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Abstract

Utilization of Yeast Industry Waste Water by *Aspergillus niger* ATCC 16404 to Produce Citric Acid

Muhannad I. Massadeh^{1*}, Ahmad Saleem², Othman Al Sharafart³

¹Department of Biology and Biotechnology, Faculty of Science, 13115, Zarqa, Hashemite University, Jordan

²Veterinary and Agricultural Product Manufacturing Co.Ltd (VAPCO), Dhulail/Zarqa, Jordan

³North Badyah Directorate, Ministry of Education, Jordan

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Abstract

Background and aim: Citric acid is an organic acid that is widely used in food, confectionary, drink and pharmaceutical industries. In Jordan, some industries produce wastes as a result of the manufacturing process. One of the most important wastes is the Yeast Industry Wastewater (YIW) that is produced in large quantities. In this study, YIW was employed as a fermentation medium for *Aspergillus niger* to produce citric acid.

Materials and methods: In preliminary experiments growing *A. niger* in Petri-plates containing different concentrations of YIW, the results revealed that undiluted (100%) YIW was the most suitable concentration for growing *A. niger*. Shake cultures of YIW were prepared to optimize the process of citric acid production.

Results: The results revealed that fungal growth and metabolism were achieved when the fungus was grown at 27 °C in a YIW medium pH of 6.0, supplied with 0.5% KH₂PO₄, 2% ammonium sulphate, and 10% sucrose. A batch culture bioreactor experiment was conducted using Continuous stirred tank reactor at the optimum conditions mentioned above. This experiment contributed to enhance citric acid production by 19 folds recoding a concentration of 36.4 g/l after 7 days of fermentation compared to shake culture experiments. The total carbohydrates concentration kept decreasing while the citric acid concentration was elevating to record a maximum yield (YP/S) of 31%.

Conclusion: In conclusion, YIW is a promising media for citric acid production with additional benefits of its use with regard to environmental and economic aspects.

Keywords: *Aspergillus niger; Citric acid, Optimization, Yeast, Industry, Wastewater*

***Corresponding author:** Muhannad I. Massadeh, Department of Biology and Biotechnology, Faculty of Science, 13115, Zarqa, Hashemite University, Jordan.

E-mail address: massadeh@hu.edu.jo