COMPARATIVE STUDIES OF ETHANOL PRODUCTION FROM DIFFERENT FRUIT WASTES AND DETERMINATION OF PRODUCTION EFFICIENCY

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COLLEGE: M.S RAMAIAH COLLEGE OF ARTS SCIENCE AND COMMERCE
BRANCH: BIOTECHNOLOGY ENGINEERING
GUIDES: DR. LAKSMI KANTH R.N
STUDENTS: MR. HARSHA S
MR. NIRANJAN S N
MR. VINAYPRASAD M M

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Introduction: It is used as a fuel additive and also as an important industrial ingredient, a base chemical for other organic compounds, medical wipes and as an antibacterial, hand sanitizer gels, antiseptic etc. Ethanol from biomass-based waste materials is considered as bioethanol. Vehicles are run with petrol/diesel, causing environmental pollution, to reduce the pollution bioethanol can be used as an alternative fuel.

Objectives
The objective of the project is to produce bioethanol from different fruit wastes at a low cost and to determine the production efficiency of bioethanol.

Methodology
Mass multiplication: by growing SY1 in malt agar media and allowing it for mass multiplication in 15% sugar solution for 8-10 days.
Different fruit wastes were collected from the market areas in Bangalore. Fruit wastes of Banana, Orange, Papaya, Grapes and Chikoo were collected. Partially rotten and damaged fruits were selected
The substrate was prepared by washing it thoroughly with 5% KMno4 for 30 mins and autoclaved. TSS was determined using Hand refractrometer. pH and temperature was maintained at 3-4 and 30-35°C respectively
For fermentation the substrate was transferred to cans by adding equal volumes of water. SY1 culture was added and allowed for fermentation
Result and discussion
Better growth of *Saccharomyces cerevisiae* was observed in the agar slants after 48 hours. The cell count on final day was $3 \times 10^9$.

The results show that maximum pH was observed in the substrate obtained from papaya (4.79) and minimum in grapes (3.93).

The maximum ethanol concentration was achieved with pH 4.5 followed by pH 4. The lowest achieved ethanol concentration was at pH 3.5 indicating that it has lower enzyme activity at this pH.

The result of this study has shown that how the different parameters affect the production of bio ethanol. From this study, it is clear that the maximum yield of ethanol (chikoo) was obtained at pH 4.79, total soluble sugars; 11brix and specific gravity 0.9851 which is appropriately close the constant value of ethanol.

<table>
<thead>
<tr>
<th>FRUIT WASTES SAMPLES</th>
<th>OBTAINED %</th>
<th>Study by Janani et al (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grapes</td>
<td>10.0</td>
<td>6.21</td>
</tr>
<tr>
<td>Banana</td>
<td>10.0</td>
<td>5.40</td>
</tr>
<tr>
<td>Orange</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Papaya</td>
<td>7.0</td>
<td>4.19</td>
</tr>
<tr>
<td>Chikoo</td>
<td>11.0</td>
<td></td>
</tr>
</tbody>
</table>

From this study we conclude that the process is cheaper and does not produce any toxic residues. This bio ethanol production process can be used for small and large scale production because raw fruit waste can obtained from fruit industries continuously and the bioethanol produced can be used as an additive with fuels with different concentrations of the ethanol blends.