

Effect of fluoride toxicity on the growth and yield of mungbean [*Vigna radiata* (L.) Wilczek]

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SUMMARY

The effect of fluoride toxicity has been studied on morphological characters *i.e.* height, leaves, nodules/ plant, leaf area/plant, pods/plant, seed/pod, test weight and yield/plant of mungbean cv. P.S.-16. The experiment was conducted for two years, in simple randomized block design and was followed by five treatments of NaF such as 10, 25, 50, 100, 250 ppm alongwith control for four replications were taken. The results were recorded on an average basis taking five plants for each treatment in each block. Reduction in all characters, in treated plants was higher in concentrations *i.e.* 100-250 ppm NaF in *Vigna radiata* in comparison to the control.

Key words : Fluoride toxicity, Mungbean, Growth, Yield.

With the increasing demand of food, need is specially stressed to improve the physiology of growth and there by increasing the crop yield. The chief goal of farmer, plant breeders and commercial producers is to get maximum out put of their crops. The fluoride pollution problem has two principal aspects, first direct injury to agronomical crop, by producing typical necrotic lesions on the leaves of sensitive plants. (Thomas and Hendricks, 1956; Zimmerman and Hitchcock, 1956; Maclean *et al.*, 1969; Guderian, 1969) and second raising the fluoride level of these crops above above 30-50ppm, which is hazardous to the life of men and animals.

MATERIALS AND METHODS

The experiments was conducted at the Research Farm, of R.M.P. (P.G.) college, Gurukul Narsan, Haridwar during the years 1992 and 1993. The soil of the farm was alluvial. After sowing the seeds of mungbean, agronomic practices *e.g.* weeding, irrigations, spraying of pesticides and harvesting were done properly at required time.

The experiment was laid out in randomised block design with six treatments and four replications. The concentrations of NaF solution were taken 10, 25, 50, 100 and 250 ppm.

The seeds of Mungbean var. P.S.-16 was obtained from I.A.R.I., New Delhi. The seeds were presoaked in water for 24 hours and then sown in the rows at a distance of 20 cms 60 cms with a depth of 5 cms. After germination 30 days old plants were treated with different concentrations of NaF. Spraying was done at 15 days interval till the maturity of the crop.

RESULTS AND DISCUSSION

The effect of fluoride toxicity on the morphological characters of mungbean is presented in the Table 1. The maximum value was recorded in control of the seeds and the minimum was found in the highest concentration (250ppm) in all the characters in both years.

The maximum height 90.0 cm, number of leaves 93.2, number of nodules per plant 59.0 were found in control, while height 73.0 cm, leaves 62.9 and nodules 26.5 were found in 250 ppm dose of NaF in 1993. The maximum leaf area per plant (sq. cm.) 2079, pods per plant 70.5, seeds per pod 10.0 and test weight 53.0 g. of 1000 grains was found in control while minimum leaf area 1354 sq. cm., pods 32.6, seeds per pod 7.0 and test weight 44.1 g. of 1000 seeds was found in 250 ppm dose of NaF in 1993. The maximum yield 85 g per plant and minimum 22.5 g per plant was found in 250 ppm dose of sodium fluoride. The results of all the above eight characters were significant at 5% level of significance (Table 1). $C > 10 > 25 > 50 > 100 > 250$ ppm.

It is suggested that the accumulation of F-ions was more in seeds due to inhibition of NaF solution. Growth suppression was evident at higher concentration. The reduction in height was due to decrease in number as well as size of the cell as suggested by Yamazoe (1962). Higher concentrations of the sodium fluoride also had significant effect on number of nodules in plant. Thus, symbiotic development in legumes is affected by NaF. Variation in the total leaf area of a plant is supposed to be due to toxicity of NaF which brought about great change in leaf.

Variation in leaf size arise from the effect on cell

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