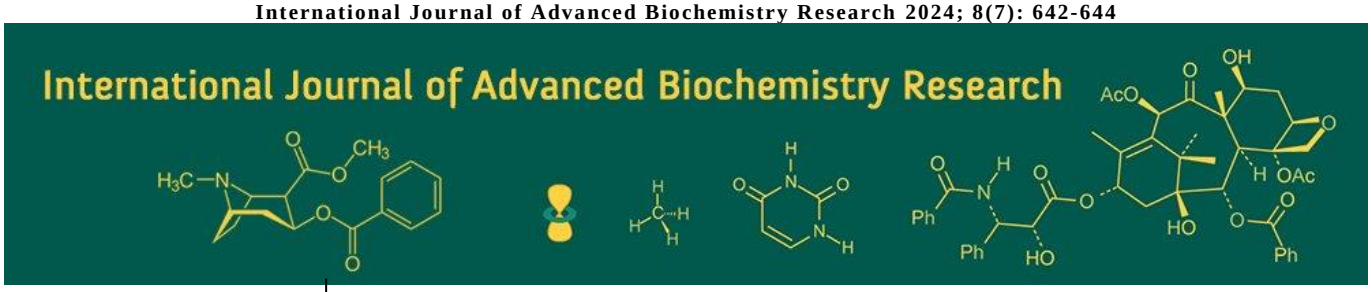

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(7): 642-644
www.biochemjournal.com
Received: 03-05-2024
Accepted: 05-06-2024

RN Bhoya
Department of Vegetable Science, College of Horticulture, Junagadh Agricultural University, Junagadh, Gujarat, India

AM Butani
Assistant Professor, College of Horticulture, Junagadh Agricultural University, Junagadh, Gujarat, India

VD Solanki
Department of Vegetable Science, College of Horticulture, Junagadh Agricultural University, Junagadh, Gujarat, India

NA Paija
Department of Vegetable Science, College of Horticulture, Junagadh Agricultural University, Junagadh, Gujarat, India

Corresponding Author:
RN Bhoya
Department of Vegetable Science, College of Horticulture, Junagadh Agricultural University, Junagadh, Gujarat, India

Effect of nitrogen and phosphorus on growth of cauliflower (*Brassica oleracea* var. *botrytis*) CV. Kavya

RN Bhoya, AM Butani, VD Solanki and NA Paija

DOI: https://doi.org/10.33545/26174693.2024.v8.i7h.1562

Abstract
The present research entitled "Effect of nitrogen and phosphorus on growth of cauliflower (*Brassica oleracea* var. *botrytis*) cv. Kavya" was conducted at Instructional Farm, Jambuvadi, Junagadh Agricultural University, Junagadh during October-2023 to February-2024. The treatments comprised of two levels of nitrogen (N) viz., N_1: 150 kg/ha, N_2: 175 kg/ha and two levels of phosphorus (P) viz., P_1: 37.5 kg/ha, P_2: 50 kg/ha. The experiment was laid out in Randomized Block Design (Factorial) with twelve treatment combinations and three replications. The results indicated that among two levels of nitrogen, N_2 (175 kg/ha) gave maximum stalk length (11.40 cm), maximum number of leaves per plant at harvest (21.98), maximum leaf length (at 30 and 60 days after transplanting) (23.72 and 51.11 cm) respectively. While, N_1 (150 kg/ha) gave minimum days of curd initiation (72.51 day) and days taken to curd harvest (19.38 day). Regarding phosphorus, P_2 (50 kg/ha) gave maximum stalk length (11.38 cm), minimum days taken to curd initiation (72.19 day), minimum days taken to curd harvest (19.37 day), maximum number of leaves per plant (21.83), maximum leaf length (51.03 cm) at 60 days after transplanting.

Keywords: Cauliflower, nitrogen, phosphorous, levels, growth, cv. Kavya

Introduction
Cauliflower (*Brassica oleracea* var. *botrytis*) which is also known as fool gobhi belongs to family Brassicaceae or Cruciferae it is a native to Mediterranean region. The name cauliflower has originated from Latin word "Caulis" and "Floris". Edible part of cauliflower is known as "curds". It is a cool season vegetable crop mostly grown in temperate condition. It is mostly consumed cooked, fried, boiled and pickled. India is largest producer of cauliflower in world. Important cauliflower growing states in India are UP, Karnataka, West Bengal, Punjab and Bihar. It is also commonly grown in northern Himalayas and Nilgiri hills in south.

Special operation done in cauliflower first one is a blanching and it's a common practice in cauliflower for protect curd from yellow colour after direct exposure to sun and to arrest enzymatic activity and second one is a scooping is done in cauliflower for initiation of flower stalk and scooping means removal of central portion of curd for easy initiation of flower.

Cauliflower is grown commercially on an area of about 463 thousand hectares with an annual production of about 9038 thousand metric tonnes and productivity is about 19.52 MT/ha in India (Anon., 2020) [1]. Gujarat have an area about 34.80 thousand hectares with an annual production of about 7770.77 thousand metric tonnes and productivity is about 22.15 MT/ha (Anon., 2021) [2]. West Bengal have maximum area, production and productivity.

Nitrogen is an integral part of chlorophyll, protoplasm, proteins and nucleic acids. Its deficiency checks the growth and reduces the yield unforgettably. Normal metabolic activities can keep on with only in the presence of optimum level of nitrogen.

Phosphorus (P) is an essential major component of certain enzymes, proteins, nucleic acids (DNA and RNA), phytin and adenosine triphosphate (ATP). ATP molecules are implicated in diverse energy transfer reactions. Phosphorus is necessary for energy transfer and storage into plant metabolism. P is needed for respiration, photosynthesis and biosynthesis of various organic compounds, containing nucleic acids and sugars. In addition, P is required for formation of strong and efficient plant root system (Jones *et al*., 1991; Marschner, 2012 and Gianquinto *et al*., 2013) [5, 11, 4].

Hence, sufficient availability of phosphorus in the growing medium is decisive for high vegetable yield and quality. Older leaves are pale bluish green with purple discoloration and especially the underside of leaves turns red are due to phosphorus deficiency.

Materials and Methods

The present investigation was carried out at instructional farm, Jambuvadi, Department of Vegetable Science, College of Horticulture, Junagadh Agricultural University, Junagadh during year 2023-2024. Junagadh is located in Gujarat's South Saurashtra Agro-climatic Region. Geographically, this location is located at 21.50° N latitude and 70.50° E longitude, at an elevation of 60 meters above mean sea level and 80 kilometers west of the Arabian Sea Coast near the foothills of Mount 'Girnar.' The trail was set up in a Randomized Block Design with factorial concept three replications and eleven treatments. Treatment details like the experiment consisted of 12 treatment combinations involving three levels of nitrogen (N) at N_1: 150 kg/ha and N_2: 175 kg/ha. Additionally, two levels of phosphorus (P) were applied, namely P_1: 37.5 kg/ha and P_2: 50 kg/ha. Half dose of nitrogen and phosphorus applied as basal dose and remaining dose of nitrogen applied 15 days after transplanting. The obtained data was subjected to statistical analysis using variance analysis according to FRBD by Panse and Sukhatme (1985) [12].

Results and Discussion

The data represented in Table 1 and 2 observed that, nitrogen and phosphorus was significantly effect on growth parameters in cauliflower studied in this experiment.

Effect of nitrogen on growth parameters

Significantly, maximum stalk length (11.40 cm) and maximum number of leaves per plant at harvest (21.98), highest leaf length 23.72 and 51.11 cm was reported under nutrient level N_2 (175 kg/ha) at 30 and 60 days after transplanting. The maximum growth under higher supply of nitrogen might be due to increasing the photosynthetic rates and the assimilation rates, which lead to increase in the stalk length of cauliflower. It might be due to the increase of apical branching which stimulated the number of leaves on plants. Kebrom (2017) [7], stated that an increase in nitrogen dose promotes apical branching which accelerates the number of leaves on plants. Bika and Khanal (2018) [3], observed that a higher amount of N enhanced the number of leaves in Broccoli. These findings are in agreement with those reported by Kumar *et al.* (2013) [9], Yanglem and Tumbare (2014) [19], Tekasangla *et al.* (2015) [17] and Sharma (2016) [16] in cauliflower, Prasad et al. (2009) [14] in chinese cabbage and Katiyar *et al.* (2011) [6] in broccoli, Vasava *et al.* (2016) [18] in amamnthus.

As the days to curd initiation were delayed by nitrogen levels progressively, the days taken to harvesting of curds also delayed. Plant received treatment of N_1 (150 kg/ha) came early curd initiation (72.51) and early come to curd harvest by 19.38 days, which was at par with treatment N_2 (175 kg/ha). Whereas, maximum time for curd harvesting of 20.61 days was recorded with N_2 (175 kg/ha) because of late curd initiation (77.04 days). This delay with increase in nitrogen levels it might be due to vigorous growth of plants through experience with high rates of photosynthesis under the influence of high nitrogen which negatively impacted on reproductive part. The results are in conformity with the findings of Manisha *et al.* (2023) [10] in cauliflower, Pauline *et al.* (2003) [13] in papaya and Kumar *et al.* (2004) [8] in french bean, Senjalya *et al.* (2015) [15] in tomato.

Table 1: Effect of different levels of nitrogen and phosphorus on stalk length, days taken to curd initiation and curd harvesting of cauliflower cv. Kavya

Treatments	Stalk length (cm)	Days taken to curd initiation	Days taken to curd harvesting
Nitrogen (N)			
N_1: 150 kg/ha	10.33	72.51	19.38
N_2: 175 kg/ ha	11.40	77.04	20.61
S. Em. ±	0.315	1.545	0.416
C. D. at 5%	0.92	4.53	1.22
Phosphorus (P)			
P_1: 37.5 kg/ha	10.35	77.35	20.62
P_2: 50 kg/ha	11.38	72.19	19.37
S. Em. ±	0.315	1.545	0.416
C. D. at 5%	0.92	4.53	1.22
Interaction of N and P (N x P)			
S. Em. ±	0.446	2.184	0.588
C. D. at 5%	NS	NS	NS
C. V. %	12.30	8.76	8.83

Table 2: Effect of different levels of nitrogen and phosphorus on number of leaves per plant and leaf length of cauliflower cv. Kavya

Treatments	Number of leaves per plant		Leaf length (cm)	
	30 days	At harvest	30 Days	60 Days
Nitrogen (N)				
N_1: 150 kg/ha	9.68	20.22	22.25	48.07
N_2: 175 kg/ ha	10.24	21.98	23.72	51.11
S. Em. ±	0.252	0.490	0.486	0.906
C. D. at 5%	NS	1.43	1.42	2.65
Phosphorus (P)				
P_1: 37.5 kg/ha	9.92	20.37	22.80	48.16
P_2: 50 kg/ha	10.00	21.83	23.17	51.03
S. Em. ±	0.252	0.490	0.486	0.906
C. D. at 5%	NS	1.44	NS	2.66
Interaction of N and P (N x P)				
S. Em. ±	0.357	0.692	0.721	1.281
C. D. at 5%	NS	NS	NS	NS
C. V. %	10.76	9.84	8.97	7.75

Conclusion

The results clearly exposition that treatment application of N_2 (175 kg/ha) showed better performance in terms of stalk length, leaf length (at 30 and 60 days after transplanting), number of leaves per plant. While, application of N_1 (150 kg/ha) gave early curd initiation and harvesting. Then application of P_2 (50 kg/ha) showed better results in terms of stalk length, days taken to curd initiation and curd harvesting, leaf length, number of leaves per plant.

References

1. Anonymous. Area and production 2020-21. National Horticulture Board, Ministry of Agriculture and Farmers Welfare, Government of India; c2020. Available at https://nhb.gov.in, accessed on 25 April 2024.
2. Anonymous. Area and Production 2021-22. Directorate of Horticulture. Agriculture, Farmers Welfare and Co-operation Department, Government of Gujarat, 2021. Available at https://doh.gujarat.gov.in/horticulture-census.htm, accessed on 25 April 2024.
3. Bika R, Bandari N, Khanal A. Response of different doses of nitrogen on broccoli (*Brassica oleracea* var. *italica*) in Lamjung district. Int J Appl Sci Biotechnol. 2018;6(3):270-273.
4. Gianquinto G, Muñoz P, Pardossi A, Ramazzotti S, Savvas D. Soil fertility and plant nutrition. In: Good Agricultural Practices for Greenhouse Vegetable Crops. 1st ed. c2013. p. 205-269.
5. Jones Jr JB, Wolf B, Mills HA. Plant analysis handbook: A practical sampling, preparation, analysis and interpretation guide. 1st ed. Georgia (USA): Micro Macro Publishing, Inc; c1991. p. 213.
6. Katiyar D, Tripathi SM, Dwivedi AK, Pandey V. Studied the interaction and economics of nitrogen and phosphorus on crop growth, relating traits of broccoli (*Brassica oleracea* var. *italic*). Ann Hortic. 2011;4(2):176-180.
7. Kebrom TH. A growing stem inhibits bud outgrowth - The overlooked theory of apical dominance. Front Plant Sci. 2017;8:1-7.
8. Kumar M, Sinha KK, Roysherma RP. Effect of organic manure, NPK and boron application on productivity of French bean. Indian J Pulse Res. 2004;17(1):42-44.
9. Kumar S, Singh JP, Rajbeer, R, N, Mohan B, Kaushik H, Kumar D. Influence of integrated nutrient management on growth and yield of cauliflower (*Brassica oleracea* var. *botrytis* L.). Int J Agric Sci. 2013;9(2):747-749.
10. Manisha RK, Yadav AK, Kumar R. Effect of irrigation and nitrogen levels on growth and yield of cauliflower (*Brassica oleracea* var. *botrytis* L.) in arid region of Rajasthan. 2023;12:313-320.
11. Marschner H. Mineral nutrition of higher plants. 3rd ed. San Diego (USA): Academic Press; c2012.
12. Panse VG, Sukhatme PV. Statistical Methods for Agricultural Workers. New Delhi: ICAR; c1985, p. 97-123.
13. Pauline A, Sanyal D, Sema TA. Effect of NPK on the growth, yield attributes in papaya (*Carica papaya* L.). Crop Res. 2003;263:462-467.
14. Prasad PH, Bhunia P, Naik A, Thapa U. Response of nitrogen and phosphorus levels on the growth and yield of Chinese cabbage (*Brassica campestris* L. var. *pekinensis*) in the Gangetic plains of West Bengal. J Crop Weed. 2009;5(2):75-77.
15. Senjaliya H, Rajput RP, Galani SN, Mangaroliya GS. Response of different chemical treatment on shelf-life and quality of tomato fruits (cv. GT-1) during storage in summer season. Int J Process Post Harvest Technol. 2015;6:1-5.
16. Sharma V. Effect of nutrient management on growth and yield of cauliflower (*Brassica oleracea* var. *botrytis*) inside low-cost polyhouse. Himachal J Agric Res. 2016;42(1):88-92.
17. Tekasangla S, Kanaujla P, Singh PK. Integrated nutrient management for quality production of cauliflower in acid alfisol of Nagaland. Karnataka J Agric Sci. 2015;28(2):244-247.
18. Vasava HV, Chudasama VR, Rathva V, Dalvaniya DG, Leua HN. Performance of different varieties of amaranth (*Amaranthus spp.*) under net house and open field conditions. 2016;22
19. Yanglem SD, Tumbare AD. Influence of irrigation regimes and fertigation levels on yield and physiological parameters in cauliflower. Bioscan. 2014;9(2):589-594.