

Studies of sodium fluoride on the growth and yield of chick pea (*Cicer arietinum* L.)

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Fluoride in higher concentrations is toxic to the plants. The present experiment was conducted at C.C.R. (P.G.) College, Muzaffarnagar during the years 2002-2003. Simple randomized block design with four replications and six treatments including control was followed. The concentrations of NaF were 10, 25, 50, 100 and 200 ppm. The first spray of NaF solution was done after 30 days of sowing. Subsequent sprayings and recording of data was done fortnightly till harvesting of the crop. The effect of sodium fluoride was found toxic to both the varieties of chick pea *viz.* Pusa 256 and K 850.

Key words : Toxicity of fluoride, Chick pea, Growth, yield, Test weight, Leaf area.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) accounts for more than 30 per cent (6.30 m ha) acreage and 45 percent production (6.85 m ton) of total pulse crops in the country (Anonymous, 1997). India occupies the first position in area and production in the world while its productivity is stagnant (6q/ha), mainly because of the crop continuously is grown in mostly on dry land during *rabi* season. It contains high percentage of proteins, carbohydrates, vitamins and minerals.

In western Uttar Pradesh, Chickpea is widely grown and more than 50 per cent of the total area lies in Etah, Mainpuri, Firozabad, Agra, Aligarh, Moradabad, Bareilly, Meerut, Muzaffarnagar and Saharanpur districts. Chickpea has not been a popular crop among farmers of Tarai region due to its low productivity which is attributable to the factors like heavy rainfall, heavy soils and high incidence of insect, pest and diseases. In Muzaffarnagar and Saharanpur districts light loam soils and rainfall are favourable for the production of Chickpea.

Many food, fibre, forage and forest crops are adversely affected by fluorides (Middleton *et al.*, 1965). This pollutant interferes with enzyme system, changes in cellular chemical constitution and physical structure, retardation of growth and reduction in production from altered metabolism and acute immediate tissue degeneration. There are numerous data on the reduction of growth and productivity of crop plants, but very little information is available on cellular alteration and interference with enzymes which are essential to the ultimate definition and prediction of the significance of

the effect of pollutants on growth and productivity of agricultural plants.

Yamazoe (1962) studied the response of HF on growth and yield of various crops. Reduction in growth and yield was reported by Malik (1997); Arya (1997) and Kumar (2000) in various crops.

MATERIALS AND METHODS

The experiments were conducted at the research farm of C.C.R. (P.G.) College, Muzaffarnagar during the years 2002-03. The soil of the farm is alluvial. The sowing of Chickpea was done carefully and all the agronomic practices like weeding, irrigation, spraying of pesticides and harvesting were done properly. The experiments were conducted in Simple randomized block design with six treatments including control and four replications. The row to row distance was kept 45 cm and plant to plant 10 cm. The doses of NaF solutions were taken 10, 25, 50, 100 and 200 ppm. First spraying was done after 30 days of sowing. Subsequent spraying and recording of data were done fortnightly till harvesting of the crop.

The following growth and yield characters were studied:

- Plant height (cm)
- Number of leaves per plant
- Leaf area (sq. cm) per plant
- Dry weight/m²(g)
- Test weight of 1000 seeds (g)
- Yield per plant (g)

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RESULTS AND DISCUSSION

The effect of different concentrations of NaF on the growth and yield characters of Chickpea has been shown in Table 1. The height of the plant was found maximum in control treatment *i.e.* 55.8 cm. in Pusa and 56.0 in K-850. Similarly minimum height was recorded at 200 ppm

Middleton, J.T., Emik, L.O. and Taylor, O.E. (1965). Air quality criteria and standards for agriculture, *J., APCA*, **15**(10): 476-480.

Rathore, S. and Agrawal, P.K. (1989). Modification of fluoride toxicity in *Vicia faba* through use of Nitrogen, Phosphorus and Potassium Nutrition, *Indian J. Environ. Health*, **31**(4).

Table 1 : Showing the effect of different concentrations of NaF on the growth and yield characters of Chick pea (*Cicer arietinum* L.)

Treatments (NaF)	Height (cm) per plant		No. of leaves per plant		Leaf area (sq cm) per plant		Dry weight / m ² g		Test weight of 1000 seeds (g)		Yield per plant (g)	
	Pusa 256	K850	Pusa 256	K850	Pusa 256	K850	Pusa 256	K850	Pusa 256	K850	Pusa 256	K850
Control	55.8	56.0	86.7	86.5	908	908	1068	1055	152.4	153	1475	1476
10 ppm	55.2	55.3	82.9	82.7	866	866	1034	955	150.0	150	1362	1366
25 ppm	53.0	53.4	77.5	77.0	847	844	894	857	140.3	140.6	1243	1260
50 ppm	51.0	51.5	70.2	70.0	845	842	827	784	130.0	130.6	947	951
100 ppm	47.3	47.4	62.8	63.4	743	740	723	688	123.5	125.5	772	765
200 ppm	43.1	43.1	57.2	57.5	638	635	499	510	110.0	110.4	561	556

i.e. 43.1 in both the varieties. Similar trend was observed in leaves/ plant, leaf area (sq cm)/plant and dry wt/m² in both the varieties. As regards the effect of NaF on yield characters *i.e.* test wt of 1000 seeds was found maximum (153 g) in control and minimum (110.4 g.) at 200 ppm. The yield/plant was found 1476 g. in control and 556 g. at 200ppm in variety K-850. The present results are similar to the findings of the many research workers. (Soam and Agarwal, 1990; Sunita Kumari and Agarwal, 1980; Rathore and Agarwal, 1989; Brennan and Rhoads, 1976; Treshow and Harmer, 1968; Malik, 1997; Arya, 1997; Kumar, 2000; Sharma, 2005; Rawat, 2005; Singh, 2005).

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