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A Research Perspective on The Utilization of Sweet Potato as A Growth Medium for *Lactobacillus* Sp

Abdulkhkim Sharaf Eddin and Salam A Ibrahim*

Food Microbiology and Biotechnology Laboratory, Food and Nutritional Sciences Program, North Carolina A&T State University, Greensboro, NC 27411, USA

*Corresponding author: Salam A. Ibrahim, Ph.D. Food and Nutritional Sciences Program, North Carolina A&T State University, Greensboro, North Carolina, United States, ibrah001@ncat.edu

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Introduction

The pursuit of cost-effective and sustainable substitutes has prompted microbiologists to explore novel growth medium for the cultivation of beneficial bacteria. Among the hundreds of *Lactobacilli* studied, attention has been focused on the prominent role of *Lactobacillus* sp. in food fermentation, probiotics, and health supplements. Traditionally, *Lactobacillus* sp. have been cultivated in standard laboratory media such as de Man, Rogosa, and Sharpe (MRS) broth, which can be costly and may use non-renewable resources. Consequently, there is interest in using natural sources and agricultural by-products as alternative growth media [1]. One such candidate is the sweet potato (*Ipomoea batatas*), a starchy root tuber that is rich in carbohydrates, vitamins, and minerals. In this paper, we propose the potential use of sweet potato as a *Lactobacillus* sp. growth medium by pointing out advantages and limitations, as well as future implications for both research and industry..

Keywords: Sweet potato; *Lactobacillus*; Probiotics; *Lactobacilli* broth media

Nutritional Profile of Sweet Potato

Sweet potatoes are very nutritious and rich in carbohydrates, primarily starch. This carbohydrate content is essential for the growth of *Lactobacillus* sp. which ferments carbohydrates, resulting in the production of lactic acid. Additionally, sweet potato contains vitamins such as A and B complex, while the minerals are potassium, magnesium, and iron [2]. These nutrients enhance the

overall health, metabolic activity and consequent growth and survival of *Lactobacillus* sp. Moreover, sweet potatoes are rich in dietary fiber, including pectin, which could be a potential prebiotic for the growth of *Lactobacillus* sp. This prebiotic effect could thus lead to a more robust and sustained growth of *Lactobacillus* sp. cultures. As a result, sweet potato would be a very attractive medium either for laboratory experiments or in an industrial setting [3].





Figure 1: Growth of *Lactobacillus delbrueckii* subsp. *bulgaricus* in (a) sweet potato medium, and (b) MRS medium (Source, Hayek., 2013).

Cost-Effectiveness And Sustainability

Sustainability is one of the most important advantages of using sweet potatoes as a bacterial growth medium. Sweet potatoes are an agricultural product and, as such, are renewable and accessible in different regions of the world. The use of sweet potatoes as a medium supports green biotechnology principles by reducing de-

pendency on synthetic or relatively expensive medium components which helps to lower the overall cost of production. This added value of the sweet potato could also provide an economic boost in areas where sweet potatoes are a staple crop. For example, surplus or sub-quality sweet potatoes would be useful in biotechnological applications and support the circular economy and waste reduction [4].



Figure 2: Sweet potato based medium and commercial Lactobacilli MRS media used for growth of *Lactobacillus* sp.

Challenges And Considerations

A sweet potato-based medium must be prepared with careful attention to detail in order to produce a medium that is both uniform and sterile for bacterial growth. This may include washing, cooking, soaking and blending in order to create a homogenized medium. Unlike synthetic bacterial growth media, sweet potatoes may exhibit differences in nutrient content due to the particular variety, growing conditions and storage methods. As a result of these factors, varying results could occur when testing for bacterial growth, which might be a significant drawback in research as well as industrial use. However, this could potentially be overcome by standardization of preparation and even by fortifying the sweet potato medium with nutrients [5]. While sweet potatoes afford a nutrient-rich environment, the growth rates of *Lactobacillus* sp. in sweet potato-based media compared to traditional media such as MRS broth warrant thorough investigation. Some preliminary studies have shown positive results, but an extended study would help to determine whether a sweet potato medium could support growth that is consistent with levels equal to or better than those of standard media [6].

Implications and Applications

A sweet potato-based medium could be an affordable alternative for culturing *Lactobacillus* sp. and other beneficial bacteria if the aforementioned challenges could be overcome. The potential prebiotic property of a sweet potato based medium with regard to *Lactobacillus* sp. provides the opportunity for the development of new probiotic formulations known as synbiotics that offer combined benefits of both probiotics and prebiotics. Such formulations could yield an added value of enhanced digestive health, immune activity, and resistance to pathogens [7].

Conclusion

The use of the sweet potato as a growth medium for *Lactobacillus* sp. represents a promising interface among microbiology, food science, and sustainability. While there are challenges to address,

the potential advantages in terms of lowering costs and boosting probiotic efficacy make this alternative quite encouraging. With growing global demand for probiotics and fermented food, the effort should be made to replace traditional growth media with sustainable and efficient alternatives. Sweet potatoes, with their high nutrition profile and huge availability potential, could readily fulfill this demand for a natural and sustainable cultivation method for beneficial bacteria.

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