International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2017; 5(5): 1816-1818

Received: 21-07-2017
Accepted: 22-08-2017

S Kumaresan
Horticultural College & Research Institute for women, Tamil Nadu Agricultural University, Trichy, Tamil Nadu, India

M Jawaharlal
Horticultural College & Research Institute for women, Tamil Nadu Agricultural University, Trichy, Tamil Nadu, India

Correspondence
S Kumaresan
Horticultural College & Research Institute for women, Tamil Nadu Agricultural University, Trichy, Tamil Nadu, India

Studies on integrated nutrient management for growth and yield of *Jasminum sambac* Ait. CV. Ramanathapuram gundumalli during off season

S Kumaresan and M Jawaharlal

Abstract
The present experiment was conducted in the Botanic Garden, Tamil Nadu Agricultural University, Coimbatore during August 2007 – March 2008 to study the effect of integrated nutrient management for growth and yield of *Jasminum sambac* Ait. CV. Ramanathapuram Gundumalli during off season. The results recorded that the application of 60: 120: 120 g of NPK per plant, 3 per cent panchagavya and 0.4 per cent humic acid registered the highest values for growth and yield characters. It was followed by the application of NPK at 45: 90: 90 g per plant, 3 per cent panchagavya and 0.4 per cent humic acid was recorded.

Keywords: INM, NPK, Panchagavya, Humic acid

Introduction
Jasmine (*Jasminum sambac* Ait.) is one of the most important commercial traditional flower crops belonging to the family Oleaceae. In Tamil Nadu, Gundumalli is commercially cultivated in large areas (Coimbatore, Madurai, Dindigul, Tanjore and Ramanathapuram districts) for its fragrant flowers. For the commercial cultivation of any flower crops nutrient management is the most important factor. Indiscriminate application of chemical nutrients ultimately increases the cost of production and also leads to environmental hazards. At this junction it is important to exploit an alternative strategy to sustain the productivity of crop plants and protect the environment. Biostimulants which supplement the nutrients can reduce the quantity of chemical fertilizers and sustain better growth and yield. Though many studies have been conducted regarding nutrient management in *Jasminum* spp., research on an ideal dose and combination of inorganic nutrients and biostimulants during off season is lacking. Hence it becomes a prime necessity to standardize this type of nutrient management technology to increase the productivity and yield during off season.

Materials and methods
The present study was carried out during August 2007 to March 2008 with sandy loam which contain low level of nitrogen (100.80 kg/ha), medium level of phosphorus (16.2 kg/ha) and high level of potassium (600 kg/ha). One year old jasmine bushes are taken for study and pruned uniformly with the height of 45 cm. The plants are planted at the spacing of 1.2 m X 1.2 m and all the cultural practices are followed as given in the horticultural crop production guide (Hort., 1999) [3]. The experiment was laid out in Randomized Block Design (RBD) with ten treatments viz., T_1: 100% of RDF (Control), T_2: 100% of RDF + 3% Panchagavya + 0.2% Humic acid, T_3: 100% of RDF + 3% Panchagavya + 0.3% Humic acid, T_4: 100% of RDF + 3% Panchagavya + 0.4% Humic acid, T_5: 75% of RDF + 3% Panchagavya + 0.2% Humic acid, T_6: 75% of RDF + 3% Panchagavya + 0.3% Humic acid, T_7: 75% of RDF + 3% Panchagavya + 0.4% Humic acid, T_8: 50% of RDF + 3% Panchagavya + 0.2% Humic acid, T_9: 50% of RDF + 3% Panchagavya + 0.3% Humic acid and T_{10}: 50% of RDF + 3% Panchagavya + 0.4% Humic acid and replicated thrice. (RDF – Recommended Dose of Fertilizers (60:120:120 g of NPK per plant)). Biostimulants were applied through foliar spray. The bushes were sprayed with panchagavya at 3 percent for all the treatments. Humic acid was sprayed at three different concentrations *viz*., 0.2%, 0.3%, 0.4% at fifteen days interval except in control (T_1).
Biometrical observations *viz*., plant height (cm), plant spread (m^2) and leaf area index (Williams, 1946) and yield characters *viz*., number of flower buds per cyme and number of

cymes per plant at the time of harvest, number of flower buds per plant, yield of flower buds per plant (g) were taken from randomly selected five plants and the data are subjected to statistical analysis as suggested by Panse and Sukhatme (1985) [8].

Results and Discussion

The present study was taken up to have a scientific base pertaining to effects of INM and bio stimulants on growth and yield of *Jasminum sambac* during off season.

I. Biometrical Characters

Significant difference was observed between the treatments for the trait of plant height at 30, 60 and 90 days after pruning (Table 1). Among the different treatments, the treatment T_4 (60: 120: 120 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid) and T_7 (45: 90: 90 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid) registered the highest values of 67.11, 80.81 and 86.64 cm and 66.80, 78.40 and 85.44 cm as plant height.

Increased plant height was observed with higher level of NPK at all the stages of growth. Among the three major nutrients N played an important role in increasing the plant height (Rahman *et al*., 1996) [9]. The increase in growth may be due to increased cell division and cell elongation by utilization of applied nitrogen in protein synthesis and increased level of auxin and GA activity.

The increase in plant height by nitrogen may be due to the synergistic interaction of N with available endogenous auxin and it could be observed in terms of increased cell wall plasticity and cell elongation. The favourable influence of nitrogen on plant height was quiet evident as much as it being a constituent of phosphonucleotide which helps for increased cell division and expansion thus resulting in increased plant height (Kalita *et al*., 1994) [5] in pea.

Table 1: Effects of INM and bio stimulants on plant height (cm), plant spread (m^2) and leaf area index of *Jasminum sambac.*

Treatments	Plant height (cm)			Plant spread (m^2)	Leaf area index
	30 DAP	60 DAP	90 DAP		
T_1 - 100% RDF (60:120:120 g of NPK/plant)	54.77	69.34	75.11	8.35	0.639
T_2 - 100% RDF + 3% panchagavya + 0.2% humic acid	57.99	71.00	76.99	9.01	0.901
T_3 - 100% RDF + 3% panchagavya + 0.3% humic acid	58.06	74.38	78.44	8.41	1.038
T_4 - 100% RDF + 3% panchagavya + 0.4% humic acid	67.11	80.81	86.64	11.12	1.524
T_5 - 75% RDF + 3% panchagavya + 0.2% humic acid	57.04	70.19	76.93	8.89	0.987
T_6 - 75% RDF + 3% panchagavya + 0.3% humic acid	57.11	76.86	80.60	8.93	1.231
T_7 - 75% RDF + 3% panchagavya + 0.4% humic acid	66.80	78.40	85.44	11.07	1.369
T_8 - 50% RDF + 3% panchagavya + 0.2% humic acid	54.47	60.56	64.60	8.09	0.610
T_9 - 50% RDF + 3% panchagavya + 0.3% humic acid	57.80	64.10	71.04	8.10	0.720
T_{10} -50% RDF + 3% panchagavya + 0.4% humic acid	59.82	67.37	73.93	8.21	0.769
SE (d)	0.395	0.556	0.598	0.374	0.011
CD (p=0.05)	0.830	1.168	1.257	0.787	0.024

Application of nutrients *viz*., NPK at 60: 120: 120 g per plant and biostimulants *viz*., 3 % panchagavya and 0.4 % humic acid (T_4) recorded the maximum value of 11.12 m^2 as plant spread. It was followed by T_7 (45: 90: 90 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid) (11.07 m^2).

Basal application of NPK at 60: 120: 120 g per plant and foliar spray of panchagavya at 3 % and humic acid at 0.4 % (T_4) registered the maximum value for leaf area index (1.524). It was followed by basal application of NPK at 45: 90: 90 g per plant and foliar spray of panchagavya at 3 % and humic acid at 0.4 % (T_7) and it registered a leaf area index value of 1.369.

Nitrogen, along with phosphorus and potassium is the most recognized basic element required for most metabolic activities of the plant resulting in the synthesis of chlorophyll and cytochrome which are essential for photosynthesis and respiration processes of the plants. These results are in conformity with earlier reports in rose (Maharana and Pradhan, 1976; Nanjan, 1979) [6, 7].

II. Flowering Behaviour

Results of the present study showed highly significant difference for the trait number of cymes per plant and number of flower buds per cyme at the time of harvest (Table 2). The maximum number of cymes per plant and flower buds per cyme (140.66 and 4.00) was registered by the treatment T_4 (60: 120: 120 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid). It was followed by T_7 (45: 90: 90 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid) (135.99 and 4.00). However, the lowest number of cymes per plant and flower buds per cyme was observed by T_8 (50% RDF + 3 % panchagavya + 0.2 % humic acid) (60.33 and 2.40).

Higher number of cymes per plant and number of flowers per plant was observed with combined application of NPK and foliar nutrients *viz*., panchagavya and humic acid in the present study might be due to the increased growth characters such as plant height, number of branches per plant, leaf area and leaf area index by the applied major nutrients and biostimulants.

The results showed significant difference in number of flowers per plant among the treatments by the application of nutrients and biostimulants in all the seven months of observation. The highest number of flowers per plant (948.40) was recorded by treatment T_4 (60: 120: 120 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid), which was closely followed by T_7 (45: 90: 90 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid) (926.50).

Table 2: Effect of nutrients and bio stimulants on number of cymes per plant, number of flower bud per cyme, number of flowers per plant and yield per plant of *Jasminum sambac* CV. Ramanathapuram Gundumalli.

Treatments	Number of cymes per plant	Number of flower bud per cyme	Number of flowers/ plant	Yield per plant
T_1 - 100% RDF (60:120:120 g of NPK/plant)	99.42	2.75	656.27	109.38
T_2 - 100% RDF + 3% panchagavya + 0.2% humic acid	108.20	3.60	714.90	122.33

T_3 - 100% RDF + 3% panchagavya + 0.3% humic acid	118.30	3.00	808.80	135.69
T_4 - 100% RDF + 3% panchagavya + 0.4% humic acid	140.66	4.00	948.40	163.69
T_5 - 75% RDF + 3% panchagavya + 0.2% humic acid	110.10	2.80	765.40	128.99
T_6 - 75% RDF + 3% panchagavya + 0.3% humic acid	120.40	3.00	830.40	136.65
T_7 - 75% RDF + 3% panchagavya + 0.4% humic acid	135.99	4.00	926.50	160.30
T_8 - 50% RDF + 3% panchagavya + 0.2% humic acid	60.33	2.40	545.70	91.82
T_9 - 50% RDF + 3% panchagavya + 0.3% humic acid	70.99	2.40	612.00	98.83
T_{10} -50% RDF + 3% panchagavya + 0.4% humic acid	85.66	2.60	618.10	103.90
SE (d)	1.281	0.030		
CD (P=0.05)	2.693	0.630		

The treatment T_4 (60: 120: 120 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid) recorded the highest flower yield per plant (163.69), which was followed by T_7 (45: 90: 90 g of NPK per plant + 3 % panchagavya + 0.4 % humic acid) (160.30). The results revealed that treatments T_4 and T_7 were on par with each other.

The increased yield ascribed might be due to the availability of major nutrients throughout the cropping period and the presence of bioactive principles like auxin, gibberellins, cytokinins, vitamins and amino acids in biostimulants could have influenced reproduction and yield. Humic substances present in the biostimulants leads to greater movement and availability of phosphorus and micronutrients might also be a possible reason for higher yield. The results are in corroboration with earlier findings of Thanuja (2002) [11] in black pepper and Subhavasugi (2007) [10] in senna.

Improvement in yield might have been due to the stimulation of root growth which helped in better absorption of water and mineral nutrients from the soil. Phosphorus is associated with phosphorylation and is a constituent of energy rich compounds like ATP, ADP, NADH and NADPH. These energy rich metabolites would have been utilized for flower production and ultimately increased the number of flowers per plant and fresh weight of flower. These results are in close conformity with earlier findings of Chezhiyan *et al*. (1986) [2], Belgaonkar *et al*. (1997) [1] and Jhon and Paul (1999) [4] in chrysanthemum.

References

1. Belgaonkar DV, Bist MA, Wakde MB. Influence of nitrogen, phosphorus and different spacings on flower quality of annual chrysanthemum. J. Soil and Crops. 1997; 7:90-92.
2. Chezhiyan N, Nanjan K. JBMMD. Abdul Khader. Studies on nutrient requirement of *Chrysanthemum indicum* L. cv. Co 1. South Indian Hort. 1986; 34(3):173-178.
3. Hort. Crop production techniques for horticultural crops. Department of Horticulture and Plantation Crops. Chennai and Tamil Nadu Agric. Univ., Coimbatore, 1999.
4. Jhon AQ, Paul TM. Response of *Chrysanthemum morilifolium* Ramat. To different levels of nitrogen and phosphorus. Appl. Biol. Res. 1999; 1:35-38.
5. Kalita P, Dey SC, Chandra K, Upadhaya LP. Effect of foliar application of nitrogen on morphological traits of pea (*Pisum sativum*). Indian J. Agric. Sci. 1994; 64:850-852.
6. Maharana T, Pradhan RC. Effects of nitrogen, phosphorus and potassium and their combinations on growth, flowering and anthocyanin development of hybrid tea rose cv. 'Celebration'. Punjab J. Hort. 1976; 16:77-79.
7. Nanjan K. Studies on the effect of nitrogen, phosphorus and potassium on growth and flowering of Edward rose (*Rosa bourboniana* Desp.). Ph.D. (Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore-3, India. 1979.
8. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi. 1985.
9. Rahman MA, Haider J, Saha UK, Choudhary AR, Choudhary MMU. Ann. Bangladesh Agric. 1996; 6(1):71-74.
10. Subha Vasugi S. Standardization of organic practices in *Cassia angustifolia* Vahl. M.Sc. (Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore-3, India. 2007.
11. Thanuja TV. Arbuscular mycorrhiza – A low cost technology for pepper nurseries. Spice India. 2002; 15(7):168-172.
12. Williams RF. The physiology of plant growth with special reference to the concept of Net assimilation Rate. Ann. Bot. 1946; 10:41-72.