BIOACCUMULATION OF SOME HEAVY METALS BY LOCAL ISOLATES OF ALGAL BIOMASS

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Barakah[1], F.N.

ABSTRACT

Algal biomass consisting of different cultures of algae was used to elucidate its affinity to grow and accumulate some heavy metals (Fe, Zn, Mn and Cu) in different concentrations. These algal cultures were isolated from soil irrigated with primary treatment sewage water. The algal mixed culture was grown on a mineral medium in conical flasks and bubbled with air at a flow rate of 126 ml $(min)^{-1}$ for each flask. This rate of aeration incorporated 685 mg CO_2 $(week)^{-1}$ per flask. Algal biomass, CO_2-outlet, CO_2-utilized, accumulated heavy metals were determined during 3 weeks of incubation. Identification studies indicated that the algal mixed culture included *Chlorella* , *Nostoc* , *Oscillatora* and *Scenedesmus* genera. The low levels of metals (10 and 20 mg l^{-1}) did not show a significant effect on algal biomass as compared to control during the 1st week of incubation, while 30 and 40 mg l^{-1} metals had a scarcely inhibitory effect. During the 2nd and 3rd week, the lowest levels of metals supported algal growth. Other concentrations suppressed algal biomass where 40 mg l^{-1} produced a retarding effect. The most dominant genera in the mixed culture were *Chlorella* and *Nostoc* at 30 mg l^{-1} whereas *Chlorella* was found in high frequency at 40 mg l^{-1}. The rate of outlet and utilized CO_2 increased gradually with elapsing of incubation time. The lowest amount of CO_2-outlet and the highest figures of CO_2-utilized were recorded in control culture than heavy metals treatments. The lowest levels of metals gave the highest values of yield coefficient . The increase of metals up to 40 mg l^{-1} led to decrease this parameter. Higher amount of Fe followed by Zn were accumulated by algal biomass than Cu and Mn. The absorbed Fe was 1.46 , 3.90 and 6.81 times greater than Zn , Cu and Mn respectively. The adsorbed Mn was 4.55 , 1.14 and 1.19 times greater than Fe , Zn and Cu respectively. This algal mixed culture could grow and accumulate a considerable amount of metals with a high efficiency. It was also capable to resist and tolerate high concentrations of metals. These findings demonstrated that the local isolates of algae provide a useful tool for bioremoval of heavy metals from polluted waste waters.

1- Department of Soil Science, College of Agriculture, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia, Fax: 00966-1-4678440

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