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Comparative studies of effluent dilution, FYM and BF amendment on crop plant

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SUMMARY

Studies on the effect of paper mill effluent in combination with farmyard manure and bio-fertilizers on growth, biochemical constituents, rhizosphere analysis, nodulation, yield and seed characteristics of green gram were carried out under potted condition. Effluent concentration (50%) in combination with FYM and BF amendment promoted the growth parameters (shoot length, root length and biomass), bio chemical constituents (chlorophyll and protein), microbial population and nodulation of green gram, whereas the higher concentrations (75 and 100%) reduced all the above said parameters. The yield parameters studied *viz*., pod length, number of pods per plant and number of seeds per pod exhibited marked increases in the plants raised in 50% effluent concentration in combination with FYM and BF treatment. A similar observation was observed in protein content of the harvested seeds. The 40 – day – old test plants registered higher biochemical, microbial populations and nodulation of green gram.

Key words : Green gram, Paper mill effluent, Phytotoxicity, F.Y.M., Biofertilizer

As the saying "Nothing is a waste under gods creation" almost all the wastes generated can be reused after proper treatment. In the same way the effluents and solid wastes let out from industries after undergoing primary and secondary treatments can be made use for agricultural purpose. It is estimated that if 20 per cent of waste water is regenerated, water withdrawal needs in 2000 AD could appreciably be reduced throughout the world (Falkenmark and Lindh, 1974). If the waste water from paper and pulp industry be successfully used for irrigation, it would be possible to prevent river water pollution. Irrigation of raw effluent often alters the physico-chemical properties of the treated soils and retardation of plant growth (Rajannan and Oblisami, 1979, Lakshmi and Sundaramoorthy, 2001; Kaushik *et al.*, 2004). The combined use of FYM and BF might provide the soil with need based nutrients and with better physical and microbiological environment, thus improving the soil fertility and productivity. (Baronia, 2000; Kalaichelvi, 2001; Sundaramoorthy *et al.*, 2007).

MATERIALS AND METHODS

Uniform seeds of *vigna radiata* (L.) R. Wilczek obtained from department of pulses, Tamil Nadu Agricultural University, Coimbatore were surface sterilized with 0.1% $HgCl_2$ and washed thoroughly. Earthern pots (30 cm x 20 cm) filled with field soil and farmyard manure in the ratio of 5 : 1 (Soil : FYM). In biofertilizers the pot is filled with 5: 1 ratio (Soil: Biofertilizer). The carrier based inoculum packets of Rhizobium and Phosphobacteria were obtained from Department of Agricultural Microbiology, Tamil Nadu Agricultural University, Coimbatore. The pots were drenched with different concentrations (25, 50, 75 and 100%) of the effluent and left as such for 1 weak. Five replicates were maintained for each treatment. The pots were sown with KM_2 variety of green gram at the rate of 10 seeds per pot and watered with the respective effluent concentration. Well water was used for intermittent watering whenever necessary and also used for control set. No pesticide was applied to the plants during the course of the study.

The plants were uprooted on 20, 40, 60 and 80th day after sowing. The measurement for length (shoot and root) and biomass were made. The number of root nodules in the root system was counted and expressed as individuals (plant^{-1}). Chlorophyll was estimated as per Yoshida *et al.* (1976). Protein estimation was done by following Lowry *et al.* (1951) method. Dilution plate method was employed for the enumeration of microbial population in the soil samples. Statistical analysis of data was according to DMRT – Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

The effect of different concentrations of effluent, in combination with farmyard manure and biofertilizer amendment on the growth, biochemical constituents, bacterial, fungal population and nodulation of *vinga radiata* has been shown in Table 1, 2, 3 and 4 at different

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