

Impact of Green Technology on Sustainable Development of Agriculture

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Abstract

The use of technology is increased day by day, we all depend on technology and use various technologies to accomplish specific tasks in our lives. Today we have various emerging technologies which impact our lives in different ways. Technology is being implemented in almost every section of our lives and business structure. It does not matter which industry you're dealing in, technology will be of use in a certain manner. This technology will keep on changing basing on the demands of people and market. So, it's your role to keep yourself up-to-date with trending technology.

The poverty alleviation in India can be fundamentally linked with GT because it has strong and positive co-relationship with the environment. GT promises to increase farm profitability while reducing environmental degradation and conserving natural resources. In a nutshell, GT is the development and application of products, equipment and systems used to conserve the natural environment and resources, which minimizes and reduces the negative impact of human activities. Green technologies are innovative technologies with the potential to steer agriculture along a sustainable path, and at the same time contribute to the advancement of economic and efficient production of safe and high quality food, help Asian small scale farmers increase their income through high value marketable farm produce and viable farm enterprises and promote sustainable production methods to prevent harm to human health and the environment.

Key words - Green Technology, Sustainable Development and Agriculture.

The use of technology is increased day by day, we all depend on technology and use various technologies to accomplish specific tasks in our lives. Today we have various emerging technologies which impact our lives in different ways. Technology is being implemented in almost every section of our lives and business structure. It does not matter which industry you're dealing in, technology will be of use in a certain manner. As the worlds keeps on developing, technology will be changed, what is working today might not work not be efficient tomorrow. So, it is better to stay up-to-date with new technologies and learn how to embrace and use them in our daily life. The use of technology is immeasurable, technology has played big role in many fields health care, job creation, data management, education, public sector, for improving food quality and agriculture development. In the agriculture industry, productivity is a key factor. If production is high the farmer will make more profit so technology has helped farmers replace the old way of farming with machines that can do the job in time right from the day of planting to the day of harvesting.

Using the knowledge for practical use is known as technology. The innovative practices used in this technology can bring positive changes in our daily life. The practice involves fulfilling the needs of the society without causing depletion of the available natural resources and preserving it for future use. Green technology uses nonpolluting practices to produce things and materials which are non-toxic. So, green technology gives importance to sustain at the same time allowing the fulfillment of current needs.

Objective of the study

1. To study about green technology
2. To study about the impact of green technology on sustainable development of agriculture

Meaning of green technology

Technology can be termed as the application of knowledge for practical purposes. In this context, technology allows people to become more efficient or to do things that were not possible before. To benefit from

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technology, it needs to be successfully linked with country's overall development objectives and applied to solving socio-economic problems. The productivity increase is possible through environment-friendly and profitable technologies. Not necessary all the profitable technologies are adopted since barriers to practice new technologies and unavailability of market for environmental attributes associated with green technologies (GT) can limit their effectiveness. As the name implies green technology is one that has a "green" purpose. By green we do not mean the color. Green inventions are environmentally friendly inventions that often involve - energy efficiency, recycling, safety and health concerns, renewable resources, and more. The risks to human health are great. Therefore, the need of the hour is that every investor should think green. Green technology is defined by the global collaborative encyclopedia, Wikipedia, as "the application of one or more of environmental science, green chemistry, environmental monitoring and electronic devices to monitor, model and conserve the natural environment and resources, and to curb the negative impacts of human involvement" (<http://en.wikipedia.org>) (<http://en.wikipedia.org>). GT is a broad term and it defines more environment friendly solutions. It is known as environmental healing technology that reduces environmental damages created by the products and technologies for peoples' conveniences. The poverty alleviation in India can be fundamentally linked with GT because it has strong and positive co-relationship with the environment. GT promises to increase farm profitability while reducing environmental degradation and conserving natural resources. In a nutshell, GT is the development and application of products, equipment and systems used to conserve the natural environment and resources, which minimizes and reduces the negative impact of human activities^{2,3}. Green technologies are innovative technologies with the potential to steer agriculture along a sustainable path, and at the same time contribute to the advancement of economic and efficient production of safe and high quality food; help Asian small scale farmers increase their income through high value marketable farm produce and viable farm enterprises; and promote sustainable production methods to prevent harm to human health and the environment. Green technologies are an approach towards saving earth. Thus both its positives and negatives need to be investigated. Green technology uses renewable natural resources that never depletes. Green technology uses new and innovative energy generation techniques. Green nanotechnology that uses green engineering and green chemistry is one of the latest in green technologies. One of the important factors for environmental pollution is the disposal of waste. Green technology has answers to that as well. It can effectively change waste pattern and production in a way that it does not harm the planet and we can go green. GT is a method of practical application of knowledge from environmental science to conserve the natural environment and resources. Any technology should be in harmony with natural and ecological principles. GT is an alternative to improve the national economy without harming the environment.

The general objective of GT is to use Information and Communication Technology (ICT) to generate systemic effects resulting in improved environmental efficiency and empower people thought it.

The Goals of the Green Technology

The important goals of the green technology include

- Conservative use of the natural resources
- Creation of products that are reusable or recyclable
- Bringing change in the production pattern to reduce waste and pollution
- Finding alternatives to the practices which adversely affects the environment and humans

This will ensure less pollution to the environment and better living conditions for humans in the future.

Although it is difficult to precisely define the areas that are covered by green technology, it can safely be said that GT helps addressing the emerging issues of sustainability because of the advancement in science and technology. This technology should meet the needs of society in ways that can continue indefinitely into the future without damaging or depleting natural resources. In short, GT is defined as the technology that meets present needs without compromising the ability of future generations to meet their own needs.

Types of green technology

Green technology covers a broad area of production and consumption technologies. The adoption and use of green technologies involves the use of environmental technologies for monitoring and assessment, pollution prevention and control, and remediation and restoration. Monitoring and assessment technologies are used to measure and track the condition of the environment, including the release of natural or anthropogenic materials of a harmful nature. Prevention technologies avoid the production of environmentally hazardous substances or alter

² Silivarajoo P., Technology a driver towards sustainable development, *IGEM*, 1-17, October, (2010).

³ Manimozhi K. and Gayathri D., Eco friendly approaches for sustainable agriculture, *J. Environ. Res. Develop.*, 7(1), 166-173, (2012)

human activities in ways that minimize damage to the environment; it encompasses product substitution or the redesign of an entire production process rather than using new pieces of equipment. Control technology renders hazardous substances harmless before they enter the environment. Remediation and restoration technologies embody methods designed to improve the condition of ecosystems, degraded through naturally induced or anthropogenic effects.

DIFFERENT TYPES OF GREEN TECHNOLOGY PRODUCTS

Green technology products are items which factor environmental awareness into their design and use. Green technologies products aim to reduce waste, cut pollution, and even diminish fossil fuel use. Some of the major types of green technology products include energy creation products, green chemicals, sustainable or recyclable products, and technology that run on alternative energy. Products that help create alternative energy, such as solar panels and thermal heating discs, are some of the most important green technology products used in everyday life. Solar panels, which can be installed on homes, apartments, and commercial buildings, use the sustainable heat of the sun to charge solar batteries, which can be used for electricity instead of traditional, non-sustainable sources like gas. Thermal heating discs, which are used in swimming pools, suck the sun's rays in and radiate them over the pool's surface, providing an alternative means of heating that avoids fossil fuel use. Green chemicals are important in many green technology products. These products aim to create the same effects as toxic, polluting chemicals, while reducing risk of poisoning and environmental harm. Green chemical products include home cleaning agents made out of coconut and glycerin, insecticides that use orange or peppermint oil instead of toxic chemicals, and even green laundry detergent that can reduce water pollution. Sustainable and recyclable green technology products help increase the life cycle of consumer material. These products may include cell phones made from plastic water bottles, appliances rebuilt from scrap metal, and even recyclable laptops. Green technology products that use sustainable and recyclable materials often advertise their involvement in recycling initiatives; consumers shopping for a new cell phone or laptop may wish to inquire about specific models that use recycled materials. Solar powered charging devices for phones, laptops, and portable appliances are also popular green technology products. By converting everyday products to alternative energy power sources, green technology can help reduce fossil fuel use and help users cut energy bills. It is also useful in the agriculture like green manure and in form of organic farming.

Impact of green technology on sustainable development of agriculture

Most people are unaware of the true significant of agriculture in our society. It's more than just to provide food to the total numbers of individuals in a certain country. Agriculture does not only provide our nourishment for our daily life intake but also an income source of every single nation that exist on this planet, where most manufacturing industries as well as business are dependent on it. Without giving a serious attention on it, any country can't be politically and economically strong. Agriculture sector is a crucial sector in India, as it contributes 20% of the overall country Gross Domestic Product (GDP) and it also contributes close to a quarter of India's national income and the workforce engaged in agriculture sector is about 52%.⁴

The technology is a link that connects sustainability with enhanced productivity, where natural resource productivity is efficiently maintained by carefully planning the conservation and exploitation of resources such as soil, water, plants and animals. The tasks of transferring existing technology and development of cost-effective and environment-friendly biotechnology should be taken simultaneously. The development of biotechnology is recommended to properly assess socioeconomic, food security and environmental impacts for helping the poor rural communities for maintaining sustainable agriculture. The ideal technology should be efficient, practical, cost effective and free from pollution. The sustainability factor should be looked at the ability of agricultural land to maintain acceptable levels of production over a long period of time, without degrading the environment. Some define sustainability as the maintenance of productivity under stress conditions (Gill, 1993). Agricultural sustainability in this context, should seek to maximize food production within constraints of profitability. Sustainable development is defined as the development which meets the needs of the present generation without compromising the ability of future generations.⁵ Agricultural progress is said to be sustainable when it provides high quality food from a high quality environment and maintains the character of the countryside and its landscapes, habitats and species, secures an acceptable quality of life for the rural community.

⁴ A report by Indian Council of Agriculture Research, Published by the project director, Directorate of Knowledge management in agriculture Newsletter, *Vision 2030*, January, (2011).

⁵ Kates R. W. and Thomas M. P., An article *Science and policy for sustainable development*, 47(3), 8–21, (2005).

Sustainability should also consider resource saving, not only resource usages. GT is available to assist farmers in a various way. The sustainable growth and development of Indian agriculture by interfacing education, research and extension initiatives complemented with efficient and effective institutional, infrastructure and policy support, for ensuring livelihood security. Hence, the development of agriculture sector, defined in terms of increased production with decreased average cost, becomes prerequisite for the overall development of an underdeveloped economy in a country like India. Sustainability factor is the ability of the agricultural land to maintain acceptable levels of production over a long period of time without degrading the environment, while producing safe and high-quality food. These are different aspects of agricultural which effected by the Green Technology.

Solar photovoltaic technology –

For instance, converts sunlight into electricity using semi-conductor modules. Used generally for meeting lighting requirements, they can also be used for pumping water, refrigeration, communication, and charging batteries. Solar photovoltaic has application as green agricultural energy source for pumping water, street lighting in villages, lighting in rural houses and pest management.

Wind energy is in a boom cycle.

Overall, wind energy contributes only 1% of global electricity generation, but some countries and regions are already producing up to 20%. Its importance is increasing in the sense that comparatively with other sources; the wind energy produces less air pollutants or greenhouse gases.

Biofuel as bio-

Ethanol and bio diesel have the potential to assume an important portfolio in future energy platter. Food security concerns and risks to environment and biodiversity are parameters that necessarily need to be assessed while analyzing sustainability linkage of agriculture and biofuel. Also, conversion of wasteland to farmland with some crop options can be viewed as positive impacts. This area is going to be the hot cake for future research.

Biogas –

Biogas is the product of anaerobic digestion of organic matters by methanogenic bacteria. Biogas qualifies on the merits that this technology utilizes organic agricultural waste and converts it to fuel and fertilizer. Direct impacts of biogas are fuel-wood, agriculture residue, livestock manure, and kerosene savings. Increases in soil fertility and crop production have also been observed.

Biomass –

Agriculture residues and wastes are converted to electric and thermal energy through processes like combustion, gasification, and cogeneration. Biomass technologies compliment mainstream crop production and reduce or completely replace consumption of traditional fuel. Experiences of some APCAEM countries portray biomass to be effective means of increasing agricultural revenue and conserving exhaustible resources.

Transgenic Technologies

Most transgenic technologies are under research and development phase and comprehensive results have not yet been ascertained. Among food crops few like rice, eggplant, mustard, cassava, bananas, sweet potato, lentils, and lupines have been approved for field testing in one country or the other, while some like BT Maize (mostly for feed) in the Philippines, publicly developed transgenic vegetables in China are allowed for cultivation.

Organic and biodynamic farming

Organic and biodynamic farming systems have soils of higher biological, physical, and in many cases chemical quality than that of conventional counterparts. When productivity in terms of inputs applied and outputs obtained and social costs of conventional farming are considered, organic alternative has been found to be significantly economical.

Integrated Pest Management (IPM) as a knowledge intensive approach dichotomous to conventional chemical intensive approach best serves the purpose of this research. IPM, especially through initiative like Farmer Field School programs where farmers are envisaged experts with their expertise emanating from routine hits and trials, interactions, and trainings have both empowered farmers and maintained agricultural and environmental balance.

India is promoting jatropha. Major attraction of Jatropha lies on its growing capacity even in saline, marginal and infertile soil. Since it can grow without water, drought has no impact on it. Furthermore, it requires little maintenance that in turn reduces cost of production. The contributions of biotechnology includes the production of "Golden Rice" which is enriched with beta carotene and iron that can help combat vitamin-deficiency, a principal cause of blindness and anemia; plants resistant to toxic metals that will increase the areas available for farming; and insect-resistant cotton that provided better yields is improving the lives of farmers in China, South Africa and elsewhere.

India is second highest populated country with one of the highest growth rate in the world. This necessitates high demand for energy. India's energy demand is expected to grow at an annual rate of 4.8 per cent over the next couple of decades. Most of the energy requirements are currently satisfied by fossil fuels – coal, petroleum-based products and natural gas. Domestic production of crude oil can only fulfil 25-30 per cent of national consumption.

Therefore, the development of innovative, appropriate and efficient information and communication systems is possible through the establishment of ICT infrastructure, which can prove to be nations' critical tools in the promotion of development. India is promoting development of agriculture growth, included with economic growth of country. Though selection of technology is by default condition dependent one or the other renewable energy technology and green agriculture strategy can in all circumstances be pragmatic.

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