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Research Journal of Agricultural Sciences
An International Journal

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

Volume: 12
Issue: 06

Res. Jr. of Agril. Sci. (2021) 12: 1937–1943

CARAS

Res. Jr. of Agril. Sci. (Nov-Dec 2021) 12(6): 1937–1943
www.rjas.org

Full Length Research Article

Effect of Growth Retardants on Growth, Yield and Quality of Jathi Malli (*Jasminum grandiflorum* L.)

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Received: 16 Jul 2021 | Revised accepted: 05 Oct 2021 | Published online: 04 Nov 2021

A B S T R A C T

The present investigation was carried out in the Department of Horticulture, Annamalai University during the year 2017-19 in randomized block design with ten treatments and three replications. The results indicated that foliar spray of cycocel 1000 ppm recorded the maximum reduction in plant height (112.28 cm) and internodal length (6.68 cm), whereas the other growth characters like number of branches per plant (81.65) and number of leaves per branch (135.97) were recorded the best in the treatment T_6 which received the application of mepiquat chloride 75 ppm foliar spray. The plant spread was recorded the maximum of 120.63 cm^2 in T_{10} (control), which was closely followed by treatment T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP) with the value of 119.01 cm^2. A moderate reduction in leaf area (13.07 cm^2) and the maximum chlorophyll content (1.648 mg g^{-1}) were observed with the application of mepiquat chloride 75 ppm foliar spray (T_6) followed by T_3 (Cycocel 1000 ppm foliar spray at 45th and 90th DAP). The early flower bud appearance (61.58 days) was noticed in the treatment T_3 (Cycocel 1000 ppm foliar spray at 45th and 90th DAP), which was closely followed by T_6 (62.73 days). The yield and yield attributes viz., hundred flower bud weight (9.53 g), flower buds yield per plant per year (3.12 kg) and estimated flower buds yield per hectare per year (10.45 tonnes) were also found to be the maximum in the plants treated with mepiquat chloride 75 ppm foliar spray on 45th and 90th DAP (T_6). The application of mepiquat chloride 75 ppm foliar spray on 45th and 90th DAP (T_6) exerted favourable influence and enhanced the quality parameters *viz*., flower bud length (4.37 cm), corolla tube length (2.28 cm), flower bud diameter (0.41 cm), flower diameter (3.82 cm), shelf life (33.23 hours) and visual scoring (9.60). Therefore, the present study has resulted that the application of mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP (T_6) was found to be beneficial for the effective cultivation of jasmine – jathi malli (*Jasminum grandiflorum* L.).

***Key words*:** *Jasminum grandiflorum* L., Growth retardants, Cycocel, Mepiquat chloride, Paclobutrazol

India has a long tradition of floriculture, with flowers forming an integral part of almost all the religious, social and cultural activities of Indian society. Commercial floriculture in India comprises of both the modern and the traditional groups of flowers. Among the traditional flowers, jasmines are the most significant flowers. Jasmine flowers are used for various purposes viz., making garlands, bouquets, adoring hair of women, religious offering and concrete extraction. Jathi malli (*Jasminum grandiflorum* L.) is an ornamental plant of Oleaceae family. It is semi evergreen to deciduous shrub reaching a length of 8 meters, often with pendulous branches. The leaves are odd-pinnate with 7 to 9 leaflets of equal size. The flowers are white with faint, pinkish streaks, delightfully fragrant and borne in lax terminal inflorescences. These flowers are not only essential to the perfumery industry but also have been highly appreciated by Orientals since time immemorial. The pretty jasmine flower originated in the lower valleys of the Himalayas of northern India [1]. Presently India is the second largest producer of flowers after China. In India, area under floriculture production was 308 thousand ha with a production of 1806 thousand tonnes of loose flowers and 704 thousand tonnes of cut flowers. India has exported 20703.46 metric tonnes of floriculture products to the world for the worth of Rs. 507.31 crores in 2017-18. United States of America, United Kingdom, Germany, Netherlands and United Arab Emirates were the major importing countries of Indian floriculture products during 2017-18 (APEDA AgriXchange, 2018). Tamil Nadu stands first in the area under flower cultivation (35.30 thousand ha) as well as loose flower production (520.38 thousand metric tonnes) in 2018-19. (http://tnhorticulture.tn.gov.in.gov.in/horti/flowers). In India, jasmines are cultivated throughout the country. However, the largest area under jasmine flower production

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is in Tamil Nadu followed by Karnataka. The major jasmine producing districts of Tamil Nadu are Madurai, Erode, Coimbatore, Dindigul, Salem, Thirunelveli, Virudhunagar and Trichy of which Madurai and Erode are predominant districts [2].

Recently, jasmine cultivation has received a fillip through research findings which indicated the potentiality of south Indian jasmine. But, one of the serious limiting factors affects both jasmine flower growers and the consumers is that the flowering of all the *Jasminum* species is seasonal. The time of peak flowering does not coincide with the time of high demand. Therefore, any method of modifying the flowering sequence to avoid peak production in particular month and promotion of a more or less continuous and uninterrupted flower production with higher yield and quality throughout the year by using any cultural practices will be an immense use for both the producers and consumers. Further, any cultural practices which will induce more flowering during the heavy demand period even in the regular season will also be much more useful to both the farmers and consumers. In the recent years, a number of plant growth retardants have been used in the field of agriculture for inducing more acceptable plant characteristics like compact growth, dwarfness and increased number of healthy branches, which are the desired traits in modern floriculture industry [3-4]. It´s also used to regulate shoot growth, stem elongation, to induce secondary branches, early flowering, to increase the number of flowers, reductions of leaf expansion and to get thicker leaves with deep green colour. It also increases the tolerance to plants to temperature and drought stress, thereby improving shelf life and extending the flower marketability [2]. Plant growth retardants modify the plant physiological processes within the plant, which ultimately suppress the plant growth and development, improve the flower production [5]. The available information regarding the impact of growth retardants viz., paclobutrazol, cycocel and mepiquat chloride on the jasmines especially in *Jasminum grandiflorum* L. is scanty. Keeping in view of the above facts, the present study entitled “Effect of growth retardants on growth, yield and quality of jasmine - Jathi malli (*Jasminum grandiflorum* L.)” was undertaken.

MATERIALS AND METHODS

The present study was carried out during the year 2017-19 in the Department of Horticulture, Annamalai University. The details relating to treatments, methods and materials used are described under following headings. Treatment details are described below:

Crop	:	Jathi malli (*Jasminum grandiflorum* L.)
Experimental design	:	Randomized Block Design
Cultivar	:	Thiruvannamalai local
No. of treatments	:	Ten
No. of replications	:	Three
Spacing	:	2.0 × 1.5 m

Table 1 Treatments details

T_1: Cycocel 500 ppm foliar spray at 45th and 90th DAP
T_2: Cycocel 750 ppm foliar spray at 45th and 90th DAP
T_3: Cycocel 1000 ppm foliar spray at 45th and 90th DAP
T_4: Mepiquat chloride 25 ppm foliar spray at 45th and 90th DAP
T_5: Mepiquat chloride 50 ppm foliar spray at 45th and 90th DAP
T_6: Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP
T_7: Paclobutrazol 250 ppm soil drench at 45th and 90th DAP
T_8: Paclobutrazol 500 ppm soil drench at 45th and 90th DAP
T_9: Paclobutrazol 750 ppm soil drench at 45th and 90th DAP
T_{10}: Control (Water spray)

Preparation of field: The Plants taken up for the trials were already existing one, which were pruned during last week of December 2017 uniformly and the treatments were imposed during the last week of January 2018. The recommended dose of nutrients such NPK @ 30:60:60 g / plant / year was applied in the form of Urea (46.4% N) Single Super Phosphate (16.5% P_2O_5) and Muriatic of Potash (60% K_2O) respectively. Half dose of nitrogen and full dose of P_2O_5 and K_2O mixed with 5 kg FYM were applied to all the treatments immediately after pruning.

Aftercare: Irrigation was done as flooding for the individual replication once in a week or once in ten days depending upon the soil and climatic conditions. Weeds were removed periodically by hand weeding. Other cultivation practices including plant protection measures were carried out as the recommended package of practices.

Preparation of growth retardants: The growth retardant chemicals are water soluble in nature and hence the formulation was dissolved in distilled water and then volume was made up to the solution needed with desired concentration.

Treatment of plants: Spray was done on 45th and 90th day after pruning, when the new shoots appeared with sufficient good number of freshly emerged shoots with leaves. The freshly prepared chemical formulation was sprayed at different concentrations. Drench was done on 45th and 90th day after pruning, when the plants attain sufficient good number of fleshy emerged shoots with leaves. The freshy prepared paclobutrazol was drenched at 10 cm diameter from the base to surrounding areas at different concentrations.

Observations recorded: The biometric observations like growth, physiological, yield and quality parameters were observed in each treatment replications at 180 days after pruning.

Growth and physiological parameters

Plant height (cm): The plant height from the ground level to growing tip of the plant was recorded on 180 days after pruning (DAP) and the mean plant height was worked out and expressed in cm.

Number of branches per plant: The total number of branches produced by the plant was counted on 180 days after pruning and the mean value was calculated and expressed in number.

Number of leaves per branch: The total number of leaves on each tagged branch in each plant of treatment replications was recorded and average number of leaves per

branch was worked out and expressed in numbers at 180 days after pruning.

Internodal length (cm): The intermodal length was measured between the 4 and 5 internodes from the tip of the plant on 180 days after pruning in each treatment replications and the mean value was calculated and expressed in centimetres.

Plant spread (cm²) [North-South]: The plant spread was measured and expressed as sq.cm. For the observation of radius, the maximum plant spread along the North-South direction was measured in each treatment replications and the mean sum was divided by two. By using this 'r', plant spread was calculated by using the formula of πr^2, separately for North-South direction for each treatment and expressed in cm^2.

Leaf area (cm²): The leaf area was estimated at 180 DAP from a fully expanded fifth leaf from the tip by using the leaf area meter (spectronic – model 211) from the replication plants and the mean was calculated and expressed in cm².

Chlorophyll content (mg g^{-1}): The leaf sample of 500 mg was taken at 180 DAP from a fully expanded fifth leaf from the tip and was ground well in a mortar using 10 ml of 80 per cent acetone and the chlorophyll was extracted by centrifuging at 3000 rpm for 10 minutes. The supernatant was made upto 25 ml with acetone and chlorophyll content was estimated spectrometrically at 640 and 663 nm for chlorophyll 'a' and chlorophyll 'b' respectively and also the total chlorophyll content was computed [6]. The values are expressed as mg g^{-1}.

Yield parameters

Days taken for first flower bud appearance: The number of days taken for first flower bud appearance in each treatment plant was recorded by counting the days from the date of pruning till the appearance of flower bud in each treatment and expressed in days.

Hundred flower bud weight (g): A total of hundred flower buds were taken randomly from each treatment replications during peak season of flowering, weighed separately and the average was worked out for each treatment and expressed in grams.

Flower bud yield (g $plant^{-1}$ $year^{-1}$): The fresh flower bud weight of flowers picked from the whole plant in each treatment were recorded daily and computed separately and the mean was worked out and expressed as g $plant^{-1}$ $year^{-1}$.

Estimated flower bud yield (t ha^{-1} $year^{-1}$): The yield of flower buds per hectare per year was estimated by using the individual plant flower buds yield per year by multiplying the per hectare plant population for each treatment and expressed in tonnes per hectare per year.

Quality parameters

Flower bud length (cm): The length of the flower bud was measured from the terminal end of the corolla tube to the tip of the randomly selected 10 buds in each treatment replications at 180 DAP and the mean was worked out and expressed in centimeters.

Corolla tube length (cm): The length of the corolla tube was measured from the terminal end to the tip of the corolla tube of the randomly selected 10 buds in each treatment replications at 180 DAP and the mean was worked out and expressed in centimeters.

Flower bud diameter (cm): The diameter of the fully matured ten flower buds was measured at the top end of the flower buds diagonally in each treatment replications at 180 DAP and the mean was worked out and expressed in centimeters.

Flower diameter (cm): The diameter of the fully matured ten flowers was measured at the top end of the flower diagonally in each treatment replications at 180 DAP and the mean was worked out and expressed in centimeters.

Visual scoring: Visual scoring test of the flower buds were conducted by a panel of five judges at the time of harvest for each treatment replications. The observations were recorded on the basis of colour, thickness, fragrance, freshness and other ornamental characters of the flowers and rated as below (Maximum = 10).

Excellent	:	9.1 to 10
Very good	:	8.1 to 9
Good	:	6.1 to 8
Acceptable	:	5.1 to 6
Unacceptable	:	0 to 5

The mean score was worked out for each treatment.

Shelf life (hours): Hundred flower buds from each treatment replications comprised the materials for shelf-life study. Flowers were kept in a plastic plate at room temperature. Number of hours taken from the time of start to the withering of flowers was taken as shelf life and the mean was worked out for each treatment and expressed in hours.

Statistical analysis

The data on various parameters were analyzed statistically as per the procedure suggested by [7].

RESULTS AND DISCUSSION

Plant height (cm)

It is evident from the present investigation that significant variation exists among the growth retardant concentrations with respect to the plant growth, physiological, yield and quality characters. The data on growth and physiological parameters (Table 2) showed that the application of growth retardants viz., cycocel (500, 750 and 1000 ppm), mepiquat chloride (25, 50 and 75 ppm) and paclobutrazol (250, 500 and 750 ppm) were very effective in suppressing the plant height and the degree of retardation increased with the respective higher concentration. The minimum plant height was recorded in T_3 (cycocel 1000 ppm foliar spray at 45th and 90th DAP) with value of 112.28 cm on 180 DAP and it is followed by T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP). The reduction of plant height is related to the balance of the hormones caused by the application of growth retardants, which interferes

with the biosynthesis of gibberellic acid and inhibits the formation of this hormone in plant which ultimately reduced the plant height through physiological changes [8]. The treatment with cycocel retarded the plant growth and arrested the apical dominance more specifically by its inhibitory action on auxin and gibberellins transport in several ornamentals [9].

Number of branches per plant

The number of branches per plant were found to be the high in the treatment T_6 with value of 81.65 at 180 DAP which received the application of mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP. This is followed by treatment T_3 which received the application of 1000 ppm Cycocel foliar spray at 45th and 90th DAP. This might be due to the effect of application on growth retardants which inhibited gibberellins biosynthesis. With the reduced concentration of gibberellins due to growth retardants application, there is a less elongation of cells in the stem which restrict the vertical growth and increased the branches both the side due to the suppression of apical dominance. This favours the production of secondary branches of plant. These findings are in accordance with the findings of [10] and [11] in *Jasminum sambac* and [12] in sunflower.

Number of leaves per branch

Production of leaves was enhanced by the application of growth retardants which may be due to the production of more number of branches by treating the plants with growth retardants. In *J. grandiflorum* L., application of mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP produced the maximum number of leaves. This is followed by treatment T_3 which received the application of cycocel 1000 ppm foliar spray at 45th and 90th DAP. These have supportive evidence from the findings of [13] in lily 'Enchantment' and [14] in lemon grass.

Internodal length (cm)

The minimum intermodal length was exhibited in the treatment cycocel @ 1000 ppm (T_3). This treatment was followed by (T_6) mepiquat chloride 75 ppm foliar spray at 45th and 90thDAP.The reduction in plant height may also be attributed to its inhibitory action on cell division and cell elongation of sub apical meristem and shortening of internodes and earlier cessation of terminal growth [15-16]. These observations are in close proximity to the findings of [17] in jasmine, [18] in Zinnia and [19] in chrysanthemum pot mum cv. Royal Purple.

Plant spread (cm²) [North-South]

The number of leaves and plant spread are the main photosynthetic characters in plants and synthesize the various metabolites required for plant growth and development. These characters play an impressive role in photosynthetic efficiency of the plant. The results of the present study have indicated the maximum plant spread in T_{10} (Control), followed by treatment T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP). The excessive vegetative growth may be controlled by mepiquat chloride which will reduce the risk of lodging due to intensive rainfall or wind, thereby helping to adjust a perennial plant species to annual cycle of cultivation and can be kept more compact plants. Further, mepiquat chloride is capable of inducing more branches of current season which is a foremost requirement of jasmine because of it flowering on current season growth in a compact plant ideotype. These results were probably due to the inhibiting effect of growth retardants, in turn reducing the shoot growth and elongation through cell division and cell elongation, which decreased the plant in chrysanthemum and other floricultural crops [20-21].

Leaf area (cm²)

In the present study, the leaf area got reduced by application of growth retardants but, the maximum leaf area of 13.26 cm^2 was observed in (T_{10}) control, which was closely followed by T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP) and T_3 (Cycocel 1000 ppm foliar spray at 45th and 90th DAP). The leaves of plants treated with retardants are deep green in color due to enhanced synthesis of chlorophyll and produced thicker leaf blades with reduced leaf area [22]. These results were in conformity with the findings of [23] in brush cherries (*Syzygium campanulatum*).

Chlorophyll content (mg g^{-1})

The chlorophyll is an essential component for photosynthesis and it occurs in chloroplast as a green pigment in all photosynthetic plant tissues. Among the various treatments, the treatment T_6 (Mepiquat chloride 75ppm foliar spray at 45th and 90th DAP) recorded the maximum value of chlorophyll content (1.648 mg g^{-1}), followed by treatment T_3 (Cycocel 1000 ppm foliar spray at 45th and 90th DAP) with the value of 1.624 mg g^{-1}. The plant spread, number of leaves, leaf area and chlorophyll content are more directly related to the photosynthetic efficiency of the plant as reported by [24] and [25] in gladiolus and [26] in chrysanthemum.

Table 2 Effect of growth retardants on growth and physiological parameters of Jathi malli (*Jasminum grandiflorum* L.)

Treatments	Plant height (cm)	No. of branches per plant	No. of leaves per branch	Internodal length (cm)	Plant spread (cm^2)	Leaf area (cm^2)	Chlorophyll content (mg g^{-1})
T_1	172.61	76.14	127.77	8.72	107.87	11.53	1.508
T_2	137.96	79.41	132.58	7.53	114.21	12.39	1.589
T_3	112.28	80.84	134.76	6.68	117.15	12.85	1.624
T_4	164.26	76.97	128.93	8.41	109.13	11.76	1.528
T_5	146.92	78.61	131.42	7.82	112.51	12.17	1.568
T_6	121.88	81.65	135.97	6.98	119.01	13.07	1.648
T_7	178.26	75.55	126.91	8.98	105.48	11.29	1.492
T_8	155.42	77.78	130.13	8.12	110.83	11.95	1.549
T_9	134.85	80.04	133.51	7.29	115.90	12.62	1.604
T_{10}	187.35	74.51	125.78	9.28	120.63	13.26	1.473
S.Ed	4.17	0.39	0.56	0.14	0.84	0.10	0.009
CD (P=0.05)	8.34	0.79	1.13	0.28	1.68	0.21	0.018

Yield parameters

Days taken for first flower bud appearance

The data on days to commencement of flowering revealed that early flowering was observed with the application of cycocel 1000 ppm foliar spray at 45th and 90th DAP with the value of 61.58 days (Table 3). This treatment was on par with the treatment T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP) with 62.73 days. The early flowering by the application of plant growth retardants might have been due to the fact that growth retardants would cause artificial stress in the plant system which would trigger the reproductive mechanism in the plant system earlier by using the sufficient food reserves generated by the jasmine plant due to appropriate level of growth retardant spray such as cycocel and mepiquat chloride [11]. These results are coordinated with [27] in nerium and [28] in jasmine.

Hundred flower bud weight (g)

The highest value of hundred flower bud weight (9.53 g) was observed in the treatment T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP) (Table 3). The next best treatment was T_3 (Cycocel 1000 ppm foliar spray at 45th and 90th DAP). It may be related to diversion of photosynthates towards the axillary buds and inhibition of apical dominance, which would have triggered the reproductive shoots as more number of current season branches in which jasmines would produce flowers. This goes in line with earlier reports by [29], [30] and [11] in jasmine.

Flower bud yield (g plant^{-1} year^{-1})

The maximum flower buds yield plant^{-1} year^{-1} (3.12 kg) and estimated flower buds yield hectare^{-1} year^{-1} (10.45 tonnes) were observed in the treatment T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP) (Table 3). The more number of branches ultimately resulted in increased yield of flower buds. Thus, it appears that flower yield depends on number of branches on the current season. Due to the production of more number of leaves in mepiquat chloride treated plants, resulted in increased photosynthesis and ultimately a large reserve food source leading to production of more number of flowers per plant. This finding was supported by [29], [30] and [11] in jasmine. The application of mepiquat chloride resulted in early flowering because it redirects the carbohydrates away from vegetative to reproductive growth earlier for a lengthy flowering period which ultimately resulted in increased yield. These results are supported by [31-34] who reported similar findings for sunflower.

Table 3 Effect of growth retardants on yield parameters of Jathi malli (*Jasminum grandiflorum* L.

Treatments	Days taken for first flower bud appearance	Hundred flower bud weight (g)	Flower bud yield (g plant^{-1} year^{-1})	Estimated flower bud yield (t plant^{-1} year^{-1})
T_1	70.61	7.86	2.43	8.12
T_2	65.26	8.85	2.83	9.48
T_3	61.58	9.27	3.02	10.11
T_4	69.28	8.11	2.53	8.44
T_5	66.59	8.60	2.73	9.14
T_6	62.73	9.53	3.12	10.45
T_7	71.63	7.71	2.35	7.87
T_8	67.92	8.36	2.62	8.77
T_9	64.08	9.03	2.90	9.71
T_{10}	73.08	7.46	2.18	7.50
S.Ed	0.63	0.11	0.04	0.16
CD (P=0.05)	1.27	0.23	0.09	0.32

Table 4 Effect of growth retardants on quality parameters of Jathi malli (*Jasminum grandiflorum* L.)

Treatments	Flower bud length (cm)	Corolla tube length (cm)	Flower bud diameter (cm)	Flower diameter (cm)	Visual scoring
T_1	3.50	1.93	0.34	3.43	7.99
T_2	4.02	2.15	0.38	3.67	8.95
T_3	4.23	2.22	0.40	3.75	9.35
T_4	3.63	1.98	0.35	3.49	8.24
T_5	3.89	2.10	0.37	3.60	8.72
T_6	4.37	2.28	0.41	3.82	9.60
T_7	3.43	1.91	0.34	3.41	7.81
T_8	3.77	2.04	0.36	3.54	8.46
T_9	4.11	2.17	0.39	3.70	9.12
T_{10}	3.30	1.85	0.33	3.34	7.59
S.Ed	0.12	0.02	0.004	0.02	0.11
CD (P=0.05)	0.25	0.04	0.008	0.05	0.22

Quality characters

Application of growth retardants significantly influenced the flower quality characters of jasmine. The maximum flower bud length (4.37 cm), corolla tube length (2.28 cm), flower bud diameter (0.41 cm) and flower diameter (3.82 cm) were observed in the treatment T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP), followed by T_3 and T_9 (Table 4). This might be due to their inhibitory role on cell division and cell elongation of apical meristematic cells as an anti-gibberellin compound. Mepiquat chloride can restrict vegetative growth, inducing the plant to direct more carbohydrates to the reproductive organs. Hence, the vegetative growth was restricted which favours stored carbohydrates and other nutrients to play their

role on flowering. These results are in conformity with the findings of [35] in calendula, [36] in annual chrysanthemum and [11] in jasmine.

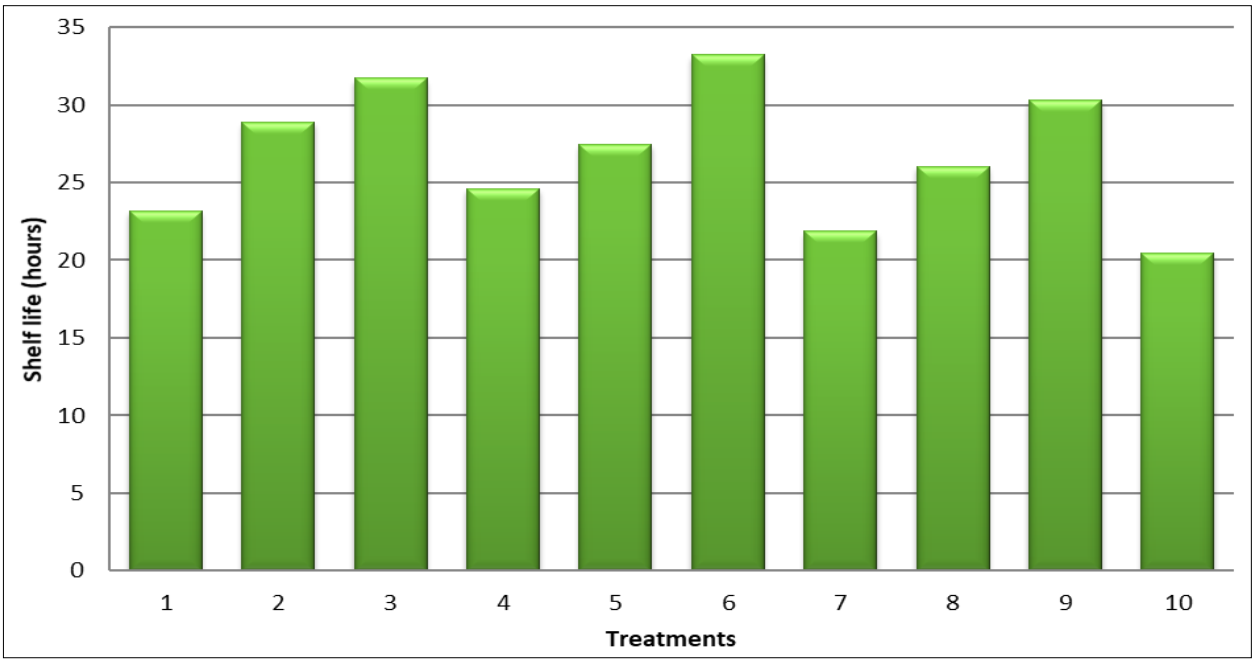

Fig 1 Effect of growth retardants on shelf life (hours) of jathimalli *(Jasminum grandiflorum* L.)

Shelflife (hours)

With regards to other quality aspect like shelf life (33.23 hours) (Fig 1), the treatment T_6 (Mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP) was found to be excellent treatment followed by treatment T_3 (Cycocel 1000 ppm foliar spray at 45th and 90th DAP) and T_9 (Paclobutrazol 750 ppm soil drenching at 45th and 90th DAP). Extension in shelf life of flowers is a key issue in post-harvest management of flowers like jasmine which is highly perishable and sensitive to ethylene. Better quality of jasmine flowers might be due to higher carbohydrate, other essential nutrients, plant growth regulators and enzymes deposition in flower cells. Similar findings were reported by [5] in China aster local variety for cycocel spray. Paclobutrazol also performed well in this regard. This finding was in agreement with the observation made by [37] in chrysanthemum, [38] in chrysanthemum, [39] in sunflower cv. Sunbright Supreme and [40] in lily.

CONCLUSION

From this experiment, it was revealed that all the parameters were significantly influenced by different growth retardants in various concentrations. The plant characteristics like maximum reduction in plant height and internodal length along with early flower bud appearance were found to be the best in the treatment T_3 (Cycocel 1000 ppm foliar spray at 45th and 90th DAP), while the mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP (T_6) showed the moderate reduction in leaf area, the maximum chlorophyll content, enhanced the flower bud length, corolla tube length, flower bud diameter, flower diameter, shelf life and visual scoring. The yield and yield attributes viz., hundred flower bud weight, flower buds yield per plant per year and estimated flower buds yield per hectare per year were also found to be the maximum in the mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP (T_6). The overall results of this present study revealed that the mepiquat chloride 75 ppm foliar spray at 45th and 90th DAP (T_6) was found to be beneficial for the effective cultivation of jasmine – jathi malli (*Jasminum grandiflorum* L.) under open field condition.

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