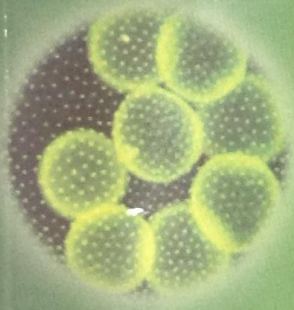

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Unique silicicolous actinobacterial community from coastal sand dune ecosystem of Keri-Terekhol

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Abstract- Relatively poor knowledge exists about Silicicolous Actinobacterial Communities. The Coastal sand dunes (CSD) being subjected to stressful environmental forces are considered as unique repositories of biotechnologically beneficial microbial genes. This work is in continuation with encouraging results previously obtained from Actinobacteria isolation from CSD of Ashvem, Morjim, Velsao, Arossim. The ecologically and geomorphologically unique Keri Coastal Sand Dune Ecosystem (KCSDE), traversing 1500 metres has so far not faced much human interference and therefore attempts were made to explore Silicicolous Actinobacterial community by periodic sampling of sand dune and application of standard bating technique. Successful colonization of Actinobacterial species e.g. *Streptomyces, Nocardia, Micromonospora* etc. were observed. Considering the Oligotrophic and nutrient poor status of KCSDE impacted by high day time radiation, both marine and estuarine tidal forced and storm surges during monsoon the actinobacterial community is subjected to continous stress. It has provided an opportunity to explore the ecological role and biochemical creativity considering the fact that Keri in Pernem taluka , is extremely vulnerable to Global Sea Level Rise (GSLR). The work presented shows that KCSDE might have provided protection to the village but time is running out due to threat posed by GSLR for systematic bioprospecting of its multifarious microbial flora and scout for biotechnologically important Actinobacterial species.

Introduction

Sand dunes are nature's first line of defense to coastal areas. These areas are ecologically sensitive and the geomorphological features which play a role in maintaining the integrity of the coast. Goa has 105 km long coastline of which 70 km is made up of sandy beaches. The entire sand dune belt of Goa is subdivided into four major parts viz., Keri-Morjim, Caranzalem - Miramar, Velsao - Mobor, and Talpona - Galgibag. Coastal sand filters large amount of organic and inorganic matter from terrestrial and marine environment harbours large diversities of microorganisms. Beaches receive large inputs of organic matter from waste products of marine flora and fauna which generates optimal conditions for the growth of high population of microorganism – mainly bacteria and also fungi, yeast and actinomycytes - that can adopt to constantly changing environment. These organisms colonize on sand grains and nutrient cycling. The sand dunes are constantly subjected to strong environmental variation in terms of rate of sun exposure, immersion, rainfall, nutrients, salinity (Viera et al 2001) both marine and estuarine tidal forces, storm surges, erossive forces, thermal gradient, con-

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struction, mining of sand, disposable fire and oil spills. Actinobacteria harbouring these dunes are more likely to produce biotechnologically useful secondary metabolites for survival under such conditions.The objective of the present work was to study the unique silicicolous Actinibacterial community from sand dune ecosystem of Keri-Terekhol.

Materials and methods

Coastal sand dunes of Goa are depicted (**Fig. 1**), which indicates geographical position of KCSDE towards northernmost part of Goa on the mouth of river Terekhol (**Fig. 2**), shows the strategy used for selection of sampling locations and processing of the samples to obtain pure Actinobacterial cultures.

The sampled sites (**Fig. 3**) are spread in roughly N-S direction for a length of 1500-1700m at MSL of 10-11m. The samples were drilled at a depth of upto 20cms from dune surface. The microcosm (**Fig. 4**) were prepared as per Velho-pereira and Kamat (2012). Standard techniques were used to isolate and maintain cultures.

Results and Discussion

The microcosm prepared with samples yielded active colonization of Actinobacteria. **Fig. 5.1** to **5.7** shows the morphology of actinobacterial cultures. Most of these colonies were tentatively identified as *Streptomyces* , *Actinomadura, Nocardia* . Total 15 Actinobacterial starins were recovered . The GSLR has been rapidly rising due to human interference and constant climatic changes. Village Keri in Pernem taluka is extremely vulnerable to global sea level rise. The presented work shows that KCSDE might have provided protection to the village. KCSDE is a rich source of biotechnologically important Actinobacterial species as shown in this study yielding 15 dffrerent starins. The increase in the GSLR will have an impact on the sources as shown in the **Figures** above. Increase in sea level (**Fig. 6.2**) to 2m will submerge 10% of the total area, which will cover up the mangrove areas. On 4m GSLR (**Fig. 6.3**) approximately 20% of the total area will be submerged which includes the cultivation land. A higher risk at 6m (**Fig. 6.4**) GSLR will submerge approximately 40% of the total area which will include the coastal sandunes. A total loss at arise of 9m (**Fig. 6.5**) GSLR will show a major damage of KCSDE. It is therefore imperative that the biotechnologically important Actinobacterial diversity is mapped and useful cultures isolated before KCSDE permanently irreversibly is swallowed by the rising sea. Although modest in its attempt, the present work claims to point out the importance of tropical coastal sand dunes as rich repositories of important actinobacteria.

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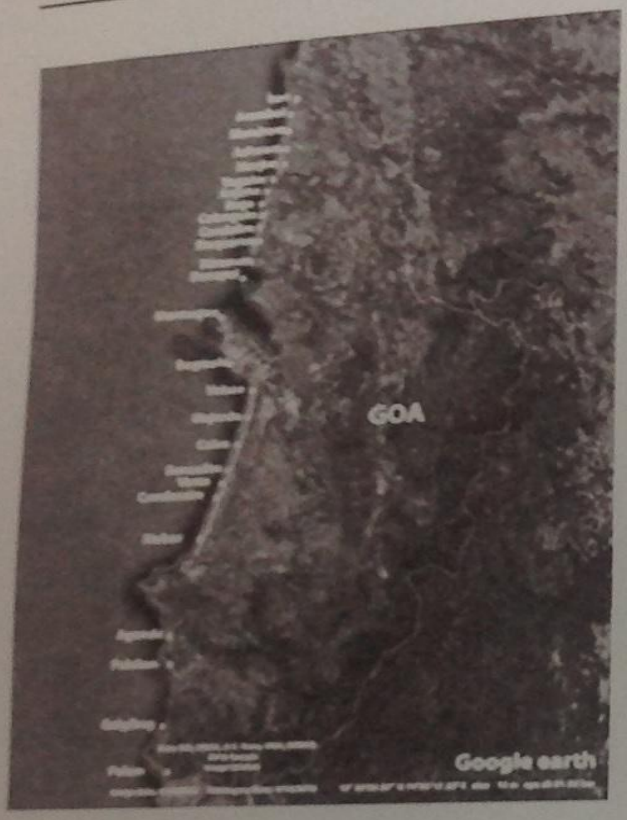

Fig.1: Distribution of sand dunes in Goa

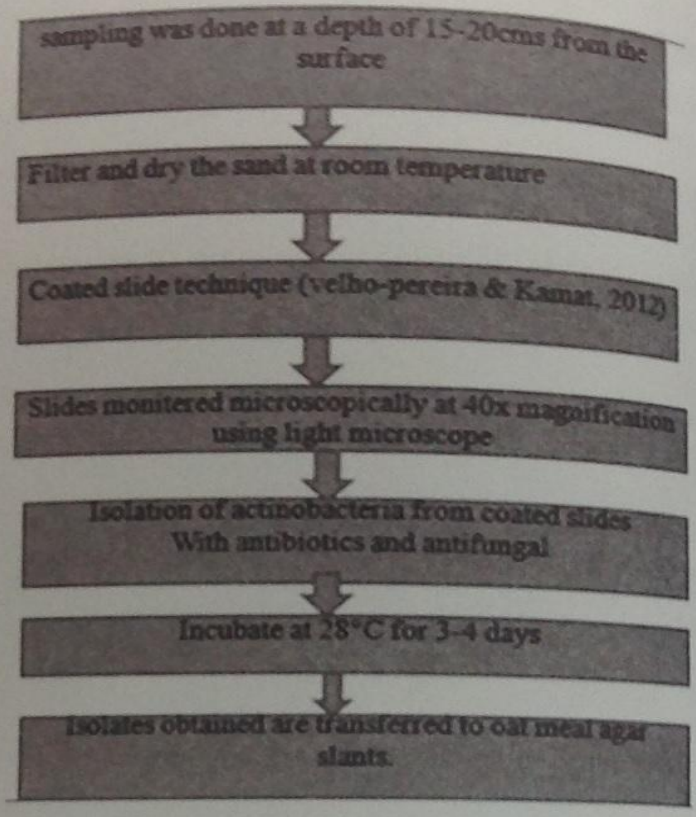

Fig. 2: Materials and Methods

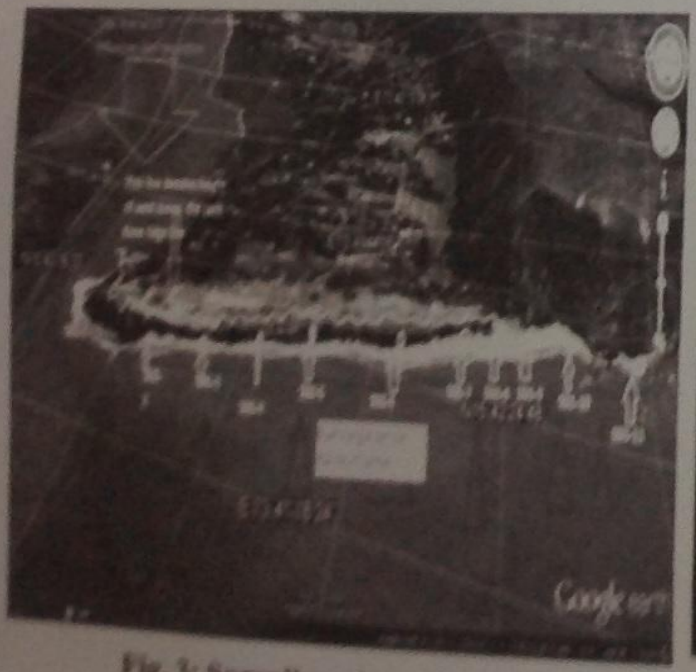

Fig. 3: Sampling sites

Fig. 4: Coated slide technique

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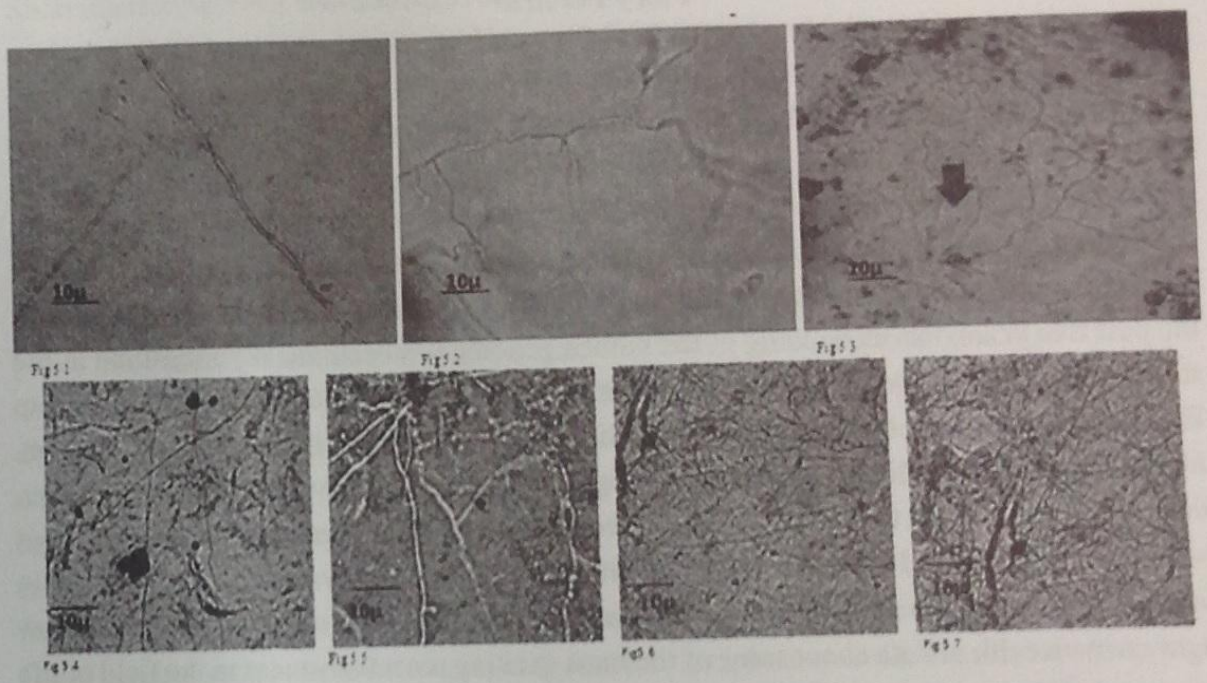

Fig. 5: Colonization of actinobacterial species

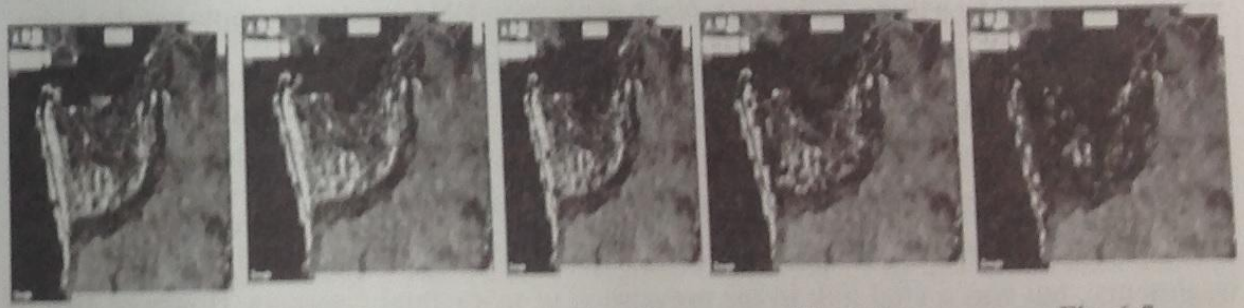

Fig. 6.1 Fig. 6.2 Fig. 6.3 Fig. 6.4 Fig. 6.5