

# Litter Decomposition Study (*Avicennia officinalis*) with the Help of Soil Arthropods w.r.f to Nayachar Island, West Bengal, India

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**Abstracts:** *Avicennia officinalis* is the most common mangroves species in Nayachar Island (Latitude 21°58'33" and longitude 88°04'54"). This species tends to occupy the inner parts of the Island and is the most abundant mangrove. This study presents the decomposition rate for *Avicennia officinalis* leaf litter throughout the year. It also quantifies physico-chemical factors along with microarthropods population abundance throughout the decomposition process. Soil microarthropods help ecosystem functioning by way of imparting important role in food-chain, food-web system vis-à-vis in trophic relationships and also help nutrient cycling as decomposer. The present study attempt to analysis of soil microarthropods population extracted from mangroves litters under the process of decomposition over an interval period of 3 months throughout the year to investigate successional development of soil microarthropods population, species composition and trophic relationships of soil microarthropods communities in relation to changing ecological parameters of *Avicennia officinalis* during different phase of decomposition.

**Keywords:** Mangroves, Decomposition, Microarthropods

## 1. Introduction

Soil is a decomposition product. Its solid phase has two main constituents, namely minerals derived from some parent materials e.g. rocks by weathering and organic substance closely associated with minerals, mainly derived from the vegetation growing in the soil. Soil organisms actively play in the decomposition of organic litter<sup>[1]</sup>. Living organisms were reported to have been established themselves very early in the process of decomposition of parent material, which indicates that organic decomposition is also associated with the early stage in soil formation. The organic content of the soil in its embryonic phase of development has been found to be very low as the vegetation and its associated fauna do not develop in high densities<sup>[2]</sup>. Mangrove is one of the most extraordinary ecological formations occurring almost exclusively in the tropics. Like the tropical rain forests, the mangroves have also played a very important role in the economy of our coastal population for thousands of years, providing a wide variety of goods and services including wood production, support for commercial and subsistence fisheries aquaculture, salt production and shoreline and coastal erosion control. Mangroves are salt tolerant forest ecosystems of tropical and subtropical intertidal coastal regions near river mouth. They form highly productive ecosystems since the inorganic nutrients, brought in by the incoming freshwater from land run-off, are trapped to form the source of energy for many organisms. Arthropods are one of the groups of soil fauna, which inhabit the soil, and the overlying layer of organic debris. According to Kuhnelt (1963)<sup>[3]</sup>, there was hardly an arthropodan group, which was not found in the soil. The arthropods usually referred to collectively as the soil micro arthropod fauna<sup>[3]</sup>, including Acarina, Collembola, Protrua, Pauropoda, Diplura and Symphyla. The first two groups are the abundant faunal groups in most soils in comparison to other groups<sup>[6]</sup>. The

present investigation also laid emphasis on the study of the decomposition process of *Avicennia officinalis* leave litters and the succession of different micro- arthropods population in the different phases of litter decomposition processes of the Nayachar Island of Midnapore coast, West Bengal, India.

## 2. Material and method

*Avicennia officinalis* mangrove plants were chosen for the study of mangrove leaves decomposition. Litter decomposition rate has been determined by litterbags methods. The litterbags were made of nylon, mesh sizes (6mm<sup>2</sup>) were used for present study<sup>[7]</sup>. Freshly fallen leaves of different mangroves plant were collected from the mangrove belt of Nayachar Island. The leaves were chopped with size (1inch) into uniform lengths then dried in air. Each nylon bags was filled with 200gm air-dried litter. A set of 4 such bags was made for each selected sites. A total of 12 (4×3) bags were made in three different localities. Bags were placed at a depth 5 inch under the soil. The litter bags at the rate of decompose leaves were drawn at an intervals of 3 months for one year. Microarthropods from each litter bags were extracted by modified Tullgren funnel<sup>[8]</sup>. The collected fauna were sorted out into different groups and identified with the help of Stereoscopic binocular microscope followed by taxonomic key. Decompose soil sample were study with the help of laboratory slandered method<sup>[9-11]</sup> and statistical analysis done by STATISTICA, Version 7.0.

## 3. Results and Discussion

Litter decomposition study with *Avicennia officinalis* *Avicennia officinalis*, locally named "pearebain" an important species of mangrove was selected for litter