THE ROLE OF HALOPHILIC BACTERIA IN SALT CRYSTALLISATION

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EXTENDED ABSTRACT

In India , common salt is produced from sea water along east and west coasts, from subsoil brine at Rann of Kutch , Gujarat, Tamil Nadu and from saltlakes in Rajastan , by solar evaporation. However, it is also manufactured from inland sources of brine whose salinity is higher than the salinity of the sea water. The hydro biological activity in a solar salt operation greatly determines salt production quality and quantity. It is generally considered that Artemia, a major Faunal element of hyper saline ecosystems, a continuous filter feeder ingest all organic particles and act as vacuum cleaners. They are converting any particular matter in to biomass, cyst or foecal pellets which do not interfere with the salt production. But the brine shrimp excrete their waste in membrane bound foecal pellets which sink to the bottom and form a good organic substrate for Halobacterium. They absorb heat and faster the salt crystallization. Thus in the solar salt production, active organic contribution from biological components are required for better quality.

Hence in the present study, investigated the halophilic bacteria distribution in salt crystallizers and its role for the formation of large crystals of salts .The study area has been selected by taking bore well water from Gandhidham, near Arabian sea, Gujarat , India. The salinity is found to be 140 ppt. The samples were collected and halobacterium were isolated. It was further sub cultured and growth of holophylic bacteria was monitored under prepared culture medium. The samples indicated the isolates contain several species of saltern bacteria. The rate of crystallization was found to be faster under halophilic bacteria and also clear, large size crystals were found. Taking the advantages the role of halobacteria on quality salt production, there is an ample scope for mass management of extensive area of salt work for biological management in a balanced way.

Key words: Halobacterium sp., quality salt, bore well water, Arabian sea.

INDTRODUCTION

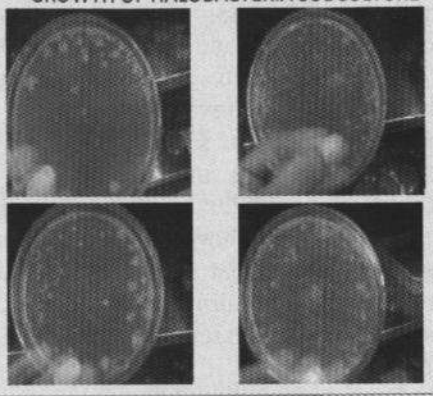
The solar evaporation of sea water to produce brine is not only a physical process but there is also an organic contribution from the biological communities within the pond ecosystem. Hypersaline water, previously thought to be lifeless, contains primary producers, consumers and decomposers like any other ecosystem. The organic contribution to the evaporation process influences production of salt (Rahaman et. al 1993). Algal blooms induced by natural availability of organic or inorganic nutrients are beneficial since they aid in increased absorption of solar heat resulting in faster evaporation which in-turn increases the salt quantity. It is also essential that they are metabolized in time, if not as excretory products or in decomposed state, the algae can act as chemical traps and consequently prevent early precipitation of Gypsum (Davis, 1973), contaminating the sodium chloride crystals which reduces the salt quality. Further more organic impurities can contaminate and induce formation of small crystals. High water viscosities may inhibit salt crystal formation and precipitation whereas formation of larger crystals occurs at lower levels. Under the extreme saline conditions only two or three algal species and bacterial species to grow and multiply and it was recorded that mucilaginous secretions of algae found to increase brine viscosity, hamper salt crystallization process and contaminate the salt. (Sorgeloos, 1983). Thus in a salt work producing quality product at the design capacity, a balanced biological system is essential. Present study was undertaken to find out the role of halobacteria in the crystallization and quality salt production of the bore well water having high salinity.

RESULT.

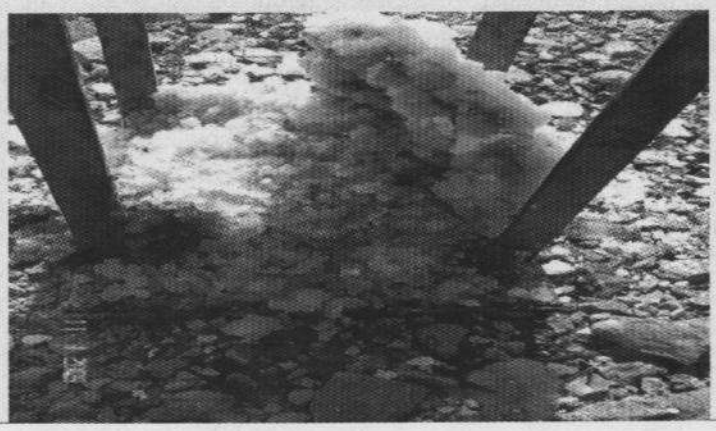
The study area selected was solar salt production site using bore well water at Gandhidham, India, which is near to Arabian sea. Salinity is found to be 140ppt. Brine samples were collected from various locations and analyzed for chemical and for bacteriological studies. The isolates of bacteria from salt ponds after identification were inoculated into different halophilic media to analyse the effect of media components on the growth of the bacteria. This was done to standardize and found the suitable media for the isolation and cultivation of bacteria. The media used were Alkaline peptone, water, halobacteria medium, synthetic water medium. The saltern bacteria showed varying pigmentation and the isolates were inoculated in to synthetic NaCl solution and incubated at 35 C for 14 days.

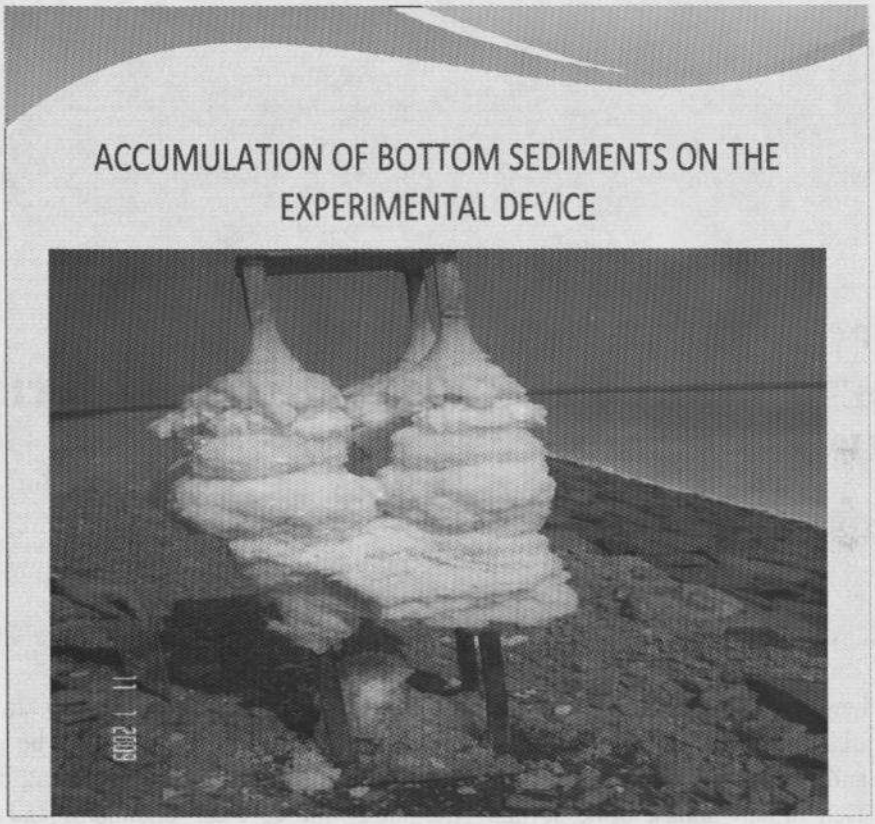
SOLAR SALT WORKS,GANDHIDHAM
considered for our study

GROWTH OF HALOBACTERIA SUBCULTURE



COLLECTION OF NaCl SAMPLES FROM THE EXPERIMENTAL DEVICE





The rate of crystallization was observed with and without halobacterium culture. It was observed after 25 days that large size crystals of salts have been formed under halobactriam culture tray. The study reveals that the need of biological management for the quality salt production of design capacity.