Investigation of Biosurfactant Quality Generated from Fungi using Agrowaste (Cassava Peels, Yam Peels and Potato Peels)

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Abstract:

Background: Biosurfactant are produced extracellularly by microorganism on cell surface or excreted extracellularly. They are involved in the reduction of surface and interfacial tension between molecules at the surface and interface, respectively. Thus, this study was conducted to determine and compare the capability of biosurfactant production from immediate agrochemical wastes (yam peel, cassava peels and sweet potato peels) using fungi isolates.

Materials and Method: The test fungi (Aspergillus niger and Fusarium oxysporum) were isolated from yam, potato and cassava peels showing advanced rottenness. Standardized production of biosurfactants using well researched protocol involving media and inclusion of agrochemical wastes in a fermentation broth containing the isolated fungi was carried out.

Results and Discussion: The highest biosurfactant activity value obtained was with F. oxsporum on yam peels with emulsification index (EI) of 94.2±0.20% on kerosene after 72 hours (EI72). While the lowest activity of biosurfactant was observed in A. niger grown on cassava peels broth with EI72 activity of 36.36±0.53% on diesel. The trend showed that emulsification index on diesel after 24 hours (E24) with biosurfactant from A. niger grown in yam peel broth gave the highest EI concentration (48.42±0.14%) followed by biosurfactant from F. oxysporum cultured in yam peels (48.27±0.99%). In comparison with kerosene emulsion formed: biosurfactant from F. oxysporum grown in yam peels showed highest EI (94±0.10%) followed by A. niger cultured in yam peels (78.72±1.08). The EI results showed that yam peel served as a better substrate for biosurfactant production while F. oxysporum is the better biosurfactant producing fungi. The EI values were slightly maintained for 48hrs (EI48) and 72hrs (EI72). The result of the oil spreading assay using engine oil revealed that biosurfactants produced by F. oxysporum grown on sweet potato peels broth displaced more area of expired engine oil in water by forming miscelles with oil displacement area (ODA) of 9.08±0.02cm2 followed by biosurfactant from A. niger grown in sweet potato broth with ODA of 8.04±0.38 cm2. In terms of substrate specificity the sequence of increment in EI was: Yam>Cassava>Sweet potato. However, considering the critical micellar level or the oil displacement ability of the product, the sequential increment was: Sweet potato>Cassava>Yam peels.

Biography:

Dr. C. S. Ezeonu is a Senior Lecturer in the Department of Biochemistry, Federal University Wukari, Taraba State Nigeria. He obtained his B.Sc. (Biochemistry/Microbiology) in 2001, M.Sc. (Environmental Toxicology) in 2004 and Ph.D in Biochemistry (Environmental Toxicology) in 2009 from University of Nigeria, Nsukka. He has taught Industrial Biochemistry, Toxicology, Biostatistics, Environmental Health Nutrition, Advanced Toxicology and Bioenergetics at both undergraduate and postgraduate levels. Dr. Otitoju is a member of West Africa Society of Toxicology, Society of Environmental toxicology and chemistry Europe/Africa (SETAC). Olawale is the current Coordinator of SETAC for Central and West Africa regions. He has good mastery of the computers and its applications to problem solving situations including data analysis.

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