Find out the Effect of Organic Manure Integrated Nutrient Management on Quality of Cauliflower

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Abstract— *The experiment was laid out in factorial randomized block design with three replications and consisting four fertility levels (Control, 50% RDF, 75% RDF and 125% RDF) and three treatments of organic manure (control, FYM @ 20 t/ha + Azospirillum and vermicompost @ 7.5 t/ha + Azospirillum).*

Results showed that application of 100% RDF significantly increased the plant height, number of leaves per plant, plant spread, days taken to curd maturity, biological yield, curd diameter, fresh weight of curd, curd yield, nitrogen, phosphorus and potassium content, net returns and B: C ratio of cauliflower which was superior as compared to control and 50% RDF.

Keywords— Replications, Maturity, Biological, Significantly.

I. INTRODUCTION

There has been substantial increase both in the production and productivity of the vegetables with the adoption of high yielding varieties and improved production technologies. Cauliflower is a heavy feeder of nutrients they're by the use of chemical fertilizers is increasing day by day and the indiscriminate use of chemical fertilizers has simultaneously resulted in many problems like degradation of soil productivity, environment pollution, depletion of non- renewable source of energy etc. Moreover, chemical fertilizers are becoming costlier input in agriculture. Thus, integrated nutrient management refers to the "maintenance of soil fertility and plant nutrient supply at an optimum level for sustaining the productivity through optimization of the benefits from all possible sources of organic, inorganic and biological compounds in an integrated approach."

Nitrogen plays a key role in nutrition of the plants. As a matter of fact, the plant life would not be possible without this element. Adequate amount of nitrogen is also required to obtain good yield in vegetable crops. Phosphorous and potassium are considered as major nutrients in crops and they are involved in all the metabolic process in the plant and there is considerable evidence to show that, these element plays an important role in photosynthesis and helps in building up of carbohydrate in the plant. The production of dry matter is further affected by the effect of potassium on rate of respiration.

Organic manures and biofertilizers are the important components of integrated nutrient management as supply the trace amounts of micronutrients which are generally not supplied by the farmers to their vegetable crops. Vermicompost is the product of ingested biomass by earthworm after undergoing physical, chemical and microbial transformations and available in the form of cast. Earthworm reduces the C: N ratio, increases humic acid, cation exchange capacity and water-soluble carbohydrates.

II. MATERIAL AND METHOD

2.1 Experimental details (Design and layout):

The present experiment consisting of 12 treatment combinations was laid out in Factorial Randomized Block Design. Treatments details along with their symbols and other details of experiment are presented in table 1.1 and table 1.2.

TABLE 1
DETAILS OF THE EXPERIMENT ARE AS FOLLOWS

1.	Season	:	*Rabi*, 2020-21
2.	Experimental design	:	Factorial Randomized Block Design
3.	Crop	:	Cauliflower
4.	Total number of treatments	:	4 x 3
5.	No. of replications	:	3
6.	Total number of plots	:	12 x 3 = 36
7.	Plot size	:	2.40 m × 3.15 m = 7.56 m^2
8.	Spacing	:	60 cm x 45 cm

TABLE 2
CHRONOLOGICAL RECORD OF RAISING CABBAGE CROP

S. No.	Operations	Date
1.	Seed sowing in nursery	09.10.2020
2.	Ploughing and planking of field	16.11.2020
3.	Preparation of beds	17.11.2020
4.	Transplanting of seedling	19.11.2020
5.	Irrigation	At an interval of 7-10 days
6.	Cultural operations	As and when required
7.	Harvesting	29.01.2021 to 11.02.2021

2.2 Statistical analysis:

To test the significance of variation in data obtained from various growth, yield and quality characters, the technique of analysis of variance was adopted as suggested by Panse and Sukhatme (1967), for randomized block design. Significance of difference in the treatment effect was tested through 'F' test at 5 per cent level of significance and CD (critical difference) was calculated. The analysis of variance for all the data discussed is given in the appendix-XII.

III. RESULT AND DISCUSSION

3.1 Effect of integrated nutrient management on yield attributes and yield:

Biological yield (q/ha)

- **Effect of fertility levels:** The data revealed that different fertility levels were significantly affected the biological yield of cauliflower. Highest biological yield of cauliflower was recorded with the application of 100% RDF as compared to control and 50% RDF but found at par with 75% RDF. Biological yield of cauliflower increased due to application 100% RDF by 27.88 per cent over control and 11.89 per cent over 50% RDF.
- **Effect of organic manure:** A critical screening of data revealed that application of organic manures had significant effect on biological yield of cauliflower. The significantly highest biological yield of cauliflower was recorded with the application of vermicompost @ 7.5 t/ha + *Azospirillum* which was superior to control and FYM @ 20 t/ha + *Azospirillum*. The enhancement in biological yield of cauliflower due to application vermicompost @ 7.5 t/ha + *Azospirillum* was 27.52 and 10.75 per cent as compared to control and FYM @ 20 t/ha +*Azospirillum*, respectively.

TABLE 3

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON DAYS TAKEN TO CURD MATURITY OF CAULIFLOWER:

Treatments	Days taken to curd maturity
Fertility levels	
Control	98.41
50 % of RDF	84.55
75 % of RDF	74.06
100 % of RDF	72.30
SEm ±	3.32
CD (P=0.05)	9.74
Organic manure	
Control	95.04
FYM @ 20 t/ha + *Azospirillum*	81.61
Vermicompost @ 7.5 t/ha + *Azospirillum*	70.34
SEm ±	2.87
CD (P=0.05)	8.43

TABLE 4

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON BIOLOGICAL YIELD OF CAULIFLOWER

Treatments	Biological yield (qha)
Fertility levels	
Control	367
50 % of RDF	420
75 % of RDF	467
100 % of RDF	469
SEm ±	14
CD (P=0.05)	41
Organic manure	
Control	377
FYM @ 20 t/ha + *Azospirillum*	434
Vermicompost @ 7.5 t/ha + *Azospirillum*	481
SEm ±	12
CD (P=0.05)	35

Curd diameter (cm^2)

Effect of fertility levels:

An investigation of data revealed that curd diameter of cauliflower increased significantly with increasing fertility levels. Significantly maximum curd diameter was obtained with the application of 100% RDF which was significantly higher over control and 50% RDF and remained at par with application of 75% RDF. Curd diameter of cauliflower increased due to application 100% RDF by 30.64 and 13.04 per cent over control and 50% RDF.

Effect of organic manure:

A critical examination of data indicated that application of vermicompost @ 7.5 t/ha + *Azospirillum* gave significantly maximum curd diameter of cauliflower over control and FYM @ 20 t/ha + *Azospirillum*. The magnitude of increase in

curd diameter of cauliflower due to application of vermicompost @ 7.5 t/ha + *Azospirillum* was 31.52 and 11.69 per cent as compared to control and 30 t /ha FYM, respectively.

Fresh weight of curd (kg)

Effect of fertility levels:

A critical examination of data indicated that different fertility levels had significant influence on fresh weight of curd of cauliflower. Among different treatments, 100% RDF, being at par with 75% RDF and gave significantly maximum fresh weight of curd of cauliflower over control and 50% RDF. The magnitude of increase in curd weight per plant of cauliflower due to application 100% RDF was 35.11 and 12.66 per cent, respectively over control and50% RDF.

Effect of organic manure:

An investigation of data revealed that fresh weight of curd of cauliflower increased significantly with application of organic manure. Significantly maximum fresh weight of curd of cauliflower was obtained with the application of vermicompost @ 7.5 t/ha + *Azospirillum* which was significantly higher than control and FYM @ 20 t/ha + *Azospirillum*. Curd weight per plant of cauliflower increased by 28.93 and 11.51 per cent over control and FYM @ 20 t/ha + *Azospirillum*, respectively.

TABLE 5
EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON YIELD ATTRIBUTES OF CAULIFLOWER

Treatments	Curd diameter (cm^2)	Fresh weight of curd (g)
Fertility levels		
Control	15.96	0.621
50 % of RDF	18.44	0.744
75 % of RDF	20.65	0.830
100 % of RDF	20.84	0.839
SEm ±	0.57	0.027
CD (P=0.05)	1.67	0.079
Organic manure		
Control	16.30	0.660
FYM @ 20 t/ha + *Azospirillum*	19.19	0.764
Vermicompost @ 7.5 t/ha + *Azospirillum*	21.43	0.851
SEm ±	0.49	0.023
CD (P=0.05)	1.44	0.069

Curd yield

Effect of fertility levels:

Further reference of data given in revealed that curd yield of cauliflower was significantly increased due to the different fertility levels. The highest curd yield of cauliflower was recorded under the treatment of 100% RDF which was significantly higher over control and 50% RDF and remained at par with 50% RDF. The increase in curd yield of cauliflower due to 100% RDF was 34.06 and 13.00 per cent over control and 50% RDF.

Effect of organic manure:

It is evident from the data in that the significantly highest curd yield of cauliflower was recorded with application of vermicompost @ 7.5 t/ha + *Azospirillum* as compared to control and FYM @ 20 t/ha + *Azospirillum*. The increase in curd yield due to application of vermicompost @ 7.5 t/ha + *Azospirillum* in terms of per cent was 31.77 and 11.28 per cent, respectively over control and FYM @ 20 t/ha + *Azospirillum*.

Effect on yield attributes and yield

In the present investigation, there was significant increase in yield attributes and yields of cauliflower with different fertility levels. The maximum mean values of yield attributes and yield of cauliflower obtained with the application of 100% of RDF which was significantly superior to control and 50% of RDF.

The beneficial response of inorganic sources of nutrient on yield attributes and yield of cauliflower might be due to the availability of sufficient amount of plant nutrients throughout the growth period of crop resulting in better uptake of nutrients, plant vigor and improved yield. The increase in yield attributes may be explained due to increase in number of leaves under high fertility levels. With the application of higher levels of fertility, the tissue differentiations from the somatic to reproductive, meristematic activity and the development of floral primordial might have been enhanced causing greater production of flowers. Higher fertility level induced greater translocation of photosynthates from leaves via stem to curd and these resulted in higher yield attributes. The increase in yield may also be due to better uptake of nutrients from the soil which might have contributed to increased dry matter accumulation and number of leaves per plant ultimately enhanced curd yield of cauliflower. Similar finding was reported by Khare and Singh (2008), Sarkar *et al.* (2010), Yadav *et al.* (2012), Chaudhary *et al.* (2015) and Singh *et al.* (2018).

IV. CONCLUSION

Effect of organic manure

The maximum plant height of cauliflower was recorded with the application of vermicompost @ 7.5 t/ha + *Azospirillum* which was significantly higher than control and FYM @ 20 t/ha + *Azospirillum*.

The significantly highest number of leaves per plant in cauliflower was recorded with the application of vermicompost @ 7.5 t/ha + *Azospirillum* which was superior to control and FYM @ 20 t/ha + *Azospirillum*.

Keeping in view the objectives to undertake the study and the results obtained after conducting the experiment for one year, it has been concluded that application of different integrated nutrient management treatments significantly enhanced the growth parameters, yield attributes, yields, nutrient content and economics of cauliflower. Application of 100% RDF gave significantly higher growth parameters, yield attributes, yield, nutrient content and net returns of cauliflower over control and application of 50% RDF.

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