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Production of Biofuel from Nawkhala Grass

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Abstract - *Nawkhala grass, are the waste product for farmers after removing it from land. In the present work the bioethanol was extracted from the Nawkhala grass (Family - Poaceae or Gramineae) by microbiological and biotechnological method. The extracted bioethanol was studied for preliminary physical test. Flammability and burning test of the extracted or distillate product indicated the presence of bioethanol. Extracted bioethanol was used for various household works as well as to run two stroke engine. Engine eliminates less environment harmful product with bioethanol as compared to petrol. It has been concluded that bioethanol can be used as an alternative biofuel for petrol as well as kerosine.*

Key Words: **Nawkhala grass, Trichoderma species, Fermentation, Biofuel.**

1. INTRODUCTION

Nawkhala grass is a monocotyledon plant, Indian herbaceous perennial plant belonging to the family Poaceae or Gramineae. It's a low, green plant with narrows leaves that grows naturally, having groups of very thin leaves that grow away together in large numbers. Nawkhala grass is known for its multipurpose use in medicine, cattle feed and biofertilizers. The Nawkhala grass are grass plants which are found in region of Nawkhala, Maharashtra, India.

However, studies related with Nawkhala grass biowastes on bioethanol production are too limited. Hence, present study was made an attempt to find out the possibility of sustainable utilisation of Nawkhala grass biowastes by using microbiology and biotechnology. These biomass waste products are constituted mainly of three components: celluloses, hemicelluloses and lignin.

Nawkhala grass is a lignocellulosic biomaterial that is used as mainly a cattle feed. Nawkhala grass has a fast growth rate and the composition of Nawkhala grass, which is approximately 30 - 40% cellulose and 20 - 30% hemicellulosic, makes it a strong potential source of carbohydrates.

The aim of this work is to production of bioethanol from the fermentation of enzymatic hydrolysate obtained from Nawkhala grass. Bioethanol is now considered interesting biofuel and has been attracting attention since it can be directly used in place of petrol, diesel or kerosene.

2. MATERIALS AND METHODS

2.1 Sample collection and Pretreatment

The Nawkhala grass, were collected along the region of Nawkhala, Nagbhid taluka, Chandrapur district, Maharashtra, India. The collected Nawkhala grass were washed and cleaned with tap water twice and once by distilled water to remove the adhering soil crystals, dirt and other gravel particles. Then the substrate were cut and chopped into small pieces or ground to small particles. After that, the biomass or biomaterial, were air or sun dried for a one day to remove the moisture content.

Then the sample was placed in an Erlenmeyer flask (conical or titration flask) and add some hot distilled water to it and shake it well. The Erlenmeyer flask were then placed in an autoclave for 15 minutes at 100°C. After 15 minutes Erlenmeyer flask was collected and shake it well. The Erlenmeyer flask were allowed for cool at room temperature. Then liquid slurry was filtered by using filter paper.

2.2 Enzyme Production

Trichoderma species was obtained from Rajiv Gandhi Biotechnology Centre, Nagpur and was later cultured in PDA at 30°C for 7 days. Cut agar plugs with the filaments of fungi were inoculated into flask containing medium for cellulase production in the presence cellulose as a corbon source. The media was sterilized by autoclaving at 121°C for 15 minutes. After incubation at 30°C and shaken at 148 rpm for 6 days, the mycelia were removed by filtration through filter paper. Crude enzyme was collected using filter paper.

2.3 Enzymatic Hydrolysis

Enzymatic hydrolysis was performed on pretreated biomass. A pretreated Nawkhala grass was placed in a Erlenmeyer flask. The Erlenmeyer flask, were then shake it well. The sample, were treated with cellulase. Cellulase were added to the Erlenmeyer flask containing substrate. After that addition of enzyme, the flask, were shake it well and incubated at 50°C for 72 hours. After hydrolysis supernatants were finally filtered through filter paper.

2.4 Fermentation

A fixed volume of enzymatic hydrolysate was placed in a Erlenmeyer flask and sterilised in an autoclave at 120°C for 15 minutes. The Erlenmeyer flask were allowed for cool at

room temperature. Then Saccharomyces cerevisiae culture were added. The pH of the mixture was adjusted to 4 to 5. Syringes were inserted into the stoppers to collect the corbon dioxide gas formed in flask during fermentation. The flask were shake it well and maintained at 30°C for 7 days.

2.4 Distillation

After fermentation, decant the liquid fermentate in the flask away from the solid sludge that is at the bottom through filter. Place the liquid fermentate in the distillation column or mixture are kept on perforated bottom of the distillation unit. The mixture was heated about 78°C. Heat the mixture to boiling and adjust that temperature at 78°C, so that the distillate drops into the reciever. Continue the distillation until maximum distillate has been obtained. After the extracted bioethanol was condensed and collected in the reciever, the distillate was allowed to stand for cool down. Turn off the heat.

3. RESULT AND DISCUSSION

The bioethanol biofuel is giving the same engine performance compared with petrol i.e. it burn completely and clearly in engine at which the petrol burns. The spark plug faces the problem of corbon deposition many times which has been found reduced with the use bioethanol biofuel. This indicated that bioethanol biofuel produces less pollution as compared with petrol when used as fuel for bike.

4. CONCLUSION

The bioethanol biofuel is very cost effective since it is obtained from the biomass which is waste product for farmers. Secondly, bioethanol biofuel is less flammable, less volatile and can be safely stored at room temperature. Thus bioethanol can be used an alternative biofuel for petrol, diesel or kerosene. The more efforts and scientific studies need to be carried out to increase the yield of bioethanol and explore its application as biofuel.

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