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# Study and Analysis of Leaching Pollutant in Agricultural Sub-Soil Environment

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***ABSTRACT*- Around the world agriculture has been considered as an important part of profitable development. It's a needful of a docket for raising the global issue of 21st Century. The increase in population growth has laid to the rapid-fire growth of civic development and artificial development in colorful countries across the world as a result there's release of huge quantum of dangerous poisonous emulsion in the terrain which affect the quality of life and ecological function. These contaminants can enter in the soil system through indecorous waste disposal, artificial and civic effluent discharge, sewage sludge, fungicides and toxin operation, unauthorized jilting house hold waste. undressed solid waste and release of sewage effluent in terrain and their use for crop product is the major path for impurity of Agricultural soil with poisonous essence and organic adulterants. In developing countries disposal of undressed external solid waste is the major concern. The external solid waste contains dangerous adulterants which causes dangerous result to mortal and girding.**

**The study aimed at assessing the effect of Filtering contaminant of external solid waste on Agricultural sub-soil quality. The four samples are collected from the jilting point at different distance and one sample is collected from the agrarian land. The soil sample are anatomized and physio- chemical parcels are determined. The result shows that the soil samples attained from the jilting point are defiled by the adulterants of waste due to the filtering process. The physio- chemical parcels have variation than the soil sample of controlled point. On the base of result, it's being concluded that the open jilting of solid waste at the outskirt of the metropolises is unhealthy for the agrarian subsoil terrain. Proper way should be taken in order to control the pollution in soil subcaste.**

***Keywords: MSW, Sub-Soil, Contaminants, Agriculture, Leachate.***

## I. INTRODUCTION

From thousands of times ago Agriculture is the part of mortal Actuality. each over the world agrarian is considered as the major frugality part for the development of mortal society. Roughly 135.26 crores of population of India are Dependent on Agriculture. According to ( Census2011) approx. 54.6 percent of India population is indulged in husbandry and affiliated conditioning and it contributes 17.4 to the country's Gross Value. Advancement in the technologies and population growth are simply responsible for generating solid waste and its proper operation is a major problem of external pot. Solid waste is the composition of solid, semi solid, non-soluble accoutrements , dangerous accoutrements which are generated through domestic, marketable and artificial sources. In India the solid waste is disposed on Land which is the easiest system for jilting the external solid waste. In result it requires the large area and proper drainage which is substantially available on out skirt of the metropolises. The disposal of External and artificial solid waste on land is the major cause of impurity of soil and groundwater. indecorous jilting yards are responsible for the impurity of soil due to leachate. Leachate is the polluted liquid which is attained from water which percolates through solid waste and other sources in ground face and this process is called filtering. The physio- chemical parcels of soil are affected by the leachates generated from the solid waste dump. Proper disposal and treatment of solid waste is necessary because undressed or unmanaged waste becomes a source of impurity of soil and underground water and colorful conditions. The main cause for the impurity of groundwater and soil pollution is release of waste from plant spots, shy waste and wastewater disposal, unbridled tips, inordinate operation of agrochemicals, tumbles of numerous types, and numerous other conditioning similar as mining and smelting that are carried out using poor environmental norms are also source of impurity. Accordingly, in this study we will collect samples of soils containing filtering adulterants of External solid waste, analysis will be done, by achieving the physio- chemical parameters of soil which will determine the effect of filtering adulterants in agrarian sub-soil. Which Proper way Should be taken to control the filtering adulterants in soils will be bandied.

## II. METHODOLOGY

### *A. STUDY AREA*

A comprehensive plan is designed to give the information about filtering effect of external solid waste in agrarian sub-soil. A point is chosen in Lucknow megacity of Uttar Pradesh. At this point the waste is ditched from different sources, the waste includes domestic waste demolition waste, beast immerse, and other waste are ditched. Private scrap collector also uses to leave the waste collected from houses. The degree of pollution the sample was taken from the dumping land located in the Lucknow city of Uttar Pradesh. The point is considered as same as the dumping point which are located at Sitapur Road near agricultural land. The dumping land is covered with the scrap's, beast excreta, rubbish, obliteration waste. The sample 3 is collected from the agrarian land positioned near Sitapur Road, Lucknow, Uttar Pradesh Latitude of 26.9740600 and longitude of 80.9250838. The physio- chemical parcels of sub-surface of dumping ground and agrarian land was anatomized and its

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effect on agrarian sub-soil are discussed.


Fig. 1: Study area of sample 1 & 2


Fig. 2: Study area of sample 3

Fig. 3: Dumping site (Lucknow),
for sample 1 & 2

## *B. COLLECTION OF SOIL SAMPLE*

The soil samples were collected the waste was removed and sub soil layer at depth of 15-20 cm was collected at considerable distance of site. Total of three sample of soil was collected weighing 1.5 kg. The sample of soil was carried to laboratory for physical and chemical parameter of soil . The selected physio chemical parameter of soil such as pH, moisture content, electrical conductivity, organic carbon, available nitrogen, available phosphorus, and available potassium , were analysed.

## *C. RESEARCH DESIGN*

The sample are collected for their analysis of physio-chemical properties by various methods which are listed below-

Table 1: Method of measurement for study of soil properties

| S NO | Soil Property | Analysis Method | Unit |
|---|---|---|---|
| 1 | pH (Ratio1:3) | pH meter | Percentage |
| 2 | Moisture | Oven drying method | Percentage |
| 3 | Elec. Conductivity (µ mhos/cm) | Electrical conductivity meter | µ mhos/cm |
| 4 | Organic Carbon (%) | Titrimetric method (Walkleyand Black, 1934). % Soil. | Percentage |
| 5 | Available Nitrogen as N(mg/kg) | Micro Kjeldahal Method | (kg/ha) |
| 6 | Phosphorous as $P_2O_5$(mg/kg) | Spectrophotometric method | (kg/ha) |
| 7 | Potassium as K(mg/kg) | Flame photometer method | (kg/ha) |

## III. RESULTS AND DISCUSSION

The results are attained by experimental system of the specific of soil for both polluted soil due to the filtering of external solid waste and polluted soil which is the agrarian land in Table 2. The analysis is concentrated on recognition of adulterants in the soil due to filtering of contaminant generated from external solid waste and polluted soil which is an agrarian land. At last assessment of both defiled and polluted soil characteristics were made.

Table 2: Result of Physio - Chemical properties of soil sample 1, 2, 3

| S No | Parameter of soil | Sample 1 | Sample | Sample 3 | Mean |
|---|---|---|---|---|---|
| 1 | pH Value | 5.17 | 5.75 | 7.41 | 6.11 |
| 2 | Moisture | 34% | 25% | 21% | 26.66 % |
| 3 | Elec. Conductivity(µ mhos/cm) | 204 | 176.89 | 102.62 | 161.17 |
| 4 | Organic Carbon(% ) | 2.34 | 1.76 | 1.01 | 1.70 |
| 5 | Available Nitrogen as N(kg/ha/) | 389 | 314 | 223 | 308.66 |
| 6 | Phosphorous as $P_2O_5$(kg/ha) | 43 | 33.52 | 17.09 | 31.20 |
| 7 | Potassium as K(kg/ha) | 212 | 201 | 134.4 | 182.46 |

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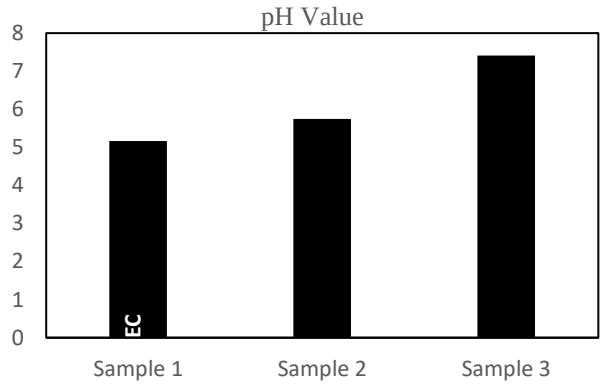
*A. pH Value*

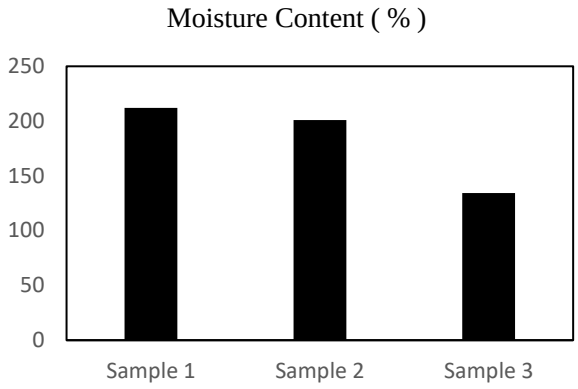
The specific of soil sample whether it's alkaline or acidic can be determined by mean of the hydrogen ion- exertion generally known as pH value. colourful factors may affect the Soil pH. Some of them are soil- water rate, answerable swab attention, temperature variation. The pH value of soil sample drop if there's increase in swab attention, if there's increase in temperature the pH value decreases. The soil is considered rich if the pH ranges from 6-7.5 which is suitable for crops growth. After the analysis of soil sample pH of soil samples ranges from 5.17 to 7.41 for polluted soil and the mean is 6.11 which shows that the soil is slightly acidic. If the pH number is less than 7 it indicates acidic in nature and if the pH number is more than 7 it indicates alkalinity. Solubility of micronutrients is high at low pH value and at high pH value vacuity of is taken from agrarian field. Sample 1 is largely acidic which is due to the presence of solid waste which is the main element and leads to the conformation of organic acids which indicates the acidity in soil. Sample 3 has alkaline pH. soil acidification reduces the pH of soil which effect the force of nutrient to the factory and increase in poisonous micro-nutrient in the crop's growth.




Graph 1: For pH Value

*B. MOISTURE CONTENT*

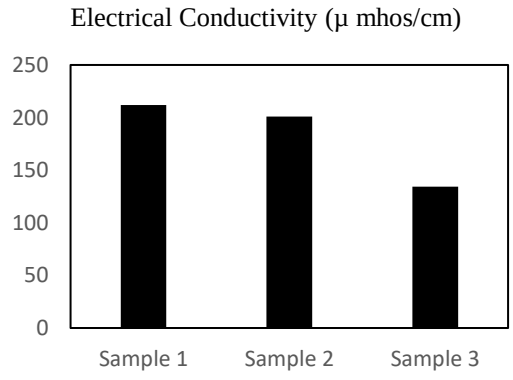
Another physical property of soil is humidity content. Amount of water present in soil indicates the humidity content of soil. The nutrients absorbed by the soil depends upon the humidity content of soil. Void rate, particle size, complexion mineral, organic matter and ground water condition are the major factors on which soil humidity depends. humidity content will be high in soil close to the dumping point due to corruption of organic matter and soil microbial exertion. The sample 1 has high humidity content and sample 2 has low humidity content. The increase in humidity content may be due to lower evaporation of humidity form the dumping point as compared to the polluted point ( sample 3). The health of crops depends on the sufficient force of humidity and soil nutrient. As the humidity content in soil reduces the growth of shops and crops decline. As the humidity content in polluted soil sample is further than the polluted soil which is due to the cover of MSW on land which doesn't allow to precipitate the liquid which in result in filtering of MSW adulterants in agricultural soil.




Graph 2: For moisture content

*C. ELECTRICAL CONDUCTIVITY*

To estimate answerable salt attention and for the dimension of salinity electrical conductivity is used. For the mineralization of organic matter in soil electrical conductivity is useful. However, it affects crop growth, availability of nutrient in plants, If soil is saline. If there's increase in attention of ions in soil result it means electrical conductivity of soil sample increases. Sample 1 has the loftiest electrical conductivity and the controlled point sample has lower electrical conductivity. Due to high attention of swab and sodium content position in waste causes precarious




Graph 3: For electrical conductivity (µ mhos/cm)

*D. ORGANIC CARBON (%)*

The organic carbon is stored in soil when the organic matter decomposes and enter the soil due to leaching process. However, it'll affect the health of human and vegetation, if organic content is high in soil. In dumping point, the percent of organic carbon is more because due to corruption of waste which are ditched on dumping point. The sources of organic matter are food waste, cow immerse, field waste. Organic matter is good source of essential nutrient for agrarian practices unless proper organic matter is used for enhancing the soil parcels for agrarian practice, but the organic matter attained from MSW waste affects the soil nutrient and growth of crops. Organic matter present in MSW is due to biodegradable waste. The percent of organic carbon is less in controlled as compared to the unbridled point this may be

International Journal of Engineering Research & Technology (IJERT)
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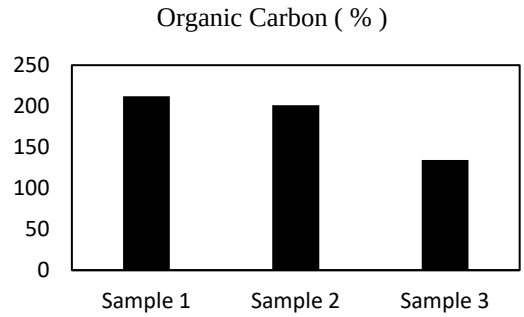
Vol. 12 Issue 07, July-2023

due to the use of limited quantum of toxin used in controlled point. Organic carbon acts as storehouse house for essential factory nutrient it increases the water and nutrient capacity along with air moment in the soil. Soil organic matter improves soil structure severance size distribution, total porosity in the soil. In sample 1 the organic carbon content is more compare to other sample because due to the presence of organic matter on the face similar as cow immerse, municipal solid waste.




Graph 4: For organic carbon %

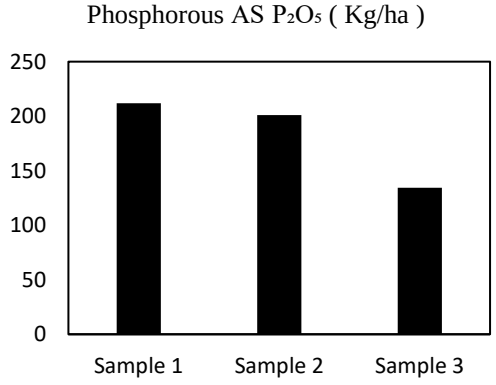
### *E. AVAILABLE NITROGEN AS N( kg/ha)*

Availability of nitrogen plays important part in agrarian soil. Nitrogen position in soil should be maintained within the standard position and range by using proper nitrogen fertilizer. NO3 and NH4 are the forms of nitrogen which plants root takes up. It's a major element for generation of chlorophyll, plant protein and growth of plant increase in soil depth decreases the vacuity and form of nitrogen content. The soil was supplemented with high content of nitrogen position.

Graph 5: For Available Nitrogen as N(Kg/ha)

### *F. PHOSPHOROUS AS $P_2O_5$(Kg/ha)*

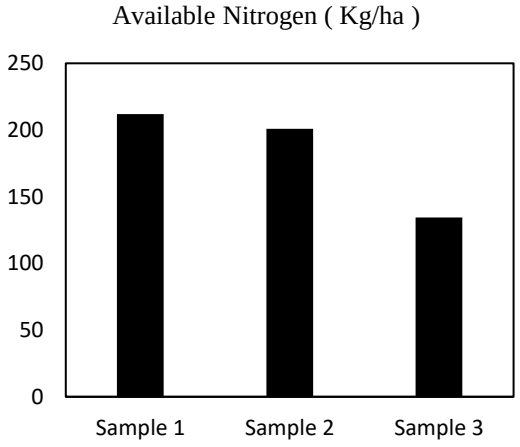
It is the most essential micronutrient which helps in plant growth. It helps in the process of photosynthesis and in the formation of starch, sugar, oil etc. Deficiency of phosphorous in soil results in slow growth and poor seed and fruit development. Sample 1 & 2 has more phosphorous content due to presence of organic matter in dumping soil. The increase in amountof phosphorous in soil is due to the leaching of pollutant from municipal solid waste. If there is deficiency in soil the edges of plant leaves changes into dark colour.




Graph 6: For Available Phosphorous as $P_2O_5$ (Kg/ha).

### *G. POTASSIUM AS K(kg/ha)*

- For the plant growth potassium is the important nutrient in soil, the anthropogenic conditioning could lead to increase in the potassium position which is the source for soil pollution and ground water impurity. Due to declination of solid waste, there's vacuity of potassium content in soil. As potassium is nutrient for factory growth and has no ill- effect on soil parcels. It helps in increase the root growth. It enhances pest and complaint to plant growth. Sample 1 has the loftiest attention of potassium which is due to the presence of municipal solid waste. Deficiency in potassium in soil leads to dark brown colour of leaves.



International Journal of Engineering Research & Technology (IJERT)
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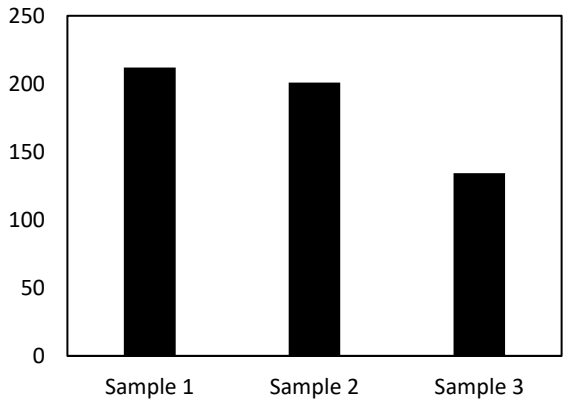
POTASSIUM AS K(Kg/ha)




Graph 7: For Available Potassium as K(mg/kg)

## IV. DISCUSSION

After the Experimental analysis, it's set up that the pH of sample 1 & 2 is 5.17 & 5.75 and the pH of sample 3 is 7.41 which indicate it's alkaline in nature. Electrical conductivity for sample 1 & 2 ranged from 204 µ mhos cm to 176.89 µ mhos cm. The sample 1 is having high EC which may be due to close to jilting point and presence of large number of ionic substances and mariners which are released from MSW dump. Mean of 1.7 organic carbon was set up near the dumping point which is another factor for increase in pH & EC. The experimental result concluded that the range of NPK is lesser in the soil samples of jilting point than that of controlled sample point that's agrarian land.

## V. CONCLUSION

After determining the physio-chemical characteristic of soil sample and analysis of the soil sample in both contaminated and uncontaminated soil, the result shows the affect of pollutants of MSW due to leaching in soil and loss of fertility in comparison to the controlled soil samples. The study concluded that improper management and disposal of municipal solid waste at the out skirt of the cities contaminate the soil layer, groundwater and also the surrounding of the dumping site which are agricultural field. Due to the presence of pollutants of MSW in soil layer in agriculture field will bring significant changes which will affect the growth of crops and nutrient in crops. So proper step should be taken to control the Leaching of MSW pollutant in soil.

Following Measures should be taken in account for the soil fertility of agricultural soil-

- Awareness among the farmers on soil issues, causes and prevention of soil fertility should be done.
- Proper management for the disposal of municipal solid waste should be adopted.
- Landfilling should be likely more in practice in every city.
- Municipal corporation should prepare proper management for treating and recycling of waste rather than dumping the waste.

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