Characterisation of different land uses in *Pokkali* ecosystem

Anju Sajan[1*], A. K. Sreelatha[2] [1]College of Agriculture, Kerala Agricultural University, Thrissur, Kerala, India,[2]Rice Research Station, Vyttila, Kerala Agricultural University, Kerala, India

INTRODUCTION

Pokkali fields are tidal wetlands of Kerala, where a traditional indigeneous organic method of rice-fish rotational cultivation is being practiced. *Pokkali* soils are highly fertile acid saline soils with high organic carbon. Prawn cultivation is being practiced during high saline phase (November – May) and salt tolerant rice variety *'Pokkali'* cultivated during low saline phase (June – October).

It is now facing the challenge of prawn monoculture at the cost of traditional rice-prawn farming system. Though this provides higher net returns over the traditional system in the short run, it is unstable in the long run. The study was undertaken to characterise the soils of different land uses in *Pokkali* ecosystem.

METHODOLOGY

Soil sampling

Pokkali tract is found in the parts of Thrissur, Ernakulam and Alappuzha districts and is situated between a latitude of 9°45" N and 10°15" N and a longitude of 76°10" E and 76°20" E. This study was carried out in three major land use systems of *Pokkali*, which include rice – prawn (L1), rice alone (L2) and prawn alone (L3).Georeferenced samples were collected from Kumbalangi (L1), RRS Vyttila (L2) and Kadamakkudy (L3). In total, 5 composite samples were collected from each land use at a depth of 0-20 cm using core auger in January 2020. The samples were sealed and labelled for further analysis.

Fig 1. soil sample collection from rice-prawn land use (Kumbalangy)

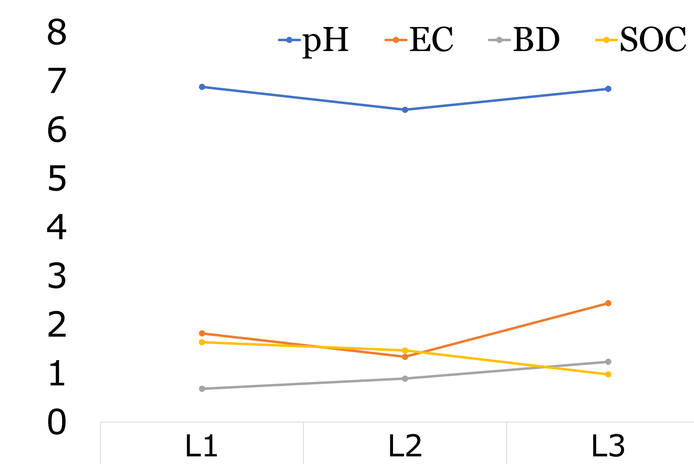
Soil characterization

Soil pH and electrical conductivity were measured by using pH meter and EC meter respectively. Bulk density (BD) of the samples collected using core auger was estimated following the method described by Blake and Hartge (1986). Particle size analysis was done as outlined by Piper(1966). Soil organic carbon (SOC) content was determined by wet oxidation followed by titration with ferrous ammonium sulphate(Walkley and Black 1934). Microbial biomass carbon (MBC) was determined by chloroform fumigation extraction method by estimating the amount of CO_2-C evolved from the soil samples (Jenkinson and Pawlson, 1976). Dehydrogenase activity (DHA) was estimated by procedure outlined by Cassida *et al.,* (1964).

RESULTS

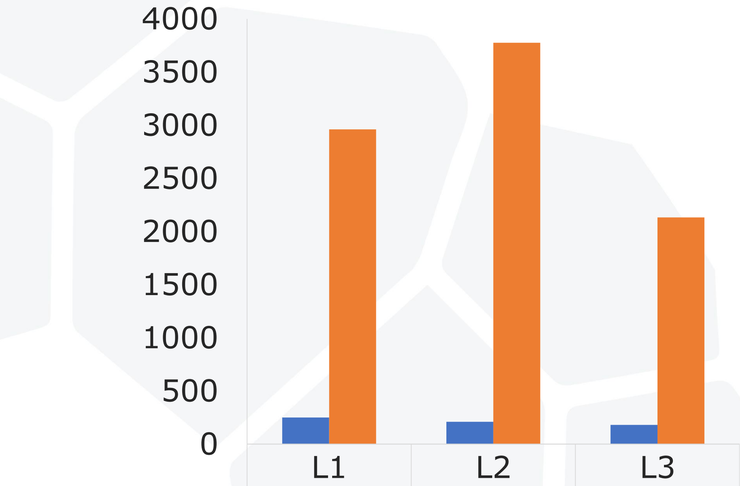
The results gathered from soil analysis on differnt land uses in Pokkali ecosystem is illustrated in Fig.2 and 3.

- The pH of *Pokkali* soil from L1, L2 and L3 were found close to neutral values
- The observed EC values for L1, L2 and L3 were <4 dSm^{-1}. Highest EC was observed for L3 followed by L1 and L2
- Texture analysis showed that both L1 and L2 had a clay texture while L3 had a sandy clay loam texture.
- L1 showed lowest bulk density compared to other land uses which indicates better soil quality
- Highest soil organic carbon content and MBC was found in L1 compared to others
- Dehydrogenase activity was found higher in L2 against other land uses
- All the results showed a significant difference among different land uses



	L1	L2	L3
pH	6.88	6.41	6.84
EC	1.82	1.34	2.44
BD	0.684	0.893	1.238
SOC	1.64	1.47	0.98

Fig 2. mean value of results obtained from soil analysis for pH, EC , BD and SOC of different land uses in Pokkali ecosystem



	L1	L2	L3
MBC (µg g-1 soil)	249.82	208.87	180.07
DHA (µg TPF h-1 g-1 soil)	2959.69	3775.2	2132.49

Fig 3. mean values of for MBC and DHA of different land uses in Pokkali ecosystem

CONCLUSIONS

The research findings shows that rice-prawn land use has good soil properties compared to other land uses. The continuous monoculture of prawns in these *Pokkali* fields can lead to deterioration of soil quality. These valuable wetland resources can be protected and the ecological balance can be maintained by adopting organic *Pokkali*-prawn rotational farming practice.

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