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Isolation of *Lactobacilli sp.* from Various Nondiary Substrates—A Review

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Abstract

Lactic acid bacteria (LAB) have also been delineated as bioprotective agents. Efficient pathogens' inhibition has been derived by LAB. LAB competes with the microbes by modifying the microenvironment with their metabolic end products. The habitat of Lactobacilli is not only confined to diary but it has spread and adapted habitat to nondiary substrates too. This paper garners information about the various nonsubstrate habitats in which Lactobacilli can be isolated.

Keywords: *Lactic acid bacteria, habitat, diary, substrate, nondiary*

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INTRODUCTION

Lactobacilli are the major type of lactic acid bacteria (LAB) which have been shown to act as a preservative as well as a probiotic agent [1]. Probiotics means, it provides beneficial effects of microorganisms on human health. Probiotics are products availed as dietary supplements to copious the growth and health of the humans and animals [2].

ASSESSMENT OF *LACTOBACILLUS SPP.* POPULATION FROM TUBA INOCULATED IN DIFFERENT BEVERAGES

Tuba samples were mainly taken from coconut trees. These samples were placed directly in five sterile plastic bottles, having 100 ml of tubâ in each bottle, as soon as the harvester of tuba reaches the ground [3, 4]. It was taken from the coconut trees mainly in the afternoon and was immediately brought to the laboratory for *Lactobacillus* isolation, purification, inoculation, and population counting in four beverages [5].

Isolation and Characteristics of Lactic Acid Bacteria Isolated from Ripe Mulberries

Mulberry (*Morus australis*) has been cultivated in Southeastern Asia for thousands of years. The leaves of mulberry trees represent indispensable food for silkworms and the ripe fruits are edible and have been widely availed in juices, wines and jams [6, 7]. The ripe fruit is sweet with a very mild flavour. LAB have been availed as food and feed preservatives for centuries, and bacteriocin-producing LAB could replace chemical preservatives for the prevention of bacterial spoilage and the outgrowth of pathogenic bacteria in food products [8].

Isolation of LAB

MRS (de Man, Rogosa, and Sharpe)-agar plates were availed for the isolation of LAB. To distinguish acid-producing bacteria from other bacteria, 1% $CaCO_3$ was added to the MRS-agar plates. Each mulberry sample was crushed and mixed with 0.75% NaCl solution. Dilutions of the mixed solution (10- to 1000-fold) were uniformly spread directly onto the surface of MRS-agar plates [9].

The Homofermentative Lactobacilli of Apple Juice

Homofermentative lactobacilli producing majorly lactic acid and only traces **of** byproducts from carbohydrates are also present in apple juice [10]. They occur in large numbers on apples and have observed considerable fluctuations in their population during growth and development of the fruit on the tree. Freshly expressed juice from healthy fruit always contains a small number of these bacteria, but when the fruit contains an increased proportion of rot their incidence in the juice aggrandize. For the synthesis **of** pure natural apple juice, the juice is always fined and filtered prior to bulk storage in refrigerated pressure tanks, and this

treatment decreases the complement of organisms in the juice [11].

Organisms Isolated

Many cultures of homofermentative lactobacilli were encountered.

***Culture* 1.** Isolated from fresh juice and apples availed for the production of juice, was present on sound fruit and also on fruit infected with Blue Mould *(Penicillium expansum)* and Brown Rot *(Sclerotinia fructigena),* thus representing a wide distribution [12]. It was also encountered in tank-stored juice but sporadically diminished during storage. On nutrient agar it appeared as nonsporing, nonmotile, single rods and also in short chains. The rods were Gram-positive and catalase negative. After 7–14 days some curved forms were observed [13].

Isolation, Characterization and Identification of Lactic Acid Bacteria from Fruit Juices

Fresh synthesize such as fruits and vegetables, are the normal part of human diet and are consumed in large quantities in most civilizations. Fruits and vegetables have been regarded as microbiologically safer than other unprocessed food items such as meat, milk, eggs, poultry and sea food [14]. These products are rich in carbohydrates and poor in proteins with pH value from 7.0 to slightly acidic and provide a suitable habitat to many bacteria, yeasts and moulds. In contrast to vegetables, fruits have good record from public health standpoint. Many fruits possess a natural defense mechanism [15]. Fruits comprise organic acids in quantities adequate enough to contribute a pH value of 4.6 or lower. The pH and the type of the acid itself are the major influence that select for major microflora in fruits. Acid tolerant microbes such as fungi and LAB are demonstrated as a part of autochthonous microflora of tomatoes owing to its low pH and organic acids. Food-borne bacteria capable of causing human illness cannot grow at a pH less than 4.0, so edible portion of most fruits avert the involvement as substrate for proliferation of human pathogen. Rich nutrients, such as carbohydrates, minerals, nitrogen compounds and a low pH environment are necessary for the growth of LAB. Fruit juices cater as an intriguing substrate for proliferation of LAB [16]. LAB and microorganisms most frequently availed as probiotic agents also exist as the part of indigenous microflora of fruits. An extensive research was focused on isolation of LAB from a variety of fruits. LAB majorly genus *Lactobacillus* are one of the most distinguished probiotics and have been reported to be a valuable adjunct to food, ultimately boosting health and vitality to an enormous extent. The traditional food preservatives that may lead to the formation of potentially carcinogenic byproducts (Nitrosamines from nitrites) have created an interest in natural antimicrobials [17]. During last few years there have been great efforts to use living microorganisms as an alternative to chemical pesticide. Strains of the LAB are one of the most relevant biocontrol agents that are categorized as biological control agents (BCA).

Isolation and Microencapsulation of *Lactobacillus* spp. from Corn Silage

Probiotics such as lactobacilli are useful to enhance the health and immunity. Encapsulation using alginate is a nontoxic, economically viable, biocompatible medium used to encapsulate biological components. Chitosan is another encapsulating material, which is a linear polysaccharide which aids in corn silage encapsulation [18–20]. Lacobacilli—a heterofermentative bacteria—was isolated from corn silage.

***Lactobacillus nagelii* sp. nov.—An Organism Isolated from a Partially Fermented Wine**

Sluggish or stuck alcoholic fermentations are problems sometimes highlighted by wine makers. These problems in fermentations can be due to unsterilized fermentation conditions or to insufficient nutrients being present in the grape must to support adequate yeast growth. The majorly isolated were three strains of LAB that could slow the fermentation of a Chardonnay grape juice. Species of Lactobacillus that have been isolated from grapes and wines were *Lactobacillus brevis, Lactobacillus buchneri, Lactobacillus casei, Lactobacillus fermentum (Lactobacillus cellobiosus), Lactobacillus curvatus, Lactobacillus delbrueckii, Lactobacillus fructivorans, Lactobacillus hilgardii,*

Lactobacillus jensenii and *Lactobacillus plantarum*. However, most lactobacilli found in wines are considered to be spoilage organisms, due to production of acetic acid [21].

CONCLUSION

There are many species of lactobacilli, *Lactobacillus brevis*, *Lactobacillus buchneri*, *Lactobacillus casei*, *Lactobacillus fermentum* (*Lactobacillus cellobiosus*), *Lactobacillus curvatus*, *Lactobacillus delbrueckii*, *Lactobacillus fructivorans* (*Lactobacillus trichodes*), *Lactobacillus hilgardii*, *Lactobacillus jensenii* and *Lactobacillus plantarum.* These lactobacilli species is having indigenous features and is isolated from various nondiary substrates such as fermented alcoholic products, soy milk, corn silage etc. This paper provides information regarding the growth pattern of lactobacilli in nondiary substrates.

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