

Research Article

Biosurfactant producing diazotroph *Azotobacter salinestris* isolated from North Gujarat

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Summary

A total of 21 isolate of nitrogen-fixing bacteria were isolated from rhizospheric soils of different agricultural plant species, including rye, maize and wheat, from North Gujarat, using nitrogen-deprived selective isolation conditions. Ability to fix nitrogen was verified by the acetylene reduction assay. Out of them one individual isolate was found to produce biosurfactant. Biosurfactant production was confirmed by conventional screening methods, including haemolytic, drop collapsing and lipase production activity. These studies revealed that the isolate produced surface active agents which degrade oil and hence, find its importance in oil contaminated soils to maintain soil fertility by performing dual role of nitrogen fixation and oil degradation. Molecular identification results from 16S r-DNA analysis were also corroborated by morphological and biochemical data.

Key words : N₂ fixation, Biosurfactant production, 16S r-DNA sequencing, *Azotobacter salinestris*

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Introduction

The source of soil nitrogen is the atmosphere where Nitrogen gas occupies about 79 per cent of the total atmospheric gases. Living organisms that are present in the soil have profound effect on N₂ transformation, which provide food and fibre for an expanding world population. Although nitrogen is very abundant in nature; it often limits plant productivity because atmospheric nitrogen is only available to a very narrow range of organisms belonging to diazotrophs, symbiotically and non-symbiotically. Biosurfactants are microbial surface active agents produced by certain microorganisms during their growth phase. They may be extracellular or intracellular in nature (Chen *et al.*, 2007). Substrates for biosurfactant production are sugars, oils, alkanes and waste materials (Lin, 1996). Biosurfactants are amphiphilic, non-toxic and biodegradable molecules with high

specificity (Cooper and Zajic, 1980). They are highly stable at extremities of temperature, pH and salt concentration (Desai, 1987). These molecules have the ability to decrease the surface tension, critical micelle concentration and interfacial tension (Banat, 1994). Biosurfactants are thus used as an alternative for chemical surfactants. They are highly useful in agriculture, food, health care and cosmetics industries (Kokare *et al.*, 2004).

Resources and Research Methods

Sample collection and processing :

Rhizosphere soil at a depth of 0 to 15 cm was sampled from an area of 100 m² during 2010 from Sabarkantha, Banaskantha, Patan and Mehsana districts of North Gujarat.

Isolation of pure culture :

Discrete well-developed and separated colonies from the