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COMPARATIVE STUDIES OF PHYSIO-CHEMICAL PROPERTIES OF TYPES OF SOILS AND INDUSTRIAL WASTAGE (SLAG) OF BASTAR DIVISION TO ENHANCE THE SOIL PRODUCTIVITY

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ABSTRACT

Slag from the iron and steel industries are sometimes classified as industrial waste material in actual facts these by products are valuable and extremely versatile construction material. The history of slag in use road building dates back to the time of Roman Empire. Some 2000 years ago when broken slag from the crude rock iron making forges years ago of that era were used in base construction. In recent years the need for maximum utilization and recycling of by product and recovered waste material for economic and environmental reason has led to rapid growing in many others. This discussion will briefly cover the composition properties and uses of iron blast furnaces slags and of steel making slags. The major basis will make naturally be the experience development in the US with mention of the uses in other countries although other slags are sometimes used by the major slags produced by the iron and steel industries will be considered.

INTRODUCTION

Soil is surface covering on root of the earth's land area an aggregation of unconsolidated mineral and organic particles produced by the combined action of wind, water and organic matter. Soils are formed from hard rocks, loose and unconsolidated transported inorganic materials and accumulated organic residues. **Arora B.R and Acharya C.L et al.(2010)** These soils occur almost throughout world. In India these are observed all over except in hot and arid regions. Many inceptisols are agriculture productive and productive and provide excellent natural grazing grounds. They can be cultivated for improved growing a variety vegetables and grain crops .These are however inceptisols is limited because of imperfect drainage.GoldichS.S(1938). Most of the inceptisols of Punjab under assured irrigation conditions produce wheat yield as high as 4.5 tonnes ha^{-1}.**Heller J (1963).** similarlyalfisols are base rich timbered mineral soils of sub humid and humid regions these are characterized by a light coloured, because of the high base saturation favorable textures and location in semi-arid to humid region alfisols are naturally fertile and productive **Cropping with slag and food security:** The effective utilization of slag fertilizer in agriculture to neutralize soil productivity. Improve crop productivity ,green house gas emission and stabilize heavy metals in contaminated soil turns it into a high value added product in sustainable agriculture.Slag consists mostly of mixes oxides of elements such as Sulphur, phosphorus and aluminum and products formed in their reaction with furnace lining and fluxing substance such as limestone **Yieldirin and prezzi, 2011 plataket al.2015.** since slag in rich in lime (CaO) silica acid(Sio_2) phosphoric acid (P_2O_5) Magnesia(mgO) Mn and fe these properties of slag can be explained to make use of fertilizers production mostly in japan, korea and china fertilizers made of slag are categorized as as slag silicate fertilizers, like fertilizers, slag phosphate fertilizers and iron matter of special fertilizers **Ito 2015** in recent years several studies have revealed that the slag based fertilizer amendment in agriculture , **White rt al.2017 Gwon et al.2018** alleviate greenhouse gases (GHG) **Wang et al.2015 GWon et al. 2018** and stabilize heavy metal in contaminated soils **Ning et al 2016** which turn. These beneficial in soil microbial habitats and microbial activities. Sol

microorganism play a vital role in all ecosystem processes and provide ecosystem for the maintenance for the maintenance of soil quality and productivity **Das et al 2017.**

MATERIAL AND METHODS

For the purpose of assessment of soil fertility surface (0-20 cm) soil samples were drawn from each plot taken as the individual unit from each block under on.
Out Of the 512 composite soil samples, 131 samples were taken from Inceptisol 131 from Alfisol and 250 from Inceptisol .and slag samples from interval of times.
Within the plot 6 to 8 borings were taken up to the depth Of 20 cm in random manner with the help of soil auger. The individual soil samples collected from the were mixed thoroughly and reduced in by the normal method of quartering. The soil samples were put In polythene bags, labelled and carried to the lab.

Physio-chemical properties of soil of Bastar district

Analysis under applied by two ways.

(i) Conventional method
(ii) Complexmetric (DTPA) method

The following analytical instruments and chemicals are preparing for estimation of containing nutrients and physiochemical properties of samples.

(i) pH: The pH was determined by glass electrode pH meter in soil water suspension (l: 2:5) Piper (1950).

(ii) Electrical conductivity: The conductivity ot supernatant of Soil: Water was determined by direct reading conductivity Jackson (1967).

(iii) Organic carbon: Organic carbon estimated by the modified Walkley - Black procedure. Walkley (1947).

(iv) Mechanical analysis: Sand and clay percent of were determined by international pipette method Piper (1960).

(v) Available nitrogen: Available nitrogen determined by alkaline permanganate method OE and (1956).

(vi) Available phosphorous: The soil wag extracted With 0.5 M sodium bicarbonate at pH 8.5 (Olsen ee al., 1954) and phosphorous estimated by the ascorbic acid method (Watanable and Olsen, 1965).

(vii) Available potassium: Extractant used was neutral normal ammonium acetate and the concentration of K in the extract was determined with the help of flamephotometer (Muhr, et al., 1965).

(viii) Available potassium: Extractant used was neutral normal ammonium acetate and the concentration of K in the extract was determined with the help of flamephotometer (Muhr, et al., 1965).

(ix) Free calcium carbonate: Calcium carbonate content was estimated by rapid titration procedure (Piper, 1950)

(x) Available, zinc, manganese, iron and copper: The micronutrients were extracted by using 0.005 M- Diethylene triaminepentaacetic acid, O .01 X Calcium chloride dihydrate and Triethanolamine buffered at pH 7 3 (Lindsay and 197B) and the concentrations of zinc , iron. copper and manganese in the filtrate were analyzed by absorption spectrophotometer 4129

Table No: 1

Sr. No.	Parameters	Soil of Bastar district
1	pH	6.7
2	Electrical Conductivity	0.03
3	Total alkali%	0.06
4	Org. Carbon%	0.32
5	Total- N.%	0.007
6	Total –Cl%	0.04
7	Total.S.%	0.23
8	Total.P as $P_2O_{6.7}$ in	24 ppm
9	Calcium as CaO%	1.42
10	Mg as MgO%	1.13
11	Na as Na_2O ppm.	69
12	K as K_2O ppm	53

Physic-chemical characteristics of slag amended soil

The utilization of slag in agriculture on large scale as liming agent for acidic soils, soil conditioner and also as a source of essential plant nutrients such as Ca,Mg.K,P,Cu,Zn,Mn,Fe, etc. holds great promise. Systematic investigation on different aspects of utilization of slag in agriculture as a source of essential plant nutrients, liming agent and soil conditioner have been carried out at the central fuel research institute by conducting in depth laboratory and pot experiments.

Table No: 2

Parameters	Concentration of slag	Groundnut 115d	Ladies finger 115d	Radish 115d
pH	Control expt.	7.11 7.53	7.33 7.337	7.37 7.613
Soil conductivity	Control expt.	0.08 0.086	0.101 0.161	0.087 0.148
Organic carbon	Control expt.	0.24 0.38	0.12 0.32	0.18 0.34
Available phosphorous	Control expt.	2.9 5.67	2.4 6.28	4.1 5.033
Nitrogen	Control expt.	0.053 0.051	0.063 0.062	0.068 0.066
Organic carbon/nitrogen	Control expt.	4.423 7.937	1.937 5.403	2.656 5.145

STATUS OF AVAILABLE MICRONUTRIENTS IN SOILS

The data pertaining to Status Of available zinc, iron and manganese of farms under copper, investigation are presented in Appendix and summarize in given table of observation columns.

Table No: 3

S.No	Properties	Observed mean values		
		Inceptisol	Alfisol	Entisol
1	pH	6.64	7.15	7.60
2	E.C	0.163	0.21	0.27
3	Org C %	0.37	0.49	0.63
4	CaCo3	0.619	1.62	3.08
5	Av . N $Kg.ha^{-1}$	176.30	210.62	253.61
6	Av . p $Kg.ha^{-1}$	17.28	12.76	10.81
7	Av . k $Kg.ha^{-1}$	288.97	378.17	458.62
8	Av . Zn $mg.ha^{-1}$	0.86	0.78	0.64
9	Av . Cu $mg.ha^{-1}$	2.82	2.56	1.46
10	Av . Fe $mg.ha^{-1}$	25.36	20.59	10.39
11	Av .Mn $mg.ha^{-1}$ Mechanical analysis	24.97	21.19	11.95
12	Sand%	44.45	24.54	15.42
13	Silt%	28.44	41.46	33.44
14	Clay%	27.11	34.00	51.14

The stabilization technique aims at reducing heavy metals and methods metalloid (e.g As Cr,Cu, Pb, cd Zn) in contaminated soil the technique is based on amendment to change the soil physio chemical properties through absorption, precipitation ion exchange technique, redox potential technology and pH control technology that change the existing forms and specification of heavy metals/metalloids and thus reduce their toxicity (**Mosa et al.2016**) there are several examples as carbon be stabilized by sorption on Fe (III) arsenates or can be stabilized by the reduction from more mobile and toxic (IV) to less toxic and stable cr(III) Cu can be stabilized by precipitation of cu carbonates and ox hydroxide Iron exchange and formation of cation anion complex on the surface of Fe and Al ox hydroxides and Pb and Zn can be Immobilized by phosphorous amendments **Branca and colla**
2012the adequate Si supply through slag silicate fertilizer amendment causes competitive inhibition of As(III) uptake by Crop plants. **Meharg and meharg 2015.**

LITERATURE REVIEW

Blast furnace is defined by the american society for testing and materials the non- metallic of calcium and other bases that is developed in a molten condition imultaneously with iron oxide to sinter etc. flux stone (lime stone and dolomite)and fuel(coke) molten iron collect in the bottom of the furnace and the liquid slag floats on it.**Lee A.R and Edward Amold et al.(2014)**

Organic and inorganic acids or salts in it some minerals such as sodium chloride dissolve readily in water whereas the solubility of some silicates such as quartz in water is very lowChammah G.C and ChhonkarP.Ket al.(2012).

Slag consists mostly of mixes oxides of elements such as Sulphur, phosphorus and aluminum and products formed in their reaction with furnace lining and fluxing substance such as limestone **Yieldirin and prezzi, 2011 plataket al. 2015.**

One of them inceptisols are very recently developed mineral soils with no diagnostic horizon,Goswami and Gupta R.K et al(2015). The main features of inceptisols is slight degree of sol formation because of either, limiting time or unfavorable condition inceptisols by virtue of plant growth and root penetration show some mineral weathering and surface

accumulation of organic matter. As well as inceptisol the soil representing early stage in soil formation.Datta S.C and Dhir R.P et al(2013) in recent years several studies have revealed that the slag based fertilizer amendment in agriculture , **White rt al.2017 Gwon et al.2018** alleviate greenhouse gases (GHG) **Wang et al.2015 GWon et al. 2018** and stabilize heavy metal in contaminated soils **Ning et al 2016** which turn. These beneficial in soil microbial habitats and microbial activities. Sol microorganism play a vital role in all ecosystem processes and provide ecosystem for the maintenance for the maintenance of soil quality and productivity **Das et al 2017.**

Slag amended soil and the use of plant growth hormones G.A and I.A.A helped to improve the plant growth parameters. The observation are in agreement with the works of previous workers. Thomas Mathew(1995), A.Naren et al(1995)

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