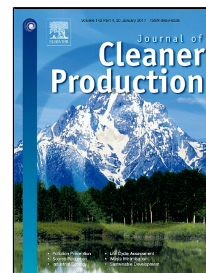


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Environmental and energy analysis of biopolymer film based on cassava starch in Brazil



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20 Highlights

- 21 • We verified the environmental and energy impacts of processing cassava biofilm in Brazil
- 22 • The main impacts refer to cassava cultivation, energy consumption, and additives
- 23 • Hypothetical scenarios for improving the processing performance were verified
- 24 • Industrial processes have more decisive impacts than agricultural processes
- 25 • The combination of biofilm with fossil film was positive on an environmental level

26

27 *Abstract:*

28 Consumer markets have questioned the use of plastics in packaging because of their environmental
29 impact, and alternative, bio-based films are being developed for this purpose. This study employs Life
30 Cycle Assessment to analyze the environmental and energy performances of producing cassava starch-
31 based film made from casting in Brazil. Results indicate that impacts are mainly caused by the cassava
32 crops, the film manufacture, and the fossil glycerin and ethanol additives used. Resource efficiency and
33 cleaner production measures were devised to reduce the environmental and energy impacts of the product.
34 In terms of energy, an arrangement using both renewable glycerin and biofilm made by extrusion
35 combining cassava starch and polyethylene was shown to be an adequate option to reduce impact. The
36 use of sugarcane ethanol led to an increase in impact for most of the analyzed categories. On the other
37 hand, if the carbon balance considers both carbon dioxide sequestration and biogenic carbon dioxide
38 emissions, the use of renewable alcohol leads to lower impact in Climate Changes. This systemic analysis
39 also allowed for the identification of trade-offs in terms of environmental impacts when considering
40 cultivating and processing cassava in other sites.

41

42 *Keywords:* LCA; energy and environmental performance; casting; packaging; biopolymer film; cassava.

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