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Hydrocarbon plant—New source of energy for future

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Abstract

The development of alternative sources for energy and chemicals, particularly the use of plant biomass as a renewable source for fuel or chemical feedstocks, has received much recent attention. This paper attempts to review the work carried out by many workers on evaluation of some plant materials as source of energy and chemical feedstocks and the possibilities of producing hydrocarbon and related chemical products, directly or indirectly. Also an exploratory work carried out at Regional Research Laboratory, Jorhat is discussed. Some future directions, which need to be considered to promote development of these petrocrops, are suggested.

Keywords: Hydrocarbon plant; Petrocrops; Bio-crude; Energy

Contents

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1. Introduction

World energy scene is undergoing a period of transition. As the inevitability of exhaustion of fossil fuels is becoming increasingly intensive, efforts are on to find and use substitute form of energy. The large dependence of most societies in the world on petroleum lends importance to hydrocarbon supplies on a self-sustaining and renewable basis. The bio-energy system makes a significant contribution to the world's growing energy needs. The renewable sources would only be able to compete with the fossil fuel resources, if special plant crops containing energy-producing, hydrocarbon-like material are breed and cultivated. The earth has vast areas of land which are unsuitable for food and fodder crops, and recent experience with growing hydrocarbon yielding plants may make it possible to use these large areas for harvesting plants which may yield a substitute for conventional hydrocarbons. Various machines have been developed in the last several decades, which are based on the use of liquid hydrocarbon mixture of appropriate chemical aggregate composition and desirable physico-chemical and performance parameters. There are several compelling reasons for seriously exploring the prospects of hydrocarbon plantations. First, the prospects of increased dependence on oil imports pose a difficult challenge. Secondly, oil prices are likely to go up substantially in the next 10–15 years. Further, it is becoming increasingly evident that woody plants, which are often grown on relatively good soil, will not meet all the demand for fuel wood particularly in countries like India. Petrofarming could, therefore, provide a welcome solution to some of these problems, even though no substantive claims can be made on the viability of this option at present. Various workers have conducted extensive screening program in an attempt to identify potential bio-crude and botanochemical feedstocks.

Before discussing the efforts in developing petroleum plantations and growing green factories for the production of hydrocarbon-like material, it is necessary to describe briefly some of the energy sources available and their constraints, the concept of using plants for material production in the world and finally the creation of a controlled experiment in the growth and harvesting of particular plant for their oil content and hydrocarbon contents. Natural gas, coal and oil (all fossilized photosynthetic products) provide a little more than 95% of the world energy supply; the rest of our resources are very small in comparison. The supply of fossil hydrocarbon would gradually be exhausted, in due course. King Hubbert, a geologist for the US geological survey, was discussing this problem publicly, how fuels, specifically oil and coal, will come into and go out of use [1]. King Hubbert was probably correct in his guesstimates and oil might even peak out before 2050. The methods to increase the energy prospect were those that use sunshine in some useful way, with a minimum environmental problem. Then the idea came in mind that green plants could catch the sun and reduce the carbon, particularly on the equator where plants are the most productive. Through the mechanism of the photosynthetic carbon cycle, the green plant captures the carbon dioxide from the atmosphere and with the aid of sunshine, separates