Seagrasses are extremely productive and have a high biodiversity. They provide nursery habitats for fishes, crustaceans, molluscs including many commercially valued species. A wide range of nutrient cycling processes occur in coastal seagrass communities and this makes them sites of elevated microbial activity as they serve as substrates for bacteria.

Monitoring of seagrass provides valuable information on broader ecosystem health in addition to seagrass health. Seagrass monitoring was done by studying the distribution, biomass and the radioactivity. Seagrasses *Halodule pinifolia* and *Syringodium isoetifolium* were noted abundantly in the coastal areas of Kanyakumari. The west coast was devoid of seagrass. During most of the seasons these seagrasses were seen along with *Sargassum* spp., *Ulva* sp., *Caulerpa* sp. and *Gracilaria* sp.

The biomass of seagrasses varies between seasons. *H. pinifolia* showed higher biomass during the post-monsoon season. The total biomass of *S. isoetifolium* showed a higher value during monsoon period, indicating the former’s tolerance to varying environmental conditions. The recorded radioactivity in seagrass is important because they form an excellent habitat for various species and they belong to the first trophic level, serving as a food source for other organisms. The concentration of $^{210}\text{Po}$ activity in *H. pinifolia* was more than *S. isoetifolium*. 
The presence of bacterial aggregates on leaves interact in a cooperative manner. The interaction depends on external environment factors, chemical interaction, etc. The host plant develops chemical interaction to defend from predators or pathogenic bacteria. Thus bacterial population on leaves often influence the health of host plant under suitable conditions.

The studies on the qualitative analysis of biofilm-forming bacteria from seagrasses blades *Halodule pinifolia* and *Syringodium isoetifolium*, quantitative assessment of epiphytes and endophytes, seasonal hydrological conditions and seagrass bioactivity profiles were carried out for a period from September 2008 to August 2010 from the east coast of Kanyakumari.

The biofilm-forming bacteria on seagrass blades were morphologically and biochemically tested. A total of four different bacterial isolates were obtained from *H. pinifolia* blades namely *Staphylococcus*, *Micrococcus*, *E. coli* and *Bacillus*. *Bacillus* was the predominant bacteria seen associated with this seagrass. Hence a molecular approach was carried out for the confirmation of the strain identity. The 16s rDNA gene of the isolates were sequenced after the DNA isolation and amplification.

The nucleotide homology and phylogenetic analysis showed that the bacteria was *Bacillus pumilus* (Accession No HM006706). Similarly five different bacteria were obtained from *S. isoetifolium* blades namely *Micrococcus*, *Staphylococcus*, *Pseudomonas*, *Vibrio* and *Bacillus*. *Bacillus* and *Vibrio* were the predominant bacteria in the seagrass *S. isoetifolium* and 16s rDNA sequence
analysis showed that the bacteria were *Vibrio alginolyticus* (Accession No HM045516) and *Bacillus pumilus*.

The seagrass-associated epiphytic and endophytic bacteria were analysed by counting the colony forming units, from September ’08 to August ’09 along with the observation of hydrological parameters such as temperature, salinity, pH, TSS, dissolved oxygen and rainfall. The hydrological parameters showed a marked change between seasons. The density of bacterial load also differed between seasons. Temperature pH, TSS, dissolved oxygen showed marked relationship with the bacterial load. Rainfall and salinity did not show much relationship with seasonal bacterial settlement.

The isolated biofilm-forming bacteria were grown in the presence of varying concentration of seagrass extract. In the entire medium, higher colony forming units were noted than control. The result indicated that the nutrients present in seagrass extracts could enhance the growth of the bacteria. The seagrass extract showed bioactivity against pathogenic bacteria and microalgae. The ability of antibacterial activities of the extracts could be considered as an indicator of bioactive secondary metabolites. The seagrass was particular in defending only certain bacteria because no activity was noted against biofilm-forming bacteria.

The screening of phytochemical showed the presence of both aliphatic and aromatic compounds in these two seagrasses. Phenols, phenolic derivatives, fatty acids, fatty alcohols, an alkaloid and a flavonoid were present in the seagrass extracts. The presence of secondary metabolites was active against mosquito larvae and pests. The antilarvicidal dose response was determined for seagrass extracts
applied for 12, 24, 36 and 48 h to newly emerged fourth instar *Aedes aegypti* mosquito larvae. All the exposed larvae showed 100% mortality in 150 ppm concentration after 24 h and in 80 ppm concentration after 48 h in the presence of *H. pinifolia* extract. The highest concentration tested (300 ppm) showed 100% mortality for 24 h of exposure and in 100 ppm concentration after 48 h in the presence of *S. isoetifolium* extract. Both the extracts also showed repellent activity against the pest *Tribolium castaneum*. The repellent behavior was high in *H. pinifolia*.

The reports observed from the present study will be a baseline to understand the ecology, their association with microorganisms and seagrass defence mechanism. The screening of phytochemicals from seagrass blades also provide valuable information about the larvicidal and insect repellent activity that could lead to the development of new classes of safer insect and pest control agents.