

Effect of paper mill effluent on soil, growth and biochemical constituents of *Vigna radiata* (L.) Wilczek

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Studies on the effect of different concentrations of treated paper mill effluent on soil and growth, biochemical constituents and nodulation of green gram were carried out under potted condition. The growth parameters such as shoot, root lengths and biomass were increased upto 50% concentration of the effluent, thereafter all these attributes decreased sharply. Biochemical constituents such as chlorophyll and protein exhibited a slight increase in 25 and 50% concentration. The bacterial, fungal and nodules had also increased upto 50% concentration and decreased slowly. All the above said parameters were decreased at higher concentrations (75% and 100%). The physico chemical constituents of treated paper mill effluent showed higher BOD and COD values, dissolved oxygen was nil, NPK was low while the contents of sodium, calcium, sulphate and chloride were higher.

Key words : Green gram, Paper mill effluent, Phytotoxicity.

INTRODUCTION

Water is the most precious thing in the world. Nowadays, most of our water resources are gradually becoming polluted by addition of huge amounts of sewage, industrial and agricultural effluents. These effluents contain materials with varying properties from simple nutrients to highly toxic substances. The discharge of industrial effluents with varying amounts of pollutants has altered the water quality. Among the different major industries, the paper industry is a notorious polluter of the environment.

There are nearly 305 paper mills in India with an installed capacity of 3014 lakh tones. During paper production, the mills release a large amount of waste water containing various physical and chemical agents. They are discharged into land or nearby water bodies. The polluted water is being used for irrigation by near by farmers. It is necessary to study the impact of this effluents on crop system before they are recommended for agricultural irrigation. Several studies have been done on the impact of various industrial effluents on various crops (Lakshmi and Sundaramoorthy, 2001; Kaushik *et al.*, 2004). In the present investigation, attempt has been made to evaluate both the beneficial and adverse effects of using the paper mill effluent as irrigation water on the growth of legume *Vigna radiata* (L.) Wilczek.

MATERIALS AND METHODS

The treated effluent discharged from Seshasayee paper and boards Limited, Pallipalayam, Namakkal District,

Tamil Nadu was used as irrigation water in the present study. The colour of the effluent sample was recorded by visual observation. The odour of the effluent sample was categorized by directly smelling the sample. The solid present in the effluent sample was determined by Therox *et al.*, 1943 method.

pH of effluent samples was directly determined using a standard Elico pH meter. The soil pH was determined in 1:5, [Soil : Water suspension]. Electrical conductivity was determined in a conductivity bridge and expressed as dsm^{-1} . For soil, it was determined from saturated paste extract. The dissolved oxygen (DO) in the samples were estimated by following idometric method described in standard methods for the examination of water and waste water (Anonymous, 1981). Dilution method was employed for Biological oxygen demand (BOD) determination (Anonymous, 1972). The chemical oxygen demand (COD) was estimated by Sundaresan, 1979.

Calcium and magnesium content in the sample were estimated following the titrimetric method of Strickland and Parsons (1972). Sodium and potassium were estimated by using flame photometer. Chloride in the samples was estimated following the titrimetric method described (Sundaresan, 1979). Total phosphorus was estimated (Pemberton, 1945) and estimation of total nitrogen (Jackson, 1973). Nitrate nitrogen was estimated following Phenol Di Sulphonic acid method described in standard methods for the examination of water and waste water (Anonymous, 1981). Sulphate was estimated by (Anonymous, 1981).

The healthy and uniform seeds of *Vigna radiata*