REMEDIATION OF HEAVY METAL CONTAMINATED SOILS USING DIFFERENT AMENDMENT AND DIFFERENT SPECIES OF BRASSICA

ABSTRACT

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ABSTRACT

Soil incubation and pot culture experiments were conducted at N.R.E.C. College Khurja (Bulandshahr), U.P., with amendments and added metals incorporated in sandy loam (Typic Haplustept). The soil incubation experiment aimed to study the changes occuring in DTPA and diacid extractable heavy metals (Zn, Cu and Ni) content at 6 and 12 months period. The pot culture experiments involving *B.juneca, B.campestris, B.carinata, B.napus and B.nigra* as test crops were carried out with a view to investigate the influence of amendments (FYM, $CaCO_3$, SSP and FYM+$CaCO_3$) and added metals (Zn, Cu and Ni) on the concentration and accumulation of heavy metals in *Brassica species* and to compare the crops with respect to the drymatter yield, concentration and uptake of heavy metals by *Brassica species* in order to select the crop/crops as a phytoremediation measure for soil.

A bulk surface (0-15 cm.) soil sample was collected from sewage effluent irrigated (contaminated) field. Soil sample was air dried, ground and sieved through 2 mm. sieve. This soil was used for green house study.

pH of soil sample was determine in 1:2 soil water suspension using combined electrode (Glass and calomel) in a digital pH meter.

Organic carbon was determined in soil by wet oxidation method (Walkley and Black).

Soil samle was digested with diacid mixture (Hydrofluoric and perchloric acid) in a platinum crucible and subsequently contents were dissolved in 6 *N* HCl as per procedure of Jackson. Zn, Cu and Ni contents in the digeste were determined with flame Atomic Absorption Spectrophotometer (AAS).

Soil was extracted with DTPA solution for available Zn, Cu and Ni as outline by Lindsay and Norvell. For extraction, to 10 gram air dried soil in polyethylene bottle, 20 ml of extractant was added and contents were shaken for 1-2 hours. After filtration extract was analyzed for Zn, Cu and Ni with flame Atomic Absorption Spectrophotometer (AAS).

In our investigation pot culture experiments were conducted regularly by taken different sets of soil without contaminants and with definite ratio of contaminants and different amendments to study the effect of amendments on metal uptake by different *Brassica species* taken as extractants for heavy metals Zn, Cu and Ni.

In our study it was observed that when metals were added to the soil quantity of metals in different *Brassica species* was found to increase.

In the presence of amendments data obtained by extractants indicated that amendment was able to reduce the metal uptake in the plant, it is due to the fact that amendment has immobilized heavy metals in the soil there by reducing the metal uptake into the plant.

For comparable study of different Brassica species as metal accumulators experiments were conducted and it was observed that *Brassica carinata* is best accumulator for Zn, *Brassica nigra* is best accumulator for Cu and for Ni again *Brassica carinata* was found to be the best accumulator.

In our present investigation it was observed that amendments immobolized metals in soil so that metal uptake in plants was reduced by amendments *e.g*.

Lime has immobilized Ni maximum, Cu and Zn has also been immobilized by adding FYM and phosphate amendments.

In our presence of amendments data indicate that metal uptake by crop is reduced, since metals are immobilized in soil, hence no harmful amount of these toxic metals (Zn, Cu and Ni) is able to enter into the crops. In this way phytoremediation of contaminated soil and then adding the amendments is effective measure to prevent thr entry of harmful heavy metals in the crop. Thus phytoremediation of contaminated soil is ecofrindly and economic also, although phytoremediation takes longer time but it involves green technology and making the environment free from pollution.