

## 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. oxysporum* on yam peels with emulsification index (EI) of  $94.2 \pm 0.20\%$  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  $36.36 \pm 0.53\%$  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 ( $48.42 \pm 0.14\%$ ) followed by biosurfactant from *F. oxysporum* cultured in yam peels ( $48.27 \pm 0.99\%$ ). In comparison with kerosene emulsion formed: biosurfactant from *F. oxysporum* grown in yam peels showed highest EI ( $94 \pm 0.10\%$ ) followed by *A. niger* cultured in yam peels ( $78.72 \pm 1.08$ ). 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  $9.08 \pm 0.02 \text{ cm}^2$  followed by biosurfactant from *A. niger* grown in sweet potato broth with ODA of  $8.04 \pm 0.38 \text{ cm}^2$ . 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.

**Conclusion:** The biosurfactant produced shows more cleansing ability towards kerosene than it does for diesel. Conversely, it could be channelled toward clean-up of kerosene viz a-viz crude oil contaminated surfaces and environment.

### Biography:

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