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EFFECT OF MALEIC HYDRAZIDE ON GROWTH, FLOWERING AND YIELD OF NERIUM (*NERIUM ODORUM* L.) *CV*. ROSE SINGLE

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Abstract

An experiment was carried out to study the effect of maleic hydrazide ongrowth, flowering and yield of *Nerium odorum cv.* Rose Single at the farmer's field in Keelaiyur village, Tranquebar taluk, Nagapattinum district, Tamilnadu. The treatments were comprised of different concentration of MH @ 500, 1000, 2000, 3000 ppm and control was maintained by spraying with distilled water. The experiment was laid out in randomized block design with four replications. The results revealed that among the different concentration of MH used, MH @ 3000 ppm-T_5 recorded the maximum reduction in plant height (118.62cm), leaf area (20.65cm^2), early flowering (117.83 days) and maximum duration of flowering (177.12), flower diameter (5.51cm), hundred flower weight (41.04g). However, the treatment T4- MH 2000 ppm recorded the increased number of primary branches per plant (6.79), secondary branches per plant (47.78), number of leaves per plant (1038.26), plant spread (106.46), number of flowers per plant (1701.32), flower yield per plant (692.93g) and flower yield per plot (13.88 Kg).

Key words: Nerium, MH, maleic hydrazide, growth retardant, growth, flowering and yield

Introduction

Nerium botanically known as *Nerium odorum* L. belongs to the family Apocynaceae. Fresh flowers are used for makinggarland, worshipping in home and temple, hair adornment and floral decorations. The shrub is having an ornamental value for avenue planting, border planting and potted plants (Huxley, 1992). Apart from its ornamental use and loose flower production, this shrub is also known for its medicinal purpose (Adome *et al*., 2003). Among the loose flowers grown in Tamilnadu, nerium occupies 5th place with respect to its volume in trade after jasmine, chrysanthemum, rose and crossandra. Its cultivation in Tamilnadu is estimated around 1,408 ha with the production of 33, 780t (Kannan *et al*., 2016). Growth retardants are valuable in floriculture for manipulating growth and flowering of many ornamental plants. Growth retarding chemicals at on optimum concentration improve the efficiency of the plants by modifying the various process such as photosynthesis, transpiration, photorespiration, water and nutrient uptake in a beneficial way. Their effect varies with plant species, variety, concentration used, frequency of application and various other factors which influence the uptake and translocation of the chemical (Thrishul, 2005). Maleic hydrazide is the first synthetic growth suppressor to be reported. The trade names are MH-30, Royal MH-30 and SLO-Grow. When applied as a spray to plants, maleic hydrazide is taken up by the leaves and is readily translocated both in xylem and phloem tissues resulting in distribution throughout the plant. The effect of formulated maleic hydrazide ranged from retardation of vegetative growth to prevention of sprouting in certain crops in storage. Maleic hydrazide is translocated throughout the plant and is not metabolised. Hence, the present study was undertaken to ascertain the most appropriate concentration of MH for improving the growth, flowering and yield of *Nerium odorum cv.* Rose Single.

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Materials and methods

The present investigation was carried out at the farmer's field in Keelaiyur village, Tranquebar taluk, Nagapattinum district, Tamilnadu. Two years old bushes of uniform size were selected for the experiment. The plants were originally propagated from stem cuttings and

planted at a spacing of 1m×1m. The plants were pruned by cutting back the shoots at 45cm height from the ground level. To each plant a fertilizer mixture of 120:120:120g N, P, K and FYM at the rate of 10 kg were applied. The entire doses of P, K and one third of N were applied as basal after pruning and remaining N was applied as two split doses. Other cultural operations such as irrigation, weeding and plant protection were followed uniformly for all plants. The treatments comprised of MH @ 500, 1000, 2000, 3000 ppm and control was maintained by spraying with distilled water alone. The first spray was given on newly emerged shoots 60 days after pruning as per treatment schedule and second spray was employed 30 days after the first spray. Four plants were maintained for each replication and the experiment was laid out in a randomised block design with five different treatments and four replications. Observations were recorded ongrowth, flowering and yield parameters. Data under different characters were analysed statistically as suggested by Panse and Sukhatme (1978).

Results and discussion

Effect of MH ongrowth attributes of *Nerium odorum cv.* Rose Single

Effect of MH ongrowth attributes of *Nerium odorum cv.* Rose varied significantly with MH treatments table 1. The marked reduction in plant height was observed due to increase in concentration of MH. The maximum retardation was obtained with T_5- MH 3000 ppm (118.62cm) followed by T_4- MH 2000 ppm (125.01cm). While the plants in control plot (T_1) recorded the taller (154.07cm). Spraying of growth retardants seemed to restrict the plant height by suppressing apical dominance and thereby promoted the plant spread. The reduction in plant height was due to inhibition of gibberellin biosynthesis and suppression of apical dominance completely by inhibiting the cell division on the apical meristem, there by resulting in shorter plant. Similar results were reported earlier by Kavitha (2001) in *Jasminum sambac* and Ravikumar (2001) ingolden rod. All the concentration of MH significantly promoted the number of primary and secondary branches. Maximum number of primary and secondary branches was observed with T_4- MH 2000 ppm (6.79 and 47.78 respectively) followed by T_5- MH 3000 ppm (6.64 and 46.47 respectively) and minimum was recorded with T_1- control (5.63 and 40.37 respectively). It is mainly due to the inhibitory effect of plant growth retardants on the cell division in the apical bud which subsequently might have stopped the growth of the main axis. This in turn would have more secondary meristamatic activity through movements of nutrients from the primary meristem to secondary meristem which subsequently increased the production of more number of branches (Cathey, 1964). Similar results were also stated by Nage Gowda and Narayana Gowda (1990) in *Jasminum sambac* and Aswath *et al*., (1994) in China aster. All the MH treatments significantly influence the number of leaves per plant and plant spread. The production of leaves were enhanced due to the application ofgrowth retardants in accordance with the production of more number of primary and flowering branches in the plants treated with growth retardants. T_4- MH 2000 ppm recorded the maximum number of leaves per plant (1038.26) and maximum plant spread (106.46cm). This was followed by T_5- MH 2500 ppm with the values of 989.59 and 103.94cm respectively. The least number of leaves per plant (817.23) and plant spread (97.76cm) was registered with control. This is mainly due to the influence ofgrowth retardants on arresting the shootgrowth and lateral buds developed into shoots by destruction of apical dominance, which ultimately increased the number of leaves and plant spread. This is in agreement with Porwal *et al*., (2002) in Damask rose. However, the leaf area was found to be reduced by the application of higher concentration of MH. The maximum reduction in leaf area (20.65cm^2) was noticed with T_5- MH 3000 ppm, followed by T_4- MH 2000 ppm (22.44cm^2). The maximum leaf area (27.43cm^2) was observed with control. The reduction in leaf area as a result of application ofgrowth retardants could perhaps be due to reduction in cell size and construction of cell. The findings of this study are in conformity with the earlier reports of Venkatesan *et al.,* (2004) in triploid crossandra.

Table 1: Effect of MH ongrowth attributes of *Nerium odorum cv.* Rose Single.

Treatments	Plant height (cm)	Number of primary branches	Number of secondary branches	Number of leaves per plant	Plant spread (cm)	Leaf area (cm^2)
T_1- Control	154.07	5.63	40.37	817.23	97.76	27.43
T_2- MH 500	143.24	6.06	41.12	869.54	99.83	25.75
T_3- MH 1000	135.76	6.17	43.23	926.27	101.81	24.28
T_4- MH 2000	125.01	6.79	47.78	1038.26	106.46	22.44
T_5- MH 3000	118.62	6.64	46.47	989.59	103.94	20.65
SED	2.81	0.04	0.52	23.33	0.92	0.61
CD(p=0.05)	5.64	0.09	1.06	46.67	1.86	1.24

Effect of MH on flowering attributes of *Nerium odorum cv.* Rose Single

Application of MH was found to produce significant effects on the flowering characteristics of *Nerium odorum cv.* Rose Single table 2. Early flowering was observed

Table 1: Effect of MH on flowering and yield attributes of *Nerium odorum cv.* Rose Single.

Treatments	Days to 1st flowering (days)	Duration of flowering (days)	Flower diameter (cm)	Hundred flower Weight (g)	Number of flowers per plant	Flower yield per plant (g)	Flower yield per plot (Kg)
T_1- Control	137.76	154.08	4.44	34.71	1266.96	439.76	8.77
T_2- MH 500	133.38	160.33	4.87	37.17	1374.61	510.94	10.18
T_3- MH 1000	127.46	166.24	5.13	38.81	1492.75	579.34	11.55
T_4- MH 2000	123.11	171.46	5.48	40.97	1701.32	692.93	13.88
T_5- MH 3000	117.83	177.12	5.51	41.04	1601.44	657.23	13.12
SED	2.05	2.65	0.11	0.77	52.83	16.36	0.31
CD(p=0.05)	4.12	5.32	0.23	1.55	105.68	32.73	0.63

with T_5- MH 3000 ppm (123.11 days) followed by T_4- MH 2000 ppm (123.11 days). Maximum delay was observed with T_1- control (137.76 days). The early flowering due to the application of plantgrowth retardants might have been due to the fact that such plants have built up sufficient food reserves at initial stages. These reserve foods could have been utilized for the reproductive growth with a restriction in vegetativegrowth. A reduction in the level of endogenousgibberellin might be a prerequisite for floral induction which was achieved by the retardant sprays (Kumar and Haripriya, 2010). Similar findings were reported by Khan and Tewari (2003) in dahlia. Among the various treatments, higher concentration of MH (3000 and 2000 ppm) recorded significantly higher duration of flowering (177.12 and 171.46 days) and minimum was observed in control (154.08 days). These results were in accordance with the reports of Khandelwal *et al*., (2003) in African marigold, Jitendra Kumar and Sanjeev Kumar (2004) in balsam and Sridhar (2006) in jasmine.

Effect of MH on yield attributes of *Nerium odorum cv.* Rose Single

Different concentrations of MH significantly affect all the yield attributes of nerium *cv.* Rose single table 2. The maximum flower diameter (5.51cm), hundred flower weight (41.04g) was noticed T_5- MH 3000. This was followed by T_4- MH 2000 (5.48cm and 40.97g respectively). While the minimum value was noticed with T_1- Control with the values of 4.44cm and 34.71g. The maximum number of flowers per plant (1701.32), flower yield per plant (692.93g) and flower yield per plot (13.88 kg) was recorded with T_4- MH 2000 ppm. This was followed by T_5- MH 3000 ppm (1601.44, 657.23g and 13.12 kg respectively). While the minimum value was recorded with control with the values of 1266.96, 439.76g and 8.77 kg respectively. The treatments T_4 and T_5 are on par with each other for all the yield attributes except flower yield per plant and flower yield per plot. It is well known that MH and all the growth retardants played a major role in suppression of apical dominance, which resulted in increased biometric characters like more no of branches and leaves which resulted in production of maximum leaf area compared to control, which might have resulted in production and accumulation of more photosynthates that were diverted to the Sink (flower) resulting in more number of flowers with better size, weight and ultimately the yield (Sujatha *et al.*, 2002). The results of the present study are in agreement with the findings of Varma and Arha (2004) in African marigold and Patil *et al.,* (2004) ingolden rod.

It is conclude that among the various concentration of maleic hydrazide used, MH @ 2000 ppm (T_5) recorded the maximum number of flowers per plant, flower yield per plant and flower yield per plot.

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