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Effect of organic manures on growth, yield and quality of Cauliflower (*Brassica oleracea* var. botrytis L.) under open field conditions

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ABSTRACT

The present investigation was conducted during the session 2025-2026 at the Horticulture Field Experimentation Centre, Department of Horticulture, School of Agricultural Sciences, Career Point University, Kota (Rajasthan). The experiment aimed to evaluate the effect of different organic manure treatments on growth, yield, and quality of brinjal under open field conditions. The results revealed that growth parameters were significantly influenced by the application of organic manures at all growth stages. Among the treatments, integrated application of organic manures showed superior performance over individual applications and control. Maximum plant height at 30 and 45 DAS and at maturity, along with higher stem diameter and number of branches per plant, were recorded under T_{16} included FYM, vermicompost, poultry manure and goat manure applied equally (25% + 25% + 25% + 25%). Reproductive parameters also showed a positive response to organic treatments. The highest number of flowers per plant was observed under T_{16}, whereas the control recorded the lowest values. Fruit quality parameters such as fruit length, width, girth, and average fruit weight were significantly improved under integrated treatments, with T_{16} producing the best quality fruits. Yield attributes were markedly affected by different treatments. The highest number of fruits per plant, fruit yield per plant, and yield per plot were recorded under T_{16}, followed while the lowest yield was observed in control. Overall, the study concluded that integrated application of organic manures significantly enhances growth, yield, quality and profitability of brinjal under open field conditions.

KEYWORDS

FYM, Cauliflower, Vermicompost, Yield

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Cauliflower (*Brassica oleracea* var. botrytis L.) is most popular among winter vegetables. It belongs to the family Brassicaceae. It is an herbaceous annual for vegetable production and biennial for seed production. The name cauliflower has originated from the Latin words ‘Caulis’ meaning stem and ‘Floris’ meaning flower. Its edible part is curd (prefloral fleshy apical meristem) which is used as vegetables, curries, soups and pickles.

The curd, constitutes about one fourth of the total above ground biomass is favorite for human consumption; while the rest comprising of stem and leaves (together known as stalk) are good for cattle. It contains vitamin A (51 IU), vitamin C (56 mg), riboflavin (0.10 mg), thiamin (0.04 mg), nicotinic acid (1.0 mg), calcium (33 mg), phosphorus (57 mg), potassium (138 mg), moisture (90.8 g), carbohydrates (4.0 g), protein (2.6 g), fat (0.4 g), fiber (1.2 g) and iron (1.5 mg) per 100 g of edible portion of cauliflower (Neupane *et al.*, 2020).

It also has great medicinal value and has been found effective in inhibition of carcinogenesis as it contains high concentration of glucothiocyanate and indol-3-Carbinol with anti-inflammatory properties (Basnet and Shakya, 2016). Biofertilizers are mainly constituted of selected living cells of microbes which provide the plants with nutrients through their root system. The microbes in these fertilizers use different mechanisms to provide nutrients to the plants (Kaur *et al.*, 2020). Through the use of biofertilizers, healthy plants can be grown, while enhancing the sustainability and the health of the soil. They are an important option for agricultural sustainability, as they are conducive to long-term beneficial effects on the physical, chemical and biological aspects of soils (Méndez and Viteri, 2007).

They enhance plant nutrition either by mobilizing or solublizing and thus increasing nutrient availability in soils; add nutrients through the natural processes of fixing atmospheric nitrogen, solubilizing phosphorus and stimulating plant growth through the synthesis of growth promoting substances. They are also cost effective as they save 25-50 percent of recommended dose of nitrogenous fertilizers and increase the yield 15-50 percent in vegetable crops. Animal wastes have been used as a nutrient source in crop production for thousands of years. Globally, poultry production is the fastest growing industry among the animal husbandry activities.

In India, Telangana is one of the prominent states as far as the poultry industry is concerned having the largest number of poultry farms. Addition of poultry manure to soils not only helps to overcome the disposal problems but also enhances the physical, chemical and biological fertility of soils. Integrated nutrient supply system (INSS) is the combined use of mineral fertilizers with organic resources such as farmyard manure, sheep manure, vermicompost, poultry manure, green manures and bio-fertilizers. Its basic concept is sustaining soil and crop productivity through optimization of all possible sources of plant nutrients in an integrated manner. In this system, all aspects of mineral and organic plant nutrient sources are integrated into the crop production system and are utilized in an efficient and judicious manner for sustainable crop production.

It contributes in attaining agronomically feasible, economically viable, environmentally sound and sustainable high crop yields by enhancing nutrient use efficiency and soil fertility, increasing carbon sequestration, reducing nitrogen losses due to nitrate leaching. Therefore, the nutrient needs of crop production systems can best be met through integrated nutrient management.

Materials and Methods

Location

Kota district is located at 25.18° N to 75.83° E Latitude in South Eastern Rajasthan. It covers an area of 221.36 km^2. Agro-climatically, the district falls in Zone V, known as Humid South Eastern Plain. The average rainfall in the region is 660.6. mm. Maximum temperature range in the summer is 40 to 48°C and minimum 1.0- 2.6°C during winter.

Treatment Details

Experimental materials for the present study variety of Pusa Snowball K-1 obtained from Department of Horticulture, Career Point University, Kota, during *Rabi* 2025-2026. Experiment was replicated three times in Randomized Block Design. All the treatments were applied as per the experimental design. The experiment comprised seventeen treatments involving different organic manures, biofertilizers, and foliar applications. Treatment T_1 consisted of Control (RDF), while T_2 included Farmyard Manure (FYM) @ 100%. Treatment T_3 comprised Vermicompost @ 100%, whereas T_4 and T_5 involved Poultry Manure @ 100% and Sheep Manure @ 100%, respectively. Treatment T_6 consisted of Vermiwash Foliar Spray @ 100%. Among the combined treatments, T_7 included FYM + Azospirillum (50% + 50%), T_8 consisted of FYM + Vermicompost (50% + 50%), T_9 comprised FYM + Poultry Manure (50% + 50%), and T_{10} involved FYM + Sheep Manure (50% + 50%). Treatment T_{11} consisted of FYM + Vermiwash Foliar Spray (50% + 50%), while T_{12} and T_{13} included Vermicompost + Poultry Manure (50% + 50%) and Vermicompost + Sheep Manure (50% + 50%), respectively. Treatment T_{14} comprised Poultry Manure + Sheep Manure (50% + 50%). Furthermore, T_{15} consisted of FYM + Vermicompost + Poultry Manure (34% + 33% + 33%).

Whereas, T_{16} included FYM + Vermicompost + Poultry Manure + Sheep Manure (25% + 25% + 25% + 25%). Finally, T_{17} comprised FYM + Vermicompost + Poultry Manure + Sheep Manure + Vermiwash Foliar Spray in equal proportions (20% + 20% + 20% + 20% + 20%).

Table 1. Effect of integrated nutrient management on plant growth parameters

Treatment Combinations	Plant Height (cm)	Number of Leaves
Control (RDF)	30.50	14.60
FYM 100%	38.20	16.90
Vermicompost 100%	40.60	17.80
Poultry manure 100%	41.30	18.30
Sheep manure 100%	39.80	17.60
Vermiwash foliar 100%	37.40	16.20
FYM + Azospirillum	44.90	19.80
FYM + Vermicompost	46.30	20.70
FYM + Poultry manure	47.10	21.30
FYM + Sheep manure	45.80	20.40
FYM + Vermiwash	44.60	19.90
Vermicompost + Poultry	48.50	22.10
Vermicompost + Sheep	47.90	21.80
Poultry + Sheep	46.70	21.00
FYM + VC + Poultry	49.60	22.90
FYM + VC + Poultry + Sheep	50.80	23.60
FYM + VC + Poultry + Sheep + Vermiwash	52.10	24.30
SEm±	11.56	6.76
C.D.(P =0.05)	34.56	20.21

Experimental Details

Measurement of Growth Parameters

The observations on growth and yield parameters were recorded from tagged plants in each treatment plot using standard procedures. Plant height was measured at the time of harvesting from the base of the plant to the tip of the longest leaf with the help of a measuring scale and expressed in centimeters. The number of leaves per plant was counted from all tagged plants by considering only fully expanded and healthy leaves, while senescent and damaged leaves were excluded. Curd depth was measured vertically from the top surface to the base of the curd using a measuring scale and expressed in centimeters.

Measurement of Curd and Yield Parameters

Similarly, curd diameter was measured at the central and widest portion of the curd with the help of a vernier caliper without compressing the curd and expressed in centimeters.

Head weight was recorded by weighing individual curds from tagged plants using a digital weighing balance immediately after harvest to avoid moisture loss and expressed in grams. Stalk yield per hectare was determined by recording the total weight of stalks obtained from each plot and converting the values into quintals per hectare using standard conversion factors. Likewise, curd yield per hectare was calculated based on the total curd yield recorded from each plot and converted into quintals per hectare (q ha^{-1}). The mean values for all observations were calculated and used for statistical analysis.

Measurement of Fruit Chemical Characteristics

The quality parameters of cauliflower curds were analyzed using standard laboratory procedures. Ascorbic acid content was determined from fresh curd samples by employing the 2,6-dichlorophenol indophenol visual titration method. A representative fresh curd sample of about 10g was homogenized with 3 percent metaphosphoric acid solution to stabilize the ascorbic acid content. The homogenized sample was filtered through muslin cloth or Whatman filter paper to obtain a clear extract, and the volume was made up to a known level. An aliquot of the extract was then titrated against standard 2,6-dichlorophenol indophenol dye solution with constant shaking until a light pink colour persisted for about 15 seconds, which was considered as the end point. A blank titration was also carried out for standardization of the dye solution. The ascorbic acid content was calculated using the standard formula based on titre value, dye factor, volume made up, aliquot taken, and sample weight, and expressed as mg per 100 g fresh sample. Crude protein content in the curd sample was estimated through determination of total nitrogen by the Micro Kjeldahl method. The crude protein percentage was calculated by multiplying the total nitrogen content with the conversion factor 6.25 as suggested by (Jose, 1988) and expressed in percentage. Total soluble solids (TSS) were recorded with the help of a hand refractometer. Juice extracted from fully mature curds of each treatment was placed on the prism of the refractometer, and the readings were noted in °Brix. The observations were recorded from multiple samples and the average values were calculated for statistical analysis.

Results and Discussion

Growth Parameters

The data presented in table 1 revealed that plant height of cauliflower was significantly influenced by different organic nutrient treatments. The maximum plant height (52.10 cm) was recorded under treatment T_{17} (FYM + VC + Poultry Manure + Sheep Manure + Vermiwash), which was closely followed by T_{16} (FYM + VC + Poultry Manure + Sheep Manure) with 50.80 cm. The minimum plant height (30.50 cm) was observed in T_1 (Control – RDF). The increased plant height under organic manure treatments may be attributed to improved soil physical conditions, enhanced nutrient availability, and better root development. Table 1 shows a significant variation in the number of leaves per plant due to different treatments. The highest number of leaves (24.30) was recorded in T_{17} (FYM + VC + Poultry Manure + Sheep Manure + Vermiwash), followed byT_{16} (FYM + VC + Poultry Manure + Sheep Manure) (23.60). The lowest number of leaves (14.60) was recorded under T_1 (Control - RDF). Organic manures might have enhanced vegetative growth by providing a continuous supply of nutrients and improving microbial activity in the soil.

The high vegetative growth was attributed due to application of high level of inorganic fertilizer, FYM and poultry manure (PM) may be ascertained to increase amount of nutrients such as nitrogen, phosphorus and potassium level in plants that leads to higher level of plant metabolites production to build the plant tissue. The result clearly indicated in the beneficial effect of added FYM and PM. Application of FYM and PM improved the soil tilth and aeration, increased water holding capacity of the soil and stimulated the activity of microorganisms that made the nutrients elements readily available in the soil for crops. These results in this study were in corroborated with previous reports of (Singh *et al.,* 1973) in potato, (Jose *et al.,* 1988) in brinjal, (Harikrishna *et al.,* 2002) in tomato, (Magray, 2002) in capsicum, (Prabu *et al.,* 2003) in okra, and (Hiremath *et al.,* 2006) in Paprika.

Curd and Yield Parameters

Curd Diameter (cm)

The curd diameter was significantly affected by organic nutrient management practices (table 2).

The maximum curd diameter (15.60 cm) was obtained with T_{17} (FYM + VC + Poultry Manure + Sheep Manure + Vermiwash), followed by T_{16} (FYM + VC + Poultry Manure + Sheep Manure) **(**15.20 cm). The smallest curd diameter (8.90 cm) was observed under T_1 (Control - RDF)**.** The increase in curd diameter may be due to better nutrient uptake and balanced growth under organic manure application. Lowest curd diameter was reported in control (T_1) as there was no use of fertilizers, manure or biofertilizers which might have resulted in poor nutritional status of these plots. Integrated application of inorganic fertilizers and manures increased the availability of NPK due to which growth might have boosted as they increase photosynthetic activity and chlorophyll content of plant which leads to better nourishment of curd. The findings are also in conformity with those of (Chand *et al*., 2018, Singh *et al*., 2018a, Subedi *et al*., 2019, Neupane *et al.*, 2020, Kaur *et al*., 2020, Komma *et al*., 2020, Rabindra *et al*., 2021 and Sharma *et al.*, 2022a).

Head Weight (g)

A perusal of table 2 indicated that head weight differed significantly among treatments. The maximum head weight (925.80 g) was recorded in T_{17} (FYM + VC + Poultry Manure + Sheep Manure + Vermiwash), which was statistically superior to all other treatments. The lowest head weight (387.20 g) was recorded under T_1 (Control - RDF). Higher head weight under organic treatments could be due to improved nutrient availability and enhanced photosynthetic efficiency. Lowest head weight was observed in control (T_1) where no fertilizer, manure or biofertilizers was used which might have resulted in poor nutritional status of these plots resulting in poor growth. Increase in head weight due to the application of *Azotobacter* might be due to enhancement of uptake of water and nutrients by its use. Integrated application of organic manure and inorganic fertilizer increased the availability of NPK and also improved the fertility status of soil and productivity due to which yield attributing characters might have increased. These results are in testimony with the findings of (Singh *et al.,* 2018, Subedi *et al.,* 2019, Bhowal *et al.,* 2020, Neupane *et al.,* 2020, Singh *et al.,* 2020 and Sharma *et al.,* 2022).

Table 2. Effect of integrated nutrient management on curd quality and yield

Treatment Combinations	Curd Diameter (cm)	Head Weight (g)	Curd Yield (q/ha)	Stalk Yield (q/ha)
Control (RDF)	14.60	387.20	112.50	69.70
FYM 100%	16.90	610.40	195.80	140.30
Vermicompost 100%	17.80	665.70	210.40	147.90
Poultry manure 100%	18.30	690.60	218.60	149.80
Sheep manure 100%	17.60	652.90	205.30	145.40
Vermiwash foliar 100%	16.20	598.50	190.70	138.60
FYM + Azospirillum	19.80	742.60	238.90	159.50
FYM + Vermicompost	20.70	785.40	245.60	163.80
FYM + Poultry manure	21.30	812.60	251.80	168.20
FYM + Sheep manure	20.40	774.90	242.70	161.90
FYM + Vermiwash	19.90	755.80	239.40	160.30
Vermicompost + Poultry	22.10	835.60	255.90	170.40
Vermicompost + Sheep	21.80	820.30	252.60	168.90
Poultry + Sheep	21.00	798.20	247.40	165.10
FYM + VC + Poultry	22.90	865.40	262.80	176.50
FYM + VC + Poultry + Sheep	23.60	895.90	268.90	182.70
FYM + VC + Poultry + Sheep + Vermiwash	24.30	925.80	274.60	188.90
SEm±	4.28	8.65	6.35	2.65
C.D.(P =0.05)	11.98	25.78	18.90	7.89

Table 3. Effect of integrated nutrient management on chemical quality of cauliflower curd

Treatment Combinations	Crude Protein (%)	TSS (^{0}Brix)	Ascorbic acid (mg/100 g)
Control (RDF)	19.60	6.10	53.80
FYM 100%	20.20	6.32	56.20
Vermicompost 100%	21.10	6.45	57.40
Poultry manure 100%	21.40	6.53	57.90
Sheep manure 100%	20.80	6.41	57.10
Vermiwash foliar 100%	20.00	6.29	56.00
FYM + Azospirillum	22.80	6.82	58.10
FYM + Vermicompost	23.20	6.91	58.40
FYM + Poultry manure	23.50	7.01	58.60
FYM + Sheep manure	23.00	6.88	58.20
FYM + Vermiwash	22.90	6.85	58.00
Vermicompost + Poultry	23.80	7.05	58.80
Vermicompost + Sheep	23.60	7.02	58.70
Poultry + Sheep	23.30	6.96	58.50
FYM + VC + Poultry	24.10	7.12	59.00
FYM + VC + Poultry + Sheep	24.40	7.18	59.30
FYM + VC + Poultry + Sheep + Vermiwash	24.80	7.25	59.70
SEm±	0.56	0.23	0.90
C.D.(P =0.05)	1.63	0.70	2.76

Curd Yield (q ha^{-1})

The curd yield data presented in table 2 showed a marked increase in yield due to organic nutrient treatments.

The highest curd yield (274.60 q ha^{-1}) was recorded in T_{17} (FYM + VC + Poultry Manure + Sheep Manure + Vermiwash), followed by T_{16} (FYM + VC + Poultry Manure + Sheep Manure) (895.90 q ha^{-1}).

The lowest yield (112.50 q ha^{-1}) was recorded in T_1 (Control - RDF). Increased yield under organic treatments may be attributed to improved growth parameters and curd development.

Stalk Yield (q ha^{-1})

Table 2 revealed that stalk yield was significantly influenced by different treatments. The maximum stalk yield (188.90 q ha^{-1}) was recorded under T_{17} (FYM + VC + Poultry Manure + Sheep Manure + Vermiwash), while the minimum stalk yield (69.70 q ha^{-1}) was observed in T_1 (Control - RDF). The higher stalk yield in organically treated plots might be due to vigorous vegetative growth and enhanced biomass accumulation. Lowest curd and stalk yield in control treatment is attributed to poor nutritional status of these plots where no fertilizers or manure or biofertilizers was added. Use of vermicompost promotes soil aggregation and stabilizes soil structure. This improves air-water relationship of soil, thus increasing the water retention capacity and encourages extensive development of root system of plants. The increase in yield also may be due to the solubilization effect of the nutrients as well as the chelating effect of vermicompost, thereby, the availability of essential nutrients gets increased. Use of biofertilizers in combination with chemical fertilizers was efficient in yield increase over the exclusive application of chemical fertilizers and can be attributed to increase in uptake of nutrients resulting in faster synthesis and translocation of photosynthates from leaves to curd. These results are in accordance with those obtained by (Ali *et al.*, 2018, Chand *et al.*, 2018, Singh *et al.*, 2018, Subedi *et al.*, 2019, Bhowal *et al.*, 2020, Devkota *et al.*, 2021, Islam *et al.*, 2021).

Fruit Chemical Characteristics

Crude Protein Content (%)

The crude protein content of cauliflower curd as influenced by various treatments is presented in table 3. The highest crude protein content (24.80%) was recorded in T_{17} (FYM + VC + Poultry Manure + Sheep Manure + Vermiwash), followed by T_{16} (FYM + VC + Poultry Manure+ Sheep Manure) (24.40%). The lowest crude protein content (19.60%) was recorded in T_1 (Control – RDF).

The improvement in protein content may be due to enhanced nitrogen availability from organic sources. Lower crude protein content in control treatment was due to no fertilizer or manure or biofertilizer use in these plots. Substitution of RDN through vermicompost increased the crude protein content as it enables the plant to absorb nutrients over a longer period of time by releasing the nutrients slowly and steadily into the system. The increase in crude protein content due to the additional use of *Azotobacter* might be because of improved availability of nitrogen in the root zone and soil plant system there by facilitating better uptake of nitrogen. Similar findings were reported by (Sable and Blake, 1965).

Total Soluble Solids (°Brix)

The total soluble solids (TSS) content showed significant variation among treatments (table 3). The maximum TSS (7.25 °Brix) was observed in T_{17} (FYM+ VC+ Poultry Manure+ Sheep Manure + Vermiwash), while the minimum TSS (6.10 °Brix) was recorded in T_1 (Control – RDF). Organic nutrient application might have improved carbohydrate synthesis and accumulation in curds. Control treatment registered lowest TSS as there was no application of fertilizers, manure or biofertilizers. Increase in TSS content with the application of RDN through vermicompost might be due to the secretion of growth promoting substances by vermicompost which would have accelerated the synthesis of carbohydrates, resulting in increased TSS content. Whereas, increase in TSS due to addition of biofertilizers might be due to increased photosynthetic activates and other mineral resulted improved levels of carbohydrates and other quality parameters of cauliflower curd through the way of enzymatic activity that stimulated by plant growth substances produced by the application of biofertilizers. Similar finding were reported by (Singh *et al.*, 2018 and Kaur *et al.,* 2020).

Ascorbic Acid Content (mg 100 g^{-1})

Ascorbic acid content of cauliflower curd was significantly affected by different nutrient management practices (table 3). The highest ascorbic acid content (59.70 mg 100 g^{-1}) was recorded in T_{17} (FYM + VC + Poultry Manure + Sheep Manure + Vermiwash), followed by T_{16} (FYM + VC + Poultry Manure + Sheep Manure) (59.30 mg 100 g^{-1}).

The lowest ascorbic acid content (53.80 mg 100 g^{-1}) was recorded under T_1 (Control - RDF)**.** Enhanced vitamin C content under organic treatments may be attributed to better nutrient balance and physiological activity. Increase in ascorbic acid content by substitution of RDN by vermicompost might be due to secretion of growth promoting substances by vermicompost which would have accelerated the synthesis of carbohydrates resulting in increase in ascorbic acid content. The increased ascorbic acid content with chemical fertilizer might be due to improved nutrient availability environment in the root zone and soil plant system. Whereas, the increase in ascorbic acid content due to addition of biofertilizers might be due to increased photosynthetic activities and other minerals resulted in improved levels of carbohydrates and other quality parameters of cauliflower curd through the way of enzymatic activity that stimulated by plant growth substances produced by the application of biofertilizers. These results are in accordance with those obtained by (Basnet *et al.,* 2017, Chand *et al.,* 2018 and Kaur *et al.,* 2020).

Conclusion

From the present investigation, it can be concluded that the application of combined organic nutrient sources significantly improved the growth, yield and quality parameters of cauliflower. Among all treatments, T_{17} (FYM + Vermicompost + Poultry Manure + Sheep Manure + Vermiwash) proved to be the most effective, recording maximum plant height, number of leaves, curd diameter, head weight, curd yield, stalk yield, crude protein, TSS, and ascorbic acid content. The superior performance of T_{17} may be attributed to improved soil fertility, enhanced nutrient availability, and better microbial activity under integrated organic nutrient management. Therefore, the combined use of organic manures along with vermiwash can be recommended for sustainable cauliflower production with higher yield and better quality.

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References

Ali, M. R., Rahman, M. M. and Hossain, M. A. (2018) Effect of vermicompost on growth and yield of cauliflower in acid soils of Bangladesh, *Bangladesh Journal of Agricultural Research*, **43**: 133-146.

Basnet, M., Shakya, S. M. and Baral, B. R. (2017) Response of organic manures on post harvest soil nutrient restoration on cauliflower production, *Journal of Agriculture and Environment*, **18**: 67-72.

Bhowal, S., Hossain, M. H. and Bashir, M. M. (2020) Integrated nutrient management on the yield and profitability of cauliflower, *Bangladesh Agronomy Journal*, **23**: 45-49.

Blake, G. R. (1965) Bulk density, In: Methods of Soil Analysis, Part I (C. A. Black, Ed.), *American Society of Agronomy*, Madison, WI, pp: 374-390.

Chand, P., Kumar, M. and Singh, V. (2018) Effect of organic manures and biofertilizers on yield and quality of cauliflower, *International Journal of Current Microbiology and Applied Sciences*, **7**: 1287-1294.

Devkota, P., Sharma, M. D. and Dhakal, D. D. (2021) Effect of organic and inorganic fertilizers on yield and soil properties of cauliflower, *Nepalese Journal of Agricultural Sciences*, **20**: 45-52.

Hiremath, S. M., Nandihalli, B. S. and Hanchinal, S. G. (2006) Integrated nutrient management in paprika (*Capsicum annuum* L.), *Karnataka Journal of Agricultural Sciences*, 19(**3**): 624-626.

Islam, M. S., Rahman, M. M. and Uddin, M. J. (2021) Influence of integrated nutrient management strategies on growth and yield of cauliflower, *Scientia Horticulturae*, **276**: 109-115.

Jose, D., Shanmugavelu, K. G. and Thamsu Raj, S. (1988) Studies on the efficacy of organic *vs.* inorganic farm of nitrogen in brinjal, *Indian J. of Hort.*, 45(**1&2**): 100-103.

Kaur, P., Singh, H. and Kaur, R. (2020) Effect of integrated nutrient management on yield, quality and soil nutrient status of cauliflower, *International Journal of Chemical Studies*, **8**: 3196-3200.

Magray, M. Y. (2002) Effect of organic and inorganic fertilizers on growth and yield of capsicum (*Capsicum annuum* L.), M.Sc. Thesis, SKUAST, Kashmir.

Mendez, M. and Viteri, S. (2007) Alternatives of biofertilization for sustainable onion bulb (*Allium cepa*) production in Cucaita, Boyaca, *Agronomia Colombiana*, **25**: 168-175.

Neupane, S., Adhikari, B. and Shrestha, J. (2020) Effect of integrated nutrient management on cauliflower production and soil properties, *Journal of Agriculture and Natural Resources*, **3**: 205-215.

Prabhu, M.; Veeraraghavathatham, D. and Srinivasan, K. (2003) Effect of nitrogen and phosphorus on growth and yield of brinjal hybrid COBH-1, *South Ind. Hort.*, 51(**1-6**): 152-156.

Sharma, D., Dutta, I. and Choudhary, P. (2022) Growth, yield and quality of cauliflower, *Biological Forum*, **14**: 508-512.

Singh, R., Kumar, S. and Yadav, R. (2018) Effect of integrated nutrient management, *The Bioscan*, 13(**2**): 589-593.

Subedi, S., Bhattarai, S. and Shrestha, J. (2019) Response of Azotobacter in cauliflower, *International Journal of Applied Sciences and Biotechnology*, **7**: 12-18.