Salinity Removal Efficiency of Vetiver Grass from Laterite Soil

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***Abstract*— Rapid population increase, along with rapid industrialization and agricultural practices, causes major environmental problems, such as the development and release of massive amounts of toxic waste into the soil environment which . This project uses vetiver grass for removing excess salt content in the soil. It has the ability to adapt and develop in a variety of habitats, as well as quickly recover from poor environmental conditions. Salinity causes poor water access and weak seedbeds, slowing plant growth.**
For the experiment samples were created artificially by adding regulated amounts of salt. The tests last approximately three months.. The tests last approximately three months.

Index Terms—Vetiver, salinity, Phytoremediation,

I.INTRODUCTION

A. *Need of the study*
Soil is an important component of the environment, as it plays a role in a variety of ecosystem services. However, inadequate land management practices have resulted in a fall in actual and/or potential soil productivity, posing a serious challenge to sustainable agriculture and environmental quality, putting many countries' food security at risk. Poor land management practices often result in soil erosion and agrochemical pollution as a result of agricultural activities, urban trash, and industrial operations, reducing the soil's ability for long-term food production and impacting plants, animals, and human lives.

Vetiver grass is a tufted bunch grass that thrives in both tropical and temperate climates. Heavy metals don't bother vetiver grass. It could be used to fight pests biologically. When compared to other soil conservation technologies, the usage of vetiver grass has been viewed as a low-cost solution for soil and water conservation, stability and repair of polluted soils, and enhancement of water quality for irrigation applications.

II.METHODOLOGY

Firstly, we chose the subject that we needed for our research. We looked through numerous journals and devised a plan for what we needed to do. We then decided to apply a 2 stage procedure for checking the tolerance level of the plant against saline soil conditions. Laterite soil, that is common in kerala was taken and salt was artificially added to make it saline. this soil was taken as samples for checking the salinity tolerance of vetiver plants. We employed four 3.5kg pots of soil for saline soil preparation, resulting in salt weights of 8.96, 44.8, 67.2, and 89.6 g NaCl at each salinity level.and the plants were then planted in those soil and were grown for about 90 days.
After 90 days the soil samples were sent to a laboratory for the analysis. The test results are then compared to the initial salt content in the sample.


fig.1 Vetiver planted in pots with soil sample.

III. INDEX PROPERTIES

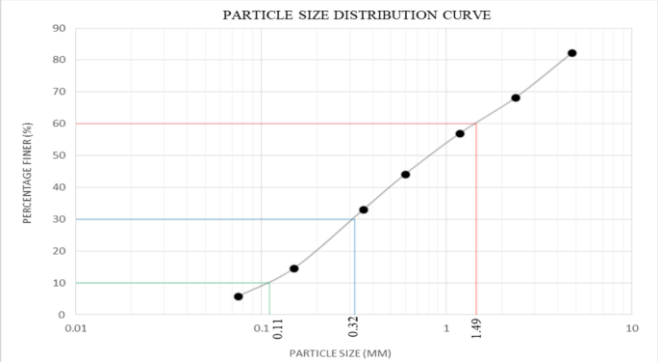
A. *Grain size analysis*

D60=1.49
D30=0.32
D10=0.11

Uniformity Coefficient(Cu)=D60/D10
=13.54

Coefficient of Curvature(Cc) = (D30) 2/(D60)* (D10)
=0.624

From the above table graph was plotted and its grain size distribution curve is as shown (Fig. 2)



B. *Specific Gravity*

Weight of dry soil = Weight of pycnometer with dry soil(W2)- Weight of pycnometer(W1) = 300g

Specific gravity ,G =
(W2-W1)/(W2-W1)-(W3-W4)

W1=554g,
W2=854g,
W3=1594g,
W4=1432g

G=(W2-W1)/(W2-W1)-(W3-W4)
G=(854-554)/(854-554)-(1594-1432)
G=2.17

C. *water content*

Mean Water Content =2.24

D. *Compaction Test*

Weight of mould =4645kg

Diameter of mould= 10cm

Height of mould = 12.6cm

Volume =$\Pi r^2 h$

$=\Pi*(5)^2*12.6$

$=989.6\ cm^3$

Maximum dry density=1.65g/cc

Optimum moisture content=12.8%
From the above values graph of density Vs water content was plotted which is as shown (Fig.3)

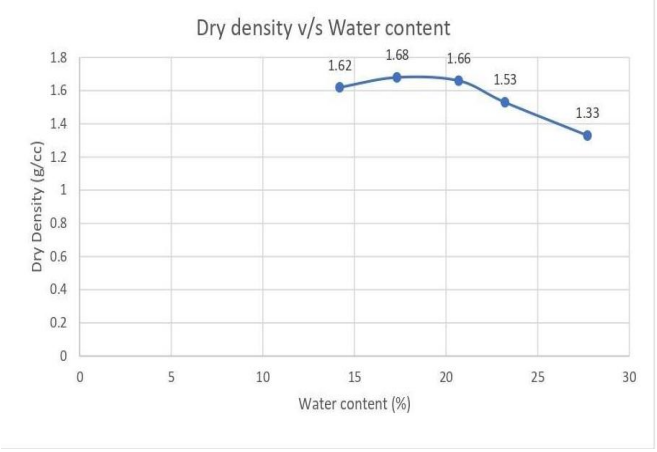


Fig 3 .Density VS Water content

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