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Effect of fluoride toxicity on chlorophyll, protein and energy content of urdbean (*Vigna mungo* L. Hepper) and mungbean (*Vigna radiata* L. Wilczek)

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SUMMARY

The effect of fluoride toxicity has been studied on chlorophyll content present in green leaves on 60th day of urd bean var. T-9 and mungbean PS-16 for two years. Protein percentage and energy content of oven dried plant material at harvest was also estimated of urdbean and mungbean in both the years. Simple Randanized Boock Design was followed with four resplications and six treatments including control. The contcentrations of sodium fluoride was taken as 10, 25, 50, 100 and 250 ppm. On the basis of findings the results were found significant. The higher concentrations 100-250 ppm NaF doses, was found toxic in urdbean var. T-9 and mungbean PS-16.

Key words : Urdbean, Mungbean, Fluoride toxicity, Chlorophyll.

Fluoride in traces, stimulates the growth of many plant species but its essentiality for plant growth, chlorophyll content in green leaves, protein and energy content has yet not been established (Arya *et al*., 1979). In sub-lethal doses of fluoride no chlorotic markings were observed on fumagated alfalfa plants. Hadjuc (1966) reported that large necrotic markings appeared on plant leaves and growth of the plants was inhibited due to the accumulation of fluoride in the soil and surrounding plant roots. Plants tend to be more susceptible to fluoride injury from the soil than the atmosphere. The worst injury has been reported in tomato when fluoride entered through the roots. Some yellow coloured material was deposited on the green leaves of tomato (*Lycopersicon esculentum*) in 250 ppm NaF concentration when the solution was regularly sprayed at 15 days interval (Arya, 1971).

The fluoride pollution problem has two principal aspects, first direct injury to commercial and ornamental plants, by producing typical necrotic lesions and chlorosis on the leaves of the sensitive plants (Zimmerman and Hitchcock, 1956; Nimesh, 2004 and Rawat 2005) and second, raising the fluoride level in forage crops above 30-50 ppm, that may cause fluorosis in the cattle and sheep (Thomas, 1958).

Injury to plants apparently depends on absorption of fluoride into the tissues. Fluoride injury to plants can be divided into two types *i.e*. chronic and acute. Chronic injury is produced by prolonged exposure to low concentrations of fuoride. Acute injury develops under widely fluctuating fluoride concentrations or brief exposure to a high concentration, possible with a lower total fluoride exposure than is required to cause chronic injury.

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MATERIALS AND METHODS

The seeds of urdbean cv. T-9 and Mungbean cv. PS-16 were obtained from I.A.R.I. New Delhi. The experiment was sown in Randonizded Block Design with four replications. Six concentrations of NaF solutions 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). The procedure for chlorophyll determination was based on the work of Mac Kinney (1941) on the absorption of light by aqueous acetone (80%) extracts of chlorophyll. Organic solvent 4:1 Acetone alcohol was used.

0.5 g freah leaves of control and treated plants were taken with organic solvent in clean specimen tubes. The extracts were centrifuged at 3000 rpm for 15 minutes and each volume was made upto 25 ml of each sample by adding more organic solvent.

Carlzeiss PMQ 2 spectrophotometer was used at Institute of Life Science, J.N.U. New Delhi and the observations of total chlorophyll content were recorded on 645, 652 and 663 wave lengths, respectively.

Total chorophyll content was calculated by using the following formula (Arnon, 1949).

C = 20.2 D 645 + 8.02 D 663 in mg/g dry weight.

Estimation of total nitrogen and protein:

Nitrogen percentage and the amount of protein