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BIOFUEL

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Abstract:- **Biofuel – An alternative source of energy for present and future. In the present scenario, there is a huge demand for various oils and their high prices is an apprehension for the mankind. Since there is an increased awareness of the eco-friendly issue, there is an urgent need to explore the alternative energy sources. Various alternative energy sources like nuclear power, solar, wind, biofuels are well known, where biofuel sounds like one of them in terms of usage and the production process.Biofuel is the process where the energy of organic materials (Renewable biomass) is replaced with the function of fossil fuels. Processes like trans-esterification which converts animal and vegetable oils into usable fuel forms. From different sources, algae produce a large amount of energy. Algae represent the significant group of biological systems, where few of them are known to produce vast quantities of lipids relative to their total biomass. However, it is important to note that the technology has so far not been sufficiently developed to allow these biofuels to be produced commercially. Economics is playing a crucial role in ensuring a smooth transition to a Biofuel future.**

Keywords**- trans-etherification, algae, biomass**

INTRODUCTION

The use of fossil fuels has now become unsustainable due to depleting resources and the accumulation of green house gases leading to rapid increase in CO2 in the environment. Political turmoil's or natural disasters have also resulted in shortages of petroleum products and thus resulting in sky rocketing fuel prices. It has now become a matter of national security to develop a reliable source of energy for the future. Biofuels can prove to be an important alternative to this global problem to achieve environmental and economic sustainability.

GENERATION OF BIOFUELS:-

Biofuels are renewable fuels derived from biological feed stocks; they include bio ethanol (gasoline equivalent) or biodiesel (diesel equivalent). There are three generations of Biofuels

- First generation includes bio diesel, bio alcohols, and vegetable oils, bio ethers, solid Biofuels and bio gas. Most of the edible sources like food crops, sugar, starch and animal or oil fats, grains are used for production of first generation fuels.
- The second generation of Biofuels is mainly based on non- food crops like waste, stalks of wheat and corn. In this category, bio hydrogen, bio methanol, mixed alcohols and wood diesel are considered.
- The third generation of Biofuels is the most complex and come usually from algae, which produces a large amount of energy.

Overall procedure for bio fuel production is represented below

RAW MATERIALS:-

Rich source for bio ethanol production
Bioethanol is an alcohol produced by fermentation of sugar component of plant materials. It is made mostly from sugar cane and corn among sugarcane .In the first generation technology sugars are directly converted to bioethanol from crops like sugarcane and indirectly through starch from corn, wheat, into ethanol via fermentation followed by distillation. In the second generation technology ethanol is produced through cellulose from biomass.

SUGARCANE:-

Sugarcane is a natural, abundant, cheap material and most suitable material for Biofuels production. Sugarcane needs to be properly cleaned followed by juice is treated to concentrate .Further fermentation is carried out by addition of yeast. It is centrifuged, distilled, and rectified, dehydrated to obtain anhydrous ethanol. Immobilization of yeast cells has

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been proved to decrease the production cost and to shorten the fermentation. Yeast cells are also protected from toxic effects of low ph, temperature, osmotic, inhibitors etc and thereby increasing ethanol yield and reducing the cost.

CORN:-

Two processing methods are employed dry grind and wet milling. Dry grind method is preferred due to the complexity of the latter method. Mash is prepared from the grinding corn in water. Here enzymes like alpha-amylase and glucoamylase are added to the mash during cooking. After cooling the mash it is transferred to fermentors where yeast Saccharomyces cerevisiae is added. It is further distilled by separating the ethanol from the solids and water in the mash. Alcohol vaporizes at 173^0F and water at 212^0F .This difference allows water to be separated from the ethanol by heating in a distillation column.

WASTE BANANA:-

Adequate percent of the harvested bananas rejected, is used as raw material to produce bio ethanol. Rotten banana is washed with distilled water, after cutting it is blended using a sterilized automatic juice blender. The banana mash is then treated with pectinases.Pectinase-hydrolized mash is treated with cellulases.After cooling, S.cerevisiae.is added to carry out fermentation process. After fermentation clean sterile cotton cloth was used to sieve the product from the residue and extract is collected.

WHEAT STRAW AND MEAL:-

Wheat is one of the rich sources of starch. Wheat straws are stem-pretreated, presaccharified treatment is essential. This methodology has been proved to be higher yielding in ethanol than those obtained with simultaneous saccharification and fermentation. Enzymes mainly alpha-amylase and amyl glycosidase is required for starch liquefaction and saccharification respectively.

COTTON:-

Cotton waste is highly rich in cellulose rich which is generated in tons in agriculture countries.Bioethanol can be produced by bio conversion of cellulosic cotton in the presence of enzyme cellulose.Cellulase usually used is produced by the organism Trichoderma reesei. Cotton wastes need to be dried at40^0C overnight and pretreated with dilute sulfuric acid then autoclaving and further it is neutralized by washing with distilled water and the samples dried. It is further seeded with pore suspension of T.reesei.After ,incubation culture broth is then centrifuged until mycelia settled and supernatant is filtered in a sterile nylon cloth under sterile conditions to prevent any microbial contamination .It is followed by enzymatic hydrolysis and treated with sodium acetate buffer. Analysis of sugar content is then estimated by means of DNSA method. Further fermentation of released sugars S.cerevisiae.was added and then alcohol content is estimated

BIODIESEL PRODUCTION:-

Bio diesel is basically fatty acid ethyl esters produced from natural oils and animal fats and vegetable origin. This type of production is more advantageous because of the less production of smoke, low emission of carbon monoxide and hydro carbons. In addition they are also bio degradable and non toxic. However the price of these sources is high and more prone to oxidation than petroleum based fuels. Biodiesel is produced by means of trans- etherification when lipid reacts with an alcohol to form esters and glyseroid. Most of the biodiesel produced currently makes use of soya bean oil, methanol, and an alkaline catalyst. But the high cost of soya bean oil makes it non feasible. Low cost oils and fats such as restaurant wastes and animal fats thus remains a best source for biodiesel production. Yellow and brown grease can be used as attractive feed stocks for bio diesel production because they are inexpensive compared with food grade vegetable oil. There are large amounts of waste vegetable oils from the food industry that could be converted to biodiesel.

ALGAE:-

Algae have higher photosynthetic efficiency than other biomass and are thus one of the best sources of biodiesel and also the highest yielding feed stock for biodiesel. It is also very easy to extract oil from algae. Advantages of using algae as feed stocks for bio fuels is their ability to

1. Synthesize large quantities of neutral lipids or oil (20-50%)
2. Grow at elevated rates
3. Flourish even in briny waters
4. Tolerate desert, arid –and semi-arid lands that are unsuitable for conventional agriculture
5. Exploit growth nutrients such as nitrogen and phosphorus from a variety of waste water sources, providing benefit to waste water bio-remediation
6. Grow in suitable culture vessels(photo-bioreactors)through out the year with an annual bio mass productivity .Oil can be extracted from algae by three method

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- Expeller: Uses a press to extract a large percentage (70-75%) of the oils out of algae
- Solvent extraction with hexane
- Super critical fluid extraction :this method is more efficient than traditional solvent separation methods and selective thus providing high purity and product concentrations.100% o f the oils can be extracted by this method

Micro algae can be cultivated in open ponds and closed bio reactors. Besides saving water, energy and chemicals, closed bioreactors are more advantageous and hence are widely being used micro algae are dried and ground with mortar and pistil. Extraction is carried out with hexane and ether solution. The biomass is collected after filtration and weighed. The extracted oil is then evaporated in vacuum to release hexane and either solutions using rotary evaporator and mixed with NaOH and methanol. Settled biodiesel is then separated from sedimentation by flask separator. Biodiesel is washed by 5% water until it becomes clean and dried by using drier

SOCIO ECONOMIC IMPACT:-

Large-scale production of bio fuel can substitute for fossil energy for bio physical feasibility that is not inhibited by the usability of land and fresh water sources for energy crop production environmentally sound and attuned with socio economic structure of society. The bio fuel system must deliver adequately large amount of net energy to society per hour of labor employed in bio fuel production to make the process economically opportune, while generating adequately low environmental loading per unit of net energy abounding to keep the process environmentally unblemished.Bio fuel technology is a sustainable economy including rural and national security

ENVIRONIMENTAL ASPECTS:-

On long-term difficulty are loss of biodiversity and the desertion of entire natural community's when energy crop monocultures spread onto adjoining non-arable land to control green house gases emission one can substitute biomass for fossil fuel or partial addition of bio fuel to coal in combustion system in view of current environmental problems, corn ethanol is marginal at reduction of green house gas emission

FUTURE PROSPECTS:-

Advances in biotechnology process science, and engineering are leading to new manufacturing avenues for converting renewable biomass to valuable fuels and products, generally referred to as the bio refinery. The integrated manufacturing technologies offer the potential for the development of sustainable bio fuel production that will lead to a new manufacturing proto type. Bio fuels appear to be the only renewable source that could meet the global demand or transport fuels innovative bio technology has shown rapid improvements of algal strains that have increased in yield by metabolic .According to the Intergovernmental Panel on Climate Change (IPCC) fourth assessment report on climate change, especially for transportation sector, second generation biofuelsare considered one of the key alleviation technologies. Large-scale production of fast growing trees like poplar, willow. And eucalyptus, and crop residue without using arable land has potential for producing bio-energy

CONCLUSION:-

The outcome of this paper confirms that biomass and Biofuels are the only non-conventional energy source that can substitute fossil fuels directly.

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