Effects of *Eichhornia crassipes* extract on germination and early seedling growth of *Pennisetum typhoides*

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ABSTRACT

Water hyacinth (*Eichhornia crassipes*) is a cosmopolitan noxious aquatic weed. The plant is known to absorb and accumulate heavy metals from sewage and blackish water. It is impossible to remove it completely from environment because water hyacinth is fastest growing weed and seed can germinate after twenty years. In present paper the phytotoxic effect of *Eichhornia crassipes* extract on germination and early seedling growth of *Pennisetum typhoides* have been given. Germinating seeds of *Pennisetum typhoides* is treated with aqueous *Eichhornia crassipes* extract and observations of early seedling growth for different time durations (24-72hrs) and various concentrations (5%-40%) is observed to monitor the phytotoxicity. The increase in the root and shoot lengths of *Pennisetum typhoides* at lower conc. (upto 20%) and shoot growth is more reduced at higher concentration are recorded. The phytotoxicity may be related to mitostatic and cytotoxic activity of extract.

Key words: Eichhornia extract, Pennisetum typhoides, mitostatic, phytotoxic.

INTRODUCTION

Water hyacinth (Eichhornia crassipes), native to America is a noxious aquatic weed which changes its biodiversity with devasting effects on environment by blocking canals and pumps in irrigation projects, interfering with hydro electricity production and clogging river or canals to the extant that the drainage is checked completely leading to floods. It imparts a global ecological and economical problems especially in tropical and sub-tropical countries and considered as the worst aquatic plant in the world, as it is impossible to eradicate it completely. Matai and Bagchi (1980) considered the plant to be rich source of plant nutrients. The plant is able to accumulate heavy metals from waste water, coalmine effluent, radioactive decays etc (Cd, Cr, Co, Ni, Pb, Hg, Cu etc) (Zaranyika et al., 1994; Mishra et al., 2007; Upadhayay et al., 2007).

Heavy metals are major environmental contaminants of air, water and soils especially in the areas of heavy automobile traffic, near metals smelters or in places where oil is burned for heating purposes (Srivastava and Rawat, 2008, Skinner et al. 2007, Vardayan & Ingole 2006). Present paper deals with the phytotoxic effect of Eichhornia crassipes extract on Pennisetum typhoides as test system. Dry and presoaked seeds are treated with aqueous Eichhornia extract for different durations.

MATERIAL AND METHODS

The plant of *Eichhornia crassipes* is dried and cut pieces are grinded by mixer and grinder to get the fine powder of plant. The stock solution has prepared by dissolving 10gm of powder in 100ml of distilled water. The different concentrations 5%, 10%, 20%, 30%, 40% have prepared by adding

calculated amount of distilled water in stock solution. Dry and presoaked seeds of *Pennisetum typhoides* are subjected to extract treatment for varying concentrations (5%, 10%, 20%, 30%, 40%) and observations have taken for different time durations (24hrs, 48hrs and 72hrs) for treated as well as for untreated (controlled) seeds of Pennisetum typhoides at 27-31°C in laboratory conditions. The treated seeds are subjected to germinate in order to determine the lethal and sub-lethal dose. LD₅₀ dose is determine by germination method and both (treated and untreated) seeds are transplanted in experimental pots to study the early seedling morphology and growth. Growth of primary and secondary roots, length of root and shoot ratio or abnormalities in the treated seedling are recorded.

RESULTS AND DISCUSSION

In present experiments there is overall decrease in the germination rate in *Pennisetum typhoides* with increase concentration and duration by *Eichhornia crassipes* extracts. However at lower concentration (5%) of extract, the germination is low and root, shoot length ratio is also low and as concentration increases the root and shoot length ratio increases for a certain concentration, (5%-20%) ,*ie*, LD₅₀ dose. More than 20% concentration the root and shoot length ratio decreases respectively. Germination has not occurred beyond 30% concentration of extract. Shoot length is not increased rapidly as root length with the increase in the concentration of extract. (Table-1)

The increase in concentration of extract beyond 40%-50%, the concentration of heavy metals check the growth of roots and shoots.Lead, mercury and other heavy metals might be responsible to inhibit the porphyrin synthesis significantly in germinating seeds of *Pennisetum* as observed by Prasad and Prasad (1990)in Bajra. The heavy metals are also known to induce impaired metabolism and retarded growth (Cooley and Martin, 1979; Samuel *et al.*, 1994). The mitostatic and phytotoxicity of *Eichhornia* extract is due to the presence of heavy metals in extract as reported by Siddiqui and Alam, (1989).

The present findings reveals that the harmonal activity (5%-10% conc.) of *Eichhornia*

Root/Shoot 2.09 1.64 1.39 2.00 1.73 Table 1: Effect of *Eichhornia crassipes* extract on germination and root/shoot length ratio of *Pennisetum typhoides* Shoot length (in cm) Root length (in cm) 4.66 length (in cm) 900 1.65 0.64 1.33 48hrs length (in cm) 1.91 length (in cm) 24hrs length Root 5 10 20 30 40 50 germination % of 80 30 40 15 တ်

crassipes extract will act as a initiator and growth promoter for germinating seeds of *Pennisetum typhoides*. The higher concentration of extract will

act as a mitostatic agent in the form of pesticide and fungicide.

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