Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.6261

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **6 (2):** 1222-1225 (2018)

International Journal of Pure & Applied Bioscience

Research Article

OPEN ACCESS

Cabbage (*Brassica oleracea* var. *capitata* L.) Yield, Nutrients Uptake and Soil Available Nutrients as Influenced by Nitrogen and Foliar Nutrients Application under South Gujarat Condition

Patel, S. J.[1*], Desai, L. J.[2], Keraliya, S. J.[3] and Patel C. K.[4]

Navsari Agricultural University, Navsari, Gujarat 396 450

*Corresponding Author E-mail: suchipatel28993@gmail.com

Received: 5.02.2017 | Revised: xx.xx.2017 | Accepted: xx.xx.2017

ABSTRACT

The present investigation entitled "Response of cabbage [Brassica olerecea (L.) var. Capitata] to foliar nutrients and different levels of nitrogen under south Gujarat condition" was conducted at college farm, N.M.C.A, NAU, Navsari during rabi season of 2016. The experiment was laid out in RBD with factorial concept having three replications and ten treatment combinations, considering 100% RDN(N1) and 75% RDN + Azotobacter (N2) and 1% NAUROJI Novel, 2% Cow urine, 1% 19:19:19, 2% Urea and control were applied at 30 and 45 DATP. The significantly highest diameter of head (15.16 cm and 15.79cm), weight of head (634.9 g and 705.2 g), volume of cabbage head (1080.3 cm3 and 1098.4cm3) and cabbage head yield (22.22 t/ha and 23.65 t/ha) were registered under application of 100 % RDN (N1) and 1% NAUROJI Novel (F1), respectively. Numerically higher value of nutrients content and uptake were recorded higher under 100% RDN (N1) and 1% NAUROJI Novel (F1). The residual available N, P2O5 and K2O were maximum with higher level of nitrogen N1 (100% RDF). Similarly numerically higher value of available nitrogen (187.5 kg/ha) and potassium (317.0 kg/ha) were recorded under 1% NAUROJI novel (F1), while available phosphorus was higher (40.88 kg/ha) with 2% cow urine (F2).The interaction effect was fails to exert its significant effect.

Key word: *Cabbage, Foliar nutrients, NAUROJI, Nitrogen levels, Nutrient uptake, Yield*

INTRODUCTION

Cabbage (*Brassica oleracea* var. *capitata* L.) is one of the most important, high nutritive and palatable leafy vegetables in India. It is a rich source of protein, minerals and vitamin A11. It has some medicinal value as it prevents constipation, increases appetite, speeds up digestion and is very useful for diabetic patient. The flavour in cabbage is due to presence of a glycoside 'sinigrin'. Due to diversified use of productive land, it is necessary to increase the food production to meet the diverse requirement of human beings. To increase the yield of cabbage, application of balanced major-micronutrients and growth regulators may a contribute to achieve the desired goal.

Cite this article: Patel, S.J., Desai, L.J., Keraliya, S.J. and Patel, C.K., Cabbage (*Brassica oleracea* var. *capitata* L.) yield, Nutrients Uptake and Soil Available Nutrients as Influenced by Nitrogen and Foliar Nutrients Application under South Gujarat Condition, *Int. J. Pure App. Biosci.* **6(2):** 1222-1225 (2018). doi: http://dx.doi.org/10.18782/2320-7051.6261

It was found that balance fertilization of macro and micro nutrients is essential for the production of high yield and quality products[1] while foliar application of micronutrients to plant is the most effective and safest way[1]. Among the growth regulators, auxin causes enlargement of plant cell and Gibberellins stimulates cell division, cell enlargement or both[9]. Kolota and Osinska[6] reported soil nitrogen fertilization and foliar urea application increased the content of almost all nutrients in leaves and heads of cabbage. Yildirim *et al.*[13] also reported that foliar application of urea especially 0.8 and 1.0% resulted in large and weightiest heads of cabbage. Use of banana pseudo stem scutching waste as an organic manure for crop production at large scale can solve the problem for disposal of wastes and also solve the lack of organic matter in soil. The scutching waste and sap obtain as by-product during fiber extraction can be used for preparation enriched vermicompost and as liquid fertilizer, respectively[3]. Hence, the present experiment was undertaken to find out the response of cabbage to foliar nutrients and different levels of nitrogen under south Gujarat condition.

MATERIAL AND METHODS

A field experiment was conducted in rabi 2016 at college farm, N.A.U., Navsari and laid out in a randomized complete block design with three replications having two levels of nitrogen viz. 100% RDN (N1) and 75% RDN + Azotobacter and five levels of foliar application viz., 1% NAUROJI Novel (F1), 2% cow urine (F2), 1% 19:19:19 (F3), 2% Urea (F4) and control (F5) with total ten treatment combinations. The time of spraying of foliar nutrients was 30 and 45 DATP. The Urea, DAP and MOP were the sources of N, P and K, respectively for the crop, in which 50% dose of N and full dose of P and K were applied at the time of transplanting and remaining half dose of N was applied at the 30 days after transplanting. The 30 days old healthy seedlings of cabbage cv. Golden acre were transplanted with a spacing of 60 x 45cm on a gross plot of 4.8 m x 2.8 m with Net plot of 3.60 m x1.80 m size. Intercultural operations were done as and when necessary. Five randomly selected plants are taken from each plot for observations at the time of harvesting of crop. Data were collected on plant and head fresh weight, head dry weight, yield per plot and yield per hectare. The data obtained from experiment was statistically analysed by appropriate procedure to randomized block design.

RESULTS AND DISCUSSION

Yield and yield attributes:

The data given in Table 1 revealed that effect of different levels of nitrogen attain the level of significance for yield of cabbage head. The significantly highest diameter of head (15.16 cm), weight of head (634.9 g), volume of cabbage head (1080.3 cm3) and cabbage head yield (22.22 t/ha) were registered under application of 100 % RDN (N1) over 75 % RDN + Azotobacter (N2). Significantly higher value of diameter of head (15.79cm), weight of head (705.2 g), volume of head (1098.4cm3) and cabbage head yield (23.65 t/ha) were recorded under the 1% NAUROJI Novel (N1), which were at par with the application of 1% 19:19:19 (14.46 cm, 592.6 g, 1042.4 cm 3 and 22.36 t/ha, respectively), while with 2 % Urea(14.33cm, 583.9g, 1022.7 cm3 and 21.34 t/ha, respectively) and volume of head with 2% cow urine (1024.1cm3). The significantly lower diameter of head, weight of head, volume of head and cabbage head yield (13.37 cm, 494.4 g, 938.7 cm3 and 19.05 t/ha, respectively) were recorded under the control (F5). All the evidence showed that higher dose of nitrogen being an essential part of nucleic acid, which enhanced better reproductive part of plant resulting in improvement of yield attributing characters and finally yield. These results are in accordance with those of Moniruzzaman *et al.*[7] in broccoli and Kodithuwakku and Kirthisinghe[5] in cauliflower.

Nutrients content and uptake

A marked increased in nitrogen, phosphorus and potash content of cabbage was significantly not affected due to nitrogen

levels. Numerically higher value of nutrients content(N 1.95 %, P 0.82% and K 1.89 %) were recorded higher under 100% RDN (N1) level, providing its superiority over N2 level by recording 4.3% increase in nitrogen content, 2.5 % increase in phosphorus content and 1.6 % increase in potash content. In case of nitrogen, phosphorus and potash uptake by the crop were significantly highest under 100 % application of RDN (N1) over 75 % RDN along with Azotobacter seed inoculation (N2). The percent increase in nutrients uptake under N1 was higher to the tune of 11.9 % in nitrogen, 10.4 % higher in phosphorus, while 9.13 % higher in potash uptake. In case of foliar nutrients application nitrogen, phosphorus and potash content and uptake were higher under 1% NAUROJI Novel (F1), which proving superiority over rest of the treatment by recording 14.4% higher N, 18.0 % higher P and 15.6 %higher K content over F5, while 39.4 % higher N, 43.9 % higher P uptake and 41.2 % higher K uptake were registered with 1% NAUROJI Novel (F1).The increase in nutrient content and uptake by crop might be due to increased levels of nitrogen and banana psudostem sap contains higher amount of essential nutrients, simultaneously increased availability of nitrogen, which also increased P absorption partly due to favorable effect of NH4 ion on the absorption of H2PO4 ion and less fixation of K owing to addition of NH4-N. Ultimately more nutrients were observed by plant, which increased nutrients content and uptake by the crop. The present findings are in agreement with those of Ngetich *et al.*[8], due to nitrogen levels and Vasu and Reddy[12] in cabbage in case of P and Singh and Pandey10 in cabbage for K due to foliar nutrients.

Soil fertility status

The residual available N, P2O5 and K2O were maximum with higher level of nitrogen N1 (100% RDF). The percent increase in available soil nitrogen, phosphorus and potassium was to the tune of 15.3%, 5.0% and 9.5%, respectively. Minimum available soil nitrogen, phosphorus and potassium were noticed with 75 % RDN + Azotobacter inoculation (N2).Similarly numerically higher value of available nitrogen (187.5 kg/ha) and potassium(317.0 kg/ha) were recorded under 1% NAUROJI novel (F1), while available phosphorus was higher (40.88 kg/ha) with 2% cow urine (F2). The lowest values of available nutrients status after harvest of crop was observed under control (F5). These results are in agreement with Chatterjee and Bandyopadhyay[4] in tomato. Interaction effects among different levels of nitrogen and foliar nutrients was failed to attain the level of significance on yield of head of cabbage, nitrogen, phosphorus and potash content and uptake by crop and soil fertility status after crop harvest.

Table 1: Yield attributes, yield, nutrient content (%), uptake (kg/ha) and soil available nutrients (kg/ha) as influenced by nitrogen levels and foliar nutrients on cabbage

Treatment	Yield attributes				Nutrient content %			Nutrients uptake(kg/ha)			Soil available nutrients(kg/ha)		
	Diameter of head (cm)	Weight of head (g)	Volume of head (cm^3)	Yield (t/ha)	N	P	K	N	P	K	N	P	K
A. Nitrogen levels (N)													
N_1 : 100% RDN	15.16	634.9	1080.3	22.22	1.95	0.82	1.89	59.41	25.08	57.82	191.8	40.0	314.3
N_2: 75% RDN + *Azotobacter*	13.68	544.0	970.3	20.66	1.87	0.80	1.86	53.11	22.79	52.98	166.5	38.1	287.1
S. Em. ±	0.32	15.6	20.9	0.51	0.04	0.02	0.04	1.44	0.49	1.31	6.5	0.87	10.2
C.D. at 5%	0.96	46.3	62.4	1.52	NS	NS	NS	4.26	1.45	3.88	19.3	NS	NS
B. Foliar nutrients (F)													
F_1: NAUROJI Novel (1%)	15.79	705.2	1098.4	23.65	1.98	0.85	1.93	63.85	27.32	62.08	187.5	40.8	317.0
F_2: Cow urine (2%)	14.16	571.1	1024.1	20.80	1.93	0.84	1.88	56.01	24.24	54.69	178.6	40.9	306.1
F_3: 19:19:19 (1%)	14.46	592.6	1042.4	22.36	1.93	0.83	2.01	58.18	24.82	60.26	181.2	39.8	306.0
F_4: Urea (2%)	14.33	583.9	1022.7	21.34	1.96	0.83	1.90	57.48	24.33	56.02	181.6	37.0	300.3
F_5: Control	13.37	494.4	938.7	19.05	1.73	0.72	1.67	45.79	18.98	43.95	166.7	36.6	274.0
S. Em. ±	0.51	24.6	33.2	0.81	0.06	0.03	0.07	2.27	0.77	2.07	10.3	1.8	16.2
C.D. at 5%	1.52	73.1	98.6	2.40	0.17	0.09	0.21	6.74	2.29	6.14	NS	NS	NS
C. Interaction (N X F)													
S. Em. ±	0.72	34.8	46.9	1.14	0.08	0.04	0.10	3.21	1.09	2.92	14.52	1.95	22.9
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C. V. %	8.66	10.22	7.93	9.23	7.15	9.17	9.05	9.88	7.88	9.13	14.04	8.64	13.2

REFERENCES

1. Aghtap, A.A., Ghanbari, A., Sirousmehr, A., Siahsar, B., Asgharipour, M., Tavssoli, A. Effect of irrigation with wastewater and foliar fertilizer application on some forage characteristics of foxtail millet (*Setaria italica*). *International Journal of Plant Physiology and Biochemistry* **3(3):** 34-42 (2011).
2. Ali, S., Khan, A.Z., Mairaj, G., Arif, M., Fida, M., Bibi, S., Assessment of different crop nutrient management practices for yield improvement. *Australian Journal of Crop Science* **2(3):** 150-157 (2008).
3. Anonymous Progress report of NAIP Component-2 sub project "A value chain on utilization of banana pseudostem for fibre and other value added products". NAU, Navsari, Gujarat, India (2011).
4. Chatterjee, R. and Bandyopadhyay, S., Studies on effect of organic, inorganic and biofertilizers on plant nutrient status and availability of major nutrients in tomato. *International Journal of Bio-resource and Stress Management*, **5(1):** 093-097 (2014).
5. Kodithuwakku, D. P. and Kirthisinghe, J. P. The effect of different rates of nitrogen fertilizer application on the growth, yield and post harvest life of cauliflower. *Tropical Agricultural Research*, **21(1):** 110 – 114 (2009).
6. Kolota, E. and Osinska, M., Efficiency of foliar nutrition of field vegetables grown at different nitrogen rates. In: Proc. IC Envirn. Probl. N-Fert. Acta Horticultural. **563:** 87–91 (2001).
7. Moniruzzaman, M., Rahman S. M. L., Kibria, M. G., Rahman M. A. and Hossain, M. M. Effect of boron and nitrogen on yield and hollow stem of broccoli. *Journal of Soil Nature.* **1(3):** 24-29 (2007).
8. Ngetich, O.K., Niyokuri, A.N., Rono, J. J., Fashano, A. and Ogweno, J.O. Effect of different rates of nitrogen fertilizer on the growth and yield of zucchini (*Cucurbita pepo* L. cv. *Diamant*). *Inernational. Journal of Agriculture crop Science,* **5(1):** 54-62 (2013).
9. Nickell, L. G. Plant Growth Regulators, Springer-Verlag BerlinHeidelberg, New York. pp. 1-3 (1982).
10. Singh, P. K. and Pandey, M. Study the effect of integrated nutrient management on yield and nutrient uptake in cabbage. *Indian Journal of Hill Farming*, **23(2):** 39-41 (2010).
11. Uddin, M. J., Islam, M. M. and Naher, M. N. A. Basic Agriculture, Part I. 74/4, Upashahar, Rajshahi. 379 (2009).
12. Vasu, D. and Reddy, M.S. Effect of fertigation on yield, quality, nutrient uptake, fertilizer and water use efficiency in cabbage. *Apropedology*, **23(2):** 106-112 (2013).
13. Yildirim, E. Guvenc, I., Turan, M. and Karatas, A., Effect of foliar urea application on quality, growth, mineral uptake and yield of broccoli (*Brassica oleracea* L. var. *italica*). *Plant Soil Environment,* **53(3):** 120-128 (2007).