ISSN: P-2455-0515
E- 2394-8450

Educreator Research Journal

A Peer Reviewed Referred Journal

OPEN ACCESS

Volume–IX, Special Issues–I
March – April 2022

Original Research Article

SUSTAINABLE AGRICULTURE: PAST, PRESENT AND FUTURE

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Abstract:

Sustainable agriculture is term used for growing food that will nurture environment, economy and society. Sustainable agriculture is capable of producing diverse forms of high-quality foods, fibers and medicines. It is regenerative farming which sufficiently produces food, fiber and repairs damage. In present era it is observed that prevalent practices of cropping under extensive as well as intensive farming have caused harm to soil and environmental problems because of which agricultural production cannot be sustained. Today's industrial farming methods are depleting our natural resources through monoculture and overuse of pesticides and fertilizers. Sustainable agriculture is a way to maintain soil fertility, water purity, it preserves bio-diversity. It helps in conserving the biological, physical and chemical qualities of the soil.

Sustainable agriculture is an effort to produce food on a continuous basis, while adopting measure to overcome the damage caused by destructive practices. The principle of Sustainable agriculture points to -meeting the needs of the present without compromising the ability of the future generations to meet their own needs.

Sustainable agriculture is ecologically sound way, economically viable, socially just and humane, culturally appropriate and has a holistic as well as scientific approach. Sustainable agriculture does not deplete soil, it is based on the strategy to protect soil and water, and it supports local communities and promote health of the people.

Keywords: *Biodiversity, Sustainability, Green Revolution, Organic Farming*

Introduction:

Agriculture is an art of cultivating crop from the soil. The history of agriculture began thousands of years ago, after gathering wild grains beginning at least 105,000 years ago. Nascent farmers began to plant them around 11,500 years ago. Plants were independently cultivated in at least 11 regions of the world. Industrial Agriculture based on large-scale monoculture in the twentieth century came to dominate agriculture output, though about 2 billion people still dependent upon subsistence agriculture.

In India, particularly in rural areas since ancient times farmers are practicing sustainable agriculture practices, which they have acquired from their ancestors but in 21st century there is a drastic change in the food supply and demand ratio. With the increase in food demand with high yield variety had lead to consumption of more and more chemical fertilizers. Crops are often infected by variety pathogens such as microbes, viruses and fungus. Because of which utilization of various pesticides and fungicides has increased which has a very bad impact on overall food chain and

ultimately sustainable food security **(Balchandran, 2004).** Many corrective measures are initiated to provide security and social recognition to the farmers to lead India in to a green prosperity which in turn will bring social, economic and environmental sustainability. Agriculture commodity has to develop new strategies to tackle this problem. With the decline in the crop production and under the burden of repayment of agricultural loan, now days in India especially in Maharashtra, rates of farmer's suicides have increased tremendously. Apart from this it has lead to rural unemployment which is a very serious issue. Hence there is a strong need to adopt different methods for sustainable development in agriculture sectors in India. After invention of Green Revolution and GM crops, organic farming could be an ideal substitute to overcome these problems.

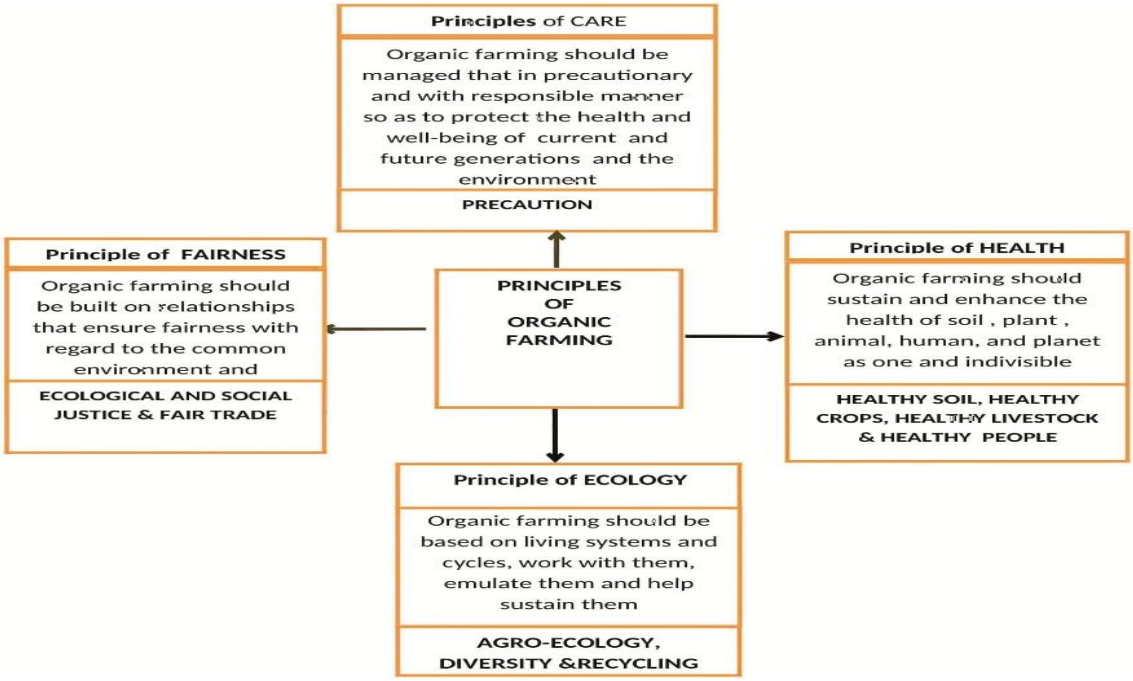
Sustainable Agriculture:

Sustainable agriculture is one that produces abundant food without depleting the earth's resources or polluting its environment **(Brodt, 2018).** It is agriculture that follows the principles of nature to develop systems for raising crops and livestock that are, like nature, self-sustaining. Sustainable agriculture is also the agriculture of social values, one whose success is indistinguishable from vibrant rural communities, rich lives for families on the farms, and wholesome food for everyone. But in the first decade of the 21st Century, sustainable agriculture, as a set of commonly accepted practices or a model farm economy.

Organic Farming:

It is a method which is devoid of use of any chemical fertilizers, fungicides, growth regulators, manures etc. and relies on maximum utilization of various strategies like crop rotation, use of crop residues, animal manure, cow dung, green manures, organic waste etc. All synthetic pesticides are replaced by plant based natural insecticides and pesticides which are safer to use. It aims at cultivating the land thereby raising the crop yield by the use of organic wastes.

Principles of Organic Farming (acquired from IFOAM, 1998)



Characteristics of organic farming:

1. To protect long term fertility of the soil by maintaining organic matter levels with the encouragement of soil biological activity.
2. To supply crop nutrients indirectly using relatively insoluble nourishment sources that are taken up by the plants with the help of soil microorganisms by the process of nitrogen fixation

3. Effective recycling of organic materials including crop residues and cow dung manures.
4. Weed disease and pest control can be achieved by periodic rotation of crops, diversity organic mannuring and use of resistant varieties.

Indian scenario of organic farming:

The concept of organic agriculture is not new to India; it was initiated way back at the beginning of 20th century. Indian farmers were basically organic farmers before the invention of inorganic or synthetic fertilizers and chemical pesticides. Overtime use of these synthetic inputs has lead to various problems to the environment and human health. To go back to organic farming not only will ensure the uncontaminated food production but also to sustain agriculture by keeping land in healthy condition. To make organic farming a success story, it is necessary to adopt eco-friendly technologies which will maintain or increase the agricultural productivity have to be developed and made available to the farmers. Government of India has started promoting the same under National Programme of Organic Production (NPOP) standards under which accreditation status and national logo was launched **(Rao, 2005).** States like Maharashtra, Karnataka, Madhya Pradesh, Bihar, Kerala, Tamil Nadu and Gujarat have adopted the concept of organic farming and started practicing it to a larger extent. In 2018, Indian government has launched National Project on Organic Farming NPOF). This project includes more than 5.66 lakh farmers and more than 4.67 lakh ha area under organic management. As more farmers are switching over to organic farming and due to less consumption at domestic level, there is rise in export of organic food from India. **(Dhaliwal, 2017).**

Need of Participatory Guarantee Systems (PGS) in India:

Participatory Guarantee Systems (PGS) are locally focuses on Quality Assurance (QA) and Quality Control (QC) systems. Producers are certified based on their active participation of stakeholders and are built on the foundation of trust, use of social networks and exchange of knowledge. The increasing global demand for organic products offers great opportunity for organic farmers. At the same time, it is mandatory to fulfill quality assurance criteria to grab international market. The certification of organic products is an essential as it assures consumers about the quality of organic food that they consume (**Rao *et al.*, 2003).**

Organic Certification:

Organic certification system is a quality assurance initiative, relies on quality assurance, minimizing frauds thereby promote economy based on set of standards and ethics. In this process a certificate is issued for producers of organic food and other allied products**(Rathi, 2003)**Agricultural Processed Foods Export Development Authority (APEDA) under Ministry of Commerce, Government of India is the parent body for organic certification for export. Certification agencies can authorize to undertake certification process under National Programme for Organic Production (NPOP).

Organic farming works on following,

- To minimize the consumption of non-renewable energy resources
- To improve and maintain the natural landscape and agro-ecosystem.
- To avoid over exploitation and pollution of natural resources.
- To explore various synergies that exists in a natural ecosystem.
- To maintain and nourish soil health by triggering activity or by the addition of organic manures with the minimal use of chemical insecticides
- To achieve profit by using safe and eco-friendly methods**(Yadav, 2019)**

Global status of Organic Farming:

2018-19 data shows, India stands at 9th position in terms of certified agricultural land with 1.94 million hectors (FIBL and IFOAM, 2020).

Country wise land distribution under organic farming

Country	Rank	Area under cultivation (in million hectors)
China	3rd	3.14
USA	7th	2
India	**9th**	**1.94**
Brazil	12th	1.18

Indian Organic Products:

Basmati rice, pulses, honey, tea, various spices, coffee, oil seeds, cereals and herbal medicines etc. and their value added products are produced in India.

Scope for promoting organic farming in India:

India is endowed with large natural and human resources. In the field of agriculture India has dominance in the production certain items like tea, some spices, rice, ayurvedic herbs etc. Traditionally Indian economy is an agrarian economy and the farm practices were environment friendly. Later the Green Revolution had replaced the traditional farming practices and lead to rapid rise in pesticide and chemical fertilizer use. The rise in use of chemical inputs has created adverse environmental and health impacts. The extensive use of pesticides has also resulted in pesticide resistance in pests and adverse effects to beneficial natural predators and parasites. The adverse effect of the modern fertilizer based farming compelled large number of farmers to adopt organic farming. India being a country with strong agrarian basis and culture, still has great opportunity to promote organic farming by providing effective training, and marketing services to organic farmers. The only group which gets benefited by this is the corporate who manufacture these pesticides. The continuous application of chemical fertilizers reduces the fertility of soli which causes continuous decline in farm produce. It leads to the increasing cost of production and declining productivity which makes the farming economically unsustainable. Sustainability of agriculture relies on its long-term economic viability. Organic farming focus on long term economic sustainability than modern synthetic fertilizers and pesticides based farming. Moreover organic products carry a premium price in the market which makes organic farming more profitable. Through various schemes such as National Project on Organic Farming (NPOF), National Horticulture Mission, Rashtriya Krishi Vikas Yojana. Under these programmes various states are assisted for area expansion of organic food crops, capacity building of farmers.

Conclusion:

As the awareness about the safety and quality of foods is increasing day by day, long term sustainability of the present farming system induces sustainable agriculture practices. Organic farming is an alternative system of farming which not only focuses on quality and sustainability but also ensures a profitable option for rural commodities in India. As India in the initial phase of Organic farming, strong institutional mechanisms and governmental support must be essential to realize its sustained growth. Strong Local institutions build up including farmers Group, Local Guidance, knowledge sharing, market linkages etc. are critical to build up successful growth of organic farming. Sustainable Agricultural development in India is essential to support the farmers who are struggling to sustain in this sector.

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Cite This Article:

**** Dr. Gangotri Nirbhavne & ** Dr. Abhijit Sahasrabhudhe,** (2022). **Sustainable Agriculture: Past, Present and Future**, Educreator Research Journal IX (Special Issues - I), March –April, 64-68.*