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Perspective

A Note on Lactic Acid Fermentation

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DESCRIPTION

Lactic acid, an enigmatic chemical has extensive uses in food, pharmaceutical, leather, textile industries and as chemical feed stock. Novel applications in synthesis of decomposable plastics have increased the demand for lactic acid. Microbial fermentations are preferred over chemical synthesis of lactic acid due to several factors. Refined sugars, though costly, are the choice substrates for lactic acid production using *Lactobacillus* sps. Complex natural starchy raw materials used for production of lactic acid involve pre-treatment by gelatinization and liquefaction followed by enzymatic saccharification to glucose and consequent conversion of glucose to lactic acid by *Lactobacillus* fermentation. Direct exchange of starchy biomass to lactic acid by bacteria possessing both amylolytic and lactic acid producing character will remove the two step procedure to make it economical.

Lactic acid fermentation frequently suffers end-product inhibition which diminutions the cell growth rate. The inhibition of lactic acid is due to the solubility of the un-dissociated lactic acid within the cytoplasmic membrane and insolubility of dissociated lactate, which origins acidification of cytoplasm and failure of proton motive forces. This phenomenon influences the transmembrane pH gradient and diminutions the amount of energy existing for cell growth. In general, the restriction imposed by lactic acid on its fermentation can be circumvented by extractive fermentation methods, which can also be exploited for product recovery. Recently, lactic acid production from renewable materials has increased enormous attention due to the numerous functional belongings it offers in different fields. The high yield productivity of lactic acid by using economical and easily available substrates has received immense attraction in the petrochemical industry. Biomass or waste materials from numerous sources have become a substantial concern because they cause severe environmental pollution if disposed of improperly. Hence, the employment of an incorporated biorefinery platform for waste materials is an ideal option to produce high-value bio-products while remediating the waste. Optical pure lactic acid production through fermentation has gained interest due to its high potential applications in pharmaceutical and cosmetic industries as well as highly promising packaging materials. The manufacturing of a decomposable bioplastic from polylactic acid materials is a green alternative to that derived from petrochemicals. However, high manufacturing costs have inhibited the widespread application of polylactic acid due to the high cost of lactic acid fabrication.

Lactic acid fermentation represents the easiest and the most appropriate way for increasing the daily consumption of fresh-like vegetables and fruits. Lactic acid bacteria are a minor part of the autochthonous microbiota of vegetables and fruits. The diversity of the microbiota markedly depends on the inherent and extrinsic parameters of the plant matrix. Notwithstanding the reliable value of the impulsive fermentation to stabilize and preserve raw vegetables and fruits, the numeral factors are in favor of using selected starters. Two main choices may be pursued for the controlled lactic acid fermentation of vegetables and fruits: the use of commercial/allochthonous and the use of autochthonous starters. Numerous evidences were defined in favor of the use of selected autochthonous starters, which are tailored for the particular plant matrix. Pro-technological, sensory and nutritional criteria for selecting starters were described as well as several functional properties, which were recently ascribed to autochthonous lactic acid bacteria. Tailored lactic acid bacteria starters completely exploit the potential of vegetables and fruits, which improves the hygiene, sensory, nutritional and shelf life properties.

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