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Influence of Integrated nutrient management on the plant growth of cabbage (*Brassica Oleraceavar. Capitata*) var. Pride of India

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Abstract

The Rama University Agriculture Research Farm at Mandhana, Kanpur, U.P., India, conducted an experiment on the effects of integrated nutrient management on the development and yield of cabbage (Brassica Oleracea var. Capitata) var Pride of India during the 2022–2023 rabi season. Eight treatments were identified: T1 (Control), T2 (100 percent RDF (N:P:K@ 150:125:100 kg/ha)}, T3 (100% RDF + Vermicompost + Azotobacter @ 2g/plant), T4 (75% RDF + Vermicompost + Azotobacter @ 2g/plant), T5 (50% RDF + Vermicompost + Azotobacter @ 2g/plant), T6 (100 percent RDF + FYM (Compost)+ Azotobacter @ 2g/plant}, T7 (75 percent RDF + FYM (Compost)+ Azotobacter @ 2g/plant)}, and T8 (50% RDF + FYM (Compost)+ Azotobacter @ 2g/plant)}. The eight treatments underwent three replications using a Randomized Block Design. Organic manure (vermicompost, FYM), fertilizer doses (50, 75, and 100%), and biofertilizers (Azotobacter) make up the treatment combination. Plant height (cm), number of leaves per plant, plant spread (cm2), leaf area (cm2), were all greatly reduced by integrated nutrient management.

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

Introduction

One of the most significant crops for the Brassicaceous family in terms of both economics and nutrition is cabbage (Brassica oleraceae L. var. capitata) 2n = 2x = 18. It is grown in ninety countries. Because of its year-round availability, affordability, and greater versatility, it is also an essential component of Indian fast food. Its nutritional content, which includes protein and vitamins, makes it valuable. According to Bahadur et al. (2006) [16], vegetables are a good source of minerals, dietary fiber, and phytochemicals in addition to important vitamins including C, A, B1, B6, B9, and E. Consuming vegetables also aids in the prevention of other medical disorders and harmful diseases. The careless application of chemical fertilizers has led to numerous issues at the same time, including decreased soil production, pollution of the environment. It has been discovered that applying biofertilizers to vegetable crops is a very effective way to solve this issue. Microorganisms that are useful to agriculture and may mobilize nutritionally significant materials from non-usable to usable form through biological processes are known as bio-fertilizers. They give the farming

system sustainability, are less costly, and rely on renewable energy sources. They are also environmentally benign. Soils are increasingly low in secondary micronutrients as a result of intense agricultural methods and careless usage of macronutrients. Micronutrients have also been proven to be advantageous for the development of cabbage, in addition to macronutrients (Hara and Sonoda, 1981). Natural products containing living organisms from the soil or roots are called biofertilizers. They therefore have no detrimental effects on the environment or the health of the soil.

Materials and Methods

This study, "Effect of Integrated Nutrient Management on Plant Growth, Yield, and Quality of Cabbage (Brassica Oleracea var. Capitata) var Pride of India," was conducted in the alluvial belt of the Gangetic plains in central Uttar Pradesh during the rabi season of 2022–2023. The Agriculture Research Farm of Rama University Mandhana, Kanpur, is where the study was conducted. Eight treatments were used in this experiment: T1 (Control), T2 {100% RDF (N:P:K@ 150:125:100 kg/ha)}, T3 (100% RDF + Vermicompost + Azotobacter @ 2g/plant), T4 (75% RDF + Vermicompost + Azotobacter @ 2g/plant), T5 (50% RDF + Vermicompost + Azotobacter @ 2g/plant), T6 {100% RDF + FYM (Compost)+ Azotobacter @ 2g/plant}, and T7 {75% RDF + FYM (Compost)+ Azotobacter @ 2g/plant)} and T8 (three replications in a randomized block design, 50% RDF + FYM (Compost) + Azotobacter @ 2g/plant). All three replications' treatments' observations were documented. Five radish plants were chosen at random and tagged under each treatment in order to measure various growth characteristics, including plant height (in centimeters), the number of leaves on each plant, plant spread (in centimeters), leaf area (in centimeters), and the number of days till harvest..

Results and Discussion

The information on the traits of growth parameter of cabbage, as well as the impact of integrated nutrition management on plant growth of cabbage (Brassica Oleracea var. capitata) var. Pride of India,.

Growth parameters

Information on how integrated nutrient management affects growth parameters such as plant height (cm), leaf area (cm2), number of leaves per plant, plant spread (cm2), and days till head appearance and harvest, among others. Table 1 displays the data pertaining to growth parameters.

The plant reached a phenomenal height of 25.25 cm at 45 days and 31.98 cm at harvest. Plant Spread (41.20 cm2), Leaf Area (34.30 cm2), and Leaf Number (20.18 leaves/plant). The treatment (100% RDF + vermicompost + Azotobacter @ 2 g/plant) documented the days taken to beginning of head appearance

(40.50) and days taken to head harvest (73.39). The lowest plant height (18.50 cm) and harvest stage (14.69 cm) at 45 days. The control treatment showed the following: number of leaves per plant (8.00), plant spread (21.50 cm2), leaf area (21.50 cm2), and days taken to beginning of head appearance (54.98). Regarding growth characteristics, the results of the experiment include concordance with the findings of Mhaske et al. (2011) in relation to cabbage.

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

Treatments	Plant Height(cm) @ 45Days	Plant Height(cm) @Harvest	No. of Leaves	Plant spread(cm^2)	Leaf Area(cm^2)	Days to head appearance	Days to Harvest
T1	14.69	18.50	8.00	21.12	21.50	54.98	85.20
T2	16.32	21.06	11.42	25.54	22.92	51.86	82.51
T3	25.25	31.98	20.18	41.20	34.30	40.50	73.39
T4	23.26	28.35	17.89	35.77	30.63	44.81	76.49
T5	19.12	25.42	14.34	30.37	26.84	48.69	79.48
T6	24.80	30.12	19.31	38.63	33.05	42.49	78.02
T7	21.94	27.25	16.68	33.63	28.82	45.98	76.95
T8	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

Conclusion

Based on current study, it can be said that the vegetative development, yield, and quality aspects of cabbage were significantly influenced by a variety of nutrition sources. In this study, the combination of 100% recommended fertilizer + vermicompost + Azotobactar yielded 9.96 kg of cabbage heads per unit, with an average head weight of approximately 1.04 kg. This yield was comparable to the results of the following combinations: 100% recommended fertilizer + FYM + Azotobacter; 100% recommended fertilizer; 75% recommended fertilizer + vermicompost + Azotobacter; 75% recommended fertilizer + FYM + Azotobacter; 50% recommended fertilizer + vermicompost + Azotobacter; and 50% recommended fertilizer + FYM +

Azotobacter. Better growth, production, and quality were therefore observed while growing cabbage with vermicompost and farm yard manure in addition to the 100% required dosage of fertilizer and Azotobacter treatment. As a result, the use of fertilizers, organic manures, and biofertilizers together supports improved production as well as the health of the soil and organic matter. The right amount of nutrients are given to plants for feeding when fertilizers are combined in accordance with recommended dosages and Azotobacter. For the best crop development and cabbage and head production, farmers growing cabbage might use the above specified combination of fertilizers, organic manures, and biofertilizers.

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