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RESEARCH ARTICLE

Effect of organic nutrients and bioregulators on growth and yield of cauliflower (*Brassica oleraceae* L.)

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SUMMARY

Vegetable production with organic farming has been practiced by many farmers in India. However, one of the problems in practicing organic farming is that the yield produced will be lower in the early stages compared to chemical farming. In this study, cauliflower vegetable was grown with organic fertilization in comparison with chemical fertilization, to see what accounts the yield limitation and how different in growth of the vegetable between organic and chemical fertilizations. Field experiments were conducted to study the influence of different organic manures and bioregulators on the growth and yield of cauliflower. The experiments were conducted in a Randomized Block Design replicated thrice with nine treatments involving different organic manures and bioregulators along with inorganic fertilizers as control. Efficacy of organic nutrition revealed that organic mode of nutrient through various combinations of bioregulators was found to be superior over chemical fertilizers, in terms of increased plant height, number of leaves and average yield of curd. The best combination was 100 per cent recommended dose of fertilizers through vermicompost @ 3.1 t ha^{-1} along with foliar spray of humic acid (0.1%).

Key Words : Bioregulators, Cauliflower, Farm yard manure, Organic nutrients, Vermicompost

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Cauliflower (*Brassica oleraceae*) is an important cole crop widely grown in tropical and temperate regions of the country. It is an important vegetable crop of the country and is widely cultivated for its white tender head (curd). It is a nutritious vegetable and contains a good amount of Vitamin B and a fair amount of protein, minerals and vitamins A and C. Thus, cauliflower becomes a popular commercial crop among the vegetable growers. But cauliflower is a heavy feeder and for better yield the soil must be fertile. Cauliflower crop removes the nitrogen (N), phosphorus (P) and potassium (K) from soil to large extent. It requires proper and sufficient N and K for better yield. Recent developments in intensive agriculture, though contributed immensely towards surplus food, caused degradation of fertile land and left hazardous residues in food products. Thus, there is an increasing awareness throughout the world about the organic, sustainable agricultural practice. Generally, excessive amounts of inorganic fertilizers are applied to vegetables in order to achieve a higher yield and maximum value of growth (Badr and Fekry, 1998, Arisha and Bardisi, 1999, Dauda *et al*., 2008) and also use of large scale inorganic fertilizers deteriorates the soil and cause the soil problem (Warade *et al.,* 1995). Organic manure can serve as alternative practice to chemical fertilizers (Gupta *et al*., 1988) for improving soil structure (Bin, 1983, Dauda *et al*., 2008) and microbial biomass. Therefore, utilization of locally produced manures by vegetable production operations may increase crop yields with less use

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of chemical fertilizer. Use of organic manures along with organic bioregulators helps in improving the growth and yield of the crop and making it more nutritious (Abusaleha and Shanmugavelu, 1988). Although the organic manures contain plant nutrients in small quantities as compared to the fertilizers, the presence of growth promoting principles like enzymes and hormones, besides plant nutrients make them essential for improvement of soil fertility and productivity (Bhuma, 2001). Keeping these points in view, the investigation were undertaken to assess the effect of organic nutrient sources and bioregulators on growth and yield of cauliflower.

MATERIAL AND METHODS

Field experiments were conducted at Department of Crop Physiology, TNAU, Coimbatore, which is located at 11°N latitude and 77°E longitude at an altitude of 432m above MSL. The soil of the experimental field was moderately deep black, clay sandy loam soil in texture having pH 8.17, EC 0.08 Om mohs^{-1} cm^{-1}, organic carbon – 0.410 per cent, available nitrogen – 250 kg ha^{-1}, available phosphorus – 14 kg ha^{-1} and available potassium – 126 kg ha^{-1}. The experiment was laid out in Randomized Block Design (RBD) with three replications and nine treatments. The net plot size was 5m x 4m. The nine treatments were as follows

T_1 – *RDF – 50:100:50 NPK kg /ha (control)
T_2 – RDF – 50:100:50 NPK kg /ha + foliar spray of TNAU panchagavya (3%)
T_3 – RDF – 50:100:50 NPK kg /ha + foliar spray of humic acid (0.1%)
T_4 – 100% RDF through FYM @ 8.3 t / ha
T_5 – 100% RDF through FYM @ 8.3 t / ha + foliar spray of TNAU panchagavya (3%)
T_6 – 100% RDF through FYM @ 8.3 t / ha + foliar spray of humic acid (0.1%)
T_7 – 100% RDF through vermicompost @ 3.1 t / ha
T_8 – 100% RDF through vermicompost @ 3.1 t / ha + foliar spray of TNAU panchagavya (3%)
T_9 - 100% RDF through vermicompost @ 3.1 t / ha + foliar spray of humic acid (0.1%).

*** Recommended dose of fertilizers (RDF) :**

The cauliflower variety 'First Early' seeds were planted in the nursery and one month old seedlings were transplanted in the main field at the spacing of 60cm x 45cm / hill. In organic treatment, application of organic sources such as farm yard manure, vermicompost was done on the basis of its nitrogen content as per treatment combinations whereas K was adjusted through rock phosphate application which is permitted in organic farming. Organic manure *i.e.* farm yard manure and vermicompost were applied fifteen days before sowing and were mixed well in soil in each plots as per treatments. In inorganic treatment, full dose of P, K and half dose of N of recommended dose of fertilizer was applied as basal dose at the time of transplanting, while remaining dose of nitrogen was applied at the time of top dressing *i.e.* 45 days after transplanting (DAT). Nitrogen was applied through urea, phosphorus through single super phosphate and potassium through muriate of potash. The foliar spray of bioregulators were imposed at three stages *i.e.* vegetative stage (30 DAT), curd initiation stage (45 DAT) and curd maturation stage (60 DAT). The biometric observations were recorded at the time of harvesting. Harvesting of cauliflower was done within 105 days. Observation on growth and yield were recorded at the time of harvesting. For recording observation, five representative plant samples were collected at random from each replication of all treatments. Plant height was measured from bottom of the stem to the tip of the growing point and expressed as cm. Root length was measured from the cotyledonary node to the tip and expressed as cm.

Yield components such as diameter of the curd and weight of the curd were recorded at the time of harvest from the five samples taken from each replication of the treatments. Curd diameter was measured at the top surface of the curd and expressed as cm. Curds of the selected plants were weighed individually and the average curd weight was

Table 1 : Effect of organic sources of nutrients and bioregulators on growth and yield of cauliflower

Treatments	Plant height (cm)	Root length (cm)	Number of leaves	Diameter of the curd (cm)	Average weight of the curd (g plant^{-1})	Curd yield (q ha^{-1})
T_1	12.4	16.2	12.6	8.8	902	200
T_2	13.0	16.3	13.2	10.5	952	212
T_3	12.0	17.0	13.9	8.3	968	215
T_4	11.7	16.0	12.2	8.9	903	202
T_5	13.2	18.1	14.2	11.1	979	218
T_6	12.7	17.8	13.7	10.0	935	212
T_7	13.0	16.6	12.8	10.2	929	212
T_8	13.5	18.5	14.2	11.3	989	220
T_9	13.9	19.6	14.9	11.8	1044	232
Mean	12.8	17.3	13.1	10.1	958	213
S.E.±	0.87	0.16	0.15	0.54	8.00	4.79
C.D. (P=0.05)	1.83	0.33	0.32	1.14	16.95	10.12

expressed as g/ plant, the curd yield per plot was recorded and then computed as hectare yield and expressed in quintal per hectare. The mean data were analyzed statistically.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Effect of organic sources of nutrients on growth of cauliflower:

All the nutrient management treatments had resulted into statistically significant effects. Data (Table 1) revealed that use of organic sources of nutrients (vermicompost) along with bioregulators (humic acid) had significantly increased plant height, root length and number of leaves. The maximum plant height (13.9 cm), root length (19.6 cm) and number of leaves (14.9) were recorded with the treatment of vermicompost @ 3.1 t ha^{-1} along with foliar spray of humic acid (0.1%) and the lowest plant height (11.7 cm), root length (16.0 cm) and number of leaves (12.2) were recorded with the treatment where farm yard manure alone was used. The treatment effect of vermicompost alone was at par with the use of recommended dose of fertilizers alone (control). Enhancement in growth of the cauliflower plant might be due to action of joint application of manures and bioregulators which have acted complementary and supplementary to each other and resulted into adequate, slow but steady supply of nutrients. The effect of vermicompost on physio-chemical properties imparts favourable soil structure for root growth which influenced better plant growth (Sharma and Bhalla, 1993). Shashidhara, (2000) also reported that plant height was significantly higher at all growth stages due to application of vermicompost @ 2.0 t ha^{-1}. And the role of bioregualtor humic acid, entered the plant during early stages of growth and are additional sources of polyphenol that act as respiratory catalyst and hence, metabolism and growth of plant will be high (Kononova, 1966).

Increase in root length was due to adding organic matter which enhances the soil structure conditions, creates conducive conditions for good root development (Arisha *et al*., 2003; Togun and Akanbi, 2003) and mineralization by micro-organisms. Hence, plants are able to get nutrients for higher yield (Wong *et al*., 1999; Al-Nasir, 2002) upon application of organic manures.

Effect of organic sources of nutrients on yield of cauliflower:

The cauliflower head harvested at 105 days after transplanting weighed from 903 to 1044 g $head^{-1}$, with the diameter of the curd ranging from 8.3 to 11.8 cm. Treatment effect of vermicompost @ 3.1 t ha^{-1} along with foliar spray of humic acid (0.1%) recorded the maximum cauliflower curd yield (232 q ha^{-1}), whereas the treatment 100% RDF (Control) recorded the curd yield of 200 q ha^{-1} with inferior quality. Organic manures treatment along with bioregulators had significantly improved the diameter of the curd and average curd yield. The data on remarkable curd yield was noticed with vermicompost and humic acid combination which was closely followed by vermicompost and Panchagavya combination. The treatment effect of 100 per cent RDF through farm yard manure @ 8.3 t ha^{-1} along with foliar spray of 3 per cent Panchagavya and 100% RDF through vermicopmpost @ 3.1 t ha^{-1} along with foliar spray of 3 per cent Panchagavya also performed better and showed non- significant variation between them. The organic N combination with bioregulator proved better in enhancing the yield parameters. The application of organic sources might have significantly enhanced the availability of native and applied macro and micro nutrients in the soil, as consequence of which the yield had been increased. Similar types of findings were reported by Mahendran and Kumar (1998), Ghuge *et al*. (2007) and Singh *et al*. (1997). The yield advantage was attributed to the presence of macro and micro nutrients, vitamins, enzymes, antibiotics and growth hormones in vermicompost (Sharma *et al*., 2004). In this investigation, humic acid spray along with vermicompost application caused a remarkable improvement in yield of cauliflower. This finding was in close conformity with the results reported by Dhanasekaran *et al*. (2007) and also with results reported by Chinnamuthu and Venkatakrishnan (2001).

REFERENCES

Abusaleha, M.G. and Shanmugavelu, K.G. (1988). Studies on the effect of organic v/s inorganic sources of nitrogen on growth, yield and quality of okra (*Abelmoschus esculentus*). *Indian J. Hort.*, **45** (3 & 4): 312-318.

Al-Nasir, F. (2002). Effect of organic fertilizers on yield and nutrients concentration of cauliflower plant. *Arch. Acker-Pfl. Boden.*, **48** : 37- 47.

Arisha, H.M. and Bradisi, A. (1999). Effect of mineral fertilizers and organic fertilizers on growth, yield and quality of potato under sandy soil conditions. *Zagazig J. Agric. Res.*, **26**: 391- 405.

Arisha, H.M.E., Gad, A.A. and Younes, S.E. (2003). Response of some pepper cultivars to organic and mineral nitrogen fertilizer under sandy soil conditions. *Zagazig J. Agric. Res.*, **30**: 1875 -1899.

Badr, L.A.A. and Fekry, W.A. (1998). Effect of intercropping and doses of fertilization on growth and productivity of taro and cucumber plants - vegetative growth and chemical constituents of foliage. *Zagazig J. Agric. Res.*, **25**: 1087–101.

Bhuma (2001). Studies on the impact of humic acid on soil fertility and productivity of green gram (VBN GG2). M.Sc. Thesis, Tamil Nadu Agricultural University, Coimbatore, T.N. (INDIA).

Bin, J. (1983). Utilization of green manure for raising soil fertility in China. *Soil Sci.*, **135**: 65- 69.

Chinnamuthu, C.R. and Venkatakrishnan, A.S. (2001). Effect of integrating organic fertilizer with vermicompost and VAM on the productivyt of sunflower. *Madras Agric. J.*, **88** (7&9): 424 – 427.

Dauda, S.N., Ajayi, F.A. and Ndor, E. (2008). Growth and yield of water melon (*Citrullus lanatus*) as affected by poultry manure application. *J. Agric. Soc. Sci.*, **4** : 121–124.

Dhansekaran, K., Bhuvaneshwari, R., Sathiyamurthi, S. and Sivakumar, K. (2007). Response of foliar application of humic acid on the growth and yield of bhendi. *Internat. J. Trop. Agric.*, **25**: 871 – 876.

Ghuge, T.D., Gore, A.K. and Jadhav, S.B. (2007). Effect of organic and inorganic nutrient sources on growth, yield and quality of cabbage (*Brassica oleraceae* var. *capitata*). *J. Soils & Crops*, **17** (1): 89 – 92.

Gupta, A.P., Antil, S.R. and Narwal, P.R. (1988). Effect of farm yard manure on organic carbon, available N and P contents of soil during different periods of wheat growth. *J. Indian Soil Sci.*, **36**: 269–273.

Kononova, M.M. (1966). *Soil organic matter, its nature, its role in soil formation and soil fertility* (2nd Ed.). Pergaman Press. Oxford, LONDON, UNITED KINGDOM.

Mahendran, P.P. and Kumar, N. (1998). Effect of organic manure on cabbage cv. HERO (*Brassica oleraceae* var. *capitata* L.). *J. South Indian Hort.*, **45** (5&6): 240 – 243.

Sharma, N.K. and Bhalla, P.I. (1993). Influence of integrated nutrient management on growth, yield and economics in okra [*Abelmoschus esculentus* (L.) *Moench*]. *J. Veg. Sci.*, **22** (1): 1-4.

Sharma, V., Kumar, K. and Dev, S.P. (2004). Efficient recycling of obnoxious weed plants and congress weed as organic manure through vermicomoposting. *J. Indian Soc. Soil Sci.*, **52**(1): 112-113.

Shashidhara, G.B. (2000). Integrated nutrient management in chilli (*Capsicum annuum* L.) under Northern Transition Zone of Karnataka. Ph.D. Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA).

Singh, J.B., Sreekrishna, B. and Sudarshan, M.R. (1997). Performance of scotch bonnet chilli in Karnataka and its response to vermicompost. *Indian Cocoa, Arecant & Spices J.*, **21**: 9-10.

Togun, A.O. and Akanbi, W.B. (2003). Comparative effectiveness of organic - based fertilizers to mineral fertilizers on tomato growth and fruit yield. *Comp. Sci. & Utilizat.*, **11** : 337 – 342.

Warade, S.D., Desale, S.B. and Shinde, K.G. (1995). Effect of organic, inorganic and bio-fertilizers on yield of onion bulbs cv. N-780. *J. Maharashtra Agric. Univ.*, **20** (3): 467 – 468.

Wong, J.W.C., Ma, K.K., Fang, K.M. and Cheung,C. (1999). Utilization of manure compost for organic farming in Hong Kong. *Bio-resource Technol.*, **67**: 43 – 46.