Detergent assisted lipid extraction for biodiesel
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Background

Problems

Objective

Response surface methodology
- Four important parameters
  - N-LS concentration
  - N-LS volume
  - Incubation time
  - Incubation temperature

Experimental design

Results

Figure 1: Experimental design using Box Bekhen design

Box Bekhen Design (BBD)
Four factors

- N-LS (0.5 – 2% w/v)
- N-LS volume (0.5 – 2 mL)
- Temperature (25-30°C)
- Incubation time (5 – 15 min)

Figure 2: Response surface plots for lipid extraction efficiency (%/w/w) at varying concentrations

Fatty acids

<table>
<thead>
<tr>
<th>Relative amount of total fatty acid (% w/w)</th>
<th>Conventional chloroform methanol (2:1 v/v)</th>
<th>N-lauryl sarcosine + chloroform/methanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palmitic acid (C16:0)</td>
<td>17.2</td>
<td>16.2</td>
</tr>
<tr>
<td>Palmitoleate (C16:1n7)</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Stearic (C18:0)</td>
<td>5.1</td>
<td>4.5</td>
</tr>
<tr>
<td>Oleic (C18:1n9)</td>
<td>45.6</td>
<td>42.5</td>
</tr>
<tr>
<td>V vaccenic (C18:1n7)</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td>Linoleic (C18:2n6)</td>
<td>24.7</td>
<td>30.2</td>
</tr>
<tr>
<td>Linolenate (C18:3n3)</td>
<td>1.3</td>
<td>1.5</td>
</tr>
<tr>
<td>C23:0</td>
<td>4.6</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Table 1: Comparison of fatty acid profiles between conventional and N-lauryl sarcosine assisted lipid extraction processes

Conclusion

N-lauryl sarcosine aided cell disruption and lipid release from the cells followed by lipid extraction using a lower volume of chloroform and methanol (1:1 v/v) revealed a high lipid extraction efficiency of 98.2% (w/w)

References