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SHORT COMMUNICATION

Green technology: an eco-friendly approach towards sustainable agriculture

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ABSTRACT

Indiscriminate use of agrochemicals for agriculture practices such as pest control, weed control, increasing soil fertility etc. may cause some undesirable effects not only to the agricultural ecosystem but also to human health due to persistent in nature. This led to the need for curtail our dependency on chemical based agro products and search for alternatives, which are environmentally feasible. In this regard, sustainable agriculture plays a vital role worldwide as it offers the potential to meet the present agricultural needs. It is also an alternative to upgrade the national economy without degrading the environmental quality. Green technology also an eco-friendly way and ensures safe and healthy agricultural outputs for mankind. The contribution of green technology towards sustainable development in the agricultural sector has been described in the present paper. It also an attempt to elaborate the role of green technology along with how it would be helpful in the sustainable development.

1) INTRODUCTION

India is known to be the seventh largest economy in the world¹. Its developmental activities not only aim at economic progress but also encompass the overall well-being of the humans. Hence, the development should be in such a manner that meets the need of the present generation without compromising the ability of the future generation. [2] Agricultural sector in India plays a crucial role, as it contributes 20% of the overall country GDP [3]. Agricultural development is said to be sustainable when it produces high quality of food without degrading environmental quality. But indiscriminate use of agrochemicals for different agricultural practices such as pest control, weed control, increasing soil fertility etc. may cause some undesirable effects not only to the agricultural ecosystem but also to human health due to their persistent nature. This calls for the need to curtail our dependency on chemical based agro products and search for alternatives, which are environmentally feasible. In this regard, sustainable agriculture by the use of green technology plays a vital role worldwide as it offers the potential to meet the present agricultural needs and make it available for the future generation.

The present study is carried out with the aim to describe the role of green technology in achieving the goal of sustainable development in agriculture. It is also an attempt to elaborate the role of green technology and related terms along with it in achieving sustainable development for present generation and future as well. Authors also have tried to identify the

potentiality of green technology in the field of agriculture sector and thereby enhancing sustainable growth in India.

2) DISCUSSION

Biogas Technology: Biogas is a term produced by anaerobic digestion of organic waste comes from domestic and agriculture output by methanogenic bacteria. It involves mainly three steps i.e. (i) hydrolysis (ii) acidogenesis (iii) methanogenesis. It is the mixture of methane, carbon dioxide, hydrogen, nitrogen and oxygen in the proportion of 50-68%, 25-35%, 1-5%, 2-7% and 0-0.1% respectively [4]. The advantage of biogas is that this technology produces fuel in the form of methane gas simultaneously with high quality manure [5]. It is also used for cooking and lighting in rural sector. It is evident that biogas has a great eco-friendly potential because it is odourless and smokeless, a solution for indoor air pollution and improves household or communal sanitation [6]. Biogas technology has been successfully fulfilling the constant energy needs for rural areas where about 70% of India's population lives [7].

Biofuel: In India, the vast energy demand is currently derived from fossil fuels which are limited in stock, non-renewable and polluting resource. In this regard, biofuels (bio-ethanol and bio-diesel) are the alternative energy sources produced

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from agricultural crops and their residues, forest residues or other forms of plant based biomass feedstock which is used as a substitute for fossil fuels like diesel and petrol.

It is estimated that all the available sugarcane molasses get utilized, 0.8 million kl of ethanol thus produced can replace 9% of our dependency on petroleum products [8]. Biofuels are derived from biomass resources to meet the ever increasing fuel demand of the nation associated with high economic growth [9]. India being an agricultural country, has huge potentials for the development of biomass energy sector and this will pave the way to achieve sustainable development in the coming years. Debate continues on the question on whether the biofuels will be able to satisfy the demand of energy in an ecofriendly and cost effective manner [10].

Organic farming: Organic farming means the farming without using chemical fertilizers and pesticides. In this farming system the aim is to cultivate crops in such a way that increases the soil fertility without harming the environmental quality. Food and Agriculture organization suggested that organic farming is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity. This can be accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs [11].

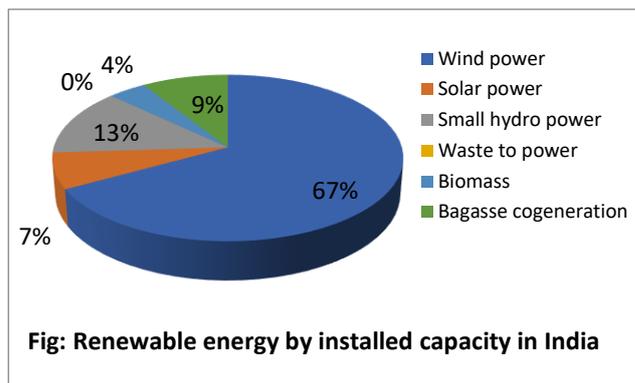
Permaculture: Permaculture uses the inherent properties of plants and animals combined with the natural characteristics of landscapes and structure to generate a life-supporting system for world by using the smallest practical area. This technique has been first developed in 1978 by Mollison, an Australian ecologist. According to him it is a combination of 'permanent agriculture' and 'permanent culture' therefore gaining huge appreciation from agriculture sector.

Wind Energy: Energy plays an important role in agriculture in terms of crop productivity and other applications such as agro-processing. The energy demand in the agricultural sector can be obtained from different renewable sources and wind is one of them. Wind power is generated in the form of electricity by converting the rotation of turbine blades into electrical current by means of an electrical generator. In windmills (a much older technology) wind energy is used to turn mechanical machinery to do physical work, such as crushing grain or pumping water [12]. Wind energy contributes approx. 1% of global electricity generation whereas India has total installed capacity of 67% out of which it produces up to 20% for the overall contribution of the country.

Solar Energy: In remote agricultural lands, the underground submersible solar photovoltaic water pump is economically viable and also environmentally-friendly option as compared to a diesel generator [13]. Photovoltaic systems can be a cheaper option than installing power lines in agricultural applications. Solar energy in the form of PV cells can be used for water pumping to irrigate the crops. The second most widely used application is in the form of solar thermal which produces heat and can be used in drying crops and grains. India is endowed with huge solar potentials which can be harnessed for sustainable agriculture. Till now a cumulative total of 30,256 solar powered water pumps and drinking water has been installed in India [14].

3) CONCLUSION

Though the concept of sustainable development in agriculture is a new concept but it is the need of the hour. For an agricultural economy like India, sustainable approach towards



agricultural practices will help to strike a balance between maximizing crop yield and economic growth. The application of green technology in the pursuit of sustainable agriculture can provide opportunities to increase yield, improving product quality, retention of soil fertility, and adoption of eco-friendly techniques. This will bring challenges and paradigm shift in the research field and related policies of the developing countries. Hence, there should be an integration of research, awareness and application of the green technologies in order to strive towards attaining sustainable development in the agricultural sector.

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