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Organic Food Production Using Green IT

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Abstract

The organic food demand has rapidly increased worldwide int these recent years mainly because of the quality and safety provided to the consumers. By using Green IT, we can incrase the organic food production by using the techniques which are eco-friendly and environmentally sustainable. The execution of proper technologies is to be made in order to make sure the improved production because of the rising concern of organic food products. The agricultural practices in India are facing ennumber of challenges such as the sudden change in climatic conditions, conventional farming practices and many more. Another major concern that is rising in the country is the economic loss that is faced due to the lack of information on the crop yield productivity. This paper presents the various technologies i.e. the Green IT ones that can be used to boom the organic food production.

Keywords— Green IT, organic food, eco-friendly, sustainable development, conventional farming

1. Introduction

Fig 1. Food products originated through organic farming

In the developing countries, green IT provides the farmers with significant information regarding sowing, how to protect the crops and also how to improvise the soil fertility which further helps in the food productivity. Now with the use of green IT with a touch of a few buttons, agricultarists can connect with the farmers globally and also other service providers to stay up-to-date on the recent crop cultivation practices. Organic food comprises of the agricultural food products that aren't treated with chemical fertilizers and pesticides, herbicides and the various other synthetic chemical substances during its production, processing and storage.

The use of organic foods has quickly increasedworldwide in the recent years mainly due to consumer perceptions of quality and safety.Excessive use of chemicals and conventional farming methodologies have led to many environmental hazards such as degradation of soil quality thereby reducing the food quality, deteriorated groundwater level,etc.

2.METHODOLOGY

1) **Digital farming**

Digital farming is the use of new, advanced technologies, that is integrated into one system,used to enable farmers and other stakeholders to improvise the food production. When comparing with conventional and sensor based techniques, an advanced technique referred as digital agriculture can assist the farmers to understand their agricultural practices in a much better and effective way. Thus, digital agriculture holds a significant impact on the crop yield practices, by empowering and educating the farmers with required scientific

knowledge to adapt good agricultural practices and thereby creating an awareness. Using technology of crop rotation and multiple cropping

Fig 2. Multiple cropping technique

Multiple cropping is a form of polyculture and can be defined as producing more than two crops in the same land, during the same season. It can be done in two methods i.e.; relay cropping, where a succeeding crop is sown along with the first one, before it is harvested and double cropping, where the first the current crop is reaped then the successive crop is planted. On the other hand the process of growing two or more dissimilar or unrelated crops in the same land in different seasons is known as Crop rotation. The major benefit that is available with the help of such systems is conserving the standard of land which is decreased because of the inorganic farming. These farming practices aim at nondestructive environment with improved production of organic food. In distinction to conventional farming, this system contributes a maximum harmonious relationship to the crops as they have soils of higher biological, physical and in several situations chemical quality.

2) The application of Solar Energy

Fig 3. Solar panels

Solar energy is the most basic source of energy and is derived directly from the Sun. The rapidly emerging alternate energy inside the photovoltaic cell, converts the sunlight straight into electricity. The Sun yearly delivers over 10,000 times of the energy that the humans are using presently. The solar electric systems provide electricity for battery charging, lighting, water pumping for small motors and many more. Solar water pumping system serves numerous problems in distinction to conventional fuel, for instance, it requires no cost for fuel and maintenance and doesn't pollute the environment. Today, in countries like India, solar water pumping system has a notable potential in it as it gets plentiful amount of solar radiation. With the rise and innovation of new techniques, there is a chance of growth of solar energy applications that would increase the efficiency of solar cells and reduce its cost. This type of Green technology is the best alternative for refining the standard of life of rural families in terms of cooking and lighting, producing biofertilizers and organic foods.

3) Using Biofuel as a technology

Bio-ethanol and bio-diesel, has stood up to the capacity for future energy prospects. There are two main parameters are taken into consideration i.e.; concerns for security of food and risks to environment and biodiversity while creating a substantial elation between agriculture and biofuel. Also, converting wasteland to farmland with some crop alternatives can be considered as positive influences. Today in India, 9% of current issue of petroleum requirements can be resolved by 0.7 million kiloliters of ethanol which can be produced if all the available sugarcane molasses is been used

adequately. Therefore, different varities of new technologies are being advanced by the researchers to produce an advanced form of biofuels from wood biomass, agricultural and forest wastes.

4) Technology of Biogas and Organic fertilizers

This type of Green technology makes use of the biological agricultural waste and converts it into fuel and fertilizer. Organic wastes are converted into biogas and residue through anaerobic digestion. Biogas is a well-known and encouraging renewable energy source which is used for lighting, cooking or maintaining temperature inside greenhouse for most appropriate vegetable growth, whereas the by product is utilized for organic cropland food production. Residue is the outcome of mineralization process. It can be used to raise the crop yield and soil fertility since it is enriched in nutrients and also has a good penetration capacity into the soil. It is regarded as replacement to chemical fertilizers and good for organic agricultural crops.

5) Use of Geothermal Energy

To generate heat or electricity geothermal technology uses energy from the earth's crust. The hot geothermal fluid is excavated out from the underground reservoirs to the surface. The heat energy that is perceived is then converted into electricity or used directly in heating applications. Usage of geothermal fluids can be seen in varied areas like for heating buildings, warming water for fish farming, pasteurizing milk, nurturing plants in greenhouses and dehydrating onions and garlic. Generally, low-to-medium temperature resources i.e between 21 ℃ and 149 ℃ are preferred as it is plentiful and also widespread compared to high-temperature resource base. That's the reason geothermal initiatives are dependable resource for organic food production.

6) Usage of Biomass

Biomass technology is an organized and cost effective technology that can be transformed into energy and high value industrial products. The sources of biomass energy are trees, crops and animal waste and hence serves best for organic-oriented agriculture. Agriculture residues and wastes are converted to electric and thermal energy through processes like gasification, which are then used for competent power generation cycles. When biomass develops a combination of bio refinery and biogas, it leads to new products and enhances the strength of organic agricultural sector. By using biomass as replacement for fossil fuels, emission of greenhouse gases can be decreased. Thus biomass can be the effective means of increasing organic agricultural revenue and conserving exhaustible resources.

7) Usage of Wind Energy

Fig 4. Windmills constructed in between the fields

Organic farming uses wind technologies as it provides mechanical energy for pumping water. It serves the motive of expensive installation of transmission wires as small wind structures also plays an important role in generating electricity. Wind energy can also be used for emitting the greenhouse gases in an ecofriendly manner with the help of power generation techniques. This type of technology can be taken as a feasible choice in providing sustainable energy services for the organic food production.

8) Green IT of Information and Communication

Information and communication technology is useful in soil testing, crop cultivation, water management, fertilizer management, pest management and many more. It is also used in the transportation process, selling and storage of organic food products. The main motive of this technology is to

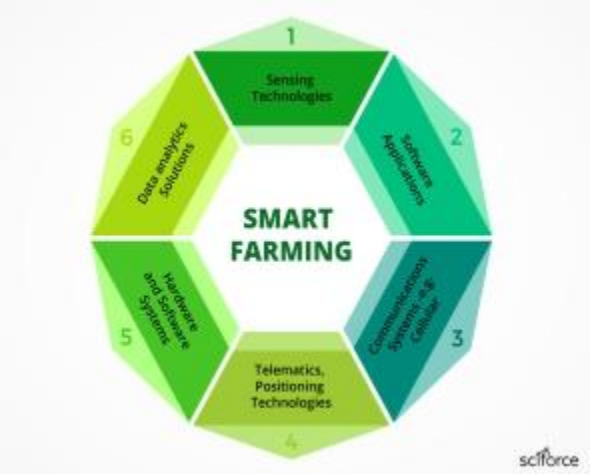
improvise and strengthen the management and homogeneity of the product quality,to obtain savings in labour and also to reduce the loss of nutrients and pesticides collectively with other possible environmentally harmful products. Through optimization of the whole production system, the chance of acquiring more from precision farming within the vastly advanced agricultural systems can be attained. This can be achieved with the development of software which could interpret the sensors for allocating pesticides and fertilizers in a specific area. Green Technology of Multiple Cropping and Crop Rotation Multiple cropping is a form of polyculture and can be defined as producing more than two crops in the same land, during the same season. It can be done in two methods i.e.; relay cropping, where a succeeding crop is sown along with the first one, before it is harvested and double cropping, where the first the current crop is reaped then the successive crop is planted. On the other hand the process of growing two or more dissimilar or unrelated crops in the same land in different seasons is known as Crop rotation. The major benefit that is available with the help of such systems is conserving the standard of land which is decreased because of the inorganic farming. These farming practices mostly aim at eco-friendly with improved production of organic food. In order to conventional farming, this system contributes a maximum peaceful relationship to the crops as they have soils of higher biological, physical and in several situations chemical quality

NEW ADVANCED METHODOLOGIES

1) Data mining and Data Analytics

Decision Support System(DSS) in the farming field is supported by the data mining tools. So here the main motive is to extract the useful information from the available data sets and then transform them using specific tools into a unique one that is easily understandable by everyone and can be used for advanced purposes. Data mining techniques assists and empowers the farmers to how to make a decision to sow particular variety of crop that results in a better yield. Data mining tehniques that are based on GPS, KNN, k-means approach, SVMs methods are useful to study the soil characteristics, the pollution in the atmosphere and various factors that influence the crop yield.

2) Smart Farming technology

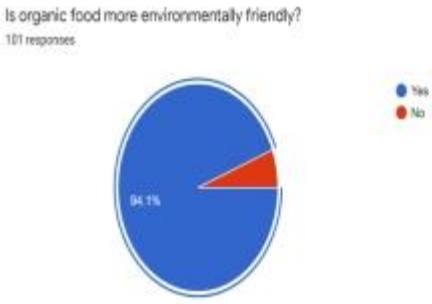


Smart farming focuses on the use of Information and Communication technology in the cyber-physical farm management process.Smart farming uses modern IT into agriculture thereby giving rise to a Third Green Revolution. Also as per the current studies it is noticed that the population is increasing day by day and to in order to provide food and meet the needs for such a large population is a bit complex task and sort of impossible with less cultivable land and conventional farming approches. So the government is focusing on smart agricultural practices and the application of IoT technology in agriculture in order to overcome the crop limiting hindrances such as crop failure, crop damage, loss of productitivity and thereby losing the productivity rate.

FIGURES AND RESULTS

Public Survey

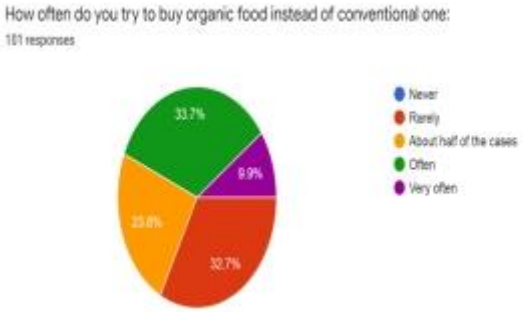
- Is organic food more environmentally friendly?



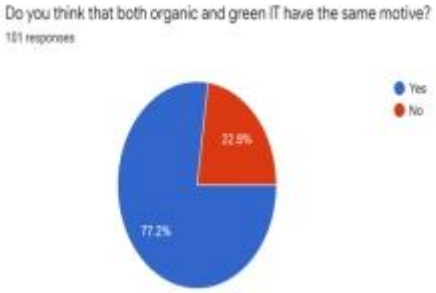
How important is organic farming as a topic of discussion?

How often do you read the label/information on the package for the food you buy:

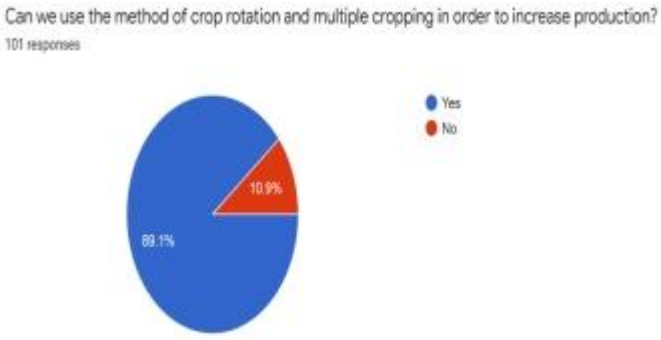
How often do you try to buy organic food instead of conventional one:



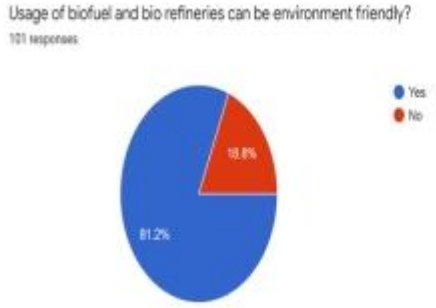
Do you think that both organic and green IT have the same motive?



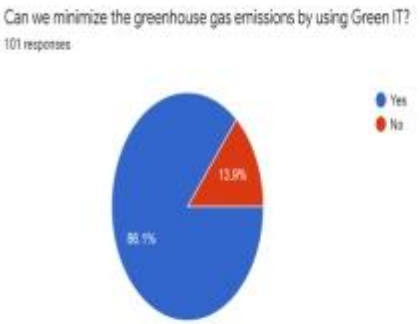
Can we use the method of crop rotation and multiple cropping in order to increase production?



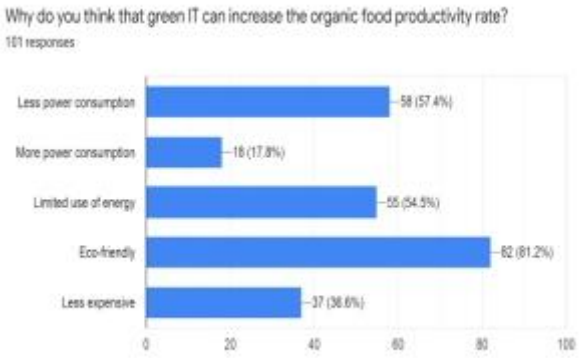
Usage of biofuel and bio refineries can be environment friendly?



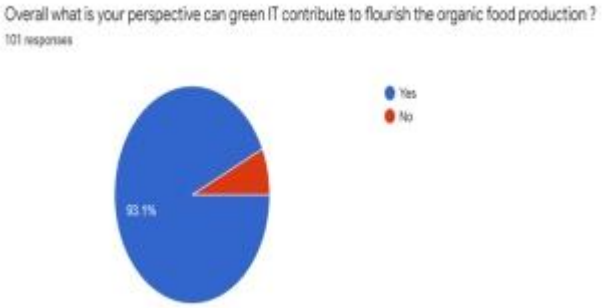
Can we minimize the greenhouse gas emissions by using Green IT?



Why do you think that green IT can increase the organic food productivity rate?



Overall what is your perspective can green IT contribute to flourish the organic food production ?



Conclusions

As per the research, it is clearly observed that Green IT or Green Computing majorly contributes in the organic food production. Also, it can be observed that there are variety of approaches that can be used to increase the quality and quantity of crops thereby increasing the crop yield. The solution is to adopt green technology but some of the poor countries have not been able to use applicable technology to a great extent since their incapability to afford to the existing ones. Efforts are required to make these technologies affordable to all. Today, efforts are being made to increase the agricultural output while managing the depletion of presently available resources beyond the point of recovery by adopting Green Technologies.

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