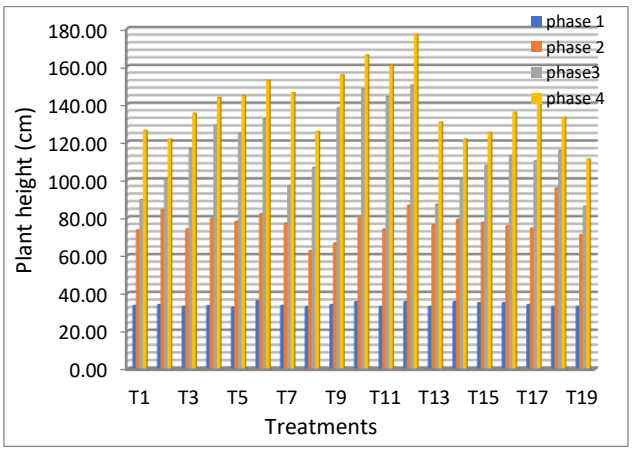

Chart 1 Effect of fertigation and consortium of biological sources on plant height

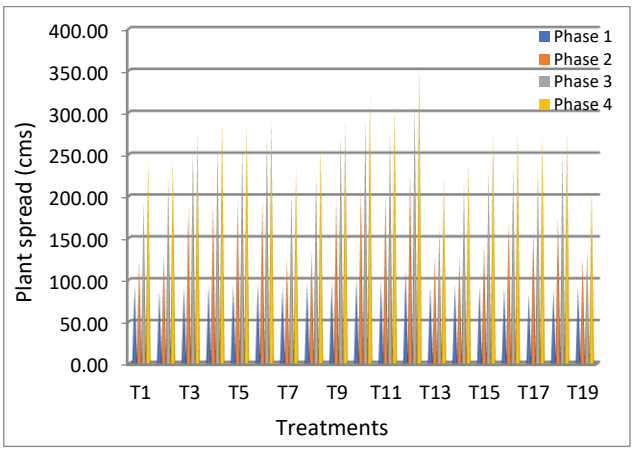

Chart 2 Effect of fertigation and consortium of biological sources on plant spread

Combination of biofertilizers and nitrogen fertilizers for growth and yield of *Rosa damascena*. They found that the application of 50 g of N $plant^{-1}$ along with *Azotobacter* and *Azospirillum* each @ 1 ml $plant^{-1}$ produced maximum plant height (134.23 cm), number of branches (49.53) plant spread N-S (95.20 cm) and E-W (100.00 cm) and stem diameter (2.04 cm) [8]. Similar findings were also observed by Haripriya *et al.* [9] in rose using vermicompost and fertilizers. In India, fertigation has potential in Gerbera for more timely and accurate crop nutrition leading to increased yield and enhanced quality [10]. In increasing the quality attributes and yield, biostimulant like humic acid and Panchagavya had a significant role in Gladiolus [11]. Application of humic acid enhanced the growth and flowering in tuberose in pot culture experiments [12]. Cytokinin and auxin present in Humic acid increases the antioxidant levels [13].

CONCLUSION

It could be inferred that the treatment combination with 100 per cent of the recommended dose of fertilizer through fertigation (RDFTF) along with MC @ 12.5 kg ha^{-1} and 4 per cent Panchagavya and 0.5 per cent Humic acid (T_{12}) was found to be the most significant one for ensuring all the desirable growth-related parameters besides yield and other quality attributes of Edward Rose.

LITERATURE CITED

1. Neima HA, Ahmad FK, Ahmed TA, Amen TA. 2020. Effect of fertigation on the cut rose growth and yield under semi-controlled conditions in Sulaymaniyah city. *Journal of Applied Horticulture* 22(1): 8-11.
2. Bar-Yosef B. 1999. Advances in fertigation. *In*: Advances in Agronomy; Volume 65: D.L. Sparks (ed). Academic Press: London, UK. https://doi.org/10.1016/S0065-2113(08)60910-4. pp 1-77.
3. Kafkafi, U. and S. Kant, 2004. Fertigation. In: Encyclopaedia of Soils in the Environment, Volume 2: D. Hillel (eds). Academic Press. NY. p. 1-9.
4. Manimaran, P., P. Rajasekar, D. Rameshkumar and M. Jaison, 2017. Role of nutrients in plant growth and flower quality of rose: A review. *Intl. Jr. Chemical Studies* 5(6): 1734-1737.
5. Krishna. B., K. Krishnappa, N. Reddy and M. Anjanappa.1999. Effect of fertigation on growth and yield of carnation cultivars grown under poly house. *Mysore Jr. Agric. Sciences* 33(1): 33-38.
6. Yusuf, N. and T. Dennis. 1999. Distribution of nutrient in cut flower roses and quantities of biomass and nutrients removed during harvest Hort. Sci. 34 (2): 251-253
7. Panse VG, Sukhatme PV. 1985. *Statistical Methods for Agricultural Workers*. ICAR, New Delhi. pp 134-192.
8. Chaudhari CK, Jadav RG, Masu MM. 2010. Effect of biofertilizers and their combinations with nitrogen fertilizer on growth, yield and quality of rose (*Rosa damascena* L.). *Asian Jr. Horticulture* 4(2): 373-376.
9. Haripriya K, Senthilkumar S, Sriramachandrasekharan V. 2004. Effect of vermicompost and fertilizer on the growth and yield of Rose. *Jr. Interacad*. 8(2): 207-210.
10. 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.
11. Sankari A, Anand M, Arulmozhiyan R. 2015. Effect of bio-stimulants on yield and post-harvest quality of gladiolus cv. White prosperity. *The Asian Journal of Horticulture* 10(1): 86-94.
12. Hadi G, Mehdi R, Asghari HR, Hassan GG, Sharififar A. 2016. Cultivation of Tuberose in pot and field with humic acid treatments under a semi-arid climate. *Indian Jr. Horticulture* 73(3): 391-395.
13. 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.