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Removal of diesel fuel from water by combined culture of azolla and bacteria

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Introduction:

Dispersion of petroleum compounds in low concentrations in water causes adverse environmental effects. Physico-chemical methods in removing oil compounds dispersed in water is not cost-effective. Few researches have been done on the removal of diesel fuel from water by biological methods. The aim of this study was to determine the removal of diesel fuel from water by combined culture of azolla and bacteria.

Methods and Materials:

Diesel fuel was used as a source of petroleum hydrocarbon pollution in water. Bacteria were isolated from the soil of a site contaminated with diesel fuel. Experiments were carried out in 14 days in a greenhouse in three separate runs includes by culturing only bacteria, only azolla and combined culture of azolla and bacteria in water containing medium contaminated with diesel fuel. Three concentrations of 100, 500 and 1000 mg/L of diesel fuel in water were examined. Total Petroleum Hydrocarbon (TPH) was analyzed according to ASTM method D 7066-04.

Results:

By using only azolla culture, the removal of TPH from water during 14.0 days of contact were 100,70 and 62%, for 100 ,500 and 1000 ppm TPH respectively. For 1000 ppm of TPH and using pure bacterial culture, pseudomonas aeruginosa showed the lowest removal of 35% and alkaligenes faecalis had the highest removal of 60%. Regarding combined culture of azolla and bacteria for 1000 ppm of TPH, pseudomonas aeruginosa and azolla showed the lowest removal of 80% and alkaligenes faecalis and azolla showed the highest removal of 100%.

Discussion & Conclusions:

Inoculation of bacteria into azolla culture medium improved the removal of diesel fuel from water. By this method it is possible to remove dispersed hydrocarbon from drinking water resources.