Plant Archives Vol. 26, Supplement 1, 2026 pp. 2235-2239 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2026.v26.supplement-1.301

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH, YIELD AND QUALITY OF FIG CV. POONA

Anilkumar G. K.[1*], I. B. Biradar[2], S. N. Patil[1], Sanjeevraddi. G. Reddi[3] and Anand G. Nanjappanavar[4]
[1]Department of Fruit Science, College of Horticulture, Bagalkot, Karnataka, India.
[2]Department of NRM, College of Horticulture, Bagalkot, Karnataka, India.
[3]Department of Agronomy, Technical officer to VC, UHS, Bagalkot, Karnataka, India.
[4]Department of Fruit Science, Main Horticulture Research and Extension Center, Bagalkot, Karnataka, India.
*Corresponding author E-mail: anilgkammar123@gmail.com
(Date of Receiving : 05-08-2025; Date of Acceptance : 17-10-2025)

ABSTRACT

The current investigation evaluated the influence of Integrated Nutrient Management on growth, yield and fruit quality of fig (*Ficus carica L.)* during 2024–25 at MHREC, Bagalkot. A Randomized Block Design with seven distinct treatments was employed for the experiment and three replications on established fig plants. Among the treatments, INM module T_6 (RDF + organics + biofertilizers) recorded maximum plant height (246.67 cm), canopy volume (1.89 m³), leaf area (484.50 cm²) and chlorophyll content (63.12 SPAD). The same treatment also produced highest number of fruits per plant (308), fruit yield per plant (14.25 kg) and fruit yield per hectare (10.54 t/ha). Marked improvements were observed in the fruit quality parameters with higher TSS (22.75 °Brix), ascorbic acid content (8.90 mg/100 g), fruit firmness (1.10 N), longer shelf life (4.33 days) and lowest titratable acidity (0.24 %) resulting in highest TSS: acid ratio (94.79). The study concludes that INM practices enhance vegetative growth, yield and fruit quality in fig, highlighting its role in promoting sustainable production practices.
***Keywords*:** Fig, Poona, Integrated Nutrient Management, yield, quality

Introduction

Fig (*Ficus carica* L.), a member of the family Moraceae, is considered an important fruit species due to its high nutritional value and therapeutic properties. It is nurtured in several states of India, notably Maharashtra, Karnataka, Gujarat, Uttar Pradesh and Tamil Nadu. Figs are rich in carbohydrates, minerals, vitamins and bioactive compounds, which contribute to their health benefits. Despite its economic and nutritional significance, productivity in fig remains relatively low due to imbalanced fertilizer application, nutrient mining and poor soil health (Eyduran *et al.*, 2015).

Excessive dependence on inorganic fertilizers often results in nutrient imbalance and soil degradation, while exclusive use of organics may not meet the crop’s nutrient demand. Integrated Nutrient Management (INM), which combines the benefits of chemical fertilizers, organic manures, biofertilizers and micronutrients, has emerged as a sustainable approach. INM not only enhances improvement and yield potential but also maintains soil fertility and quality. This study was conducted with the objective to evaluate the influence of different INM modules on vegetative growth, yield and quality parameters of fig under dry land conditions.

Materials and Method

The experiment was performed during the 2024–2025, at the Main Horticultural Research and Extension Centre (MHREC), UHS, Bagalkot. Karnataka. The experimental layout consisted of a Randomized Complete Block Design (RCBD) with seven treatments, each replicated thrice. A three-year-old fig orchard, developed from healthy tissue-cultured plants, was chosen for the research. The total numbers of trees included in the experiment were 105 and were spaced at 4.5 m X 3 m. The experiment consist of 7 treatments *Viz.*, T_1- 100 % RDF (150:100:100 g NPK/plant), T_2- 125 % RDF (187:125:125 g NPK/plant), T_3- 150 % RDF (225:150:150 g NPK/plant), T_4- 50 % RDF (75:50:50 g NPK/plant) + 25 % through organic sources *i.e.,* vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant) + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant), T_5- 75 % RDF (112:75:75 g NPK/plant) + 25 % through organic sources *i.e.,* vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant) + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant), T_6- 100 % RDF (150:100:100 g NPK/plant) + 25 % through organic sources *i.e.,* vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant) + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant), T_7- 100 % RDF through organic sources 50 % through vermicompost + 50 % through neem cake + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant). Organic manures and biofertilizers were applied at the time of pruning, biofertilizers are mixed thoroughly with the farm yard manures 15 days before the application and kept under shade. Inorganic fertilizers were applied in three different growth stages as per the following ratio *i.e.,* at vegetative stage (3:2:1), at fruit initiation stage (1:3:2) and during fruit development stage (2:1:3 NPK).

Several growth parameters, including plant height, canopy volume, leaf area and chlorophyll content, were measured. Plant height and canopy volume were determined using a measuring tape and a long stick. Leaf area was estimated through the linear method (LBK method) by selecting ten leaves from each plant, calculating their average and expressing the results in square centimetres.

The mathematical equation to calculate it is as follows;

$$\text{Leaf area (LA)} = L \times B \times K$$

Where L = maximum length, B = maximum breadth and K = Correction factor

The SPAD-502 chlorophyll meter was employed to assess chlorophyll content in fully matured leaves.

Different yield-attributing traits, such as the number of fruits per plant and fruit yield, were recorded. For biochemical parameters including TSS, titratable acidity, TSS to acid ratio, and shelf life, five healthy fruits were randomly selected from each tree at full maturity. A hand refractometer was employed to measure the total soluble solids (TSS). Fruit acidity was determined through a standard acid–alkali titration procedure, while ascorbic acid content analyzed by using the method outlined by Ranganna (1986). Fruit firmness evaluated using the TAXT plus texture analyzer, which punctured the pulp with a 2 mm cylinder probe. The peak force value displayed on the graph was utilized to determine the texture value, measured in Newton force (N). Shelf life was assessed by recording the number of days from harvest until the fruits stayed in acceptable edible condition without signs of spoilage under ambient storage.

Result and Discussion

The study revealed significant effects of INM modules on vegetative growth, yield and quality parameters of fig. Among the treatments, T_6 (RDF + organics + biofertilizers) was consistently superior.

Significant changes were observed due to integrated nutrient management in the vegetative growth of fig (Table 1). The treatment T_6 (RDF + organics + biofertilizers) recorded the highest plant height (246.67 cm), canopy volume (1.89 m³), leaf area (484.50 cm²) and chlorophyll content (63.12 SPAD), while the minimum values were observed in the control. The increase in growth attributes under INM may be attributed to a steady nutrient supply, organic matter improvement and stimulation of beneficial soil microorganisms. Vermicompost and neem cake enhanced organic carbon availability and soil physical condition, while VAM and PSB improved nutrient solubilization and uptake efficiency. Biofertilizers are also known to release growth-promoting substances which stimulate vegetative vigour. Similar improvements in vegetative growth due to INM have been reported in fig by El-Gioushy *et al*. (2021) and in other fruit crops by Amir *et al.* (2011), who observed significant gains in leaf area and chlorophyll because of the synergistic use of fertilizers and manures. These findings closely align with with the finding of Ali *et al.* (2023) and Pratap and Tripathi (2025) in fig.

There was a significant effect on yield parameters by the treatments (Table 2). The treatment T6 produced the highest number of fruits per plant (308), fruit yield per plant (14.25 kg) and yield per hectare (10.54 t/ha). This increase in yield is associated with balanced nutrition, improved flower initiation and better fruit retention under INM. The integrated use of organic and inorganic fertilizers provided both rapid nutrient supply and sustained soil fertility. Similar improvements in yield through integrated nutrient management (INM) were documented in fig by Osman (2010) and Singh *et al*. (2015), who emphasized the importance of combined nutrient strategies in enhancing fruit set and overall productivity. These results are consistent with the findings of Gajbhiye *et al*. (2020), who reported that the combination of organic amendments with RDF notably improved fruit yield and harvest index in perennial fruit crops. Comparable observations were made by Ahmed *et al.* (2025) in fig (*Ficus carica* L.), where integrated nutrient management significantly boosted yield attributes by enhancing nutrient uptake and physiological efficiency.

Significant improvement in fruit quality was observed under INM (Table 3). Treatment T_6 recorded the highest TSS (22.75 °Brix), lowest titratable acidity (0.24 %), highest TSS:acid ratio (94.79), maximum ascorbic acid (8.90 mg/100 g), firmness (1.10 N) and longest shelf life (4.33 days). The improvement in TSS is attributed to greater photosynthate accumulation and efficient translocation to fruits under balanced nutrition. Reduction in acidity is due to rapid metabolism of organic acids during ripening, leading to a better TSS:acid balance and improved taste. The increase in ascorbic acid content may be attributed to improved enzymatic activity resulting from organic amendments, the involvement of micronutrients in vitamin C biosynthesis and the enhanced availability of essential macronutrients and micronutrients by farmyard manure (FYM), which enhances photosynthesis, carbohydrate and sugar metabolism, leading to higher fruit quality. The results obtained also got the support of the findings of Tripathi *et al.* (2010). Fruit firmness and shelf life were also improved under INM, possibly due to higher calcium uptake and strengthened cell wall structure from organic manures. Similar results were observed in fig by Kurubar *et al.* (2015) and in other fruit crops by Sharma *et al.* 2016, where integrated nutrient management improved sweetness, nutritional quality and storage life.

Conclusion

The findings of the present study indicated that integrated nutrient management markedly enhanced the growth, yield and quality traits of fig. Among the treatments tested, the highest effectiveness was observed with the application of 100 % RDF (150:100:100 g NPK/plant) + 25 % through organic source *i.e.,* vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant) + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant), which combined RDF with organics and biofertilizers, recorded superior performance with maximum yield and fruit quality, along with better shelf life. Implementing such INM modules can be suggested as a sustainable approach to improve both productivity and profitability in fig cultivation.

Table 1: Plant height, canopy volume, leaf area and chlorophyll content as influenced by INM module in fig cv. Poona

Treatment	Plant height (cm)	Canopy volume (m^3)	Leaf area (cm^2)	Chlorophyll (SPAD values)
T_1	216.67	1.26	366.40	44.81
T_2	225.00	1.35	385.47	46.42
T_3	238.00	1.60	445.13	53.16
T_4	235.00	1.51	425.10	49.62
T_5	240.67	1.73	464.30	61.02
T_6	246.67	1.89	484.50	63.12
T_7	232.00	1.47	405.03	47.24
S. Em±	**3.77**	**0.03**	**4.23**	**0.64**
CD at 5 %	**11.57**	**0.10**	**13.03**	**1.97**

T_1- 100 % RDF (150:100:100 g NPK/plant)
T_2- 125 % RDF (187:125:125 g NPK/plant)
T_3- 150 % RDF (225:150:150 g NPK/plant)
T_4- 50 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_5- 75 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_6- 100 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_7 - 100 % RDF through organic sources 50 % through vermicompost + 50 % through neem cake + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)

Table 2: Number of fruits per plant and fruit yield as influenced by INM module in fig cv. Poona

Treatment	Number of fruits per plant	Fruit yield	
		Kg/plant	t/ha
T_1	270	9.47	7.01
T_2	278	9.95	7.36
T_3	286	10.85	8.03
T_4	295	12.2	9.03
T_5	304	13.98	10.34
T_6	308	14.25	10.54
T_7	288	10.84	8.02
S. Em±	**4.14**	**0.08**	**0.20**
CD at 5 %	**12.74**	**0.25**	**0.60**

T_1- 100 % RDF (150:100:100 g NPK/plant)
T_2- 125 % RDF (187:125:125 g NPK/plant)
T_3- 150 % RDF (225:150:150 g NPK/plant)
T_4- 50 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_5- 75 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_6- 100 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_7 - 100 % RDF through organic sources 50 % through vermicompost + 50 % through neem cake + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)

Table 3: Total soluble solids, titratable acidity, TSS to acid ratio, anthocyanin content and shelf life as influenced by INM module in fig cv. Poona

Treatment	TSS (°Brix)	Titratable acidity (%)	TSS to acid ratio	Fruit firmness (N)	Ascorbic acid (mg/100g)	Shelf life (days)
T_1	18.50	0.32	46.25	0.75	4.01	2.32
T_2	19.23	0.32	60.09	0.80	4.89	2.33
T_3	19.67	0.31	65.56	0.81	6.08	2.67
T_4	20.72	0.30	69.06	0.85	5.20	3.00
T_5	20.87	0.27	77.30	0.90	7.83	3.67
T_6	22.75	0.24	94.79	1.10	8.90	4.33
T_7	20.83	0.28	74.39	0.94	6.93	3.33
S. Em±	**0.32**	**0.01**	**1.28**	**0.01**	**0.09**	**0.02**
CD at 5 %	**0.97**	**0.03**	**3.94**	**0.03**	**0.28**	**0.07**

T_1- 100 % RDF (150:100:100 g NPK/plant)
T_2- 125 % RDF (187:125:125 g NPK/plant)
T_3- 150 % RDF (225:150:150 g NPK/plant)
T_4- 50 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_5- 75 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_6- 100 % RDF + 25 % through organic sources [vermicompost (1.25 kg/plant) + neem cake (0.75 kg/plant)] + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)
T_7 - 100 % RDF through organic sources 50 % through vermicompost + 50 % through neem cake + VAM (50 g/plant) + PSB (20 g/plant) + KSB (20 g/plant)

Acknowledgement

The authors gratefully acknowledge the Department of Fruit Science and the Main Horticultural Research and Extension Centre (MHREC), UHS, Bagalkot, in appreciation of their assistance and for providing the necessary resources to carry out this experiment.

References

Ahmed, A. A. S., & Lateef, M. A. A. (2025). Effect of organic fertilizer Bio Health and nano calcium on the growth and yield of fig trees *Ficus carica* L. cv. Waziri under greenhouse conditions. *Journal of Kirkuk University for Agricultural Sciences*, **16**(1).

Ali, M. T., Iqbal, U., Mehraj, S., Ahmad Shah, Z., Hussain, S., Kuchay, M. A., & Wani, O. A. (2023). Potential role of biofertilizers in fruit crops. In *Microbiomes for the* *management of agricultural sustainability* (pp. 145–166). Cham: Springer Nature Switzerland.

Amir, M. A. (2011). *Effect of organic and inorganic fertilizers on soil health and productivity of pomegranate* (Ph.D. dissertation). Dr. Yashwant Singh Parmar University of Horticulture and Forestry.

Eyduran, S. P., Ercisli, S., Akin, M., Beyhan, O., & Gecer, M. K. (2015). Organic acids, sugars, vitamin C, antioxidant capacity and phenolic compounds in fruits of white (*Morus alba* L.) and black (*Morus nigra* L.) mulberry genotypes. *Journal of Applied Botany and Food Quality*, **88**, 134–138.

Gajbhiye, B. R., Patil, V., & Kachave, T. R. (2020). Effect of integrated nutrient management (INM) on available micronutrients of pomegranate (*Punica granatum* L.) orchard soil. *International Journal of Chemical Studies*, **8**(1), 1900–1903.

Kurubar, A. R., Allolli, T. B., Naik, M. K., & Angadi, S. G. (2015). Effect of organic and inorganic fertilizers on fruit characters, quality and economics of fig production (*Ficus carica*). *Acta Horticulturae (ISHS)*, **1173**, 213–216.

Osman, S. M., & Abd El-Rhman, I. E. (2010). Effect of organic and bio-N-fertilization on growth and productivity of fig tree (*Ficus carica* L.). *Research Journal of Agriculture and Biological Sciences*, **6**(3), 319–328.

Pratap, R., & Tripathi, V. (2025). Influence of vermicompost and biofertilizers on vegetative growth and yield of dragon fruit. *Journal of Advances in Biology & Biotechnology*, **28**(4), 318–326.

Ranganna, G. S. (1986). *Manual of analysis of fruit and vegetable products*. New Delhi: Tata McGraw-Hill Publishing Company Ltd.

Sharma, A., Wali, V. K., Bakshi, P., Sharma, V., Sharma, V., Bakshi, M., & Rani, S. (2016). Impact of poultry manure on fruit quality attributes and nutrient status of guava (*Psidium guajava* L.) cv. L-49 plant. *Indian Journal of Agricultural Sciences*, **86**(4), 533–540.

Singh, S. R., Banik, B. C., & Hasan, M. A. (2015). Effect of integrated nutrient management on vegetative growth and yield in mango cv. Himsagar. *Journal of Horticultural Science*, **10**(1), 120–124.

Tripathi, V. K., Kumar, N., Shukla, H. S., & Mishra, A. N. (2010). Influence of *Azotobacter*, *Azospirillum* and PSB on growth, yield and quality of strawberry cv. Chandler. *Egyptian Journal of Horticulture*, **22**(6), 198–199.