INFLUENCE OF RHIZOPHORA MUCRONATA AND PISUM SATIVUM ON SOIL CHARACTERISTICS

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Abstract: Plants inhabit a range of soil and climate type for the growth. However, cultural practices make exotic species also inhabit a different soil and climate. With the idea of studying the requirement of a mangrove plant from the soil, a variety of soil including its native soil brought from different provinces (U.P., A.P., Uttaranchal) and provenances of U.P-Polluted, Irrigated, Roadside were studied for their physical and their nutrient properties initially and after the growth of the *Rhizophora mucronata*. Similarly in artificially made combination of soil to math with the area close to the coal fields, a study was carried out after growing a pulse crop. Barren soil of Uttaranchal with minimum organic matter, CEC, WHC, Moisture% and Total N_2 exhibited best growth of *Rhizophora mucronata* in Meerut climate (35°C,60% RH). It also exhibited maximum Na^+ uptake by the plant whereas, the plant did not take up Na^+ from mangrove soil. Rest of the soil extracted out Na^+ from the seedling in the form of leachates. The normal irrigated soil initially at pH 8.0, after growth of a pulse crop *Pisum sativum*, lowered down in pH with additional CEC in contrast to the previous observation and also lost organic matter by 50%. The study throws light on regeneration of abandoned and degenerating lands.

Key words: *Rhizophora mucronata*, *Pisum sativum*,Soil-climate regime and Salinity.

INTRODUCTION

Rhizophora mucronata, a member of family Rhizophoraceae, has attracted the attention of scientific community during the last decades in India as well as other countries due to the presence of aerial root and velamen tissue. However, physiological understanding of the behaviour of *Rhizophora mucronata* plant under edaphic requirement for the growth, productivity, phenology and chemical constituents of the component parts of plant. In the present study an attempt has been made to analyse the sustenance of *Rhizophora mucronata* under changed physical and chemical characteristics of soil from different provenances of U.P., Uttaranchal and its native soil besides alien non-coastal climatic condition (as at Meerut, average temperature range during the year being 30-35°C and humidity being 70-75%). Besides modification of soil fertility characteristics of the soil, the growth pattern of *Rhizophora mucronata* as against native soil-native climate.

MATERIALS AND METHODS

Rhizophora mucronata seedling for the present study were procured from Pandi pallam, Amalapuram (A.P.) and certified pulse material from seed store. The *Rhizophora mucronata* material and seed material were sown in soil of different provenances of U.P. (Roadside, Polluted and Irrigated), Uttaranchal (Barren) and its native soil (as control), Whereas the pulse crop *pisum sativum* was sown in irrigated field soil. In *Rhizophora mucronata* after 38 weeks of establishment following parameters were studies for finding out the modification in soil due to respective plant growth.

Physical parameters: Height of the plants, No. of leaves/ plant, size of leaf for comparison of growth status of plant.

Soil parameters before sowing and after removal of plant:

1. Total N_2 content (Snell and Snell, 1944)
2. Na^+ content (Pratt., 1990)

Organic carbon (Datta *et al., 1962*)

RESULTS AND DISCUSSION

It is clear from the fig.(1-4) that barren soil of Uttaranchal with minimal organic matter, CEC (Cation Exchange Capacity), WHC (Water Holding Capacity), Moisture% and total N_2 exhibited best growth of *Rhizophora mucronata* in Meerut climate (30-35^{0}C and RH 70-75%). Barren soil also exhibited maximum Na^+ uptake by the plant whereas the plant did not take up Na^+ from the mangrove soil. Rest of the soils extracted out Na^+ from the seedling. The normal soil (Irrigated) initially at pH- 8.0 after the growth of pulse crop (*Pisum sativum*) lowered down the pH with increased CEC in contrast to the previous observations and also lost OM (organic matter) by 50%.

Wetland plant like *Rhizophora* when grown in the barren wetland of Uttaranchal may raise the Na^+ content and pH, instead of reclamation of OM (organic matter) of the soil. Legume crop plants like *Pisum* reduce the pH of alkaline soil and *Rhizophora* increases its further beyond tolerance limit of other plants.

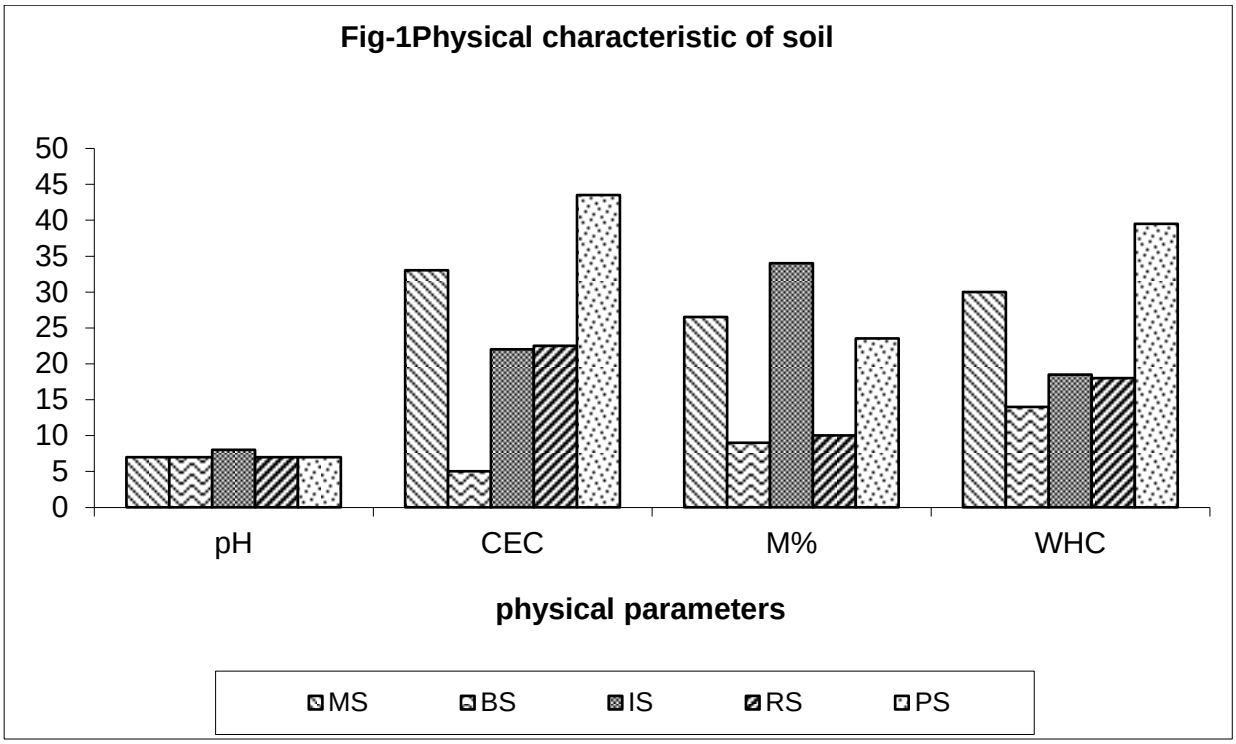


Fig-1Physical characteristic of soil
50
45
40
35
30
25
20
15
10
5
0
pH
CEC
M%
WHC
physical parameters
MS
BS
IS
RS
PS

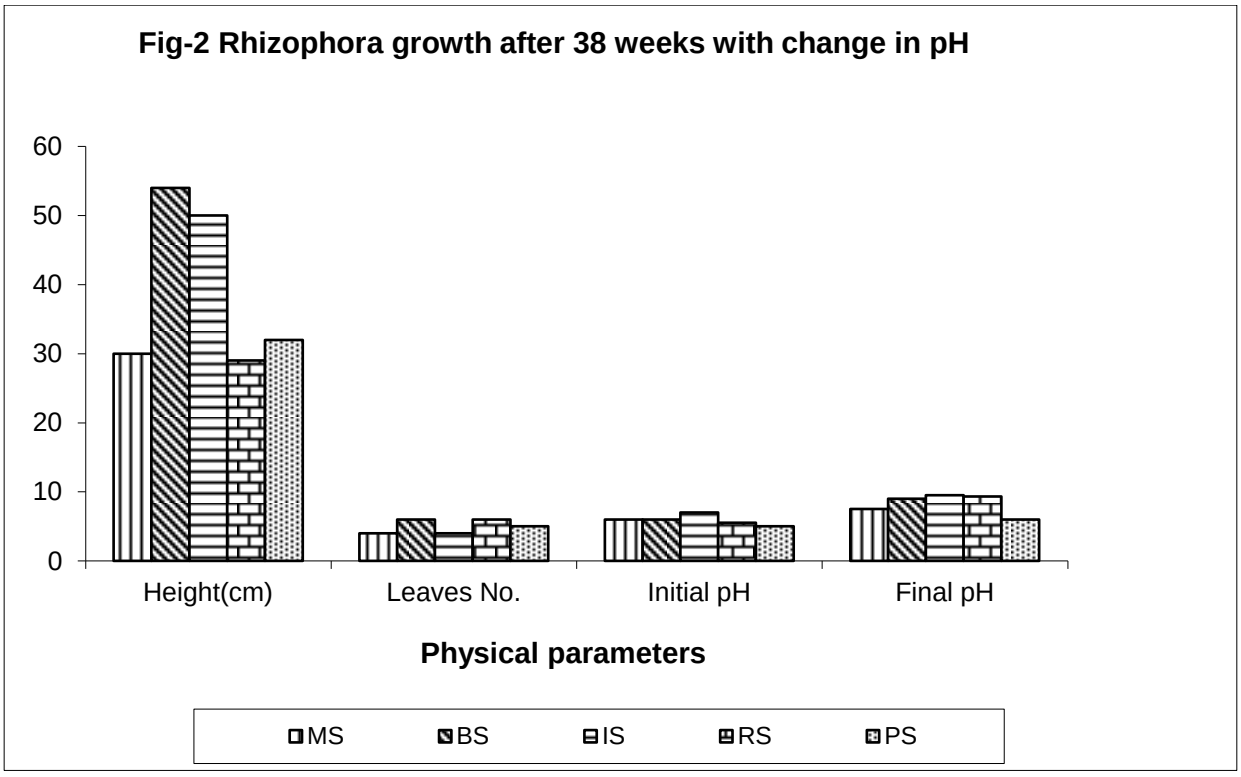


Fig-2 Rhizophora growth after 38 weeks with change in pH
60
50
40
30
20
10
0
Height(cm)
Leaves No.
Initial pH
Final pH
Physical parameters
MS
BS
IS
RS
PS

Fig-3 Modification in chemical nature of soil after 38 week of Rhizophora growth

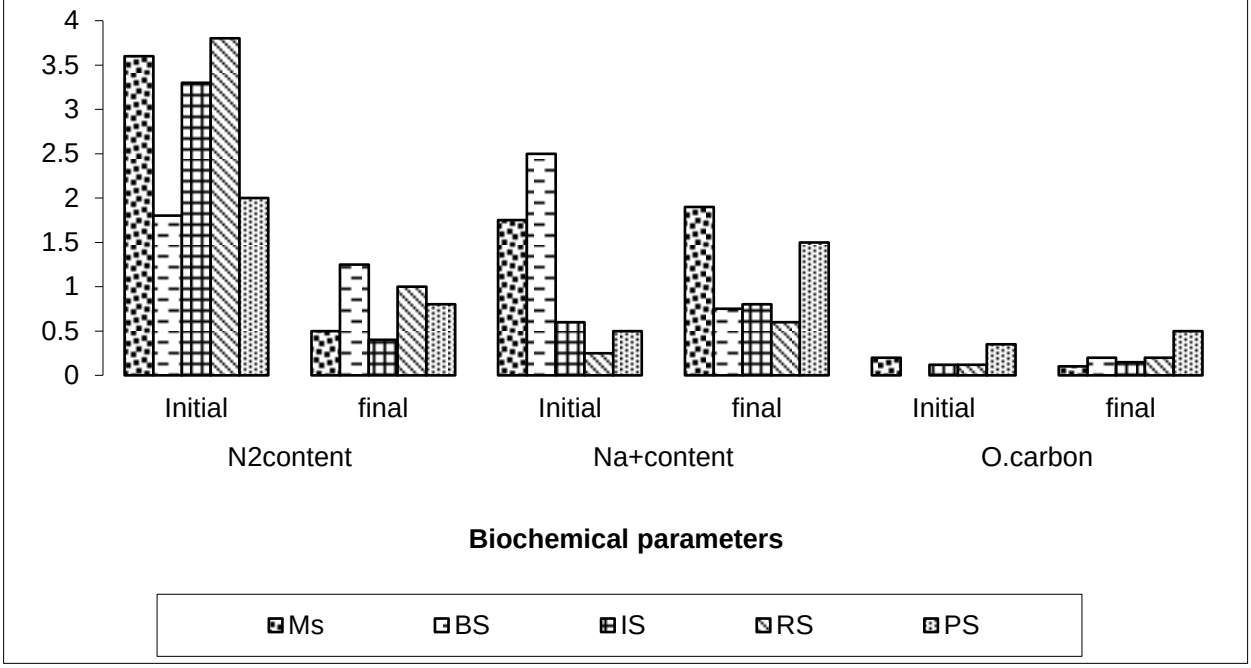
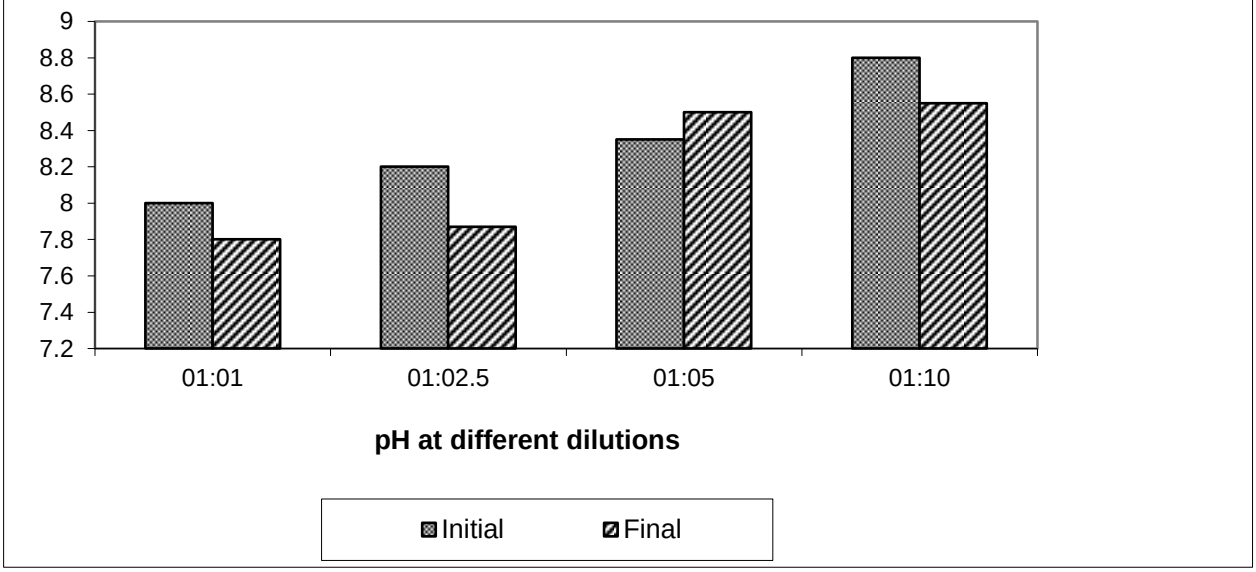


Fig-4 Changes in soil characteristics after 90 days of *P. sativum* growth



CONCLUSION

Using the wetland plant like *Rhizophora*, to recover organic matter of barren wetland of Uttaranchal can raise the Na^+ content and pH to further ruin the soil, although *Rhizophora* can grow well.

Legume crop plant like *Pisum* reduce the pH of alkaline soil and *Rhizophora* increases its further beyond to tolerance limit of other plants.

ACKNOWLEDGEMENTS

Authors wish to thank Head, Department of botany, J.V. College Baraut for providing Facilities in conducting the experiments.

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