

Effect of integrated nutrient management on growth and yield of cauliflower
(*Brassica oleracea*)

PRIYANKA PUSHAM*, U.S. BOSE, MEGHA SHUKLA AND NAMDEO

Department of Horticulture, College of Agriculture, Rewa (M.P.) 486 001

Received: May, 2019; Revised accepted: July, 2019

Among different vegetables, cauliflower (*Brassica oleracea* var. botrytis L.) is one of the most important winter vegetable among the cole crop which belong to the genus *Brassica* of the family Cruciferae. It is being grown in India in 452 ha with production 8499 MT and productivity 18.8 MT ha⁻¹ (Anonymous, 2017). Cauliflower being a heavy feeder and exhaustive crop responds very well to nutrients application. Due to excessive use of chemical fertilizers, the increased vegetable production has been widely recognized but it created detrimental impact on soil health, ecology and other natural resources due to non-addition of organic matter. The escalating prices of chemical fertilizers and its detrimental impacts had forced farmers to adopt organic sources of nutrients for vegetable production (Meena *et al.* 2019). Therefore, reducing the use of chemical fertilizers and obtaining the sustainable vegetable production is only possible through integrated nutrient management strategy. The concept of integrated nutrient management has emerged as an important tool for maintaining soil fertility, crop productivity which requires optimum use of organic, inorganic and bio-sources of plant nutrients. Biofertilizers have also emerged promising components of integrated nutrient supply system which are environment friendly and low cost inputs. With organic and inorganic fertilizers as part of an integrated nutrient management strategy, biofertilizers play a significant role in plant nutrition. In view of the above fact, the present experiment was carried out to study the effect of INM on cauliflower. A field experiment was conducted during rabi season of 2018 at fruit Research Station.

The soil of experimental field was silty clay-loam in texture having pH 6.10, organic carbon 8.2 g kg⁻¹, electrical conductivity 0.42 dS m⁻¹, available N, P₂O₅ and K₂O 220, 12.54 and 299 kg ha⁻¹, respectively as well as available sulphur 2.20 kg ha⁻¹. There were thirteen INM treatments (Table 1) which were laid out in a RBD design keeping three replications. The transplanting of Girija cauliflower 30-days old seedlings was done on 24 November, 2018 keeping row to row 50 cm and plant to plant

distance 60 cm. The fertilizers and organic manures were applied according to the treatments as per recommended package of practices. The crop was harvested during February, 2019. At harvest yield of curd was recorded.

It is evident from the data (Table 1) that the maximum plant height (34.6 cm) was noted with 100% RDF (120:80:40 NPK) at 60 DAT stage of crop growth. The second and third best treatments were 75% RDF+5 t VC ha⁻¹ and 75% RDF+10 t FYM ha⁻¹ respectively. The plant height tended to decrease with the decrease in the multi-nutrient supply from organic and inorganic sources of nutrients. The significantly minimum plant height (30.9 cm) was noted from control treatment. The best treatment for curd diameter was 100% RDF (120:80:40 NPK) and 75% RDF+5t VC ha⁻¹ then 75% RDF+10 t FYM ha⁻¹ where its diameter ranged from 17.2 to 17.3 cm as against 14.8 cm in control. Similarly fresh weight of curd ranged from 800 to 845 g as against only 450 g in control. The dry weight of curd varied from 260 to 305 g as against only 110 g in case of control. The maximum curd yield (238.90 q ha⁻¹) was obtained from 100% RDF. The second best INM treatment was 75% RDF + 5 t VC ha⁻¹ (232.65 q ha⁻¹). The third best treatment was 75% RDF+ 10t FYM ha⁻¹ (230.85 q ha⁻¹). Whereas the curd yield was found significantly lowest (123.80 q ha⁻¹) from the control treatment. The higher yield under these treatments may be on account of the maximum yield-attributing parameters in these treatments. The contribution of 100% RDF or 75% RDF along with 10 t ha⁻¹ FYM or 5 t VC ha⁻¹ to increase in curd yield can be attributed to the balanced C:N ratio and enhanced availability of essential plant nutrients, hence increase rate and efficiency of metabolic activities resulting in higher assimilation of proteins and carbohydrates. The beneficial role of added vermicompost and FYM in improving soil physical, chemical and biological properties was well known which in turn helped in better nutrient absorption by the plant which resulted in better yield-attributes and yield. Such beneficial effect of full dose of inorganic fertilizers or their

*Corresponding author's email: priyankapusham42@gmail.com

** Email-drknnamdeo@gmail.com College of Agriculture, Rewa 486001 (M.P.), India
Kuthulia, College of Agriculture, Rewa (M.P.).

Table 1: Growth, yield, yield- attributes and economics of cauliflower under different INM treatments

Treatments	Plant height (cm) 60 DAT	Diameter of curd (cm)	Fresh weight of curd (g)	Dry weight of curd (g)	Yield (q ha ⁻¹)	Net income (Rs.ha ⁻¹)	B:C ratio
T ₁ PSB Biofertilizer	32.5	15.8	511	150	128.50	77800	2.53
T ₂ 10 t VC ha ⁻¹	33.7	16.9	740	231	224.80	164600	3.73
T ₃ 20 t FYM ha ⁻¹	33.2	16.6	650	222	223.85	163700	3.71
T ₄ 50% RDF (60:40:20)	33.1	16.5	610	216	221.90	168840	4.18
T ₅ 50% RDF+ PSB Biofertilizer	33.0	16.4	580	210	220.65	167140	4.12
T ₆ 50% RDF+ 5 t VC ha ⁻¹	33.9	17.0	780	235	227.50	169440	3.91
T ₇ 50% RDF+ 10 t FYM ha ⁻¹	33.4	16.7	690	226	223.70	165640	3.85
T ₈ 75% RDF (90:60:30)	33.0	16.2	535	191	215.25	160710	3.94
T ₉ 75% RDF + PSB Biofertilizer	32.9	16.1	522	186	207.80	152810	3.77
T ₁₀ 75% RDF+ 5 t VC ha ⁻¹	34.3	17.3	825	290	232.65	173210	3.91
T ₁₁ 75% RDF+ 10 t FYM ha ⁻¹	34.1	17.2	800	260	230.85	171410	3.88
T ₁₂ 100% RDF (120:80:40)	34.6	17.4	845	305	238.90	182980	4.27
T ₁₃ Control	30.9	14.8	450	110	123.80	73600	2.46
C.D. (P=0.05)	0.23	0.23	25.47	7.40	1.02	--	--

RDF = recommended dose of fertilizers, FYM = farmyard manure, VC = vermicompost

application with organic manures have been recorded by Nath and Singh (2011), Thilagam and Kasthuri (2011), Pawar and Barkule (2017), Singh *et al.* (2017), in case of cauliflower and Upadhyay *et al.* (2012) in cabbage.

The maximum net income (Rs.182980 ha⁻¹) with 4.27 B:C ratio was obtained under 100% RDF. The second and third equally best treatments were 50% RDF i.e. 60:40:20 NPK and 50% RDF+ PSB biofertilizer which gave net income (Rs.167140 to Rs. 168840 ha⁻¹) with 4.12 to 4.18 B:C ratios, respectively. The T₂ and T₃ having full dose of VC or FYM resulted in

lower net income (Rs.163700 to Rs.164600 ha⁻¹) which was due to increased expenditure of these organics. The control treatment gave the lowest net income (Rs.73600 ha⁻¹) with 2.46 B:C ratio. The variation in net income from different INM treatments was on account of variation in productivity as well as variation in the expenditure involved in the treatments.

The findings allude that 100% RDF (N₁₂₀ P₈₀ K₄₀) gave the maximum yield and income, but for sustainable productivity 75% RDF with FYM or VC may be applied to obtain income up to the same extent.

REFERENCES

- Anonymous (2017) Horticultural Statistics at a Glance 2017-18. Ministry of Agriculture & Farmers Welfare, Government of India, New Delhi.
- Bashyal, L.N. (2011) Response of cauliflower to nitrogen fixing biofertilizer and graded levels of nitrogen. *The Journal of Agriculture and Environment* 12: 41-50.
- Ganesh, P., Tharararaj, K., Kolanjinathan, K. (2011) Effect of inorganic manure and biofertilizers on physical, biological properties and growth of rice by application study. *International Journal of Current Life Science* 1 (1):1-15.
- Meena, D. C., Meena. M. L and Kumar, S. (2019) Influence of organic manures and biofertilizers on growth, yield and quality of okra (*Abelmoschus esculentus* L.Moench). *Annals of Plant and Soil Research* 21 (2): 130-134
- Nath, G. and Singh, K. (2011) Role of vermicompost as biofertilizer for the productivity of cauliflower (*Brassica oleracea* var. botrytis) and biopesticide against nematode (*Meloidogyne incognita*). *World Applied Sciences Journal*, 12(10): 1676-1684.
- Pawar, R. and Barkule, S. (2017) Study on effect of integrated nutrient management on growth and yield of cauliflower (*Brassica oleracea* var. botrytis L.). *Journal of Applied and Natural Science* 9(1): 520-525.
- Sentiyangla Kanaujia, S.P., Singh, V.B. and Singh, A.K. (2010) INM for quality production of radish (*Raphanus sativus* L.) in acid alfisol. *Journal of Soils and Crops* 20(1): 1-9.
- Singh, S.K., Singh, D.K., Singh, P.K., Singh, S.K., Adarsh, A. and Pratap, T. (2017) Effect of integrated nutrient management on growth, quality, yield and economics of cauliflower (*Brassica oleracea* var. botrytis L.). *Bulletin of Environment, Pharmacology and Life Sciences* 7(3): 08-11.
- Thilagam and Kasthuri, V. (2011) Integrated nutrient management for sustaining cauliflower productivity- a review. *Agriculture Review* 32 (1): 26-31,2011.
- Upadhyay, A.K., Bahadur, A. and Singh, J. (2012) Effect of organic manures and biofertilizer on yield dry matter partitioning and quality traits of cabbage. *Indian Journal of Agriculture Science* 82 (1): 12-15.