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Effect of fluoride toxicity on chlorophyll, protein percentage and energy content of Wheat (*Triticum aestivum* L.) and Chick pea (*Cicer arietinum* L.)

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Fluoride and SO_2 are air pollutants which are toxic to vegetation human lives and animals. 100-200 ppm doses of NaF are more toxic than 10 ppm. 10 ppm dose does not affect any plant or animal. Thus it is considered under threshold limit. The present experiment was conducted at C.C.R. (P.G.) College, Muzaffarnagar during the years 2002-2003 to study the effect of fluoride toxicity on chlorophyll, protein percentage and energy content in wheat and Chickpea. The Chlorophyll content in green leaves was studied on 60th day of sowing. Protein and energy contents were studied after harvesting with the oven dried plant material at 80 ^{0}C temperature 100-200 ppm concentrations of NaF were found toxic to wheat and chickpea.

Key words : Chlorophyll, Protein, Energy content, Fluoride toxicity.

INTRODUCTION

Fluoride kills in acute poisoning by blocking normal metabolism of cells. Enzymes involved in essential processes are inhibited. Vital functions such as the origin of transmission of nerve impulses cease (WHO, 1970). Toxicity health hazards were also noted (Spomer, 1973).

Wallac and Romney (1980) observed the chlorosis due to fluoride toxicity in various plants. They observed the inward rolling, discoloration of leaves prior to death of leaf in rice and wheat. The initiation of symptoms of toxicity begin from tips and margins of leaves was found in gladiolus (Hitchcock *et al.*, 1963). Necrosis in cereal crops like wheat, flacking or chlorotic mottling in corn leaf tips, reddish brown bands in *Simalacina* sp are characteristic features of mild fluoride toxicity. In case of moderate toxicity chlorotic spots develop between the veins. When injury is severe some of chlorotic tissues become necrotic, particularly along the margins and leaf tips.

Treshow and Pack (1968) discussed the symptoms of injury on vegetation of gaseous fluoride. Fluoride air pollutants enter the plant primarily though the leaves. It enters through the stomata, passes into the intercellular spaces and is absorbed by the mesophyll cells (Thomas and Hendricks, 1956). From the mesophyll the fluoride may move to other cells by simple diffusion or through the vascular tissue. It moves with the transpiration stream towards the leaf tips and margins where it accumulates in concentrations at least several times higher than the average concentration in the leaf as a whole (Zimmerman and Hitchcock, 1956). Injury from fluorides appears on leaf tips or margins of sensitive plants, since toxic ions migrate to those regions on the leaf. Gladiolus varieties are very sensitive to fluoride at a concentration of several parts in a billion parts of air (Daines *et al.*, 1960). The effects of atmospheric pollution on vegetation were studied by Leone (1980) and he suggested that fluoride may accumulate in high concentrations in plant parts.

MATERIALS AND METHODS

The seeds of wheat c.v. WL75, UP2003 and Chickpea c.v. 256, K 850 were obtained from I.A.R.I. New Delhi. The experiments were sown in Randomizded Block Design with four replications at C.C.R. (P.G.) College, Muzaffarnagar during the year 2002-2003. Six concentrations of NaF along with control were taken. The solutions of sodium fluoride were sprayed fortnightly after one month of sowing the crops. The concentrations of NaF were C, 10, 25, 50, 100 and 250 ppm. The methods adopted for the estimation of chlorophyll, nitrogen content, protein percentage and energy content are given below:

Estimation of total chlorophyll:

The chlorophyll content in fresh leaves was determined according to Arnon (1949) on the absorption of light by aqueous acetone (80%) extracts of chlorophyll. Organic solvent 4:1 Acetone and alcohol was used.

0.5 g fresh leaves of control and treated plants were

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