RESEARCH ARTICLE | *International Journal of Plant Sciences,* (January to June, 2010) Vol. 5 Issue 1 : 239-245

Performance of *Glycine max* (L.) Merr. in disel oil contaminated soil

S.PARVATHI AND S. SRI VAISHNAVY

Accepted : November, 2009

SUMMARY

A pot culture experiment was carried out to study the influence of *Glycine max* L. Merr. (Soybeans) in a soil contaminated with diesel oil. The soil was artificially contaminated with different concentrations of diesel oil varying from 0 to 20 ml. The result showed that the seed germination of *Glycine max* recorded on 7 and 14 DAS (days after sowing) was maximum in control T_1 and that in T_5 had poor germination percentage. The biometric parameters like shoot and root length, number of leaves per plant, fresh and dry weight of the plant analysed on 30, 60 and 90 DAS and the number of flowers and root nodules recorded on 60 DAS were found to be higher in uncontaminated control T_1 and lower in T_5. The biochemical parameters like protein and carbohydrate content observed on 30, 60 and 90 DAS was found to be maximum in T_5 and minimum in control T_1. The chlorophyll content of the control T_1 was more on 30 DAS and 60 DAS, and decreased in the 90 DAS in all the treatments. There was a gradual decrease in the chlorophyll content as the concentration of diesel oil increased. There was a decrease in the leghaemoglobin content as the concentration of diesel oil was increased. In yield parameters, number of pods per plant, number of seeds per pod and the weight of a pod were maximum in T_1 and minimum in T_5 on 90 DAS.The initial and final concentration of petroleum hydrocarbons in all treatments were analysed and it was noticed that after the harvest period (90 DAS), there was a decline in the concentration of petroleum hydrocarbons in the soil. The different soil parameters like pH, EC, nitrogen, phosphorus, potassium, iron, copper, manganese and zinc showed a gradual increase in contaminated soil than control at the onset of the investigation. But at the end of the investigation, the micronutrients and macronutrients showed a decrease in their amounts in polluted treatments than control. On the other hand pH and EC were further increased in the diesel oil treated soil than control.

Key words : Soybean, Diesel oil, Biometric, Biochemical, Yield and soil parameters

Soil pollution with petroleum and its derivatives is one of the causes of degradation of natural environment. Toxicity of refinery products depends on their physical and chemical properties. The traditional methods used to clean up petroleum-contaminated soils were land filling and incineration, which are labor intensive and costly. Hence, there is an urgent need to tackle the most hazardous pollutants like heavy metals, pesticides and other xenobiotics in soil environment by bioremediation and phytoremediation techniques (Riis *et al*., 1995 and Olson *et al*., 1999).

Biodegradation of refinery product is one of the methods of combating pollution caused by petroleum-derived compounds (Margesin and Schinner, 1997). An alternative method is phytoremediation, the use of plants and microbes associated with roots to remove, contain or render harmless environmental contaminants. It is cost-effective and low maintenance method of remediating oil-contaminated soils on site (Cunningham *et al.*, 1996; Kirkpatrick *et al.*, 2006).

Legumes are thought to have an advantage over non-leguminous plants in phytoremediation because of their ability to fix nitrogen in soils, which are deficient in oil-contaminated soils. Legumes do not have to compete with microorganisms and other plants for limited supplies of available soil nitrogen at oil contaminated sites (Gudin and Syratt, 1975).

The present study deals with utilization of a leguminous crop, soybean (*Glycine max* (L.) Merr.) that has the potential to phytoremediate petroleum hydrocarbons.

MATERIALS AND METHODS

The study was laid out in a completely randomized design, consisting of five treatments. All the treatments were replicated three times. The soil was cleaned absolutely by removing stones and other unwanted materials and was homogenized properly. Then each pot was filled with 2 kg of soil in 1: 1 ratio of red sandy loam soil: sandy soil and treated with diesel fuel to achieve concentration of 0ml, 5 ml, 10 ml, 15 ml and 20 ml, respectively. Viable seeds were selected and about 10 – 15 seeds were sown in each pot.

Correspondence to:
S. PARVATHI, Department of Botany, Avinashilingam University for Women, COIMBATORE (T.N.) INDIA
Authors' affiliations:
S. SRI VAISHNAVY, Department of Botany, Avinashilingam University for Women, COIMBATORE (T.N.) INDIA