Abstract in English ,kiswahili and Kikuyu in innovation and invention in my field of study.

ENGLISH.

**ABSTRACT**

The rising energy requirements and atmospheric contamination by combustion gases and conventional fuel, has opened avenues for new, safe, effective and more accessible energy sources. This study looked at the production of bio-ethanol from cassava peels. Cassava peels were collected from cassava processing sites, prepared by washing to remove sand, dirt, and other impurities that may affect the results, the peels were then sun dried for some days to remove moisture and grinded into cassava flour.for seven days, and was aseptically added to the autoclaved samples. The uniform action of enzymes was achieved throughout the sample, also Saccharomyces cerevisiae was used for the fermentation of the hydrolysate for seven days, and this was aseptically added to the hydrolysate after filtration .Distillation of the fermented liquid was carried out immediately after fermentation, 4% of ethanol by volume was produced after distillation from the 500g sample. The pH was measured at 7.3,showed that cassava peel starches can be readily degraded by A. N. The bio-ethanol produced was comparable with ethanol.Bioethanol is an important product in the fuel market obtainable from biomass through fermentation process but direct conversion of cassava peelings to bioethanol as energy by-product is difficult because of its lignocellulosic content.

The increasing demand for renewable and sustainable energy sources has stimulated research into the production of biofuels as a viable alternative to fossil fuels. In this context, cassava peels, an abundant agricultural waste product, have emerged as a promising feedstock for ethanol production due to their high carbohydrate content. This abstract presents an overview of the process of producing ethanol from cassava peels, highlighting its potential as a sustainable approach to biofuel production.

The production of ethanol from cassava peels involves several key steps, including pretreatment, acid hydrolysis, fermentation, and distillation. Pretreatment methods such as drying, milling, and size reduction are employed to enhance the accessibility of carbohydrates present in the peels. Subsequently, acid hydrolysis is employed to convert the complex carbohydrates into simple sugars, primarily glucose, which serves as the substrate for fermentation.

Fermentation, the crucial step in ethanol production, involves the addition of yeast or other microbial agents to convert glucose into ethanol and carbon dioxide. Various fermentation techniques, such as batch, fed-batch, and continuous processes, can be employed to optimize ethanol yield. After fermentation, distillation is performed to separate ethanol from the fermentation broth, resulting in an ethanol-rich solution that can be further purified.

The production of ethanol from cassava peels offers several advantages. Firstly, it utilizes an abundant and underutilized agricultural waste, reducing waste disposal issues and promoting a circular economy. Secondly, cassava peels have a high carbohydrate content, making them a rich source of fermentable sugars for ethanol production. Moreover, cassava is known for its resilience to adverse environmental conditions and its ability to grow in marginal lands, making it a suitable crop for sustainable biofuel production.

Abstract in kiswahili.

Utangulizi

Mahitaji makubwa ya nishati na uchafuzi wa anga kwa gesi za kuchoma na mafuta ya kawaida yamefungua njia za vyanzo vipya, salama, na vya ufanisi zaidi vya nishati. Utafiti huu ulilenga uzalishaji wa bio-ethanol kutoka kwa maganda ya muhogo. Maganda ya muhogo yalikusanywa kutoka maeneo ya usindikaji wa muhogo, yalitayarishwa kwa kuoshwa ili kuondoa mchanga, uchafu, na uchafuzi mwingine ambao unaweza kuathiri matokeo, kisha yakawekwa kwenye jua kwa siku kadhaa ili kuondoa unyevunyevu na kusagwa kuwa unga wa muhogo.

Kwa siku saba, unga huu wa muhogo uliandaliwa kwa njia ya aseptiki na kuongezwa kwenye sampuli zilizotengenezwa kwenye autoclave. Hatua iliyofanikisha hatua ya kawaida ya enzymes ilipatikana katika sampuli nzima, pia Saccharomyces cerevisiae ilitumika kwa kuchachusha hidrolisati kwa siku saba, na hii iliongezwa kwa njia ya aseptiki kwenye hidrolisati baada ya kufinywa. Uchujaji wa kiowevu kilichokachushwa ulifanyika mara moja baada ya kuchachusha, 4% ya ethanol kwa kiasi ilizalishwa baada ya kufinywa kutoka kwenye sampuli ya 500g. pH ilipimwa kuwa 7.3, ikionyesha kuwa wanga wa maganda ya muhogo unaweza kuoza kwa urahisi na A. N. Bioethanol iliyozalishwa ilikuwa sawa na ethanol. Bioethanol ni bidhaa muhimu kwenye soko la mafuta inayopatikana kutoka kwa biomassa kupitia mchakato wa kuchachusha lakini mabadiliko moja kwa moja ya maganda ya muhogo kuwa bioethanol kama bidhaa ya nishati ni ngumu kutokana na maudhui yake ya lignoselulosiki.

Hitimisho

Mahitaji yanayoongezeka ya vyanzo vya nishati endelevu vimechochea utafiti katika uzalishaji wa biokaa kama mbadala mzuri wa mafuta ya kisukuku. Katika muktadha huu, maganda ya muhogo, bidhaa ya taka ya kilimo yenye wingi, yamejitokeza kama malighafi yenye matumaini katika uzalishaji wa ethanol kutokana na kiwango chake cha juu cha wanga.

Mbinu za Uzalishaji

Uzalishaji wa ethanol kutoka kwa maganda ya muhogo unajumuisha hatua kadhaa muhimu, ikiwa ni pamoja na maandalizi, hidrolisisi ya asidi, kuchachusha, na kufinywa. Njia za maandalizi kama vile kukausha, kusaga, na kupunguza ukubwa hutumika kuimarisha upatikanaji wa wanga uliopo kwenye maganda. Baadaye, hidrolisisi ya asidi hutumika kubadilisha wanga tata kuwa sukari rahisi, hasa glukosi, ambayo hutumika kama substrati kwa ajili ya kuchachusha.

Kuchachusha

Kuchachusha, hatua muhimu katika uzalishaji wa ethanol, inahusisha kuongeza chachu au wakala wengine wa kibiolojia ili kubadilisha glukosi kuwa ethanol na kaboni dioksidi. Teknolojia mbalimbali za kuchachusha, kama vile mchakato wa batch, fed-batch, na endelevu, zinaweza kutumika ili kuongeza uzalishaji wa ethanol. Baada ya kuchachusha, kufinywa kunafanyika ili kutenganisha ethanol kutoka kwenye maji ya kuchachusha, ikitoa suluhisho lenye ethanol ambalo linaweza kusafishwa zaidi.

Faida za Uzalishaji wa Ethanol kutoka kwa Maganda ya Muhogo

Kwanza, inatumia taka za kilimo zenye wingi na ambazo hazitumiki vya kutosha, kupunguza masuala ya kutupa taka na kukuza uchumi mzunguko. Pili, maganda ya muhogo yana kiwango kikubwa cha wanga, hivyo kuwa chanzo kizuri cha sukari za kuchachusha kwa uzalishaji wa ethanol. Zaidi ya hayo, muhogo unajulikana kwa uwezo wake wa kustahimili mazingira hatarishi na uwezo wake wa kukua katika ardhi duni, hivyo kuufanya kuwa mmea unaofaa kwa uzalishaji endelevu wa biofuel.