

## Optimization of the Production Processes of Biodiesel from a Locally Sourced *Gossypium herbaceum* and *Moringa oleifera*

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**Abstract :** This research project addresses the optimization of biodiesel production from *Gossypium herbaceum* (cottonseed) and *Moringa oleifera* seeds. Soxhlet extractor method using n-hexane for *Gossypium herbaceum* (cottonseed) and ethanol for *Moringa oleifera* were used for solvent extraction. 1250 ml of oil was realized from both *Gossypium herbaceum* (cottonseed) and *Moringa oleifera* seeds before characterization. In transesterification process, a 4-factor-3-level experiment was conducted using an optimal design of Response Surface Methodology. The effects of methanol/oil molar ratio, catalyst concentration (%), temperature (°C) and time (mins), on the yield of methyl ester for both cottonseed and *Moringa oleifera* oils were determined. The design consisted of 25 experimental runs (5 lack of fit points, five replicate points, 0 additional center points and 1 optimality) and provided sufficient information to fit a second-degree polynomial model. The experimental results suggested that optimum conditions were as follows; cottonseed yield (96.231%), catalyst concentration (0.972%), temperature (55°C), time (60mins) and methanol/oil molar ratios (8/1) respectively while *Moringa oleifera* optimum values were yield (80.811%), catalyst concentration (1.0%), temperature (54.7°C), time (30mins) and methanol/oil molar ratios (8/1) respectively. This optimized conditions were validated with the actual biodiesel yield in experimental trials and literature.

**Keywords :** optimization, *Gossypium herbaceum*, *Moringa oleifera*, biodiesel

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