

Irrigational impact of dye factory effluent on tissue metabolites concentration in *Vigna radiata* (L.) R. Wilczek

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The impact of dye factory effluent on various tissue metabolites concentration was evaluated in pot culture experiment using *Vigna radiata* (L.) R. Wilczek as a test crop. Accumulation of various chemical constituents viz., chlorophyll, protein, soluble carbohydrate, reducing sugar and tissue nutrients such as N,P,K was promoted by dye factory effluent irrigation with the optimum effluent concentration (25%). Irrigation with treated effluent also gave comparable results.

Key words : Dye factory effluent, *Vigna radiata*, Biochemical constituents, Tissue nutrients

INTRODUCTION

Water is the greatest gift of nature and a necessity of mankind. Nature has its own mechanism to regulate and degrade wastes. But when the quantum of wastes exceeds the regulating capacity, the crisis situation emerges. The rapid industrialization has led to the enormous amount of discharge of wastes from industries. Textile dyeing and printing industries require large amount of water and consequently generate an equally large amount of waste water carrying high concentrations of the dyes resulting in the pollution of surface waters and also ground water upon percolation. Besides that, they also cause major loss to crops, vegetables and stored organic materials. Recently, the use of dye factory effluent for growing crops is considered as one of the viable alternative for its disposal (Chidambaram pillai and Shunmugasundaram (2008) but also had adverse effect on plant growth and tissue metabolism.

MATERIALS AND METHODS

The seeds of *Vigna radiata* (L.) R. Wilczek were obtained from TamilNadu Agricultural University, Coimbatore. Healthy and uniform seeds were selected and surface sterilized with 0.1% $HgCl_2$ and washed thoroughly with distilled water. Earthen pots (30cm and 20cm) filled with field soil served as medium to grow the test plant. Then, they were drenched with different concentrations (20, 50, 75 and 100%) of the effluent and left as such for one week. The dilution of effluent was made in distilled water. Sterilized *V. radiata* seeds at the rate of 10 seeds per pot were sown and watered regularly with effluent concentrations. The plants were uprooted

on different age level (20, 40, 60 and 80 days) and the biochemical characters were studied Chlorophyll, Yoshida *et al.* (1976); Protein Lowry *et al.* (1951). Total soluble carbohydrate and N, P, K content of plant samples were analysed by classical Kjeldahl's method.

Hence, the present study was designed to investigate the effects of both forms of effluent treatments on plant biochemical constituents.

RESULTS AND DISCUSSION

In the present study, certain biochemical contents of *V. radiata* were quantified with a view to assess the extent of plant injury as a consequence of dye house effluent irrigation. Generally assimilatory pigments viz., chlorophyll 'a' and 'b' are often related to different levels of host tissue samples (Haspel Horvatovie and Harickove, 1974). In the present investigation, treated dyeing effluent significantly enhanced the chlorophyll content in the leaves of *V. radiata* at all the four age levels studied (Table 1). Raw effluent after suitable dilutions (25% and 50% effluent concentrations) also gave comparable results (Table 1). On the, other hand, treatment of plants with undiluted effluent (100%) and 75% concentration registered pronounced decreases indicating various levels of host tissue injury. In similar line of research using dyeing factory effluent Jain and Khan (1996), Gupta and Nathawat (1991) showed decreasing trend in chlorophyll content in the leaves of the test plants with increasing concentrations of the effluent. In a number of short term studies using various other industrial effluents as irrigation water, dilution seems to neutralize their toxic effects and promote chlorophyll content. (Mamte and Nail, 1992) showed similar trend of increase in pigment content at