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Isolation, characterization and production studies of lactic acid bacteria from *Hordeum vulgare*

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ABSTRACT

Lactic acid is present in plants, animals and micro-organisms widely used in food industry, pharmaceutical, textile and leather industries. Lactic acid production has been studied recently with increased interest because of its application in the synthesis of biodegradable, biocompatible plastics and coatings. L (+) lactic acid can be polymerized to form polylactic acid (PLA). The present study is intended to isolate lactic acid from the micro-organisms of cereal grain barley *(Hordeum vulgare)*. From that total 14 type of bacterial strains were isolated ($B_1 - B_{14}$). Among the isolated colonies B_6, B_9, B_{11} produced maximum amount of lactic acid that is 19.33, 19.15 and 19.01mg/ml respectively. The production was enhanced by fermentation with various agitations and different media variation were studied. These isolates were starch hydrolyzing hence could be used for large scale lactic acid production by fermentation using starchy substrates.

Key words : *Hordeum vulgare,* Lactic acid, Starch hydrolysis, Fermentation

Lactic acid, also known as milk acid or 2-hydroxypropanoic acid, is a carboxylic acid with a chemical formula of $C_3H_6O_3$ (Lockwood *et al.,* 1965). It is present in plants, animals and micro-organisms with a long history of usage in the food industry (Davison *et al.,* 1995). Lactic acid and its salts are widely used in pharmaceutical, textile and leather industries (Vick Roy, 1985) for the production of base chemicals like acetaldehyde, acrylic acid, propionic acid etc. Lactic acid production has been studied with increased interest because of its application in the synthesis of biodegradable, biocompatible plastics and coatings. L (+) lactic acid can be polymerized to form polylactic acid (PLA) (Datta *et al.,*1995; Litchfield, 1996).

Of the 80,000 tonnes of lactic acid produced worldwide every year about 90 % are made by lactic acid bacterial fermentation and the rest is produced synthetically by the hydrolysis of lactonitrile (Kadam *et al.,* 2006). The biotechnological production of lactic acid has been gradually gaining support from industry, due to depletion of petroleum resources and environmental pollution problems. However it is necessary to develop inexpensive raw materials for lactic acid fermentation because lactic acid must be produced cheaply (Oh *et al.,* 2003; Hofvendahl and Hahn- Hagerdal, 2000; Kulozik and Wilde, 1999; Schmidt and Padukone 1997; Wee *et al.,* 2004)

The lactic acid bacteria are collectively assigned to the family Lactobacteriaceae. Lactic acid bacteria (LAB) consist of gram positive genera; *Lactococcus Lactobacillus, Leuconostoc, Streptococcus, Enterococcus, Carnobacterium, Oenococcus, Pediococcus, Tetragenococcus, Vagococcus,* and *Weissela,* and they ferment carbohydrates via different pathways resulting in homo, hetero-, or mixed acid fermentation (Stiles and Holzafel, 1997), the homofermentive pathway give only lactic acid as the major end product of glucose catabolism through Embden-Mayerhof-Parnas (EMP) pathway, while the hetero or mixed acid fermentation pathway give not only lactic acid, but acetic and formic acids as byproducts. Strains of *Lb.delbrucekii* are often used as the commercial production of lactic acid (Datta *et al.,*1995). Currently, the strains used in the lactic acid industry are all but proprietary. However, it is belived that most of the microorganisms used belong to the genus *Lactobacillus* (Berry *et al.,* 1999; Hofvendahl *et al.,* 1999). Furthermore, most lactic acid bacteria generally have complex nutritional requirements and very low growth rates (Stainer *et al.,* 1986) which are the main drawbacks of industrial lactic acid fermentation processes.

The present paper describes the isolation,

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