FROM THEORY TO IMPACT: NEW VISIONS ACROSS DISCIPLINES

FIRST EDITION
2025

Editor-in-Chief
Daniel James

ASDF UK

ISBN 978-81-951337-7-2

From Theory to Impact: New Visions Across Disciplines 2025

FTI 2025

FIRST EDITION 2025

From Theory to Impact: New Visions Across Disciplines 2025

FIRST EDITION FTI 2025

By

ASDF, UK

Financially Sponsored By

Association of Scientists, Developers and Faculties, India

Editor-in-Chief

Daniel James

Editors:

Anbuoli Parthasarathy and Katsuo Shichirou

Published by

Association of Scientists, Developers and Faculties
Address: 483 Green Lanes, London N13 4BS. England. United Kingdom.
Email: admin@asdf.res.in || www.asdf.international

From Theory to Impact: New Visions Across Disciplines 2025 (FTI 2025)

First Edition

Editor-in-Chief: **Daniel James**
Editors: **Anbuoli Parthasarathy and Katsuo Shichirou**

Cover Design: **Saravanan Velayudham**

Disclaimer:

No responsibility is assumed by the FTI 2025 Publisher for any injury and/ or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products or ideas contained in the material herein. Contents, used in the articles and how it is submitted and approved by the contributors after changes in the formatting. Whilst every attempt made to ensure that all aspects of the article are uniform in style, the FTI 2025 Publisher or the Editor(s) will not be responsible whatsoever for the accuracy, correctness or representation of any statements or documents presented in the articles.

ISBN-13: 978-81-951337-7-2
ISBN-10: 81-951337-7-0

Table of Contents

ORGANIC FARMING FOR SUSTAINABLE DEVELOPMENT

A BHAVATHARANI

Assistant Professor and Research Department of Mathematics, Mannar Thirumalai Naicker College, Madurai, Tamil Nadu.

ABSTRACT

- To produce high nutritional quality food in sufficient quantity to serve the growing population
- To promote the usage of natural fertilizers, pesticides and minimize the usage of chemical fertilizers at the same time controlling pests, diseases, and weeds
- To avoid pollution of air, water, soil that may result from various agricultural techniques
- To encourage and enrich biological cycles within farming system which involves microorganisms, soil, flora and fauna, plants and animals
- To maintain and increase long term fertility and structure of soil
- To allow agricultural producers adequate returns and satisfaction from their work which includes safe drinking water

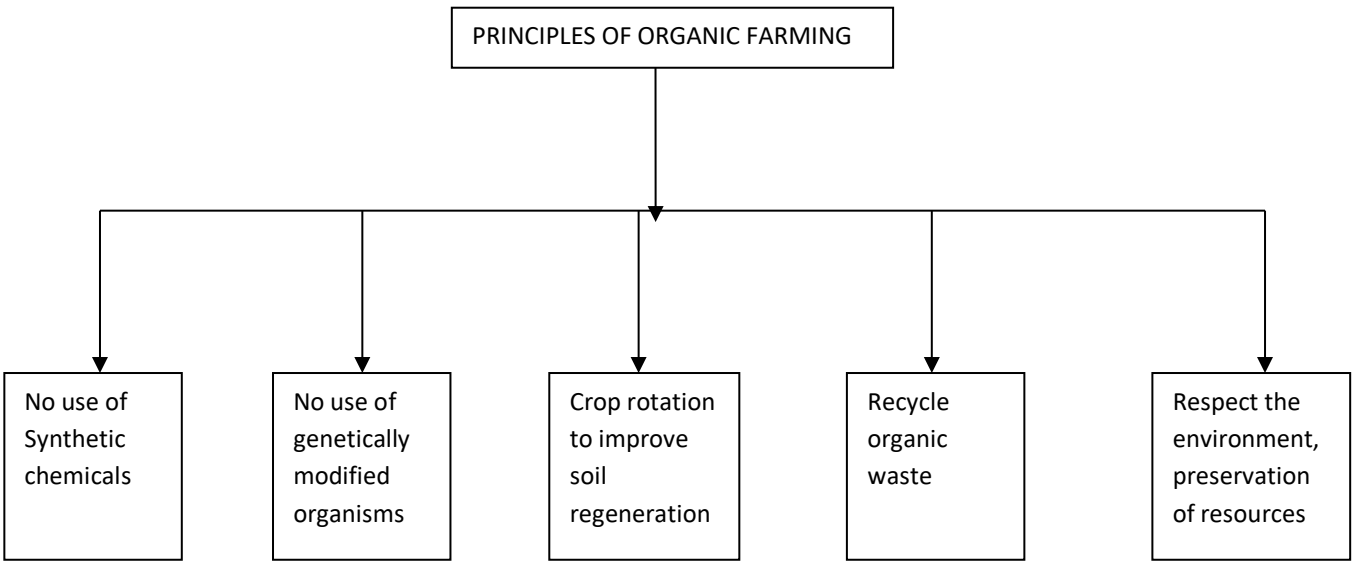
INTRODUCTION

Farming is the practice of cultivating plants and raising cattle. Agriculture was the key development in the rise of human civilization, where the farming of domesticated species created surplus that facilitated people to live in cities in a civilized manner.

For thousands of years, agriculture thrived without relying on chemicals or artificial fertilizers, with farmers using time-tested natural methods to nurture the land and crops. Artificial fertilizers were developed in the mid-19th century which were cheap but powerful and transportation was easy for bulk products. Similarly, chemical pesticides were also developed in the late-19th century which led to this decade being called the “pesticide era”. Even though the advancements in agricultural techniques were beneficial in short term but it proved to have serious long-term side effects such as soil erosion, compactness of soil, soil infertility and a lot more. Agricultural contaminants such as pesticides, fertilizers, nitrates and phosphorus impact the quality of ground and surface water and deplete soil health which requires intensive use of fossil fuels for creation. The by-products, emissions and pollution from all the stages starting from production to distribution affect air quality and result in climate change which affects communities over vast areas (rural and urban). While the conventional farming methods yield high production levels it also has its adverse effects on individuals and a community as a whole. This also led to health hazards such as obesity, cardiovascular disorders, acute and chronic disorders and respiratory illness.

To cope up with the adverse effects of conventional farming and due to increasing environmental awareness in the general population researchers and agriculturists developed the method of organic farming which included the use of fertilizers of organic origin such as compost manure, green manure and bone meal which did not have any ill effects on the nature and for living beings. Organic farming is a holistic approach that prioritizes sustainability, soil health,

and biodiversity by relying on natural methods and prohibiting synthetic chemicals, genetically modified organisms, and artificial growth promoters.



METHOLOGIES

1. Crop Rotation:

Crop rotation is the technique of growing different crops in different seasons in a sequential order. In this technique farmers do not grow the same crops on the same part of land in the subsequent years. If the same crop is planted in the same part of land every year the soil structure depreciates as the same nutrients are consumed year after year.

After a few years the soil is drained of its nutrients. So adoption of this method naturally replenishes the soil as different kinds of crops contribute nutrients to the soil. It also disrupts the habitat of weeds and pests as they get rotated every year or season. Compared to monoculture (same crop year after year) farming soil erosion can be controlled because different root systems protect the soil. And also, it boosts the yield and reduces the cost.

Advantages of Crop Rotation:

1. By alternating crops such as shallow rooted plants and deep-rooted plants they absorb nutrients from different depths.
2. Nitrogen fixing plants such as legumes and peas improve the quality of soil for the crops that are to be planted in the future.
3. Pests that nourish on one type of crop get stalled as their food source is not in the same place every year.

2. Crop Diversity:

Crop diversity refers to polyculture in which a variety of crops are cultivated simultaneously in order to meet the increasing demand in crops. This has been evolved over years as the interaction between humans and nature. It provides the biological foundation for food production which contributes to economic development. Basically, farmers rely on a single staple crop such as rice, wheat, sorghum, etc. associated with a few other crops such as pumpkin, peas, potatoes, tomatoes, etc. which increases the diversity of varieties and improves the capacity of a crops to cope up with insects and pests. Crop diversity allows farmers to start new practices that protect them against various hazards as they become

irrepressible to natural calamities. If one crop fails there will be a minimum insurance left for the farmer from the other crops. It also ensures consistent availability and a large variety of food for both local and market needs.

3. Soil Management:

After harvesting the crops, the soil loses its nutrients, minerals and quality. Organic agriculture promotes soil health through the use of natural methods, such as composting, crop rotation, and cover cropping, to enhance soil fertility and structure. It concentrates on the use of bacteria that is present in animal waste which helps in making the soil nutrients more productive to augment the soil. What organic farming does is not to use that soil immediately again, but to allow it to go back and settle to its natural health by using "natural ways" - Organic waste, including crop residues, animal manure, plant trimmings, and aquatic waste, can be repurposed as valuable resources in agriculture and other industries. By reducing the tillage of soil the soil is not turned over and therefore less carbon is lost to the atmosphere which results in more soil organic carbon.

4. Green Manure and Animal Manure:

Green Manure refers to uprooting and mixing dying plants with the soil to make them act as manure which has nutrients to increase the quality of soil. The process increases the moisture levels and nitrogen content in the soil. It reduces the invasion of weeds. The green undecomposed material is called as green manure. Important green manure crops are cluster beans, sunn hemp and pillipesara.

Animal Manure refers to enriching the soil with animal wastes excluding slaughter by-products. Both the methods are similar but there are a few restrictions for adding animal manure.

5. Weed management:

The unwanted plant that grows in fields is called weeds. Weed management does not mean by removal of weeds rather it means lowering the weed which enhances crop competition. Since, there are both helpful and harmful organisms in the fields that affect the crops. The growth of such organisms needs to be controlled to protect the soil and the crops rather than completely eliminating them. This can be made by the use of herbicides and pesticides that contain fewer chemicals or are all natural.

Two methods are widely used to control weeds:

- Mulching – The method of laying plant waste on the top layer of the soil to avoid the growth of weeds.
- Mowing – The method of cutting the weeds' upper growth to reduce its quantity.

6. Livestock Management:

Organic farming uses domestic animals in order to increase the sustainability of the farm. Since organic farmers use animal waste as fertilizer their presence is of high importance for both the crop and the fields. This method of farming excludes the usage of chemical products which are dangerous for the crops, so there is no better place for the domestic animals to lead their life. Farming practices must provide proper conditions for raising and grazing and create an appropriate environment to make sure of the livestock's natural behavior both indoors and outdoors. There are various other methods such as intercropping, plowing, integration of crops, biological pest control, and genetic modification and so on.

IMPACT OF THE WORK

Sustainability:

Many activities in today's life are short termed but organic farming aims at the medium term and long-term goals of agricultural involvement in the ecosystem. The foremost aim is to produce food but at the same time sustaining an ecological balance in order to prevent soil infertility and pest problems. By creating healthier soil in these ways, organic farmers create a system that is more flexible to the effects of drought, as the soil is full of organic matter and increased biodiversity has the ability to retain more moisture over longer periods of time without constant irrigation To help produce these other goods and services, farmers take up jobs off the farm. Yet it can only be sustained only if labor productivity in farming increases, through innovation in production as well as better access to markets to sell the surplus. Overall, organic agriculture performs better than conventional farming and provides environmental advantages such as halting the use of harmful chemicals and their spread in the environment and reducing water usage as well as reducing carbon and ecological footprints.

Environment Friendly:

Organic farming systems are environment friendly concerning greenhouse gases emissions. Above all, there is a reduction in emissions. This is because of the limited usage of chemical fertilizers. Organic agriculture reduces non-renewable energy use by decreasing agrochemical needs which require high quantities of fossil fuel to be produced. Organic agriculture contributes to mitigating the greenhouse effect and global warming through its ability to sequester carbon in the soil.

Species Richness:

Organic farming increased species richness by about 30% and had a greater effect on biodiversity, as the percentage of the landscape consisting of agricultural fields increased. It was found that organic fields had up to five times higher plant species richness compared to conventional fields.

Source of Employment:

Since organic farming is labor rigorous it requires more employment opportunities. With 1.3 billion people employed in the agriculture sector it is the second greatest source of employment worldwide after services and it accounts for 28% of global employment and when it is integrated with organic farming it proves to be a great opportunity for employment.

PROPOSED WORK

Organic farming is a bit expensive and involves invariable expenditure. Most of the farmers are not in a position to meet the expense of the cost of organic farming. So they continue to depend on chemical fertilizers owing to their cost affability. Organic seeds are costlier, take more time to grow and the storage of the final products is expensive too. Convincing the farmers to move to organic farming is a challenge as it may have an immediate commercial impact on their income in the subsequent seasons. The final prices of organic products are always higher than conventional products and the customers always decide on for cheaper products. It tremendously impacts the organic production market in India. In short, the expensive organic farming methods, limited production, supply chain irregularities, storage, preservation and market competition are the major challenges faced by Organic farming in India. To solve this a holistic and community motivated

approach, similar to the "Swachh Bharat" for "Swachh Food" needs to be embarked on. The government involvement is also a must to provide the security for farmers at a greater level. With the support of the government and proper supply chain mechanism, the prices can be reduced which will attract more farmers to shift to Organic farming.

Seeds and inputs are highly regulated and governed by government policies. The government provides subsidies for chemical fertilizers and pesticides but there is no such condition for organic inputs. There are certification programmes for organic seeds which are very rigorous, but there is no recognition for certified seeds. Due to the less availability of certified organic seeds, so farmers are enforced and advised to use the conventional seeds only, as they could be treated with chemicals. Hence the government should implement a separate policy framework for organic farming which covers seeds production and input supplies.

There was no policy or framework to sell organic food products in India. As a result, anyone could sell anything, under the label of 'organic'. So, this created trust issues among the customers. In order to develop trust among customers there should be a proper regulatory framework, compliance with the requirements and the same should be communicated to customers. To solve this FSSAI has come up with the Jaivik Bharat framework, a globally recognized third-party certification process which is controlled by APEDA.

Smart strategy, scientific planning, responsible public activity and government support will help in overcoming those challenges shortly. The Green revolution introduced modern chemical fertilizers, modern farming techniques along with better seed management which boosted up the country's food grain production.

CONCLUSION

Organic farming yields more nutritious and safe food. The popularity of organic food is growing dramatically as consumer seeks the organic foods that are thought to be healthier and safer. Thus, organic food perhaps ensures food safety from farm to plate. The organic farming process is more eco-friendly than conventional farming. Organic farming keeps soil healthy and maintains environment integrity thereby, promoting the health of consumers. Moreover, the organic produce market is now the fastest growing market all over the world including India. Organic agriculture promotes the health of consumers of a nation, the ecological health of a nation, and the economic growth of a nation by income generation holistically.

Organic Agricultural practices are a promising method that would hopefully be expanded in the future. The benefits of buying, eating and producing organic food outweigh its negatives. The price of the organic food may be a deciding factor but the health of the soil and us is more important. It appears to be sustainable eco-friendly and economic since there is zero risk in toxic residues.

The ultimate goal of farming is not the growing of crops, but the cultivation and perfection of human beings.

– Masanobu Fukuoka

So, it is all about the mindset of people on what kind of food they consume, how they are produced. Food is the ultimate need of every individual, it must be chosen the best. In this case Organic foods seem to be the best remedy for this. I hope that in the upcoming years countries will realize it is inexpensive and efficient to plant more organic crops which impacts the nature in a positive manner.

REFERENCES

1. "History of Organic Farming". , March 2023. *Various types and methods of organic agriculture have been developed in the Northern Hemisphere, such as the biological-organic and biodynamic method*
2. "Organic farming". Lexicon Wein-Plus, March 2023. A form of production (also organic farming, ecological farming, ecological-biological farming, ecological agriculture, alternative agriculture) for the production of food and other agricultural products
3. Gamage, Ashoka; Gangahagedara, Ruchira; Gamage, Jeewan; Jayasinghe, Nepali; Kodikara, Nathasha; Suraweera, Piumali; Merah, Othmane (2023). "Role of organic farming for achieving sustainability in agriculture". Farming System.
4. *Rhoads, Dale*. "What is organic farming?" (PDF). *Purdue Extension Service. Archived from* the original (PDF)*, June 2016*.
5. " The World of organic Agriculture - Statistics and Emerging Trends 2024". Research Institute of Organic Agriculture *and* IFOAM - Organics International. *p. 12*., February 2024.

ASSOCIATION OF SCIENTISTS, DEVELOPERS AND FACULTIES
483 GREEN LANES, LONDON N13 4BS
INDIA | THAILAND | SOUTH KOREA | UNITED KINGDOM
+44 20 81445548 | ASDF@ASDF.INTERNATIONAL | WWW.ASDF.INTERNATIONAL

£ 99
ISBN 978-81-951337-7-2