The Pharma Innovation Journal 2023; 12(7): 469-471

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(7): 469-471
© 2023 TPI
www.thepharmajournal.com
Received: 09-04-2023
Accepted: 21-05-2023

Rajesh Maurya
M.Sc., Department of Horticulture, Faculty of Agricultural Sciences and Allied Industries, Rama University, Kanpur, Uttar Pradesh, India

Jitendra Kumar
Assistant Professor, Department of Horticulture, Faculty of Agricultural Sciences and Allied Industries, Rama University, Kanpur, Uttar Pradesh, India

Vinay Joseph Silas
Teaching Associate, Department of Horticulture, Faculty of Agricultural Sciences and Allied Industries, Rama University, Kanpur, Kanpur, Uttar Pradesh, India

Mohit Lal
Assistant Professor, Department of Horticulture, Nandini Nagar PG College, Nandini Nagar, Gonda, Uttar Pradesh, India

Himanshu Trivedi
Associate Professor, Department of Horticulture, SAAST, CSJM University, Kanpur, Uttar Pradesh, India

Ankit Singh Bhadauria
Assistant Professor, Department of Horticulture, SAAST, CSJM University, Kanpur, Uttar Pradesh, India

Shivam Dixit
M.Sc. Scholar, Janta College Bakewar, Etawah, Uttar Pradesh, India

Corresponding Author:
Rajesh Maurya
M.Sc., Department of Horticulture, Faculty of Agricultural Sciences and Allied Industries, Rama University, Kanpur, Uttar Pradesh, India

Effect of integrated nutrient management on plant growth, yield and quality of cabbage (*Brassica Oleracea var. Capitata*) var. Pride of India

Rajesh Maurya, Jitendra Kumar, Vinay Joseph Silas, Mohit Lal, Himanshu Trivedi, Ankit Singh Bhadauria and Shivam Dixit

Abstract
The experiment Effect of Integrated nutrient management on plant growth, yield and quality of Cabbage (*Brassica Oleracea var. Capitata*) var Pride of Indiawas conducted on radish crop at Agriculture Research Farm of Rama University, Mandhana, Kanpur, U.P, India, during rabi season of 2022-2023. There was 8 treatments *viz.*, T_1 (Control), T_2 {100% RDF (N:P:K@ 150:125:100 kg/ha)}, T_3 (100% RDF + Vermicompost + Azotobacter @ 2g/plant), T_4(75% RDF + Vermicompost + Azotobacter @ 2g/plant), T_5 (50% RDF + Vermicompost + Azotobacter @ 2g/plant), T_6 {100% RDF + FYM (Compost)+ Azotobacter @ 2g/plant}, T_7 {75% RDF + FYM (Compost)+ Azotobacter @ 2g/plant)} and T_8 {50% RDF + FYM (Compost)+ Azotobacter @ 2g/plant)}. All the 8 treatments were replicated thrice in Randomized Block Design. The treatment combination consists of organic manure (vermicompost, FYM), doses of fertilizers (50, 75 and 100%) and biofertilizers (*Azotobacter)*. Integrated nutrient management significantly plant height(cm), number of leaves per plant, plant spread (cm^2), leaf area (cm^2), head circumference (cm), head weight (kg), yield per plot (kg), TSS and vitamin-'C' minimized the days to head appearance and days taken to head harvest.

Keywords: Cabbage, pride of India, vermicompost, FYM, Azotobacter

Introduction
Cabbage *(Brassica oleraceae* L. var. *capitata)*2n *=2x=18* is one of the most economically and nutritionally important crop of *Brassicaceous* family. It is cultivated in 90 countries. It is also a vital part of fast food in Indian -cuisine due to wider adaptability, economical and all year availability. It has important values because of its nutrient values like vitamins and protein. Vegetables are source of essential vitamins such as vitamin C, vitamin A, vitamin B1, vitamin B6, vitamin B9, vitamin E, and minerals, dietary fiber and phytochemicals to humans (Bahadur *et al.,* 2006) [16]. Vegetable consumption also helps to reduce dangerous diseases and other medical conditions. The injudicious use of chemical fertilizers has simultaneously resulted in many problems like degradation of soil productivity, environmental pollution, depletion of non-renewable source of energy etc. Application of biofertilizers in vegetable crops has been found very effective to get rid of this problem. Bio-fertilizers are agriculturally beneficial microorganisms, which have the ability to mobilize the nutritionally important elements from non-usable form to usable form through biological processes. They are eco-friendly, less expensive and are based on renewable energy sources and provide sustainability to the farming system. Due to the intensive cultivation practices and injudicious use of macronutrients, soils are becoming deficient in secondary micronutrients. In addition to macronutrients, micronutrients have been found to be beneficial for cabbage production (Hara and Sonoda, 1981). Biofertilizers are natural products that contain living organisms from the root or cultivated soil. As a result, they have no negative impact on soil health or the ecosystem. *Azotobacter* and *Azospirillum* have long been recognised as important biofertilizers for vegetable crops among the numerous types of biofertilizers available (Kachari *et al*., 2009).

Materials and Methods
The present investigation 'Effect of Integrated nutrient management on plant growth, yield and quality of Cabbage (*Brassica Oleracea var. Capitata*) var Pride of India' was carried out during the *rabi* season of 2022-23 at Agriculture Research Farm of Rama University,

Mandhana, Kanpur, which is located in the alluvial belt of Gangetic plains of central Uttar Pradesh. For this an experiment was planned using 8 treatments *viz.*,T_1 (Control), T_2 {100% RDF (N:P:K@ 150:125:100 kg/ha)}, T_3 (100% RDF + Vermicompost + Azotobacter @ 2g/plant), T_4 (75% RDF + Vermicompost + Azotobacter @ 2g/plant), T_5 (50% RDF + Vermicompost + Azotobacter @ 2g/plant), T_6 {100% RDF + FYM (Compost)+ Azotobacter @ 2g/plant}, T_7 {75% RDF + FYM (Compost)+ Azotobacter @ 2g/plant)} and T_8 {50% RDF + FYM (Compost)+ Azotobacter @ 2g/plant)}with three replication in Randomized Block Design. The observations were recorded from each treatment of all three replication. Five plants of radish were selected randomly and tagged under each treatment for recording different growth parameters *viz.*, plant height(cm), number of leaves per plant, plant spread (cm^2), leaf area (cm^2), days to head appearance and days to harvest were recorded. Yield parameters *viz.* head circumference (cm), head weight (kg), yield per plot (kg) and quality parameters *viz.* TSS and vitamin-'C' were recorded.

Results and Discussion

The data on the ''Effect of Integrated nutrient management on plant growth, yield and quality of Cabbage (*Brassica Oleracea var. Capitata*) var. Pride of India' on characters *viz.*, gowth, yield and quality parameter of cabbage.

Growth parameters

The data on effect of integrated nutrient management on growth parameter *viz.*, plant height(cm), number of leaves per plant, plant spread (cm^2), leaf area (cm^2), days to head appearance and days to harvest. The data of growth parameters have been presented in the Table-1.

The remarkable plant height at plant height at 45 days (25.64cm) and harvest stage (31.54 cm). number of leaves per plant (20.21), plant spread (41.17 cm^2), leaf area (34.10 cm^2) days taken to initiation of head appearance (40.05) and days taken to head harvest (73.69) were recorded in the treatment (100% RDF + vermicompost + Azotobacter @ 2 g/plant). The lowest plant height at 45 days (14.56 cm) and harvest stage (18.22 cm). number of leaves per plant (8.40), plant spread (21.49 cm^2), leaf area (21.05 cm^2) days taken to initiation of head appearance (54.33) were noticed in the control treatment. The investigation's findings in terms of growth characteristics include conformity with the findings of Mhaske *et al*. 2011 in cabbage.

Table 1: Effect of biofertilizers and micronutrients on growth parameters on cabbage

Treatments	Plant Height(cm) @ 45 Days	Plant Height(cm) @ Harvest	No. of Leaves	Plant spread(cm^2)	Leaf Area(cm^2)	Days to head appearance	Days to Harvest
T_1	14.56	18.22	8.40	21.49	21.05	54.33	85.45
T_2	16.32	21.06	11.42	25.54	22.92	51.86	82.51
T_3	25.64	31.54	20.21	41.17	34.10	40.05	73.69
T_4	23.26	28.35	17.89	35.77	30.63	44.81	76.49
T_5	19.12	25.42	14.34	30.37	26.84	48.69	79.48
T_6	24.80	30.12	19.31	38.63	33.05	42.49	78.02
T_7	21.94	27.25	16.68	33.63	28.82	45.98	76.95
T_8	18.50	24.60	15.61	31.92	27.58	46.98	80.71
S.Em.±	0.309	0.319	1.013	0.551	0.390	0.426	0.479
CD (0.05)	0.947	0.978	0.331	1.686	1.195	1.304	1.466

Yield parameters

The yield and weight of cabbage head were obtained in treatment combination of RDF 100%, vermcompost and *Azotobacter*. The azotobacter is free living nitrogen fixer bacteria that can fix the environmental nitrogen to nitrate (form of plant use) and therefore, the microbial activities are increased that produces in term of yield. The data of yield parameters have been presented in the Table-2.

The remarkable increase in head circumference of cabbage (52.01 cm), head weight of cabbage (1.04 kg) and head yield per plot (9.56 kg.) were recorded in treatment (100% RDF + vermicompost + Azotobacter @ 2 g/plant) while the head circumference of cabbage (35.06 cm), head weight of cabbage (0.35 kg) and head yield per plot (3.22 kg.) were noticed in the control treatment. The investigation's findings in terms of yield characteristics include conformity with the findings of Din *et al*. (2007) and Chatterjee *et al.* (2015) [5] in tomato.

Table 2: Effect of integrated nutrient management on yield parameters on cabbage

Treatments	Head circumference(cm)	Head weight (kg.)	Yield/plot (kg.)
T_1	35.06	0.35	3.22
T_2	38.48	0.51	4.82
T_3	52.01	1.04	9.56
T_4	48.69	0.85	8.17
T_5	43.95	0.66	6.20
T_6	50.41	0.92	8.94
T_7	46.50	0.72	7.49
T_8	44.84	0.61	5.76
S.Em.±	0.533	0.006	0.136
CD (0.05)	1.633	0.017	0.415

Quality parameters

The application of fertilizers, organic manures (farm yard manure and vermicompost) and biofertilizers (*Azotobacter*) in cabbage, the treatment produced in significantly variation in quality traits. The data of quality parameters have been presented in the Table-3.

The highest fruit total soluble solid 5.85° Brix, vitamin-C @ 32.20 mg/100g), were observed in the treatment application of treatment (100% RDF + vermicompost + Azotobacter @ 2 g/plant), whereas lower total soluble solid 4.59° Brix, vitamin-C (18.35 mg/100g), were observed in the treatment control. The investigation's findings in terms of quality include conformity with the findings of Mishra *et al.* (2014) in knol-khol and Zargar *et al.* (2022) [18].

Table 3: Effect of integrated nutrient management on quality parameters on cabbage

Treatments	TSS (° Brix)	Vitamin-C (mg)
T_1	4.59	18.35
T_2	4.84	21.58
T_3	5.85	32.20
T_4	5.33	28.84
T_5	5.02	26.34
T_6	5.57	30.67
T_7	5.22	27.46
T_8	4.95	25.81
S.Em.±	0.094	0.384
CD (0.05)	0.287	1.065

Conclusion

On the basis of the current research, it can be concluded that varied nutrition sources had a substantial impact on cabbage's vegetative growth, yield, and quality attributes. In this investigation, 100% recommended dose of fertilizer + Vermicompost + *Azotobactar* gave 9.56 kg cabbage head yield per with average head weight about 1.04 kg which were at par with 100% recommended dose of fertilizer + FYM + *Azotobacter*, 100% recommended dose of fertilizer, 75% recommended dose of fertilizer + vermicompost + *Azotobacter*, 75% recommended dose of fertilizer + FYM + *Azotobacter*, 50% recommended dose of fertilizer + vermicompost + *Azotobacter* and 50% recommended dose of fertilizer + FYM + *Azotobacter*. Thus, growing cabbage with vermicompost, farm yard manure along with 100% recommended dose of fertilizer + *Azotobacter* treatment was found better growth, yield and quality. Therefore, the combination of fertilizers, organic manures and biofertilizers helps in maintain the soil health, organic matter and better production as well. The combination of fertilizers according to recommended dose, vermicompost, *Azotobacter* provide the optimum amount of nutrients to plants for their feed. The farmers of cabbage can use above mentioned combination of fertilizers, organic manures and biofertilizers for best crop growth, cabbage yield and good quality of cabbage heads.

References

1. AOAC. Official methods of analysis, 18 Edn. Association of Official Agricultural Chemists, Washington; c1960.
2. Anushruti D, Singh D, Yadav S, Kumar S. Effect of integrated use of nitrogen and biofertilizer on growth of cabbage (*Brassica oleracea* var. *capitata* L.); c2022.
3. Boteva H, Turegeldiyev B, Aitbayev T, Rakhymzhanov B, Aitbayeva A. The influence of biofertilizers and organic fertilizers on productivity, quality and storing of cabbage (*Brassica oleracea var*. *capitata* L.) in the South-East of Kazakhstan. Bulgarian Journal of Agricultural Science. 2019;25(5):973-979.
4. Das J, Phookan DB, Gautam BP. Effect of level of NPK and plant densities for curd production of early cauliflower (*Brassicaoleracea* var. *botrytis*) cv. Pusa Katki. Haryana J Horti. Sci. 2000;29:265-266.
5. Dipika M, Chatterjee R, Nimbalkar KH. Effect of vermi-compost and inorganic fertilizers on growth, yield and quality of sprouting broccoli (*Brassica oleracea* L. var. *italica* Plenck). International J Bio resource and Stress Management. 2015;5(4):507-512.
6. Ghuge TD, Gore AK, Jadhav SB. Effect of organic and inorganic nutrient sources on growth, yield and quality of cabbage. 2007;17(1):89-92.
7. Gopal L, Lal G. Effect of nitrogen and spacing on yield and quality of cabbage (*Brassica oleracea* var. *capitata*). Ann. of Bio. 1996;12:242-244.
8. Haque AF, Islam N, Nazrul Islam M, Ullah A, Dulal Sarkar M. Growth, yield and profitability of cabbage (*Brassica oleracea* L.) as Influenced by applied nitrogen and plant spacing. The Agriculturists. 2015;13(1):35-45.
9. Jana JC, Mukhopadhyay TP. Effect of nitrogen and phosphorus on. growth and curd yield of cauliflower var. Aghani in Terai zone of West Bengal. Vegetable Sci. 2001;28:133-136.
10. Kumar P, Baksh H, Singh R, Srivastava A, Pandey R. Impact of organic manures and biofertilizers on growth, yield and quality of cabbage: Effects of organic manures and biofertilizers on cabbage. Journal of Agri. Search. 2022;9(4):300-302.
11. Maurya AK, Singh MP, Srivastava BK, Singh YV, Singh DK, Singh S, *et al*. Effect of organic manures and inorganic fertilizers on growth characters, yield and economics of sprouting broccoli cv. Fiesta. Indian J Horti. 2008;65(1):116-118.
12. Padamwar SB, Dakore HG. Role of vermicompost in enhancing nutritional value of some cole crops. International J Plant sci. 2010;5(1):397-398.
13. Piper JS. Soil and plant Analysis. Inter Science Publishers Inc. New York, USAD; c1950.
14. Rana S, Thakur KS, Bhardwaj RK, Kansal S, Sharma R. Effect of biofertilizers and micronutrients on growth and quality attributes of cabbage (*Brassica oleracea* var. *capitata* L.). Int. J Chem. Studies. 2020;8(1):1656-1660.
15. Singh A, Kumar A, Yadav S, Singh S. Effect of integrated nutrient management on growth and yield of cabbage (*Brassica oleracea* var. *capitata* L.). IJCS. 2020;8(3):1196-1200.
16. Upadhyay AK, Singh J, Bahadur A, Singh VK, Singh SK. Impact of integrated nutrient management on yield, quality traits and economics of cabbage (*Brassica oleracea* L. var. *capitata*). Progressive Horti. 2015;47(1):122-126.
17. Yadav LP, Kavita A, Maurya IB. Effect of nitrogen and biofertilizers on growth of cabbage (*Brassica oleracea* var. *capitata* L.) var. Pride of India. Progressive Horti. 2012;44(2):318-320.
18. Zargar J, Kumar M, Kumar S, Chopra S, Kumar S, Bhushan A, *et al*. Integrated nutrient management studies in cabbage (*Brassica oleracea*) under subtropical plains of Jammu. The Indian Journal of Agricultural Sciences. 2022;92(1):59-62.