



## Evolving Farming Practices in India: Adapting to Modern Demands

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### Abstract

Globally, increasing population, climate change, disasters and lifestyle changes pushes the development of different types of farming system and their adoption on large scale for the fulfilment of food requirement. These farming systems such as organic, conventional, conservation, natural and regenerative farming are unique and contrast with each other in their input uses and management practices. Organic farming focused on the management of ecosystem without hampering its properties by avoiding the application of synthetic chemicals whereas traditional farming emphasises subsistence utilising natural resources. Conventional farming highly depended on the agro-chemicals and farm machineries and not much taking care of soil health and biodiversity. In conservation farming, retention of crop residues is prioritised for maintaining the soil fertility. The regenerative agriculture emphasises the ideas of plant diversity, soil cover and less chemical use for restoring soil health and improving the ecosystem services. Natural farming based the microbial formulation and on-farm resources for the sustainable production for the food security.

**Keywords:** Farming system, Natural farming, Organic inputs, Regenerative agriculture

### Introduction

Agriculture is dynamic in nature with respect to its management practices. Based on the requirement and the lifestyle, it evolved and formed itself into a different kind of farming system namely traditional farming, organic farming, conventional farming, conservation agriculture, natural farming and regenerative agriculture. With change in the management practices and the aim of the farming system these farming systems differ from one another. Traditional farming places an emphasis on subsistence and the use of natural inputs. It is based on regional traditions and knowledge that have been passed down through the centuries. To maintain soil health and ecosystem integrity, organic farming, encourages the use of natural amendments rather than artificial ones. Contrarily, conventional farming emphasizes increasing production through high-input techniques, frequently using mechanization, chemical fertilisers and pesticides. Sustainable agriculture is being elevated by new methods like regenerative and conservation agriculture. Natural farming promotes using only natural processes to nourish crops and preserve soil health, with no outside inputs (Kumari *et al.*, 2024).

The findings showed that the enhanced method using various crop and animal components is a great strategy for sustainable production, income generation and job opportunities for rural households with limited resources. This particular review made an attempt to find the major similarities as well as the dissimilarities within the different farming practices followed by farmers. The advantages, disadvantages and suitability of these agricultural methods across a range of socioeconomic and environmental contexts in an effort to better understand their similarities and contrasts. To fulfil the rising need for food, some systems concentrate on increasing productivity, while others give priority to environmental preservation. It is now essential to implement sustainable farming practices in a world that is changing quickly due to resource limitations, changing consumer tastes and climate issues. In order to promote agricultural systems that is productive, ecologically benign and socially inclusive.

### Different Farming Systems in India

#### Traditional Agriculture

Traditional agriculture has been around for centuries in

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India. Farmers began cultivating using just natural resources thousands of years ago, which is when it all began. Up until the twentieth century, when fertilisers and pesticides were invented, every farmer followed this practice (Panday *et al.*, 2024). This is considered to be the nation's traditional form of agriculture. Ancient Indian writings including the Rigveda, Kautilya's Arthashastra, Ramayana, Mahabharata, etc. briefly mention a number of organic ingredients. India is endowed with a variety of naturally occurring organic forms of nutrients that can be utilised for crop cultivation in an organic manner in various regions of the nation. Traditional farming is a farming practice followed by the farmers based on their life experience and own knowledge of farming since many years. In these practice farmers follows the methods which are suitable for their farmland. Mixed livestock, rotational land use, crop and forestry, demands high labour inputs, but in traditional farming focuses on producing goods for meeting farmers needs or local market demands along with cultural and traditional norms that have developed to manage these agro-ecosystems, including traditional environmentally friendly knowledge as well as a variety of official and unofficial organizations, are just a few of the factors that contribute to the sustainability of these systems.

#### Conventional Agriculture

Conventional agriculture is high intensive cultivation with the use of fertilizer and pesticides for higher yield. This practice over a period of time reduces the organic matter content in the soil, intern affecting the properties of soil. The application of agrochemical alters the soil microbial biodiversity and affecting the soil health. Intensification led to enhanced resource consumption (*e.g.*, water, minerals and energy), soil and water degradation and pollution because it is characterised by management practices that aims to maximise productivity, often through the utilisation of agro-chemicals (*e.g.*, fertilisers, pesticides), irrigation and mechanisation. Furthermore, intensive agricultural management contributes to several ecosystem services (ES) degradation, which is one of the causes of soil erosion, change in the carbon and nitrogen cycles, biodiversity loss and hydrological cycle regime shifts (Tonin and Benedetto, 2024).

#### Organic Farming

Agriculture is obligated to offer safe and environmentally

friendly food as a result of growing awareness of difficulties with human health and the environment hence around the world, organic farming is expanding. Organic farming is defined as an integrated approach to agriculture that seeks to capture the fundamental connections between farm biota, its output and the ecosystem as a whole. Enhancing the well-being and productivity of interconnected communities of plants, animals, soil life and people is the fundamental goal of organic farming (Table 1). A unique approach to production management, organic farming eliminates all synthetic off-farm inputs and employs mechanical, biological and agronomic methods on the farm to support and improve the health of the agro-ecosystem, which includes biodiversity, biological cycles and soil biological activity (Bergman and Pandhi, 2023). Soil formation and stabilisation carbon sequestration, recycling of waste, nitrogen cycling, pollination, predation, biodiversity and habitat protection and clean water are some of the ecological services generated. Inadequate infrastructure, a lack of expertise, low yields, higher production costs and weak marketing infrastructure are the constraints of organic farming which limits its wide adaptation.

#### Conservation Agriculture

Three agronomic principles of conservation agriculture are: no-tillage or reduced tillage, permanent residue retention and crop rotation. No-tillage soil management, as the fundamental and founding idea, is frequently linked to three advantages for agriculture, soil and climate: enhanced crop output, soil and water conservation and increased carbon sequestration. Scientists highly encourage further adoption of no-tillage, which accounts for 180 million ha, or 12.5% of the world's arable land, together with various levels of residue retention and crop rotation.

#### Natural Farming

"Natural Farming" is a farming strategy that highlights the significance of co-production of animals and crops to utilize the synergistic effects of various components of the system, depending on readily accessible "ingredients" to prepare on-farm crop treatments and micro-organisms or mycorrhizae to improve fertility of the soil. It attempts to address issues that are both socioeconomic and environmental in the farming sector. The strategy is based on the "four wheels" of Zero budget Natural Farming (ZBNF): (i) promoting activity

Table 1: Comparison between different farming systems

Parameters	Traditional Farming	Organic Farming	Conventional Farming	Conservation Agriculture	Natural Farming	Regenerative Agriculture
Inputs used	Organic	Organic	Synthetic	Organic/Synthetic	Organic	Organic
Use of plant protection chemicals	No	No	Yes	Optional	No	Optional
Purpose of farming	Family consumption	Commercial	Commercial	Commercial	Commercial	Commercial
Integration of live stock	Optional	Optional	No	Yes	Yes	Yes
Inputs generation	On farm	Procured/ On farm	Procured	Procured	On farm	Procured/ On farm

of microbes in order to increase availability of nutrients to crops and provide protection against pathogens by microbial inoculum, called “jeewamrita”; (ii) protecting growing roots from fungi and soil borne diseases using a different microbial inoculum, “beejamrita”; (iii) stabilising organic matter content and conserving top layer of soil by mulching (“acchadana”); and (iv) soil aeration (“whapahasa”) by enhanced soil quality and less tillage. A social movement could be seen in the enthusiasm for using the ZBNF strategy among a variety of stakeholders, including the government and local communities. There is a real risk that popularity of the farmers led social movement driving uptake of ZBNF practises may cause it to diverge from the science proving its worth.

#### Regenerative Agriculture

Annually 5,334 MT of soil are lost through erosion each year. According to the organisation Regeneration International, which promotes regenerative farming, there might not be enough soil left to feed the globe in next 50 years. As a result, the idea of regenerative agriculture was born. Basically the word ‘regenerative’ means ‘the capacity to bring into existence again’. J.I. Rodale known as father of regenerative agriculture defines it as a holistic approach to farming that encourages continuous innovation and improvement of environmental, social and economic measures. In order to preserve or increase farm profitability, regenerative agriculture (RA) uses natural processes to create feed and fibre, enhance nutrient cycling, restore landscape function, improve soil health and encourage biological activity. The residue retention and maintaining the soil cover avoid the disturbance of soil properties and improve the soil biodiversity. The main aim is to rejuvenate the soil health with benefiting the society, environment, economy and health (Khangura *et al.*, 2023).

#### Conclusion

The increased awareness among the population on health and environmental benefits of organic food, consumer preferences significantly shifted towards organically cultivated products. Currently, several governmental programmes and policies are encouraging the sustainable agriculture practices such as organic farming, natural farming and regenerative agriculture which help in the boosting of

soil health and resource conservation. These change in the practices helps to address biodiversity loss, climate change and food security in addition to long-term improvement in soil fertility and ecological balance. A blend of ancient knowledge and modern advances in agriculture paves a way for more sustainable and resilient agricultural future that tackles environmental and nutritional needs of growing population.

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