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A STUDY ON THE EFFECT OF NANO DAP AND MONO AMMONIUM PHOSPHATE ON GROWTH PARAMETERS OF JASMINE (*Jasminum sambac*) CV. GUNDUMALLI.

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ABSTRACT

A field experiment was conducted during 2025-2026 at the Floricultural Research Station, Agricultural Research Institute (ARI), Rajendranagar, Hyderabad to evaluate the influence of foliar application of Nano DAP and Mono Ammonium Phosphate (MAP) on vegetative growth of *Jasminum sambac* cv. Gundumalli. The experiment was laid out in a randomized block design with seven treatments and three replications. Treatments consisted of 100% recommended dose of fertilizer (RDF) as control and reduced N and P levels supplemented with Nano DAP @ 3 ml L^{-1} or MAP @ 2 g L^{-1}. Growth observations were recorded at 30, 60 and 90 days after pruning (DAP). Plant height and branch number increased progressively with crop age. Among the growth parameters, T_3 (50% N and P + 100% K + Nano DAP @ 3 ml L^{-1}) recorded the highest plant height (95.26 cm), number of branches (69 $plant^{-1}$) and maximum leaf area (19.96 cm^2), while highest plant spread recorded in T_5 (75% N and P + 100% K + MAP @ 2 g L^{-1}) produced the widest canopy, with (109.82 cm) and (112.80 cm) in east-west and north-south directions, respectively. The highest chlorophyll index (41.48 SPAD) was recorded in T_2 (75% N, P and 100% K + Nano DAP @3ml/L) and the highest branch thickness (7.25mm) was observed in T_1 (100% N, P, K (RDF)-Control). The findings indicate that foliar Nano DAP, particularly when combined with 50% of the recommended N and P and full K, may support vigorous vegetative development while reducing reliance on conventional N and P fertilization.

***Key words*:** *Jasminum sambac*, Gundumalli, Nano DAP, MAP, foliar nutrition, plant height, branches, leaf area, SPAD.

Introduction

Jasmine (*Jasminum spp.*) belongs to the family Oleaceae, is one of the oldest and most cherished fragrant flowers cultivated by humankind. Among its species, *Jasminum sambac* (L.) is an evergreen shrub that grows either upright or as a climber and is widely known as jasmine, tea flower or leafy flower (Leng and Tang, 2018). Jasmine is popularly referred as "Queen of Flowers" because of its captivative fragrance and elegant white blooms (Veluswamy *et al*., 1975). The name "jasmine" itself is derived from the Arabic word 'Jessamine' and the old Persian term 'Yasmyn', both of which signifies fragrance (Bailey, 1947).

In India, floriculture is practiced over an area of 371,860 ha, producing approximately 2,608,850 metric tons of loose flowers annually. Among the major flower crops, jasmine is cultivated on 27,080 ha with an annual production of 273,910 metric tons. The area under jasmine

cultivation in India has got steadily expanded over the past decade, increasing from about 8,500 hectares in 2013-14 to more than 15,000 hectares in 2023-24, while production was almost doubled during the same period (APEDA, 2024). Major jasmine growing states includes Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat and West Bengal and Tamil Nadu ranking first in production.

In Telangana, jasmine (locally called Gundumalli) is cultivated primarily districts around Hyderabad, including Ranga Reddy, Vikarabad, Medchal Malkajgiri, Yadadri Bhuvanagiri and Sangareddy. Although the state has over 7,800 acres under floriculture, jasmine occupies a relatively small share. (Telangana State Horticulture Department, 2025).

Nano-fertilizers have gained attention for their potential to improve nutrient-use efficiency. In jasmine and other ornamental crops, foliar application of nutrients and nano-fertilizers has been reported to enhance plant growth, leaf area and chlorophyll content (Keerthi Shankar *et al*., 2019; Srividhya *et al*., 2021; Sahithi *et al*., 2023). However, limited information is available on the use of foliar Nano DAP and MAP in *Jasminum sambac* cv. Gundumalli. Therefore, the present study was undertaken to evaluate their effect on vegetative growth under field condition.

Material and methods

The experiment was conducted during the late rabi season of 2025-2026 at the Floricultural Research Station, ARI, Rajendranagar, Hyderabad, Telangana. The experimental site was located at approximately 17.32° N latitude and 78.40° E longitude. The experimental soil was described as sandy loam. The crop was *Jasminum sambac* cv. Gundumalli, a commercially important loose-flower type. Plants were pruned to approximately 45 cm height during the last week of December. Drip irrigation, manual weeding and standard plant protection practices were maintained uniformly.

The experiment followed a randomized block design (RBD) with seven treatments and three replications, with three plants per treatment in each replication. The RDF for jasmine was (60:120:120 g) N: P_2O_5: K_2O plant^{-1} year^{-1}. FYM @ 10 kg plant^{-1} was applied and the Nano DAP or MAP foliar sprays were applied six times at 15-day intervals until harvest. A common micronutrient mixture was applied at monthly intervals. Growth parameters like plant height, plant spread, number of branches, branch thickness, leaf area and chlorophyll content (SPAD) were recorded at 30, 60 and 90 DAP.

Table 1: Effect of Nano DAP and MAP treatments on *Jasminum sambac* cv. gundumalli.

Treatment	Details
T_1	100% N, P, K (RDF)-Control
T_2	75% N, P and 100% K + Nano DAP @3ml/L
T_3	50% N, P and 100% K + Nano DAP @3ml/L
T_4	0% N, P and 100% K+ Nano DAP @3ml/L
T_5	75% N, P and 100% K + MAP @ 2g/L
T_6	50% N, P and 100% K + MAP @ 2g/L
T_7	0% N, P and 100% K + MAP @ 2g/L

Plant height was measured from ground level to the uppermost leaf, plant spread was measured in east-west and north-south directions, branches were counted on tagged plants, branch thickness was measured with a vernier caliper, leaf area was determined using a leaf area meter and chlorophyll content was measured using a SPAD meter. Data were analysed using analysis of variance appropriate for RBD and standard error and critical difference at 5% significance were used for treatment comparison.

Results and Discussion

Growth Parameters

The significant variation was observed among the treatments for all the growth parameters of jasmine, viz., plant height, plant spread, number of branches per plant, branch thickness, chlorophyll content and leaf area at 30, 60 and 90 days after pruning (DAP).

Plant height(cm)

The maximum plant height was recorded with T_3

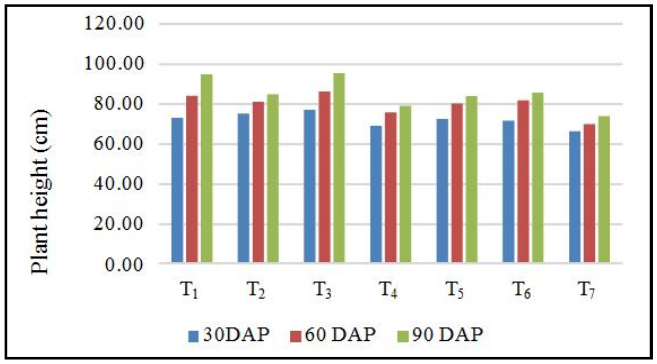


Fig. 1: Effect of Nano DAP and MAP on plant height (cm) of Jasmine at 30, 60 and 90 DAP.

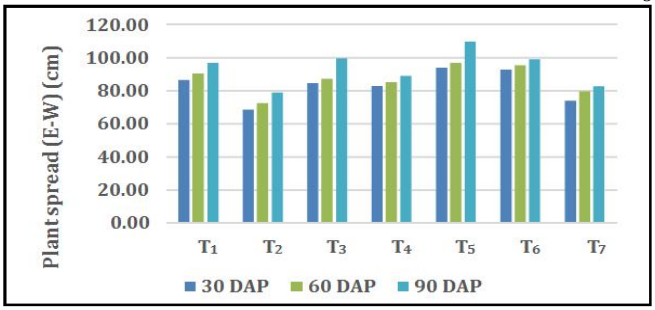


Fig. 2: Effect of Nano DAP and MAP on plant spread(E-W) (cm) of Jasmine at 30, 60 and 90 DAP.

Table 2: Effect of Nano DAP and MAP on plant height (cm), plant spread (E-W)and (N-S) at 30,60 and 90 days.

Treatments	Plant height (cm)			Plant spread (E-W) (cm)			Plant spread (N-S) (cm)		
	30DAP	60DAP	90DAP	30DAP	60DAP	90DAP	30DAP	60 DAP	90 DAP
T_1	72.9^{ab}	84.06^{ab}	94.88^{ab}	86.71^{ab}	90.76^{ab}	97.09^{abc}	85.09^{b}	87.46^{b}	93.14^{b}
T_2	75.11^{ab}	81.07^{ab}	84.68^{ab}	68.72^{c}	72.78^{c}	79.14^{d}	71.14^{cd}	74.1^{bc}	77.46^{bc}
T_3	76.91^{a}	86.18^{a}	95.26^{a}	84.75^{ab}	87.56^{b}	99.76^{ab}	81.46^{cd}	83.56^{bc}	86.17^{bc}
T_4	68.94^{ab}	75.76^{b}	78.91^{b}	83.03^{ab}	85.46^{abc}	89.09^{bcd}	78.44^{cd}	81.75^{bc}	86.45^{bc}
T_5	72.34^{ab}	80.09^{ab}	83.88^{ab}	94.09^{a}	97.12^{a}	109.82^{a}	107.77^{a}	109.13^{a}	112.8^{a}
T_6	71.51^{ab}	81.78^{ab}	85.62^{ab}	93.04^{ab}	95.8^{ab}	99.14^{b}	99.07^{ab}	106.12^{ab}	111.13^{ab}
T_7	66.15^{b}	69.81^{b}	73.76^{b}	74.08^{bc}	79.82^{bc}	82.8^{cd}	66.74^{d}	71.46^{c}	73.14^{c}
S.E.(m) ±	**1.88**	**2.35**	**2.72**	**2.66**	**2.86**	**3.38**	**3.05**	**3.21**	**3.49**
C.D. at 5%	**5.81**	**7.24**	**8.38**	**8.21**	**8.81**	**10.41**	**9.41**	**9.90**	**10.76**
C.V.	**4.53**	**5.10**	**5.53**	**5.53**	**5.69**	**6.24**	**6.28**	**6.35**	**6.61**

(50% N, P + 100% K + Nano DAP @ 3 ml L^{-1}), recorded (76.91), (86.18) and (95.26 cm) at 30, 60 and 90 DAP, respectively. The lowest plant height was observed in T_7, with (66.15), (69.81) and (73.76 cm), respectively. The superior performance of T_3 may be attributed to efficient foliar nutrient absorption and improved availability of nitrogen and phosphorus, which are essential for cell division, cell elongation and protein synthesis. Enhanced nutrient-use efficiency through nano-fertilization could therefore have promoted vigorous vegetative growth. Similar improvements in plant growth following nano-fertilizer application have been reported by Rajesh *et al.*, (2021) and Gowtham and Karuppaiah (2024) in flower crops.

Plant spread (cm^2)

The plant spread increased progressively with crop age in both directions. T_5(75% N and P + 100% K + MAP @ 2 g L^{-1}) recorded the maximum spread at 90 DAP (109.82 cm E-W) and (112.80 cm N-S), while T_2 and T_7 recorded the minimum E-W (79.14 cm) and N-S (73.14 cm) spread, respectively. The increased plant spread may be attributed to enhanced nitrogen availability, which promotes amino acid and protein synthesis, auxin activity and cell division, leading to greater vegetative growth and lateral canopy expansion. Similar responses were reported by Venkatesh *et al.*, (2022) and Rathod *et al.*, (2022).

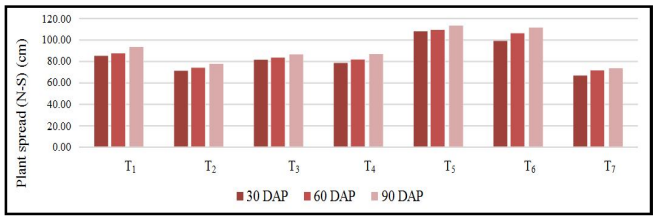


Fig. 3: Effect of Nano DAP and MAP on plant spread (cm) (N-S) of Jasmine at 30, 60 and 90 DAP.

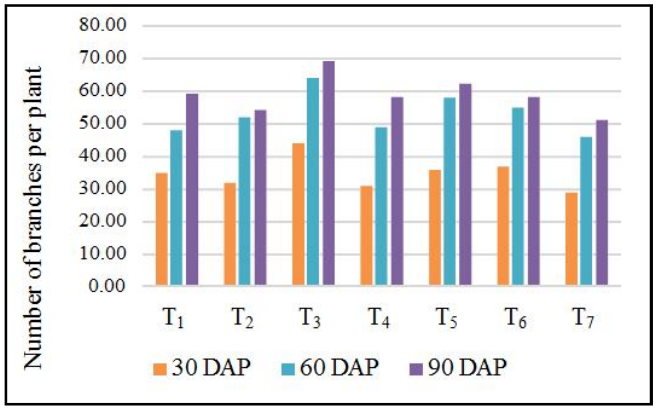


Fig. 4: Effect of Nano DAP and MAP on number of branches per plant of Jasmine at 30, 60 and 90 DAP.

Number of branches per plant

The number of branches increased progressively from 30 to 90 DAP, with T_3 (50% N and P + 100% K + Nano DAP @ 3 ml L^{-1}) recording the maximum branches (44, 64 and 69 branches per $plant^{-1}$), while T_7 recorded the minimum (29, 46 and 51 $plant^{-1}$). The higher branching in T_3 may be attributed to improved N and P nutrition, promoting lateral shoot initiation and vegetative growth. Similar responses were reported by Sahithi *et al.*, (2023) and Pandey (2024).

Branch thickness(mm)

The branch thickness increased with plant age. T_1 (100% N, P and K (RDF)- Control) recorded the highest

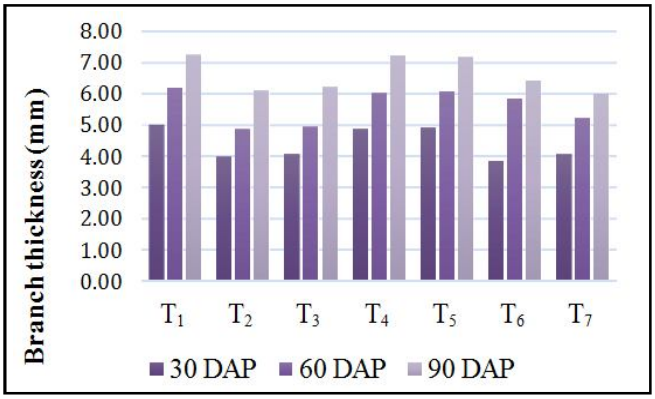


Fig. 5: Effect of Nano DAP and MAP on branch thickness (cm) of Jasmine at 30, 60 and 90 DAP.

Table 3: Effect of Nano DAP and MAP on number of branches per plant and branch thickness at 30, 60 and 90 days.

Treat-ments	NBP			BT		
	30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP
T_1	35^{bc}	48^{b}	59^{b}	4.98^{a}	6.17^{ab}	7.25^{a}
T_2	32^{bcd}	52^{ab}	54^{b}	3.99^{b}	5.21^{bc}	6.12^{c}
T_3	44^{a}	64^{a}	69^{a}	4.09^{b}	4.96^{c}	6.21^{bc}
T_4	31^{cd}	49^{b}	58^{ab}	4.89^{ab}	6.37^{a}	7.21^{ab}
T_5	36^{bc}	58^{ab}	62^{ab}	4.91^{ab}	6.06^{ab}	7.18^{ab}
T_6	37^{b}	55^{b}	58^{ab}	3.86^{b}	5.82^{ab}	6.41^{b}
T_7	29^{d}	46^{b}	51^{b}	4.06^{b}	5.21^{bc}	6.00^{c}
S.E.(m)±	**1.17**	**2.45**	**2.87**	**0.15**	**0.21**	**0.20**
C.D. at 5%	**3.59**	**7.55**	**8.85**	**0.46**	**0.64**	**0.63**
C.V.	**5.79**	**7.99**	**8.48**	**5.88**	**6.31**	**5.32**

NBP: No. of branches plant^{-1}; BT: Branch thickness (mm)

thickness at 30 and 90 DAP (4.98 and 7.25 mm), while T_4 recorded the maximum at 60 DAP (6.37 mm) while T_7 recorded the minimum at 90 DAP (6.00 mm). The improvement in branch thickness may be attributed to enhanced nutrient availability and better vegetative growth, leading to increased stem girth and plant vigor. Similar results were reported by Neeruggi and Nayaka (2024) and Khunt *et al*., (2025).

Chlorophyll content(SPAD)

Chlorophyll content increased throughout the crop

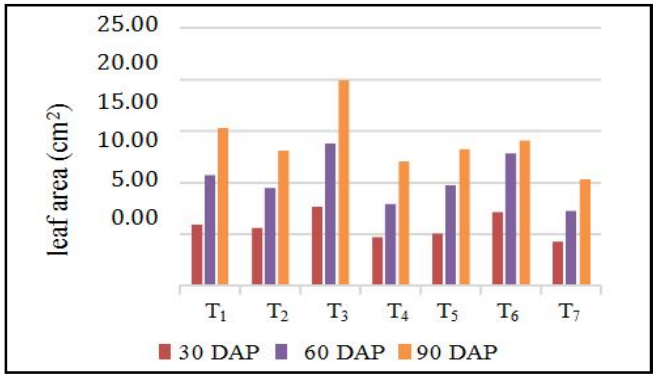


Fig. 6: Effect of Nano DAP and MAP on leaf area(cm^2) of Jasmine at 30, 60 and 90 DAP.

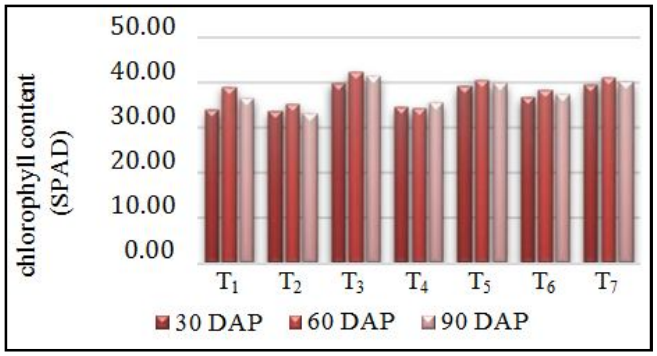


Fig. 7: Effect of Nano DAP and MAP on chlorophyll content (SPAD) of Jasmine at 30, 60 and 90 DAP.

Table 4: Effect of Nano DAP and MAP on chlorophyll content(SPAD) and leaf area(cm2) at 30, 60 and 90 days.

Treat-ments	CC			LA		
	30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP
T_1	47.17^{c}	52.07^{c}	55.74^{c}	5.87^{b}	10.73^{b}	15.33^{b}
T_2	58.35^{a}	63.43^{a}	67.60^{a}	5.57^{cd}	9.47^{bc}	13.12^{bc}
T_3	42.58^{cd}	50.63^{c}	51.94^{d}	7.58^{a}	13.79^{a}	19.96^{a}
T_4	36.77^{d}	41.92^{d}	45.62^{e}	4.66^{cd}	7.93^{cd}	12.08^{cd}
T_5	50.26^{bc}	55.21^{bc}	57.54^{c}	5.00^{cd}	9.77^{bc}	13.26^{bc}
T_6	51.55^{b}	57.60^{b}	63.30^{b}	7.07^{ab}	12.83^{ab}	14.11^{bc}
T_7	37.34^{d}	47.98^{cd}	50.62^{d}	4.23^{d}	7.27^{d}	10.34^{d}
S.E.(m)±	**1.22**	**1.39**	**1.38**	**0.30**	**0.40**	**0.49**
C.D. at 5%	**3.75**	**4.28**	**4.25**	**0.91**	**1.24**	**1.52**
C.V.	**5.72**	**6.21**	**6.32**	**8.99**	**6.82**	**6.07**

CC: Chlorophyll content (SPAD); LA: Leaf area(cm^2)

period, with T_2 (75% N and P + 100% K + Nano DAP @ 3 ml L^{-1}) recording the highest SPAD values at 30, 60 and 90 DAP (58.35, 63.43 and 67.60, respectively). The higher chlorophyll content may be attributed due to enhanced chloroplast activity and efficient nutrient utilization. Similar results were reported by Subrahmanyam *et al*., (2024) in gerbera.

Leaf area(cm^2)

Leaf area increased progressively from 30 to 90 DAP, with T_3(50% N and P + 100% K + Nano DAP @ 3 ml L^{-1}) recording the highest values (7.58, 13.79 and 19.96 cm^2), while T_7 recorded the lowest (4.23, 7.27 and 10.34 cm^2). The greater leaf expansion under T_3 may be attributed to improved N and P utilization, promoting cell division, leaf expansion and photosynthetic activity. Similar results were reported by Reddy *et al*., (2017) & Keerthana *et al*., (2024).

Conclusion

Under the conditions of the present field experiment, foliar application of Nano DAP or MAP influenced vegetative growth of *Jasminum sambac* cv. Gundumalli. T_3, comprising 50% of the recommended N and P, 100% K and Nano DAP @ 3 ml L^{-1}, was the most consistent treatment for plant height, branch production and leaf area. T_5 (75% N and P + 100% K + MAP @ 2 g L^{-1}) with MAP produced the greatest canopy spread, while T_2 (75% N and P + 100% K + Nano DAP @ 3 ml L^{-1}) produced the highest chlorophyll index. Overall, the results indicate that foliar Nano DAP can complement reduced conventional N and P fertilization and maintain vigorous vegetative growth. Multi-season trials with larger plot size and different Nano DAP concentrations are recommended before making a general fertilizer recommendation.

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