IJBPAS, January, Special Issue, 2022, 11(1): 33-42

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

ORGANIC FARMING: THE WAY TO SUSTAINABLE AGRICULTURE AND ENVIRONMENTAL PROTECTION

SAIKIA PJ

Assistant Professor, Department of Geography, Tezpur College, Tezpur -784001

***Corresponding Author: Dr. Prakash Jyoti Saikia: E Mail: saikia.prakashjyoti0@gmail.com**

Received 10th June 2021; Revised 11th July 2021; Accepted 20th Aug. 2021; Available online 15th Jan. 2022

https://doi.org/10.31032/IJBPAS/2022/11.1.1004

ABSTRACT

Today's challenge is not only how to utilize our natural resources to meet the growing demand for food and other products, but also the question of how to sustain and conserve our ecosystem. In recent decades, agricultural development has been focused on short-term production that is dependent on external inputs such as chemical fertilisers, insecticides, and the like. However, the overall consequences on natural resources have been detrimental, and agriculture is no longer considered sustainable. The growing worry over environmental damage, soil depletion, and human health are now compelling agriculturists to seriously consider alternatives to the exploitative chemical agriculture. Hence, there is an urgent need to transition from high-input agriculture to organic agriculture.

Although chemical fertilisers boost yield, they degrade the soil quality over time. Similarly, pesticides may be effective in eliminating some pests, but they come with a slew of drawbacks as these chemicals spread across the ecosystem, rendering them unfit for human survival. It is vital to preserve soil health and the environment to sustain agricultural productivity. Therefore, organic agriculture has the potential to transform agriculture into the primary tool for environmental protection if given adequate consideration. Organic farming, which produces green food, can be seen as a reasonable solution to this issue too because it intertwines bio-physical production elements with socio-economic and organisational factors.

Keywords: Organic Farming, Sustainable, Agriculture, Environment

INTRODUCTION

Agricultural development in recent decades has been focused on short-term production that is dependent on external inputs such as chemical fertilisers, herbicides, and others, leading to neglect and inappropriate use of indigenous resources. As a result, natural resources and indigenous knowledge have been negatively affected, and agriculture can no longer be considered sustainable. Chemical fertilisers, insecticides, and energy-intensive farm machinery are all significantly reliant on fossil fuel-based sources and modern agriculture is seen to be heavily dependent on them.

The growing worry over environmental damage, soil depletion, and human health as a result of the disproportionate use of chemical fertilisers and pesticides in agriculture to meet the food needs of a growing population are now compelling agriculturists to seriously consider alternatives to chemical agriculture. The general degradation of environmental conditions related to agriculture, for instance, is not just harming crop productivity and production but also the health of the general public. Hence, there is an urgent need to transition from high-input agriculture to organic agriculture. In light of this, and intending to promote organic farming in India, this paper reviews the connections between the current agricultural system and the environment, as well as the possibilities of organic farming in this regard for agricultural sustainability and environmental harmony.

METHODOLOGY

The present study is based on secondary data and has made use of various reports, e-journals, newspapers and other reliable sources.

Intensive Agriculture and Environmental Problems

The component of the environment is becoming deteriorated as a result of duplicitous usage of natural resources, raising risks to human survival. Unscientific use of agricultural inputs such as fertilisers and pesticides, especially in intensive farming systems, has resulted in the aggravation of various environmental disorders such as loss of species diversity, contamination of surface and groundwater, soil erosion, acid deposition in the atmosphere and so on. The process of de-nitrification from nitrogen-based fertilizers, for instance, is believed to play a vital role in emitting oxides of nitrogen into the air which raises the acid content in the atmosphere. The carbon deposition in the atmosphere in different forms, which are commonly known

as greenhouse gases, viz. CO_2 (63%), CFC (23%), CH_4 etc., has considerably increased during recent years and it is likely to go up further. On a worldwide scale, these greenhouse gases are increasing at a rate of 2.3 parts per million per year (NOAA, 2019), and if current emission rates continue, the climate might warm by 1.5 to 4.5 degrees Celsius by 2030. As the temperature rises, the ocean gets warm, glaciers and polar ice melt; it leads to increased water flow and threatens to flood fertile areas in countries with extensive coastlines such as India.

Agriculture in India confronts potential risks due to a steady increase in the frequency of floods and droughts, decreasing crop production, a gradual decline in agricultural and grazing lands, shifts in agro-ecological zones, a drop in agricultural labourers and farmers, and other factors. Global warming also has an impact on crops and plants, which may be unable to adapt to frequent environmental changes. Due to the depletion of the ozone layer in the stratosphere, for instance, photosynthetic activity in plants is hampered reducing crop yields. Surface water pollution is caused by strong runoff water carrying pesticides, soil particles, nutrients, and organic wastes. Irrigation water containing salt and nutrients also cause contamination of surface water. Where there is excessive use of nitrogen-based fertilisers for agricultural production, groundwater also gets contaminated as a result of nitrate leaching into the ground.

Sediments make up the largest chunk of agricultural pollutants. Flooding and fluctuations in climatic conditions harm more than 20 million hectares of land in India each year. The Ganga and Brahmaputra river systems, for example, transport 3000 million tonnes of suspended silt to the sea each year. As a result, during floods, fresh sedimentation causes significant harm in the form of top fertile soil loss. Sediments that fill streams and rivers, reservoirs and lakes, and other bodies of water cause water displacement, which can impede flood control measures or even the usability of reservoirs. Aquatic plant and fish growth are likewise hampered. Sediments also include significant amounts of nutrients (N, P, K) and pesticides, which foster the unwanted growth of algae and water weeds, lowering dissolved oxygen levels and posing a hazard to aquatic life. Pesticides used in agricultural production can kill fish and animals, and many of them are toxic to humans if they pass down the food chain.

Harvest wastes, plant leftovers, food processing wastes, animal excrement, pollutants from feedlots and poultry houses,

and pesticides that escape into the atmosphere are all possible sources of pollution as a result of chemical fertilizer-based agricultural farming and operations. If a pesticide is applied against a specific insect over a longer length of time, the pest may acquire resistance to the pesticide, resulting in an outbreak of the pest. This mandates the use of a higher dosage of a more hazardous pesticide, which multiplies the adverse effects of increased pollution of the environment. Some of the pesticides used in the agricultural production systems are not readily biodegradable and tend to persist for many years in the environment, especially in soils. Although this characteristic of pesticides may be advantageous in controlling some pests it has many disadvantages as these chemicals move to other parts of the environment making them unfit for human survival.

Not only do we have to figure out how to use our natural resource base to meet our growing need for food and non-food items, but we also have to figure out how to sustain and conserve our environment. The current generation must protect the resources entrusted to them for future generations who will be born and live in the coming centuries. All this will require a change in strategies of farming making it more efficient in fulfilling present requirements and conserving the natural resources base.

Sustainable Agriculture through Organic Farming

The notion of sustainability is based on maintaining a balance between buoyancy dynamism in agricultural expansion for meeting fundamental human needs and an emphasis on natural resource protection and conservation. Agricultural sustainability, environmental quality, and the interconnectedness of these aspects in the pursuit of human existence would be jeopardised if natural resource vitality gets damaged owing to neglect and misuse of production processes. Sustainable agriculture, according to the "Consultative Group on International Agricultural Research" (CGIAR), is "the successful management of resources to meet changing human demands while maintaining and improving environmental quality and conserving natural resources. Thus, sustainable agricultural practices are those that enable more efficient use of natural resources, mitigate the impact of agriculture on the environment, and strengthen capacity for adaption to climate change and climate variability" (Pineiro v. *et al*., 2021). Furthermore, for the sake of preservation and meeting the needs of future generations,

sustainable agricultural development emphasises a shift in focus to ensure the attainment and continued satisfaction of human requirements.

Sustainable crop production is only possible if the natural resource on which productive activity depends is not eroded or damaged in a way that damages it or endangers production and growth at all times. So, to maintain agricultural productivity, it is imperative to take care of the health of the soil and the environment. Organic farming which produces green food is a reasonable solution to the above problems. The elements of biophysical production are closely related to socio-economic and organisational factors in organic farming systems.

Organic farming can be defined as "a production system that is managed to respond to site-specific conditions by integrating cultural, biological and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity." (SARE, 2003). It is founded on the use of as few off-farm inputs as feasible, as well as management strategies that restore, maintain, and improve ecological balance. Organic farming can be a viable alternative if the associated issues, such as inefficient land usage in various forms, government assistance, research and development, food pricing, food loss, and so on, are adequately addressed. Compost, farmyard manure (FYM), vermicompost, bio-fertilizers, crop residues, and green manures are all used to boost organic carbon levels in the soil. They not only supply the plants with nutrients but also improve the soil properties. To manage pests and diseases of crop plants without affecting natural beneficial micro-organisms, organic farming uses bio-control agents. Hence, organic farming improves crop quality and reduces pollution in the environment. It also increases the prospects for organic food exports.

Important Features of Organic Farming

Agriculture based on organic farming is a broad term that refers to a variety of agricultural practices, including organic, biological, low-input, and sustainable systems. In such systems, various management approaches, as well as biological interactions between plants and organisms, are put to the test. It's a complete manufacturing-type management system. Organic food production refers to organically cultivated finished food products that have not been exposed to any chemicals, from seed multiplication and production to final post-harvest treatment such as handling and processing. Organic foods are not only devoid of chemicals, but they are also

healthier, safer, and more flavorful. If given proper consideration, organic agriculture has the potential to transform agriculture into the principal tool for environmental protection.

Input Resources for Organic Farming

Major crop augmentation efforts and that too for long-term production must rely heavily on natural processes including nutrient cycles, biological nitrogen fixation, and pest predator-pest parasite relationships. In different sections of India, there are numerous sorts of naturally available organic forms of nutrients. Bio-fertilizers, vermicompost, green manures, compost, crop residues, FYM, biogas slurry, bio-pesticides, and other organic resources are used in organic farming in the country. Crop rotation, green manuring, composting, inter-cropping, companion cropping, mulching, and other such organic agricultural practices are popularly followed for organic farming due to their manifold effect on soil health. Biological prevention is frequently regarded as a default benefit of organic farming's soil fertility measures.

Bio-fertilizers such as Azospirillum Azola, Rhizobium, Azotobacter, and blue-green algae are used to replace nitrogenous fertilisers, while phosphate-solubilising micro-organisms are employed to break down phosphate (PSMO). These bacteria include Bacillus and Pseudomonas SP, as well as Aspergillus and Penicillium sp. When paired with earthworm raising technology alongside the agricultural site, farming with vermicompost is an effective organic farming approach. Green manure crops such as Dhaincha, Sunnhemp, and Cowpea, which contribute 60-200 kg N/ha in 45-60 days, have traditionally been used in India. The pesticides that are permissible in organic farming are mostly biotanicals, such as neem-based products and biological agents such as Trichoderma sp., Pheromone Traps, Nuclear Polyhedrosis Virus (NPV), Bacillus thuringiensis, plant growth-promoting Rhizobacteria, and so on.

Status of Organic Production in India

As a country that uses few chemical fertilisers, particularly in the rain-fed areas of the North Eastern Region and the hill states, India has an excellent chance to produce organic food for both internal and export markets. The Northeast, which missed out on the Green Revolution, is now in a position to lead the country's organic agriculture movement. Nearly half of the agricultural lands in the Northeast can be managed using an organic farming approach. 29 districts consume less than 10 kg NPK per hectare and two districts that consume less than 25 kg NPK per hectare, accounting for around

155 per cent of the country's arable land in this region.

India has around 2.7 million hectares of organic farming land as of 2020, compared to the world's total acreage of over 72,3 million ha (Khurana and Kumar, 2020). Organic farming covers only about 2 per cent out of India's total 140.1 Million hectares of net sown area. As per IFOAM – Organics International's report, *The World of Organic Agriculture 2019*, India has 8,35,000 organic farms compared to 2.9 million organic producers worldwide.

The Government of India's Ministry of Agriculture has embarked on an ambitious plan to establish the "National Institute of Organic Farming" (NIOF) in Ghaziabad and Regional Organic Farming laboratories in Bhubaneswar, Hissar, Bangalore, Jabalpur, Imphal and Nagpur, respectively, to promote organic products for both the domestic and international markets. The NIOF serves as the country's top body for the development and promotion of organic agriculture.

Market potential of Organic Food

Organically grown products must be made available at a reasonable cost to the consumer. There is a growing appreciation for organic fruits and vegetables due to changes in dietary needs, higher income, and increased health consciousness. Because India has a much bigger area where pesticides and other agrochemicals have been used sparingly and where conversion is possible, the organic movement has taken root in many states. Cities are experiencing increased demand, with the market expected to rise by more than 20% every year. As a result, it is expected that roughly 20% of fruits and vegetable production will be organic within the next five years.

Export potential of Organic Produce

Europe, Japan, the United States, and the Middle East are currently India's top organic food markets. According to the EXIN bank, the annual growth rates of organic food have risen from 15-30% over the last five years, and it has a promising future, signalling considerable opportunities for India to export various organic food commodities. The predicted value of organic product exports from India in 2020-21 was assessed at Rs. 7,078 crores (USD 1 billion), however with more projects coming up in the country, exports are expected to rise significantly (PTI, April 27, 2021).

Organic foods that are regarded as safe and hazard-free are becoming increasingly popular among global consumers. According to a study by Grand View Research, Inc., the global market for organic food and beverages was expected to

reach USD 320.5 billion by 2020, which grew at a CAGR of 15.7% from 2014 to 2020 (Grand View Research, 2020). Organic produce is more profitable and remunerative on a worldwide scale. Since a substantial part of our country, particularly the Northeast, is organic by default, India has the potential to capitalise on this rising industry. Not only that, approximately 65 per cent of the country's planted acreage is unirrigated, and farming practices are still primarily organic by default.

Important Organically Produce Crop for Export

The potential crops for organic farming are high-value crops such as spices, aromatic and medicinal plants, fruits, basmati rice, wheat, cotton, sugar cane, cashew nut, oilseeds such as mustard sunflower, soybean, other crops namely potato coriander and turmeric. Based on demand, India has already initiated exported marketing of organic banana, rice, wheat, pulses, cotton, spices, vanilla, tea coffee, fruits, oil, honey etc. For the period of 2020-21, the organic export of India in respect of basmati rice, dry banana, cotton, mango pulp, cashew nut honey, spices and coffee was 8.88 lakh metric tones. States like Karnataka, Kerala and Tamil Nadu etc. have initiated the production of organic vanilla, organic spices and coffee. In 2004 Assam has started production of organic *Joha* rice under the guidance of APEDA and with technical assistance from the state department of Agriculture.

Strategies for Organic Food Production

To take maximum benefits from the vast natural resources by popularizing the organic food production in the country, following strategies are being adopted at Government text:

1. It is necessary to standardise various areas of organic food production, particularly for horticulture commodities.
2. Encourage the establishment of demonstrations sites for the preparation of vermin-compost, bio-fertilizers, bio-pesticides, bio-dynamic compost, and biodynamic pesticides.
3. Promotion of field demonstration for the organic system of cultivation.
4. Farmers, NGO representatives, businesspeople, and extension experts should receive extensive training in the production and implementation of biodynamic and organic inputs.
5. Facilitation for certification for organic production.
6. Market promotion for organic food and their processed product.

CONCLUSION

The indiscriminate use of pesticides and other agrochemicals for enhanced agricultural output has not only harmed the environment, but has also eliminated many beneficial insects and microorganisms. This limits the usages of beneficial insects and microorganisms for various pest and disease control programmes. Organic farming can help to solve the problem of environmental contamination while also restoring natural resources in the current context of sustainable crop production. Before the advent of the "Green Revolution," Indian farmers were organic farmers using traditional methods of raising crops. Organic farming is very much native to our country but it is being practised mostly in an unorganised way. More than 60 per cent of the arable land in India is under traditional cultivation where no synthetic inputs are being used. Although they are genuine organic items, they cannot be classified as organic food because they are not certified as such. To expand organic food production areas and production, the government should take the lead by offering farmers incentives in the form of free or subsidised inputs so that they can pursue it as a profession. The government should also take all necessary steps to procure organic produce directly from farmers without the involvement of a middleman so that farmers get the actual price of their organic produce. An organisation like APEDA should come forward to promote organic farming in our country by providing an incentive to growers of different organic produce.

REFERENCES

[1] Grand View Research (2020). Global Organic Food & Beverages Market to Reach USD 211.44 Billion by 2020. Report of Grand View Research, Inc. https://www.orgprints.org/38077/7/28077/pdf

[2] Khurana A. and Kumar V. (2020). On a tardy trail: State of organic farming in India - Down To Earth, https://www.downtoearth.org.in › blog › agriculture › o..., Retrieved on 10th Nov 2021.

[3] NOAA (2019). Rising emissions drive greenhouse gas index increase. Oceanic and Atmospheric Research. NOAA Research News, https://www.research.noaa.govt/ar, Retrieved on 6th Nov 2021.

[4] Pineiro V., Arias J., Elverdin P., Ibanez A. M., Opazo C.M., Praget S. and Torero M. (2021). Achieving sustainable agricultural practices: From incentives to adoption and outcomes. CGIAR, IFPRI Policy Brief. https://www.cgiar.org/news-events/news, Retrieved on 10th Nov 2021.

[5] PTI. (2021, April 27). India's organic food products exports rise 51% to USD 1bn in 2020-21. The Economic Times.

[6] SARE Outreach. (2003). Transitioning to Organic Production. The Sustainable Agriculture Network (SAN), an arm of Sustainable Agricultural Research and Education (SARE), https://www.sare.org/publications, Retrieved on 4th Nov 2021.

[7] Willer H and Lernoud J (Eds.). (2019). The World of Organic Agriculture: Statics & Emerging Trends 2019. FiBL & IFOAM-Organics International Yearbook, 2019. pdf, http://www.organic-world.net/yearbook/yearbook-2019