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Studies of fluoride toxicity on chlorophyll, protein percentage and energy content of hybrid rice (*Oryza sativa* L.)

VIBHA SINGH, R.K. SHARMA AND K.P.S. ARYA

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SUMMARY

Fluoride is air pollutant which is 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 S.S.V. (P.G.) College, Hapur (Ghaziabad) during the year 2008 to study the effect of fluoride toxicity on chlorophyll, protein percentage and energy content in hybrid rice. The chlorophyll content in green leaves was studied on 60th days 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 hybrid rice c.v. PRAGATHI 1111 and DIAMOND 22.

Key words : Chlorophyll, Protein, Energy content, Fluoride toxicity and Threshold limit

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). Crippling in human beings and endemic fluorosis in animals were observed in Punjab (Jolly *et al.*, 1980).

Soam and Agarwal (1990) reported that the reduction of biomass and productivity in broad bean (*Vicia faba*) is the direct result of continuous increase of NaF. The similar observations have been made by Sunita Kumari and Agrawal (1980) and Rathore and Agrawal (1989). Brennan and Rhoads (1976) observed the loss due to air pollution on growth of vegetation. Treshow and Harner (1968) reported the growth response of pinto bean and alfalfa to fluoride concentration. Zimmerman (1952) has observed the similar response of HF and NaF in soil. Yamazoe (1962) studied the response of HF on growth and yield of various crops. According to him 25 ppm HF is enough to cause significant reduction in paddy and barley while 50 ppm HF is enough for wheat production cut. Rice (1974) and Mc Cune *et al.* (1976) also supported the theory of reduction of yield of crop plants due to fluoride application. Thus, it has been observed that fluoride is responsible for reduction in growth and yield of many plants (Middleton *et al.*, 1965 and Brandt, 1967). Reduction in growth and yield was reported by Malik (1997) in mungbean and urdbean, Arya (1997) in onion and Kumar (2000) in pea and barley.

Sharma (2005) studied the effect of fluoride toxicity on Indian mustard (*Brassica juncea* L.). The best performance of var. Varuna was reported. The effect on growth, yield parameters, biochemical characters and sterility behaviour were found severe of 100-200 ppm doses of NaF. The effect of NaF toxicity was seen very severe on oil content also. Rawat (2005) studied the effect of fluoride on two varieties of mungbean. Toxicity was observed on growth, yield, biochemical characters and sterility percentage of pollen and ovules both. Singh (2005) reported toxic effect on soybean and broad bean. The effect was seen on nodule formation, growth, yield, biochemical characters, energy content and sterility percentage of pollen and ovules.

Saini and Singh (2005) studied the effect of NaF toxicity on four cultivars of onion (*Allium cepa* L.). Singh (2006) worked on the effect of sodium fluoride toxicity on cluster bean and lentil. The effect was seen on growth, yield, chlorophyll, protein phosphorus, energy content and sterility percentage of pollen and ovules both. Malik *et al.* (2008) studied the effect of NaF on urdbean variety T9. Reduction in growth and yield characters was reported. Malik and Arya (2008) reported the toxic effect of fluoride on growth and yield of mungbean variety P.S. 16. Malik and Arya (2008) reported the toxic effect of NaF on chlorophyll content of urdbean variety T_9 and mungbean variety P.S. 16. 100-200 ppm doses were found toxic.

Dhameja (2007) discussed in detail the environmental studies *i.e.* effect of pollution (fluoride and SO_2) on plants and animals. Agarwal and Sangal (2008) reported environmental engineering related to crop physiology and effect of fluoride toxicity on vegetation. Kaushik and

Correspondence to:
VIBHA SINGH, Department of Botany, S.S.V. (P.G.) College, Hapur, GHAZIABAD (U.P.) INDIA
Authors' affiliations:
R.K. SHARMA, Department of Botany, S.S.V. (P.G.) College, Hapur, GHAZIABAD (U.P.) INDIA
K.P.S. ARYA, Department of Agricultural Botany, R.M.P. (P.G.) College, Narsan, HARDWAR (UTTRAKHAND) INDIA