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Removal of Toxic Metals Contaminated Soil using Different Amendments and Sunflower Species (*Helianthus Annuus*)

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Species *Helianthus Annuus* (Sunflower) grown in contaminated soil and after washing with tap water. The soil were mixed with different amendments (SSP, $CaCo_3$, FYM and $CaCo_3$+ FYM).After harvesting the plants were treated with Di–Acid solution and prepare sample with double distal water. The observed uptake of concentration of Cu (72480μg pot^{-1}), Ni (2660 μg pot^{-1}) and Zn(8217 μg pot^{-1}) in sunflower species at flowering.

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I. Introduction

Heavy metals input to arable soils through fertilizers courses increasing concern for their potential risk to environmental health. Lu et al (1992), reported that the phosphate fertilizers were generally the major source of trace metals among all inorganic fertilizers and much attention had also been paid to the concentration of Cu, Ni and Zn in phosphate fertilizers.

Agriculture use of pesticides was another source of heavy metals in arable soils from non-point source contamination. although pesticides containing Cd, Hg and Pb had been prohibited in 2012,there were still other trace elements containing pesticides in existence, especially Cu and Zn. A survey also showed that heavy metal concentration in surface horizon and in edible parts of vegetables increased over time. Pandey et al (2000), reported that the metal concentration in soil increased from 8-12 mg kg^{-1} for Cd and Zn 278-394 mg kg^{-1}.

They also suggested that if the trend of atmospheric deposition is continued, It would lead to a destabilizing effect on sustainable agricultural practice and increase the dietary intake of toxic metals. The vegetables and crops growing in such area constitution risk due to accumulation of metals in India (Sinha et al,2006)

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II. Soil Pollution Control and Remediation

Conventional approaches employed for control and remediation of metals from contaminated sites include.

a) *Fixation*

The chemical processing of soil to immobilize the metals, usually followed by treatments of the soil surface to eliminate penetration by water.

b) *Land filling*

The excavation transport and deposition of contaminated soils in a permitted hazardous waste land.

c) *Leaching*

Using acid solutions as proprietary leaching agent to leach metals from soil followed by the return of clean soil residue to site (Krishnamuthy; 2000)

d) *Green cut technology*

This technology can be used for the remediation of metal contaminated sites. The bio-availability of metals to plants is affected by different factors such as soil and plant characteristics and various environmental factors. Green cut technology is another emerging low-cost in site technology. Emerging low-cost in sit technology employed to remove pollutants from the contaminated soils.

III. Materials and Method

FYM, SSP, $CaCo_3$, and combination of $CaCo_3$ + FYM for each pots samples. Each pot samples were added with urea and KCl for N, for the potash KCl will be add in the form of KCl. Sample pots were used to prepare a samples.

(a) Apparatus- AAS(Atomic adsorption spectrophotometer) for metal analysis.P^H mettry, mental heater, sample collection bottle, Whatman filter papar, Conical flask.
(b) Processing of the soil and pot filling- Collection of soil from an agricultural land .The soil samples were air-dried and sieved to give < 2mm particle size.4 kg soil was taken in with mixed with fertilizer solution and N,P, and K nutrient were applied as per the set.

(c) Collection and processing of Plant and soil samples- After the harvest of the plants was dried, the collected biomass and it was first dried at 70˚C in oven for loss of moisture. Dry weight of both biomass and make a powder from and digestion for the determination of heavy metal digestion of a sample were analyzed Zn, Cu and Ni toxic metals using AAS (GBC 904 AA)

IV. Result and Discussion

Table 1 : FYM, SSP, $CaCo_3$ and $CaCo_3$ + FYM achieve heavy metal in plant the concentration were shown in table -1

S.N.	Treatment Composition	Mean metal Uptake (µg pot^{-1})	Using treatments
1.	Cu	6497	4 Kg soil + Cu
2.	Cu + FYM	6137	4 Kg soil+Cu+ FYM
3.	Cu + SSP	8760	4 Kg soil+ Cu + SSP
4.	Cu + $CaCo_3$	10290	4 Kg soil+ Cu + $CaCo_3$
5.	Cu + $CaCo_3$ + FYM	3790	4 Kg soil+ Cu + $CaCo_3$ + FYM
6.	Ni	1590	4 Kg soil+Ni
7.	Ni+ FYM	2670	4 Kg soil+Ni+ FYM
8.	Ni + SSP	2060	4 Kg soil+ Ni+ SSP
9.	Ni + $CaCo_3$	3040	4 Kg soil+Ni + $CaCo_3$
10.	Ni + $CaCo_3$ + FYM	2920	4 Kg soil+ Ni + $CaCo_3$ + FYM
11.	Zn	4790	4 Kg soil+Zn
12.	Zn + FYM	8860	4 Kg soil+Zn+ FYM
13.	Zn + SSP	7151	4 Kg soil+Zn + SSP
14.	Zn + $CaCo_3$	8370	4 Kg soil+Zn + $CaCo_3$
15.	Zn + $CaCo_3$ + FYM	8100	4 Kg soil+Zn + $CaCo_3$ + FYM

Table 2 : Interaction effect of amendments ad metals on metal uptake in Sunflower (*Helianthus Annuus*) (µg pot^{-1})

S.N.	Amendments	Cu metal	Ni metal	Zn metal	mean
1.	FYM	61370	2630	8860	24287
2.	SSP	87670	2043	7517	32410
3.	$CaCo_3$	10190	3040	8373	7235
4.	$CaCo_3$ + FYM	37930	2927	8117	16325
	mean	72480	2660	8217	

V. Plant Sample

soil were mixed with different manner like Cu, Cu + FYM, Cu+ SSP, Cu + $CaCo_3$ and Cu + $CaCo_3$ + FYM, and for Ni metal Ni, Ni + FYM, Ni+ SSP, Ni + $CaCo_3$ and Ni + $CaCo_3$ + FYM, and also for Zinc metal Zn, Zn + FYM, Zn+ SSP, Zn + $CaCo_3$ and Zn+ $CaCo_3$ + FYM. In plant sample pots metal were mixed at the range of 0 and 20 Zn + 10 Cu + 25 Ni (mg/kg) soil. In different compression mean amendments and metals interaction metal uptake were Cu (72480), Ni (2660) and Zn (8217) µg pot^{-1} for the sample mixture of sunflower (*Helianthus Annuus*).

VI. Conclusion

Toxic heavy metal contamination of arable soil showed several problem including phototoxic effect of elements like Cd, Zn and Cu. Sunflower is the best plant species to carry out phytoextraction of Cu in the presence of SSP amendments. Motior M. Rahman, Sofian M., Azirum and Amru N. Boyce (2013) also found that the Pb and Cu uptake ability of sunflower was appreciably greater than Indian mustard and amaranthus.

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