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Economics Of Production Of Cauliflower In Latur District Of Maharashtra With Inm

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ABSTRACT

Horticultural crops play a unique role in Indian economy by improving the income of the rural people. India, with its diversified soil and climate comprising several agro- ecological regions, provides the opportunity to cultivate different crops and varieties of horticultural crops. The Cauliflower has been recognized as an important food article due to its palatable taste and rich supply of minerals, vitamins, protein, carbohydrates and gives more profit also. With this view a study was conducted in Latur district of Maharashtra on effect of integrated nutrient on cauliflower production to know the cost of cultivation and profitability of the crop in the selected area. In order to investigate, an experiment was conducted using Randomized Block Design with three replications. The experiment comprised of 14 different treatment combinations comprising of three different sources of nutrients including inorganic, organic and bio-fertilizers. The study revealed that the highest net monetary returns (Rs. 1,18,033 ha^{-1}) and gross monetary returns (Rs. 1,80,040 ha^{-1}) were recorded in treatment of 75 % RDF + FYM + *Azotobacter* + *Azospirillum* (T_6) followed by T_2. The benefit: cost ratio was maximum (2.97) in treatment of 100 % RDF + *Azotobacter* + *Azospirillum* (T_3) followed by T_6 (2.90). The minimum net returns (Rs. 31,763 ha^{-1}) and gross monetary returns (Rs. 64,000 ha^{-1}) recorded in treatment control (T_{14}) with low B: C ratio (1.93). From the studies it can be inferred that the application of 75 % RDF + FYM @ 5 t/ha along with *Azospirillum* and *Azotobacter* was found to be the most effective treatment combination for getting enhanced post harvested parameters in cauliflower with saving of 25 per cent chemical fertilizers.

KEY WORDS: Cauliflower, INM, Yield and Economics,

1. Introduction

Among different vegetables, cauliflower (*Brassica oleracea* var. *botrytis* L.) is one of the most important winter vegetable among the cole crops which belongs to the genus *Brassica* of the family Cruciferae. The vegetable production in India has touched a new height in recent years, placing it as the second largest producer with 191769 000MT in the world, and area under cultivation of vegetables is 10353

000 hectares. India is the second largest producer of cauliflower in the world. The total area under cauliflower in India was 459 000ha in 2019-2020 with the production of 8844 000MT (Annon. 2020 a).

Investment in agricultural both in public and private sectors has increased and agricultural production has achieved reasonable growth rate. This growth rate has not only to be maintained, but accelerated fluctuations in agricultural production have to be minimized. Cultivation of crops is a labour intensive and as such it generates employment opportunities to rural people. In order to overcome the present situation, the crop cultivation is an effective instrument for generating greater income per unit area, additional employment, provision of nutritive and pretentious diet and conservation of shifting cultivation. To improve income, provide gainful employment and save natural resources from degradation, diversification from grain crops to high-value crops like vegetables has emerged as an important strategy for agricultural growth (Sekhon and Kaur, 2004). Growing demand for fruit and vegetables induced by rising incomes and changing consumption patterns coupled with declining farm incomes due to rising costs and stagnating food grain productivity has necessitated diversification towards high- value crops in recent times. Apart from income enhancement, these high-value crops have potential to generate additional employment opportunities in farming due to their labour – intensive character (Weinberger and Lumpkin, 2006).

The dramatic increase in vegetable productivity and the increase in fertilizer consumption point to the crucial role of fertilizers. Recently many countries are facing the problem of soil deterioration and environment pollution due to enormous use of chemical fertilizers. Therefore, the current trend is to use organic fertilizers like bio-fertilizers of microbial origin with limited use of chemical fertilizers. The ratio between the chemically fixed and biologically fixed nitrogen usually range between 1:4 to 1:25. *Azospirillum* inoculants increase to crop production by 5-20 per cent with the saving of elemental nitrogen up to 40 per cent of the recommended dose. (Dart, 1986)

The use of bio-fertilizers with reducing dose of chemical fertilizers are as renewable and environmentally friendly supplementary source of nutrients, which helps to increase net return of farmers. Keeping in view these facts the present investigation was under taken to explore the effect of inorganic fertilizers, organic manure and bio-fertilizers on yield component and economics of cauliflower.

2. MATERIALS AND METHODS

The present investigation on effect of integrated nutrient management on growth and yield of cauliflower was carried out at vegetable Research Farm of Department of Horticulture, College of Agriculture, Latur, under Vasantrao Naik Marathawada krishi vidyapeeth Parbhani in Maharashtra. The experiment was laid out in Randomized Block Design with three replications comprising of fourteen treatment combinations (Table 1). The seeds were sown in raised nursery beds. After sowing, seeds were covered with a thin film of soil mixed with Farm Yard Manure. Thereafter, paddy straws mulching was incorporated to reduce moisture loss. The beds were irrigated twice a day with the help of water can to maintain optimum moisture in soil.

Twenty five days old seedlings were used for transplanting in the main field. The required quantity of bio-fertilizers such as *Azotobactor* and *Azospirillum* (10 kg/ha) was mixed in soil and given to the respective plots. The FYM (10 t/ha) and NPK (120:80:40 kg/ha) was applied as per the decided treatments in which half dose of nitrogen through urea along with the full dose of phosphorous through single super phosphate and potassium through murate of potash was applied. The half dose of nitrogen was given as per treatments after 30 days of transplanting. Healthy uniform seedlings of four weeks age were selected for transplanting and they were treated with bavistin @ 2 g /lit and transplanted in the plot size 3.6 m × 2.7 m at spacing of 60 × 45 cm. Thus, the numbers of plants per plot were 36. Light irrigation was given immediately after transplanting.

The observations were recorded for yield characters viz. yield/plot (kg), yield/ha (q) and economics of cultivation. Five plants in each treatment combination and in each replication were randomly selected and tagged properly for recording various observations. The experimental data of all the parameters was subjected to statistical analysis for proper interpretation. The statistical analysis of data in respect of the post harvest components was done according to the standard procedure given for randomized block design by Panse and Sukhatme (1985).

Table 1: Treatment details

Symbol	Treatments
T_1	100 % RDF (120:80:40 kg/ha.)
T_2	100 % RDF + FYM + *Azotobacter* + *Azospirillum*.
T_3	100 % RDF + *Azotobacter* + *Azospirillum*.
T_4	100 % RDF + FYM + *Azotobacter*.
T_5	100 % RDF + FYM + *Azospirillum*.
T_6	75 % RDF + FYM + *Azotobacter* + *Azospirillum.*
T_7	75 % RDF + *Azotobacter* + *Azospirillum*.
T_8	75 % RDF + FYM + *Azotobacter*.
T_9	75 % RDF + FYM + *Azospirillum*.
T_{10}	50 % RDF + FYM + *Azotobacter* + *Azospirillum*.
T_{11}	50 % RDF + FYM + *Azotobacter*.
T_{12}	50 % RDF + FYM + *Azospirillum*.
T_{13}	50 % RDF + *Azotobacter* + *Azospirillum*.
T_{14}	Control.

3. RESULT AND DISCUSSION:

The data regarding yield parameters and economics of cauliflower as influenced by different treatments of INM are presented in Table 2.

3.1. Yield per plot (kg)

The data on the yield parameter indicated that, the significant differences were observed in yield per plot (kg). The treatment of 75 % RDF + FYM + *Azotobacter* + *Azospirillum* (T_6) was recorded highest curd yield per plot (17.50 kg/plot) while, treatments T_2, T_8, T_3, T_5, T_4, T_9 and T_7 were at par. The lowest yield (6.22 kg/ plot) was recorded in the treatment control (T_{14}).

3.2. Yield per hectare (q)

The data showed that, the highest yield of curd (180.04 q/ha) was recorded in the treatment of 75 % RDF+ FYM + *Azotobacter* + *Azospirillum* (T_6) and it was at par with the treatment T_2 and T_8. The lowest yield of curd (64.07 q/ha) was recorded in treatment control (T_{14}).

Curd yield per plot and yield per hectare observed significant variation in response to the levels of application of inorganic fertilizers with organic manure and bio-fertilizers. The treatment of 75 per cent RDF + FYM + *Azotobacter* + *Azospirillum* (T_6) recorded maximum yield in both yield per plot as well as yield per hectare (17.50 kg/plot, 180.04 q/ha) and it was at par with the treatment T_2 (17.10 kg/plot, 175.92 q/ha) and T_8 (16.65 kg/plot, 171.32 q/ha). Lowest yield per plot as well as yield per hectare was recorded in treatment control (T_{14}) i.e. 6.33 kg per plot, 64.07 q per ha. The per cent increase in yield over RDF was recorded maximum (44.10 per cent) in the treatment of 75 % RDF+ FYM + *Azotobacter* + *Azospirillum* (T_6) while, followed by (40.80 per cent) in treatment of 100 % RDF+ FYM + *Azotobacter* + *Azospirillum* (T_2). The decrease in yield comparison with RDF (-48.72 per cent) was recorded in treatment Control (T_{14}). The contribution of 75 % RDF with FYM and bio-fertilizers to increase in yield can be attributed to the balanced C: N ratio and enhanced availability of essential plant nutrient hence, increased rate and efficiency of metabolic activities resulting in higher assimilation of proteins and carbohydrates. The beneficial role of added FYM and bio-fertilizers in improving soil physical, chemical and biological properties was well known, which in turn helped in better nutrient absorption by the plant resulted in better yield. Increased in yield can also be attributed to sustained availability of nutrient throughout the growing season also efficacy of inorganic fertilizers is much pronounced when they were combined with organic manure and bio-fertilizers. Such beneficial effects of bio-fertilizers and inorganic fertilizers have been recorded by El.saady and Genesia (2018) in cauliflower, Kaushal and Kaushal (2013) in cauliflower, Chatterjee *et al.* (2012) in cabbage and Sable and Bhamare (2007) in cauliflower.

3.3 Economics of cauliflower production

The cost of cultivation of different treatments was calculated. The observation on the cost of cultivation, gross monetary returns, net monetary returns and benefit: cost ratio are presented in Table 2 and graphically presented in Fig. 1.

It is evident from the data presented that, the highest net monetary returns (Rs. 1,18,033 ha^{-1}) and gross monetary returns (Rs. 1,80,040 ha^{-1}) were recorded in treatment of 75 % RDF + FYM + *Azotobacter* + *Azospirillum* (T_6) followed by T_2. The benefit: cost ratio was maximum (2.97) in treatment of 100 % RDF + *Azotobacter* + *Azospirillum* (T_3) followed by T_6 (2.90). The minimum net returns (Rs. 31,763 ha^{-1}) and gross monetary returns (Rs. 64,000 ha^{-1}) recorded in treatment control (T_{14}) with low B: C ratio (1.93).

The present investigation showed that, the higher gross monetary returns (Rs. 1,80,040 ha^{-1}) were recorded in treatment of 75% RDF + FYM + *Azotobacter* + *Azospirillum* (T_6), followed by treatment of 100% RDF + FYM + *Azotobacter* + *Azospirillum* (T_2) i.e. Rs.1,75,925 ha^{-1}, Whereas, minimum gross returns (Rs 64,000 ha^{-1}) was obtained under treatment control (T_{14}). The lowest cost of production (Rs.32237 ha^{-1}) was recorded in treatment control (T_{14}) while, the highest cost of production (Rs. 62431 ha^{-1}) was recorded in treatment of 100% RDF + FYM + *Azotobacter* + *Azospirillum* (T_2). This increase in cost of production for treatment T_2, it is due to more expenditure on inorganic fertilizers, organic manure, bio-fertilizers and harvesting cost.

Regarding the net monetary returns, it was observed that, the highest net monetary returns (Rs. 1,18,033 ha^{-1}) were obtained in treatment of 75% RDF + FYM + *Azotobacter* + *Azospirillum* (T_6), which was followed by treatment of 100% RDF + FYM + *Azotobacter* + *Azospirillum* (T_2) while, lowest net monetary returns (Rs. 31,763 ha^{-1}) were observed in treatment control (T_{14}). This could be attributed to higher production of cauliflower with good quality and little addition of cheaper bio-fertilizers.

Regards to Benefit: Cost ratio, the result indicated wide variation *i.e.* 1.93 to 2.97 among the different treatments tried. The highest B: C ratio (2.97) was observed in treatment of 100% RDF + *Azotobacter* + *Azospirillum* (T_3) which was closely followed by (2.90) in the treatment of 75% RDF + FYM + *Azotobacter* + *Azospirillum* (T_6) and it was lowest (1.93) in treatment control (T_{14}). The highest B: C ratio in the treatment T_3 was due to absences of FYM and use of cheaper bio-fertilizers while, followed by treatment T_6 due to use of 75 per cent RDF and bio-inoculants may be reduce the cost of production and increase yield with better quality. Similar result also obtained by Mira dhakal *et al*. (2016) in cauliflower, Sable and Bhamare (2007) in trial with cauliflower Cv. Snowball-16 and Gurav (2002) in cabbage.

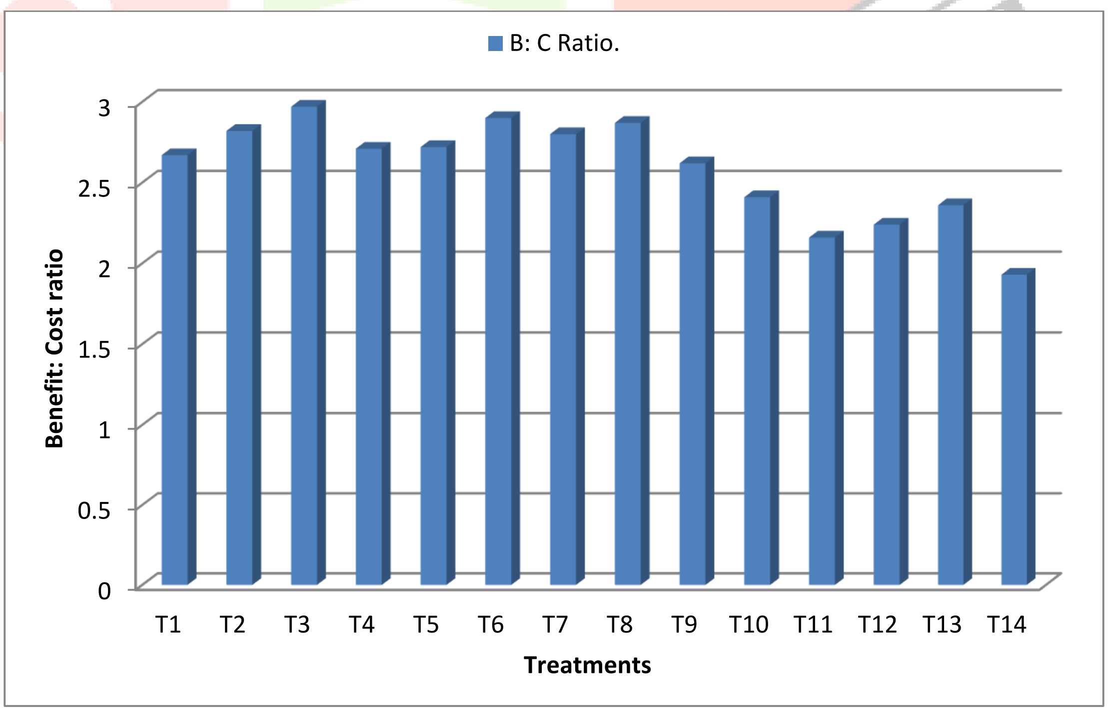

Fig. 1. Effect of different INM treatments on benefit: cost ratio of cauliflower cultivation.

Table 2: Influence of different INM treatments on yield and economics of cauliflower.

Tr. No.	Treatments	Yield per plot (kg).	Yield per hectare (q).	Cost of cultivation (Rs./ha)	Gross monetary returns (Rs./ha)	Net monetary returns (Rs./ha)	B: C Ratio.
T_1	100 % RDF (120:80:40 kg/ha.)	12.14	124.94	46833	124937	78105	2.67
T_2	100 % RDF+ FYM + *Ab.* + *Ap.*	17.10	175.92	62431	175925	113494	2.82
T_3	100 % RDF + *Ab.* + *Ap.*	16.54	162.13	54632	162130	107498	2.97
T_4	100 % RDF + FYM + *Ab.*	15.50	159.48	58891	159485	100594	2.71
T_5	100 % RDF+ FYM + *Ap.*	15.82	160.80	59113	160820	101707	2.72
T_6	75 % RDF + FYM + *Ab.* + *Ap.*	17.50	180.04	62007	180040	118033	2.90
T_7	75 % RDF + *Ab.* + *Ap.*	13.51	138.99	49665	138991	89326	2.80
T_8	75 % RDF+ FYM + *Ab.*	16.65	171.32	59753	171316	111563	2.87
T_9	75 % RDF+ FYM + *Ap.*	14.15	145.52	55454	145524	90070	2.62
T_{10}	50 % RDF+ FYM + *Ab.* + *Ap.*	12.08	124.23	51595	124228	72633	2.41
T_{11}	50 % RDF+ FYM + *Ab.*	9.87	101.51	47009	101512	54503	2.16
T_{12}	50 % RDF + FYM + *Ap.*	10.44	107.43	47995	107427	59433	2.24
T_{13}	50 % RDF + *Ab.* + *Ap.*	9.57	98.41	41796	98436	56640	2.36
T_{14}	Control.	6.22	64.07	32237	64000	31763	1.93
	S.E. ±	1.37	5.31	-	-	-	-
	C.D. at 5%	4.11	15.93	-	-	-	-

5. References

Anonymous, 2020. Indian Horticulture Database, National Horticulture Board, Govt. of India.

Chaterjee, R., Jana, J.C. and Paul, P.K. 2012. Enhancement of head yield and quality of cabbage (*Brassica oleracea*) by combining different sources of nutrients, *Indian J. of Agril. Sci.* **82**(4):323-327.

Dart, P.J. 1986. Nitrogen fixation associated with non-legumes in agriculture. *J. Plant and soil*, **90**: 303-334.

Dhakal M, Shakya SM, Bhattarai S 2016. Yield and Quality of Broccoli (*Brassica oleracea* L. var. *italica* Plenck.) cv. Calabrese Affected by Nitrogen and Farm Yard Manure in Chitwan, Nepal. *J Plant Heal* **1**(1): 102.

El-Saady, W. A. and Genesia F. Omar. 2018. Effect of some Inorganic NPK Fertilization Treatments on Cauliflower. *J. Plant Production, Mansoura Univ.*, **9** (12).

Gurav, A. D. 2002. Effect of bio-fertilizer (*Azotobacter* and *Azospirillum*) alone and in combination with reducing levels of nitrogen on growth and yield of cabbage. *M.Sc.(Agri.) Thesis.* MKV. Parbhani.(Unpublished).

Kaushal M. and Kaushal R. 2013. Plant growth promoting rhizobacteria- impacts on cauliflower yield and soil health **8**(1): 01-10.

Panse, V.G., and Sukhatme, P.V. 1985. Statistical method of agricultural workers. I.C.A.R., New Delhi.

Sable, P.S. and Bhamare, V.K. 2007. Effect of biofertilizers (*Azotobacter* and *Azospirill um*) alone and in combination with reduced level of nitrogen on quality of Cauliflower Cv. Snowball-16. *Asian J. Hort.***2** (1): 215-217.

Sekhon MH, Kaur Manjeet. 2004. Role of small Farmers in diversification of Punjab agriculture with vegetables, Indian Journal of Agricultural Marketing; **18**(1):80-88.

Weinberger K, Lumpkin Thomas A. 2006. High value agricultural products in asia and the Pacific for the small holder farmers: Trends, opportunities and research priorities. Proceedings of the workshop How Can the Poor Benefit from the Growing Markets for High Value Agricultural Products, held at CIAT, Cali, Cambodia and published by World Vegetable Center (AVRDC).