The Pharma Innovation Journal 2023; 12(8): 1427-1429

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(8): 1427-1429

www.thepharmajournal.com
Received: 02-06-2023
Accepted: 06-07-2023

Divesh Kurre
Research Scholar, Department of Horticulture (Vegetable Science), College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India

Sandeep Pahare
Research Scholar, Department of Horticulture (Vegetable science), Pt. Kishori Lal Shukla College of Horticulture and Research Station, IGKV, Raipur Chhattisgarh, India

Nitendra Singh
Research Scholar, Department of Horticulture (Vegetable Science), College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India

Jaipal Chhigarha
Department of Horticulture, Krishi Vigyan Kendra, JNKVV, Jabalpur, Madhya Pradesh, India

Dr. VK Singh
Associate Professor, Department of Horticulture, College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India

Dr. KC Shukla
Assistant Professor, Department of Plant Physiology, College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India

Dr. Shiv Ratan
Assistant Professor, Department of Genetics and Plant Breeding, College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India

Ravi Shankar Ratre
Research Scholar, Department of Horticulture (Vegetable Science) College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India

Ravi Yadav
Research Scholar, Department of Horticulture (Vegetable Science) College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India

Corresponding Author:
Divesh Kurre
Research Scholar, Department of Horticulture (Vegetable Science), College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India

Effect of varieties and nutrient levels on the growth parameters of cabbage (*Brassica oleracea* var. *capitata* L.)

Divesh Kurre, Sandeep Pahare, Nitendra Singh, Jaipal Chhigarha, Dr. VK Singh, Dr. KC Shukla, Dr. Shiv Ratan, Ravi Shankar Ratre and Ravi Yadav

Abstract
The present disquisition was convened at Horticultural Research Farm, College of Agriculture, Tikamgarh (Madhya Pradesh) was convened during the *rabi* season of 2020-21 with a view to studying Effect of Varieties and Nutrient Levels on the growth parameters of Cabbage (*Brassica oleracea* var. *capitata* L.). Twelve treatment combinations of two varieties (V_1-selection-21, V_2-Golden Acer) and six nutrient levels *viz.* (NPK-75:60:60, 75:80:60, 100:60:60, 100:80:60, 125:60:60, 125:80:60 kg h^{-1}). The experimental design used in a factorial randomized block design with three replication. V_2 Golden Acer seems to be growing taller compared to other varieties plant height (21.72, 29.84, 35.36 cm), girth of stem (1.49, 2.51, 3.77 cm.), Number of non-wrapping leaf $plant^{-1}$ (10.6, 12.85).
Yield parameters *i.e.* Head weight (g) / fresh weight of head (g) plant $^{-1}$ at harvest (1508.17), Diameter of head cm (13.64), Head yield kg $plot^{-1}$ (19.15), Head yield quintal ha^{-1}. (199.48). The growth, yield and quality parameters were significantly superior for nutrient levels N_6 (125:80:60 kg NPK ha^{-1}) compared to other nutrient levels. Similarly the interaction V_2N_6 showed better performance in all these aspects for cabbage. Consequently, variety V_2 (Golden Acer), nutrient level N_6, and interaction V_2N_6 demonstrated superior results in terms of growth, yield, and economics for cabbage.

Keywords: Cabbage varieties, nutrient levels (NPK), growth parameter

Introduction
Cabbage, scientifically referred to as *Brassica oleracea* var. capitata L., belongs to the Cruciferae family. It holds a significant position among leafy vegetable crops, being used for salads and cooking. Cabbage is a vital commercial vegetable in India, with widespread cultivation due to its nutritional value, productivity, and adaptability. Its resilience to handling and long-distance transport makes it a versatile crop. Cabbage cultivation spans the globe, from tropical to Arctic regions. India ranks as the world's second-largest producer and grower of cabbage, next to China. In India, cabbage covers 435.9 thousand hectares, yielding 8573.3 thousand metric tonnes with a productivity of 19.8 metric tons per hectare. Noteworthy cabbage-growing states include Uttar Pradesh, Karnataka, Bihar, and others. Madhya Pradesh contributes with 25.1 thousand hectares of cultivation, producing 70.38 thousand metric tons and achieving a remarkable productivity of 28.1 metric tonnes per hectare (NHB, 2015) [10].
Maximizing cabbage yield is closely tied to the careful use of fertilizers, effective cultural management, and other practices. Cabbage, being a nutrient-demanding crop, can deplete soil nutrients significantly. Therefore, supplying adequate nutrients during cultivation through proper fertilizer application becomes crucial. Sustainable high-yield cabbage production requires maintaining a balance between nutrient inputs into the soil and nutrient uptake by the crops (Naher *et al*., 2014) [9].
Cabbage's nutrient requirements, particularly for nitrogen, are substantial. Nitrogen plays a crucial role in achieving higher yields and high-quality cabbage heads (Riad *et al*., 2009) [11]. Successful cabbage yield hinges on prudent fertilizer use, proper cultural management, and other factors. Nitrogen significantly influences plant vegetative growth. Well-judged nitrogen application encourages robust growth and imparts a deep green hue to cabbage. Inadequate nitrogen supply results in stunted growth, small, yellowish leaves that are often brittle, and reduced production. Nitrogen's presence in chlorophyll, alkaloids, amino acids, amides, and proteins contributes to the plant's vibrant green color. Additionally, nitrogen enhances the tenderness and delicacy of leafy greens. It's important to provide cabbage with the right amount of nitrogen; excessive nitrogen can hinder head formation and lead to internal decay,

while insufficient nitrogen prevents head formation (Verma and Nawange, 2015) [15].

Phosphorus holds significance as a component of life, contributing to phospholipids, nucleic acids, nucleoproteins, and coenzymes. Meanwhile, potassium plays a pivotal role in carbohydrate metabolism, enzyme activation, nitrogen uptake, protein synthesis, and the movement of substances, ultimately enhancing quality (Singh *et al*., 2004) [14].

Potassium boosts plant vigor and enhances disease resistance. It plays a role in managing water loss by balancing anabolism, respiration, and transpiration, thus reducing wilting tendencies and improving water utilization. This process aids in protein and chlorophyll formation, ultimately enhancing cabbage head quality, taste, and shelf life (Rutkauskiene and Poderys, 1999) [12].

Materials and Methods

The field experiment investigation carried out during the Rabi season 2020-21 at the research form of the Department of Horticulture (vegetable science), JNKVV, college of agriculture, Tikamgarh (M.P.) Tikamgarh is situated in the bundlekhand zone (agro-climatic zone–VIII) in the north-eastern part of Madhya Pradesh, at 24' 430 North latitude and 78' 490 East longitude, with an altitude of 358 meters above mean sea level. The experimental field's topography is plain, and the soil is medium black soil with a loamy texture and uniform topography.

The study involved two varieties, V_1 (selection-21) and V_2 (Golden Acer), along with six different nutrient levels. The treatment (N_1-N_6), were applied at different nutrient levels, measured in kg NPK per hectare, as follow (N_1-75:60:60, N_2-75:80:60, N_3-100:60:60, N_4-100:80:60 N_5-125:60:60, N_6-125:80:60. The experiment was organized in a factorial randomized block design consisting of twelve treatment combination, and each combination was replicated three times. Before transplanting and during field preparation, the entire amount of phosphorus (P) and potassium (K) along with half dose of nitrogen (N) as per each treatment was applied. The nutrient were supplied in the from of DAP (Di-Ammonium phosphate) for phosphorus, MOP (Muriate of potash) for potassium, and Urea for nitrogen. Entire quantity of P and K and half dose of N as per treatment was applied in the form of DAP, MOP and Urea, respectively before transplanting at the time of field preparation. After transplanting the seedlings in the field with a spacing of 60 x 45 cm (row-to-row x plant-to-plant) in the last week of October 2020, the remaining dose of nitrogen was given to the cabbage plants at 20 days after transplanting. The seedling that were selected for transplantation were 28 days old and had a uniform height. Following the transplanting process the plant were promptly given irrigation to enhance their establishment, subsequently, irrigation was provided based on the plants specific requirement. Randomly, five plants were selected from each plot and tagged for further monitoring. The observations were recorded for various parameters, including plant height (cm), stem girth (cm), number of non-wrapping leaves, fresh head weight of (g), head diameter (cm), head yield (kg plot^{-1}), and head yield (q ha^{-1}). The economics analysis was conducted using the prevailing market prices of different inputs and outputs.

Growth Parameters

Varieties: Significantly maximum values of plant height 35.36 cm, Girth of stem 3.77 cm, number of non-wrapping leaves per plant (12.85), were observed in cabbage variety Golden Acer compared to Selection-21 (plant height 34.87cm, Girth of stem 3.64 cm And number of non-wrapping leaves per plant 12.42 g days, respectively) (Table 1). The observed differences in growth parameters of cultivars are mainly due to the nature of genotype. Similar findings have been also found by Yadav *et al*. (2013) [16] in cauliflower, Gabhale *et al*. (2014) [4] in cauliflower, Giri *et al*. (2013) [5]; Zaki *et al*. (2015) [17] in broccoli, Haque (2015) [6] in cabbage; Chaudhari *et al*. (2015) [2].

Nutrient levels: Significantly higher values of plant height (36.52 cm), Girth of stem 4.22 cm, number of non-wrapping leaves per plant (14.18), were recorded by the application of nutrient level N_6 (NPK-125:80:60 kg ha^{-1}) followed by N_5, N_4, N_3, N_2 and least in N_1 (NPK-75:60:60 kg ha^{-1}) plant height 34.28 cm, Girth of stem 3.25 cm, number of non-wrapping leaves per plant 11.48 respectively) (Table 1). The maximum growth under higher supply of nitrogen might be due to increasing the photosynthetic and assimilation rates; which lead to increase in the plant height of cabbage. These findings are in agreement with Kumari *et al*. (2015) [7]; Verma and Nawange (2015) [15]; Akand *et al*. (2015) [1] in cabbage. The increased number of leaves per plant may be due to balanced fertilization of the crop. Similar results have been reported by Shree *et al*. (2014) [13] in cauliflower, Mishra *et al*. (2014) [8]; Dadhich *et al*. (2015) [3] in knolkhol. Delay in head initiation as a result of lower dose of fertility level might have increased the days to 50% head maturity. Similar results have also been reported by Mankar *et al*. (2015) [7] in cabbage, Shree *et al*. (2014) [13] in cauliflower.

Table 1: Effect of varieties, nutrient levels and their interaction on Growth parameter of cabbage

Treatment	Plant height (cm)			Girth of stem (cm)			Number of non-wrapped leaves	
	30 DAP	45 DAP	60 DAP	30 DAP	45 DAP	60 DAP	45 DAP	60 DAP
Varieties								
V1-(Selection-21	21.15	28.76	34.87	1.40	2.21	3.64	10.4	12.42
V2-(Golden Acer	21.72	29.84	35.36	1.49	2.51	3.77	10.6	12.85
S.Em±	0.19	0.10	0.07	0.03	0.06	0.04	0.07	0.14
CD at 5%	0.57	0.30	0.20	0.09	0.19	0.12	0.20	0.42
Nutrient Levels								
N1	20.07	27.15	34.28	1.17	1.91	3.25	9.85	11.48
N2	20.57	28.07	34.53	1.27	2.17	3.43	10.18	11.68
N3	20.95	29.15	34.77	1.36	2.39	3.60	10.33	12.23
N4	22.12	30.42	35.52	1.64	2.55	3.96	10.97	13.47
N5	21.37	29.87	35.07	1.50	2.44	3.76	10.47	12.75
N6	23.54	31.15	36.52	1.75	2.71	4.22	11.10	14.18

S.Em±	0.34	0.18	0.12	0.05	0.11	0.07	0.12	0.25
CD at 5%	0.99	0.53	0.35	0.15	0.32	0.21	0.34	0.73
Interaction (V X N)								
V_1N_1	20.00	26.70	34.10	1.10	1.91	3.22	9.87	11.33
V_1N_2	20.30	27.67	34.30	1.25	1.89	3.39	10.00	11.67
V_1N_3	20.70	28.43	34.30	1.30	2.17	3.49	10.30	12.03
V_1N_4	21.44	30.13	35.37	1.61	2.40	3.81	10.73	13.17
V_1N_5	21.33	29.30	34.67	1.41	2.21	3.72	10.33	12.50
V_1N_6	23.12	30.30	36.50	1.71	2.66	4.18	10.90	13.80
V_2N_1	20.13	27.60	34.47	1.24	1.91	3.28	9.83	11.63
V_2N_2	20.83	28.47	34.77	1.28	2.45	3.48	10.37	11.70
V_2N_3	21.20	29.87	35.23	1.41	2.61	3.70	10.37	12.43
V_2N_4	22.80	30.70	35.67	1.66	2.69	4.10	11.20	13.77
V_2N_5	21.40	30.43	35.47	1.59	2.67	3.79	10.60	13.00
V_2N_6	23.97	32.00	36.53	1.78	2.75	4.27	11.30	14.57
CD at 5%	0.48	0.25	0.17	0.07	0.16	0.10	0.17	0.35
S.EM±	NS	NS	NS	NS	NS	NS	NS	NS

Conclusion

Based on observations in Tikamgarh (MP) it's evident that the Golden Acer cabbage cultivar outperforms the selection-21 cv. In both yield and profitability. Consequently, opting to cultivate golden Acer alongside the recommended supplement of 125 kg/ha nitrogen, 80 kg/ha phosphorus, and 60 kg/ha potassium would be the more advantageous choice.

Suggestions for further work

1. Replicating the study is crucial to validate the findings.
2. Exploring the inclusion of organic manure and bio fertilizer alongside chemical fertilizer during experimentation is noteworthy.
3. Future research could gain value by exploring various nutrient levels and expanding the range of tested cabbage varieties.

References

1. Akand MH, Khairul Mazed HEM, Ashraful M. Influence of different dose of nitrogen on the growth and yield of cabbage (*Brassica oleracea* var. *capitata* L.). Int. J Multidisciplinary Res. and Dev. 2015;2(2):11-14.
2. Chaudhari AH, Vadodaria JR, Patel HT, Patel GS. Performance of different varieties and planting date on growth of knolkhol (*Brassica oleracea* var. *gongylodes*). IJRANSS. 2015;3(8):39-42.
3. Dadhich S, Meena AK, Paliwal R, Meena KK, Singh SP. Influence of levels of nitrogen and zinc on yield attributes and economics of knol-khol (*Brassica oleracea* var. *caulorapa*) in Loamy sand soil of Jobner. Indian Res. J Genet. & Biotech. 2015;7(3):334-336.
4. Gabhale LK, Bharad SG, Chaudhari GV. Effect of varieties and planting dates on growth and yield of cauliflower. Bionfolet. 2014;11(3A):806-808.
5. Giri RK, Sharma MD, Shakya SM, Kandel TP. Growth and yield responses of broccoli cultivars to different rates of nitrogen in Western Chitwan, Nepal. Agril. Sci. 2013;4(7A):8-12.
6. Haque FA, Islam N, Islam MN, Ullah A, Sarkar MD. Growth, yield and Profitability of cabbage (*Brassica oleracia* L.) as influenced by applied nitrogen and plant spacing. The agriculturist. 2015;13(1):35-45.
7. Mankar A, Kumari C, Karuna K. Effect of nitrogen levels and microbial inoculants on growth, yield and quality of cabbage. Prog. Hort. 2015;47(2):296-299.
8. Mishra PP, Das AK, Mishra N. Effect of integrated nutrient management on yield, quality and economics of knolkhol (*Brassica oleracea* L.cv. *gongylodes*). Asian J Hort. 2014;9(2):382-385.
9. Naher MNA, Alam MN, Jahan N. Effect of Nutrient Management on the Growth and Yield of Cabbage (*Brassica oleracea var. capitata* L.) in Calcareous Soils of Bangladesh. The Agriculturists. 2014;12(2):24-33.
10. NHB. National Horticulture Database – 2015. National Horticulture Board Government of India, Gurgaon, India, 2015. www.nhb.gov.in
11. Riad G, Ghoname A, Ahmed A, El-baky MA, Hegazi A. Cabbage nutritional quality as influenced by planting density and nitrogen fertilization. Fruit Veg. Cereal Sci. & Biotech. 2009;3(1):68-74.
12. Rutkaunskiene G, Poderys M. Influence of NPK fertilizers on the yield and quality of white cabbage heads. Sodininkyste or Darzininkyste. 1999;18(3):155-162.
13. Shree S, Singh VK, Kumar R. Effect of integrated nutrient management on yield and quality of cauliflower (*Brassica oleracea* var. *botrytis* L.). The Bioscan. 2014;9(3):1053-1058.
14. Singh SK, Singh T, Singh BN, Verma RB. Response of fertility levels and plant density on growth, yield and quality of hybrid cabbage. Veg. Sci. 2004;31(1):69-72.
15. Verma H, Nawange DD. Effect of different levels of nitrogen and sulphur on the growth, Yield and quality of cabbage (*Brassica oleracea* L. var. *capitata*). Agric. Sci. Digest. 2015;35(2):152-154.
16. Yadav M, Parsad VM, Ahirwar CS. Varietal evaluation of cauliflower (*Brassica oleracea* var. *botrytis* L.) In Allahabad Agro – climatic condition. The Bioscan. 2013;6(1):99-100.
17. Zaki MF, Saleh SA, Tantawy AS, EI-Dewiny CY. Effect of different rates of potassium fertilizer on the growth, productivity and quality of some broccoli cultivars under new reclaimed soil conditions. Int. J Chem. Tech. Res. 2015;8(12):28-39.