

EFFECT OF FOLIAR APPLICATION OF DIFFERENT NITROGEN LEVELS AND NAA ON GROWTH, YIELD AND QUALITY OF CHILLI (CAPSICUM FRUTESCENS L) UNDER IRRIGATED CONDITION OF U.P.

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Abstract: The application of some of the plant growth regulator, auxins like NAA has been found effective in reducing the flowers and fruit drops in chilli thereby enhancing the production of chilli per unit area per unit time respectively. An experiment entitled “Effect of foliar application of different Nitrogen levels and NAA on growth, yield, and quality of chilli (*Capsicum annum L.*)” was conducted to assess at Agriculture Research Farm, Chandra Bhanu Gupta Agriculture P.G College, BKT, Lucknow during Rabi season 2023-2024. The experiment was performed in Randomized Block Design (RBD) with five treatments and three replications. The variety F-1 hybrid was transplanted with treatments T1 (Control), T2 (Urea 1% (10 g/1 litre of water) + NAA 100 ppm), T3 (Urea 1.5% (15 g/ 1 litre of water) + NAA 100 ppm), T4 (Urea 1% (10 g/1 litre of water) + NAA 200 ppm) and T5 (Urea 1.5% (15 g/1 litre of water) + NAA 200 ppm). The result of the experiment revealed that maximum growth characters like plant height (40.24 cm), No. of branches (7.10 cm) and No. of flowers (10.25) were recorded with treatment T4 (Urea 1% (10 g/1 litre of water) + NAA 200 ppm) similarly, maximum yield characters like Fruit length (10.35 cm) , No. of fruits (34.90) , Fruit diameter (0.80 cm) , Ascorbic acid content (237.68 mg) ,Fruit weight (177.75 gm) and Yield (109.70 q) were recorded with treatment T4 (Urea 1%(10 g/1 litre of water) + NAA 200 ppm) significantly which was followed by treatment T5 (Urea 1.5% (15 g/1 litre of water) + NAA 200 ppm). Whereas, the minimum values of all the parameters were recorded with treatment T1 (control) significantly. The varying responses of chilli (*Capsicum annum L.*) by application of plant growth regulators have been reported by Chaudhary and singh (2006), Mili and sable (2003). The foliar spray of urea may be attributed to the increase in better absorption and uptake of nitrogen in sweet pepper confirmed the finding of present study Srivastava and Srivastava (2002) and Sehrawat *et al.* (2021) .The data also showed that the application of urea 1% as foliar spray in respect of dose of NAA 200 PPM increased the plant height, no of branches, no. of flowers and yield characters like fruit length, no of fruit, fruit diameter, ascorbic acid content ,fruit weight and yield significantly under u.p condition.

Keywords: Plant growth regulator NAA@200ppm, Foliar spray of urea, ascorbic acid, ethyl alcohol, Tagging of plant.

Introduction

Chilli or pepper (*capsicum frutescens* L), chromosome no $2n = 24$, belongs to family Solanaceae. It is also used as vegetable, spice, condiments and for preparation of sauces, pickles and as a principal ingredient for chutney. Chillies are used as curry powder. They impart pungency, flavour and colour to foods. They also provide essential vitamins, minerals and nutrients. In addition to use as foods, condiments and medicines chilli plant are also used for their ornamental beauty.

Adequate supply of nitrogen is often considered important for realising the maximum yield of any crop. Nitrogen is the chief constituents among the several important elements occurring in the plant. Nitrogen plays a vital role in synthesis of chlorophyll as well as amino acids which contribute to building the units of protein and thus influences the growth of the plant by promoting leaves, stem and other vegetative growth and ultimately enhancing the size of the plants.

Singh *et al.*, (2021) reported in an experiment of NAA in brinjal that among auxins NAA has gained immense importance horticulturally and reported to stimulate cell division, elongation and causes cell enlargement in the apical region of the plant due to increase of osmotic pressure hence enhanced the rooting, leaf and branches in plants. NAA has been found to be promising growth regulator to reduce the flower drop and thereby increase the yield of chilli (Subedi *et al.*, 2023). Therefore, it is very essential to develop use of compatible dose of NAA with foliar spray of urea to enhance the growth and yield of chilli crop. The main objective of this work is to study the effect of NAA and foliar spray of urea on growth, yield and quality of chilli crop.

Materials and Methods

The present investigation entitled "Effect of foliar application of different Nitrogen levels and NAA on growth, yield and quality of chilli (*Capsicum annum* L.)" was conducted to assessed during Rabi season of 2023-2024, The edaphic and climatic conditions under which the experiment was carried out along with the techniques adopted and materials used are being described in this chapter. The experiment was carried out during Rabi 2023-2024 at Agriculture Research Farm, Hajipur, Chandra Bhanu Gupta Agriculture Post Graduate college, Lucknow (U.P.). The field was well leveled having good soil condition, geographically, Experimental site falls under subtropical zone.

Preparation and application of growth regulators and urea solutions:

Napthalene-acetic acid (NAA)

The solution was prepared by dissolving 100mg of NAA in about 100 ml of ethyl alcohol and the volume made to one litre to obtain 1000 ppm concentration.

Urea

Urea was dissolved in water just before sprayings. The urea solution was prepared of 1.5 per cent concentration by dissolving 1.5 g urea per litre of water and for 1.0 per cent conc. and 10 gm Urea per litre of water.

3. Results and Discussion

Growth parameters

The Data recorded for the various growth characters were collected and analysed and presented in the table 3.1 revealed that maximum plant height (62.74 cm) , No. of branches (14.73) and No. of flowers (34.44)were recorded with treatment T4 (Urea 1% (10 g/1 litre of water) +NAA 200 ppm) which was followed by treatment T5 (Urea 1.5% (15 g/1 litre of water) + NAA 200 ppm) with plant height (52.07 cm), No. of branches (10.87 cm) and No. of flowers (34.44) at all the growth stages of chilli crops after 120 days of sowing of crop significantly .Effect of different nitrogen levels and NAA had significantly increased all the vegetative growth characters like plant height, No. of branches and No. of flowers respectively. However, the minimum plant height (32.10cm) ,No of branches (7.10) and No. of flowers (10.25)were recorded with T₁ (control) i.e. without foliar spray of growth hormone and nitrogen level at 30,60,90 and 120 days after sowing at all stages of growth of crop significantly. Foliar spray of urea may be attributed to the increase in plant height for better absorption and uptake of nitrogen as nitrogen is the primary constituents of chlorophyll and protein synthesis as well as the important component of protoplasm (subedi *et al.*,). The combination of different levels of Nitrogen and NAA may led to effective absorption, utilization and better proliferation of roots resulting in quick canopy growth and also increases number of primary branches (Reddy *et al*, 2013).

Table 1: Effect of different level of Nitrogen and NAA on plant height, no. of branches and no. of flower of chilli crop.

Treatments	Plant height(cm)				No.of Branches				No of flower			
	Days after storage				Days after storage				Days after storage			
DAS	30	60	90	120	30	60	90	120	30	60	90	120
T1-Spray of water (control)	32.10	36.17	42.45	52.23	6.02	8.37	9.19	12.28	9.04	15.60	22.70	32.45
T2-Urea 1% (10g/L	36.38	40.13	47.47	55.27	6.52	8.55	9.22	13.53	9.64	18.36	26.50	32.92

water+ NAA 100ppm												
T3--Urea 1.5% (15g/L water+ NAA 100ppm)	38.41	40.8 5	51.41	57.09	6.71	8.64	9.24	13.85	9.85	18.71	26.72	34.44
T4--Urea 1.0% (10g/L water+ NAA 200ppm)	40.24	45.6 7	53.08	62.74	7.10	9.02	9.29	14.73	10.25	20.19	29.26	35.69
T5--Urea 1.5% (15g/L water+ NAA 200ppm)	39.15	43.1 9	49.17	52.07	6.79	8.76	9.22	10.87	10.17	19.23	28.35	27.12
SEm	.448	.298	.475	.395	.005	.037	.006	.149	.003	.180	.116	.100
CD(p = .05 level)	1.483	.987	1.573	13.07	.015	.123	.022	.493	1.483	.987	1.573	.332

Yield and quality parameters

The Data recorded for the various yield and quality characters were collected and analysed and presented in the table 3.2, fig 3.2. Maximum fruit length (10.35cm) , No of fruits (34.90) , fruit diameter (0.80 cm), ascorbic acid content (237.68 mg), fruit weight (177.75 g) and fruit yield (109.70 q/ha) was recorded with treatment T4 (Urea 1% (10 g/1 litre of water) +NAA 200 ppm) which was followed with the treatment T5 (Urea 1.5% (15 g/1 litre of water) + NAA 200 ppm) at all the growth stages of chilli crops after 120 days of sowing of crop significantly .Effect of different nitrogen levels and NAA had significantly increased all the yield and quality characters significantly. However, the minimum fruit length (8.19 cm), No of fruits (28.34), fruit diameter (0.44 cm), ascorbic acid content (218.50 mg), fruit weight (161.58 gm) and fruit yield (99.73 q) were recorded with T1 (control) at all stages of growth of chilli crop significantly.

The result depicted that there was an increase in fruit length at all stages of crops growth with increased rate of nitrogen (Khan *et al.*, 2004). Ascorbic acid content was increased with the application of NAA and urea sprays. Maher *et al.*, (1969) also observed more ascorbic acid content of chilli fruits due to NAA application. Desai and chavan., 1993) also found that foliar spray of NAA increased ascorbic acid content of chilli fruits. The improvement in yield characters might be due to better absorption of nitrogen by using different levels of urea as well as NAA application (kundu *et al.*, 2010) The total fruit yield were significantly influence by the foliar application of urea. This might be due to plant absorbs more nitrogen which

produced larger canopy development associated with more photosynthesis and thus were positive response on yield. This agrees with the results obtained by Rafique *et al.*, 2004), sharma and mohammad (2004), Verma and Tripathi, 2021) and katwale and saraf, 1990).

Table 2- Effect of foliar spray of NAA and Urea on fruit length, no of fruit, fruit diameter, ascorbic acid content, fruit weight and fruit yield of chilli

Treatments	FRUIT LENGTH (cm)	NO. OF FRUITS	FRUIT DIAMETER (cm)	ASCORBIC ACID CONTENT (mg/100g)	FRUIT WEIGHT (gm)	FRUIT YIELD (q)
T1- Spray of water (control)	8.19	28.34	0.44	218.50	161.58	99.73
T2- Urea 1% (10 g/1 litre of water)+ NAA 100 ppm	8.34	29.43	0.51	223.60	165.33	101.97
T3- Urea 1.5% (15 g/1 litre of water)+ NAA 100ppm	8.78	30.18	0.62	230.38	167.35	103.30
T4 -Urea 1%(10 g/1 litre of water)+NAA 200 PPM	10.35	34.90	0.80	237.68	177.75	109.70
T5- Urea 1.5%(15 g/1 litre of water)+ NAA 200 Ppm	9.88	33.42	0.74	232.62	172.41	106.42
Sem ±	0.003	0.010	0.009	0.046	0.656	0.402
CD at 0.5% level	0.009	0.032	0.020	0.152	2.171	1.330

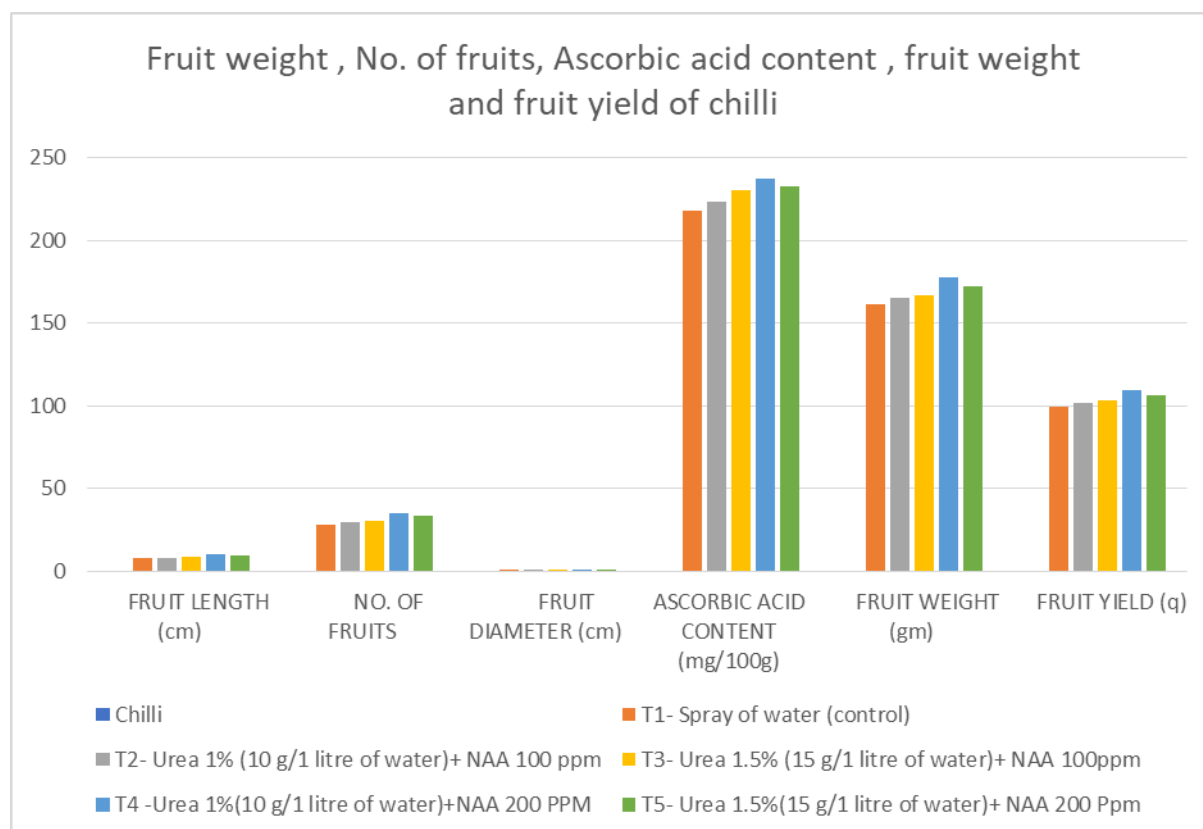


Fig 3.2: Effect of foliar application of different Nitrogen levels and NAA on Fruit length (cm), No. of fruits, fruit diameter (cm), Ascorbic acid Content (mg), fruit weight (g) and fruit yield (q) of chilli crop.

CONCLUSION

The NAA concentrations @200 ppm dose are ideal for reducing blossom drop and boosting growth characters i.e. plant height, no of leaves and no of flower. The combined application of 200 ppm NAA and 1% urea was found superior over other treatment for boosting the fruit length, no of fruits, fruit diameter, ascorbic acid content, fruit weight and fruit yield with the higher output attributed to proper plant growth, management of the abscission layer in full bloom and acceleration of full development by beneficial hormonal effects. Hence on the basis of these findings it may be concluded that the combine effect of NAA 200 ppm along with 1% nitrogen through foliar spray gave better result regarding growth, yield and quality attribute of chilli crop.

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