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Review of Literature

The literature about the study "**Creating Awareness on Organic Waste Management Practices among Selected Rural Households"** is reviewed under the following headings:

A. ROLE OF AGRICULTURE IN THE INDIAN ECONOMY
B. MEANING AND CLASSIFICATION OF WASTE
C. NEED FOR ORGANIC WASTE MANAGEMENT PRACTICES
D. ROLE OF ORGANIC WASTE IN ORGANIC FARMING
E. PRESENT STATUS OF ORGANIC FARMING PRACTICES

A. ROLE OF AGRICULTURE IN THE INDIAN ECONOMY

According to Dey et al., (2021) states that Agriculture is the foundation for the survival and development of human beings. In between the period of 7500 B.C. to 6500 B.C., man gradually shifted to agriculture from hunting and gathering. So, there is a prolonged process of development in agriculture. Agriculture has gone through three stages: 1. Primitive agricultural stage, 2. Traditional agricultural stage and 3.Modern agricultural stage. In traditional agriculture extensive use of farmyard manure and green manures to improve soil fertility; and to control insect-pests measures like crop rotation, natural enemies & hand controls were done.

In Modern agriculture large-scale use of agricultural chemicals such as chemical fertilizers, pesticides, insecticides, and growth regulating agents lead to ecological damage and environmental pollution. The utilization of chemical fertilizers and pesticides in agriculture presents several drawbacks, including environmental pollution, soil degradation, health risks, and the development of resistance in target pests. However, Standard Operating Procedures (SOPs) offer a structured approach to mitigate these disadvantages. SOPs provide guidelines for the safe handling, application, and management of chemical inputs, ensuring regulatory compliance and minimizing risks to human health and the environment. By incorporating integrated pest management strategies, monitoring and record-keeping protocols, and training initiatives, SOPs promote sustainable farming practices that reduce reliance on chemical inputs

while optimizing pest control and nutrient management. Through adherence to SOPs, farmers can effectively address the challenges associated with chemical fertilizers and pesticides, fostering a more environmentally friendly and resilient agricultural system.

To get rid of the series of environmental, safety, and health problems brought by modern agriculture, organic agriculture came into existence. Organic agriculture is the sublimation of traditional agriculture. The basic concept is to maintain the sustainable development of agriculture and minimize the environmental impact, so it could rapidly develop and promote in the whole world.

The Indian Council of Agricultural Research (ICAR) acknowledges the pivotal role of food processing as a vital link between agriculture and the food industry. Recognizing its significance, it emphasizes the need to promote food processing technologies and practices to add value to agricultural produce, reduce post-harvest losses, and enhance food security. By transforming raw agricultural products into value-added food items, food processing not only extends the shelf life of perishable commodities but also improves their nutritional content, taste, and accessibility, thereby contributing to improved public health outcomes.

It's efforts in promoting food processing encompass various objectives, including generating employment opportunities, promoting entrepreneurship, and ensuring food safety and quality. Through training, technical assistance, and financial support, it encourages entrepreneurship in the food processing sector, fostering innovation and economic development. Additionally, it advocates for the adoption of quality management systems to uphold food safety standards and meet regulatory requirements, thereby promoting consumer confidence in processed foods. Overall, ICAR's initiatives aim to harness the potential of food processing to enhance food security, nutrition, and income generation in India's agricultural sector.

Agriculture, encompassing crop production, livestock farming, and allied activities, has long been a major contributor to India's GDP. While its share in the overall GDP has gradually diminished with the rise of the industrial and services sectors, it remains a substantial contributor, accounting for a significant portion of the national income. The economic importance of agriculture is evident in its direct and indirect contributions to various economic activities and the overall prosperity of the nation (Beckman and Countryman (2021).

One of the primary and enduring roles of agriculture in India is its capacity to generate employment on a massive scale. A substantial percentage of the Indian workforce is engaged in various agricultural activities, providing livelihoods to millions, particularly in rural areas. From cultivation and harvesting to animal husbandry and agro-processing, the sector is a key source of employment, helping to alleviate poverty and sustain rural communities (Sharma, 2015).

Agriculture is indispensable in ensuring food security for India's vast and diverse population. The sector produces a wide array of crops, including cereals, pulses, fruits, and vegetables, forming the core of the nation's food supply. The ability to feed the growing population depends heavily on the productivity and sustainability of agriculture. Government policies and initiatives are geared towards achieving self-sufficiency in food production, thereby enhancing food security (Ghosh et al., 2021).

Beyond the direct cultivation of crops, agriculture encompasses a spectrum of allied activities, such as dairy farming, poultry, and fisheries. These activities contribute significantly to the income and livelihoods of rural populations. The interdependence of agriculture and various allied sectors creates a web of economic activities, fostering rural development and supporting the overall well-being of communities in agrarian regions (Behera, 2015).

The global significance of Indian agriculture is highlighted by its substantial contribution to exports. The country exports a diverse range of agricultural products, including rice, wheat, spices, tea, and more. This not only boosts the agricultural economy but also adds to the foreign exchange reserves, contributing to the overall economic stability of the nation (Baimbetova et al, 2019).

Agriculture serves as a critical source of raw materials for various industries. The textiles, sugar, and agro-processing industries, among others, rely heavily on agricultural produce. This symbiotic relationship between agriculture and industries underscores the interconnectivity of different sectors and reinforces the importance of a robust and sustainable agricultural foundation for overall economic growth (Deogharia, 2018).

Investment in agriculture has far-reaching effects on rural development. Government initiatives aimed at enhancing agricultural infrastructure, providing access to credit, and promoting modern farming practices contribute to the overall development of rural areas. Improved living standards, better educational facilities, and enhanced healthcare services are

often by products of sustained efforts in agricultural development. Government intervention and policy formulation play a pivotal role in shaping the trajectory of agriculture in India. Various schemes, subsidies, and incentives are designed to support farmers, mitigate risks, and promote sustainable agricultural practices. Ongoing reforms seek to address structural issues, improve market linkages, and empower farmers with the tools and resources needed for a resilient and thriving agricultural sector (Vyas, 2022).

Despite its pivotal role, the agriculture sector faces a myriad of challenges, including outdated farming practices, dependence on monsoons, land fragmentation, and inadequate infrastructure. Addressing these challenges requires a holistic approach encompassing technological advancements, irrigation facilities, and policy reforms. Sustainable agricultural practices, precision farming, and the adoption of modern technologies are essential for ensuring long-term viability and resilience in the face of climate change and evolving global dynamics.

Summarize that agriculture has been a vital part of India's economy since 7500 B.C., with three stages: primitive, traditional, and modern. Conventional agriculture relies on farmyard manure and green manures, while modern agriculture uses chemical fertilizers and pesticides. Organic agriculture aims for sustainable development and minimizes environmental impact. Government policies aim for self-sufficiency in food production and economic stability. Investment in agriculture enhances rural development, and sustainable practices, precision farming, and modern technologies are crucial for long-term sustainability.

B. MEANING AND CLASSIFICATION OF WASTE

Waste management is a crucial aspect of maintaining environmental sustainability and public health. The rapid increase in waste generation due to industrialization, urbanization, and consumerism has led to severe ecological and health consequences. Effective waste management is essential for reducing pollution, conserving resources, and fostering a sustainable future. (Nwokediegwu et al., 2024)

Olawade et al., in 2024 states that Waste management refers to the systematic handling of waste materials, including collection, transportation, treatment, and disposal. It aims to minimize environmental impact while maximizing resource recovery. Proper waste management involves various techniques such as recycling, composting, incineration, and landfilling, each serving a specific purpose in reducing waste accumulation.

Types of Waste Waste can be classified into several categories, including:

1. **Municipal Solid Waste (MSW):** Household and commercial waste, including paper, plastics, food scraps, and packaging materials.
2. **Industrial Waste:** Waste generated from manufacturing processes, including chemicals, metals, and hazardous materials.
3. **Biomedical Waste:** Medical and clinical waste from hospitals, including syringes, gloves, and pharmaceuticals.
4. **E-Waste:** Discarded electronic devices, such as old phones, computers, and batteries, containing hazardous substances.
5. **Agricultural Waste:** Organic waste from farms, including crop residues, manure, and pesticides. (Hernandez et al.,2024)

C. NEED FOR ORGANIC WASTE MANAGEMENT

Environmental Protection Improper waste disposal leads to soil, air, and water pollution. Plastic waste in oceans endangers marine life, while landfills emit methane, a potent greenhouse gas contributing to climate change. Sustainable waste management practices help mitigate these environmental threats. (Ming et al., 2024)

1. **Public Health and Safety** Unmanaged waste attracts pests, spreads diseases, and contaminates drinking water sources. Exposure to hazardous waste can lead to respiratory issues, infections, and other health problems. Proper waste segregation and disposal ensure a cleaner and healthier environment. (Ming et al., 2024)
2. **Resource Conservation** Many waste materials, such as paper, metal, and glass, can be recycled and reused, reducing the need for virgin resources. Composting organic waste enriches the soil, reducing the dependence on chemical fertilizers. Sustainable waste practices contribute to conserving natural resources and reducing energy consumption. (Ming et al., 2024)
3. **Economic Benefits** Waste management creates job opportunities in recycling industries, waste collection, and treatment plants. Recycling materials reduce production costs for industries and generate revenue through waste-to-energy projects. Governments can also save money by reducing landfill usage and promoting waste reduction programs. (Ming et al., 2024)

Hernandez et al.,2024 states the **Challenges in Waste Management.** Despite its importance, waste management faces several challenges, including:

- **Lack of Public Awareness:** Many people are unaware of the significance of proper waste disposal and recycling.
- **Inadequate Infrastructure:** Developing nations often lack efficient waste collection and disposal systems.
- **High Costs:** Establishing recycling facilities and waste treatment plants requires significant investment.
- **Illegal Dumping:** Some businesses and individuals illegally dispose of waste to avoid costs, leading to environmental hazards.

Solutions for Effective Waste Management

1. **Reduce, Reuse, Recycle (3Rs)** The 3Rs principle is fundamental in minimizing waste generation. Reducing consumption, reusing items, and recycling materials prevent excessive waste accumulation.
2. **Waste Segregation at Source** Households and businesses should separate waste into biodegradable and non-biodegradable categories. Proper segregation facilitates efficient recycling and disposal.
3. **Government Policies and Regulations** Governments must implement strict waste management laws, encourage sustainable practices, and invest in waste treatment infrastructure. Banning single-use plastics and promoting compostable materials can significantly reduce waste.
4. **Public Awareness Campaigns** Educating communities about the impact of waste and encouraging responsible disposal habits can drive positive change. Schools, media, and social organizations play a vital role in spreading awareness.
5. **Technological Innovations** Advancements in waste treatment technologies, such as waste-to-energy plants, biogas production, and automated recycling systems, can enhance waste management efficiency.

The need for waste management is more critical than ever. With the growing global population and increasing waste production, sustainable waste management practices are

essential for environmental conservation, public health, and economic stability. Individuals, governments, and industries must work together to implement effective waste management strategies. By adopting responsible waste disposal habits and supporting sustainable initiatives, we can build a cleaner and greener future for generations to come. (Bian et al ., 2024)

Pitakaso et al., 2024 defines the organic waste management is crucial for maintaining environmental balance and promoting sustainability. A large portion of household and agricultural waste consists of biodegradable materials such as food scraps, garden waste, and crop residues. If not managed properly, these wastes end up in landfills, where they decompose anaerobically, releasing methane—a potent greenhouse gas that significantly contributes to climate change. Proper organic waste management reduces landfill waste, prevents soil and water contamination, and helps in nutrient recycling, making it an essential practice for environmental protection.

One of the most significant benefits of managing organic waste is resource conservation. Instead of letting biodegradable waste go to landfills, it can be composted to produce nutrient-rich organic fertilizer. Composting enhances soil fertility, reduces the need for chemical fertilizers, and promotes healthier agricultural practices. Similarly, organic waste can be used in vermiculture, where earthworms break down waste into high-quality compost. These methods support a circular economy by turning waste into a valuable resource, reducing dependency on synthetic fertilizers, and maintaining long-term soil health. (Yıldız et al ., 2024)

Poor organic waste disposal also contributes to pollution and public health risks. Decomposing waste in open areas attracts pests, rodents, and harmful bacteria, increasing the spread of diseases. Moreover, when organic waste is burned, it releases harmful pollutants that degrade air quality and pose respiratory health risks. By adopting systematic organic waste management practices such as composting, biogas production, and community-driven waste segregation, we can significantly reduce environmental pollution and health hazards.(Sharma et al., 2024)

Another key advantage of organic waste management is its potential for energy generation. Biogas plants use organic waste to produce methane gas, which can be utilized as a renewable energy source for cooking, electricity, and heating. This not only reduces dependency

on fossil fuels but also contributes to a lower carbon footprint. Encouraging biogas production at both household and industrial levels can lead to a sustainable energy solution while managing waste efficiently.(Manea et al., 2024)

From an economic perspective, proper organic waste management reduces municipal waste disposal costs and creates new job opportunities in waste treatment, composting, and energy production sectors. Sustainable waste management practices also support local farmers by providing them with affordable organic fertilizers, thereby enhancing agricultural productivity. By implementing effective organic waste management techniques, we can protect the environment, promote public health, generate energy, and support economic growth, making it an essential aspect of sustainable development. (Koyunoğlu et al., 2024)

D. ROLE OF ORGANIC WASTE IN ORGANIC FARMING

Organic farming is a production system that keeps a sustainable relationship with the environment and maintains soil and human health. It depends upon biodiversity, various ecological processes, and natural cycles substituting the use of chemical inputs which have adverse effects on the environment. The term "organic farming" was coined by Lord Northbound in 1940. The beginnings of the organic movement can be traced back to the beginning of the 1800s. In 1840 Justus Von Liebig developed a theory of mineral plant nutrition. Liebig believed that manure could be directly substituted by certain mineral salts (Reddy,2010)

According to USDA “organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives, etc.) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection”. FAO defined organic farming as “Organic agriculture is a unique production management system which promotes and enhances agro ecosystem health, including biodiversity, biological cycles, and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs” (Soni et al., 2022).

Reganold and Watcher (2016) points out that organic foods and beverages are a rapidly growing market segment in the global food industry. The performance of organic farming is examined by using four key sustainability metrics: productivity, environmental impact,

economic viability, and social well-being. Organic farming systems produce lower yields compared with conventional agriculture. However, they are more profitable and environmentally friendly and deliver equally or more nutritious foods that contain less (or no) pesticide residues, compared with conventional farming. Moreover, initial evidence indicates that organic agricultural systems deliver greater ecosystem services and social benefits. Although organic agriculture has an untapped role to play when it comes to the establishment of sustainable farming systems, no single approach will safely feed the planet. Rather, a blend of organic and other innovative farming systems is needed. Significant barriers exist to adopting these systems, however, and a diversity of policy instruments will be required to facilitate their development and implementation.

Kaswan et al., (2012) Organic farming systems have attracted increasing attention over the last one decade because they are perceived to offer some solutions to the problems currently besetting the agricultural sector. Organic farming has the potential to provide benefits in terms of environmental protection, conservation of non-renewable resources and improved food quality Charyulu, and Dwivedi, (2016). Organic farming is a societal need; it is not only from the consumer's perspective but also from a farmer point of view. For the transformation of rural agriculture into a well sustainable agriculture, organic farming might become a panacea which can build a plinth for sustainable agriculture and reimburse conversion cost and maintain the sustainability of soil. Yadava et al., (2021) India is home to 30 per cent of the total organic producers in the world, but accounts for just 2.59 per cent (1.5 million hectares) of the total organic cultivation area of 57.8 million hectares, according to the World of Organic Agriculture 2018 report. Pandey and Sengupta (2018), (A majority of the farming community is resource poor and purchasing fertilizers and chemicals in adequate quantities is beyond their capacity, thus encouraging organic farming. Moreover, Organic farming is favorable for small and scattered agriculture land holders (Singh, 2018).

The phenomenon of 'Organic agriculture' is the only solution to nurture the land and to regenerate the soil by going back to our traditional method of farming i.e., free from chemicals, pesticides, and fertilizers. This is a step toward sustainable development by choosing not to use chemicals, synthetic materials, pesticides, and growth hormones to produce high nutritional quality food in adequate quantities (Mukherjee et al ,2022) Organic farming is an option agricultural system which quickly changes farming rehearsals. It depends on composts of natural starting points, for example, fertilizer excrement, green excrement, and bone feast and

so forth substantially more than deciding not to utilize pesticides, fertilizers (Elayaraja and Vijay, 2020).

Organic farming minimizes the use of pesticides and chemicals thereby reducing major environmental issues. It ensures the health of the soil, water, air and flora, and fauna. Also reduces major environmental issues like soil erosion, air pollution, water pollution etc. Organic farming does not rely on the use of synthetic fertilizers as opposed to conventional techniques that are generous with these external chemicals. Avoiding fertilizers contributes to a greater cause of energy conservation. This is because manufacturing synthetic fertilizers consumes a significant amount of energy. On average, it's safe to say that energy usage is lower by at least 30-50% in organic farming systems.

The British Department for Environment, Food and Rural Affairs in one of their reports suggested that organic crops and organic dairying use 35% and 74% less energy respectively than their conventionally grown counterparts (Rahmann et al., 2017).

One of the major differentiators and benefits of organic farming lies in the fact that the price of organic products in the market is higher than conventional products. This implies that the revenue earned by the farmers will be higher if they embrace organic farming which in turn can uplift their socio-economic situation. Through the rigorous implementation of organic farming, the country can finally give the farmers their due share of respect and financial integrity (Aivazidou and Tsolakis, 2021).

Owing to their zero dependencies on chemical fertilizers, herbicides, and synthetic pesticides, organic farmers can save a lot of capital. Adding to these benefits of organic farming, natural fertilizers are developed from the existing flora and fauna. Organic farming depends on natural techniques, rather than industrial equipment which often takes a toll on the environment. The practices are sustainable, eco-friendly, and accessible without much additional charge. Thus, even in the case of some natural calamity or deluge, the loss incurred by organic farmers will be comparatively less (Sauvé et al., 2016).

Newspapers in the last decade have been replete with cases of farmers committing suicide due to financial burdens and unplayable debts. But the benefits of organic farming and conventional farming involves the use of expensive industrial fertilizers that often push the farmers into the trap of loan sharks. However, with organic farming, farmers can depend on

natural resources and traditional knowledge to bear fruitful results. Undoubtedly, organic farmers can be more independent and self-sufficient. Organic farming is like going back to the roots before mechanization hit the lands. Thus the farmers can easily understand and adapt to the techniques of organic farming that deploy traditional knowledge. The farming techniques are based on how well a farmer can make the best use of his immediate natural resources (Ponnudurai, 2015)

Most people in emerging economies still rely mostly on agriculture for their income; this sector employs 60.0% of the global workforce. For the majority of individuals in developing economies—which account for 60.0% of the global population—agriculture remains their main source of income. Undoubtedly, the global food supply depends on the agriculture industry to provide our basic needs. Still, 820 million people go hungry every day in the world, and around half of all people are undernourished. This demonstrates that most developing countries still have low agricultural output and that creating a world free from hunger and malnutrition is challenging.

The United Nations General Assembly established the 17 Sustainable Development Goals (SDGs) in 2015 to address the world's pressing issues by 2030. Almost all of the goals have some connection to the agriculture sector, lending the sector a multifaceted definition. Using a variety of integrated pest, food, agroforestry, soil, and water management approaches is the goal of agriculture sustainability. The waste or byproducts of one business or component are used as inputs by another business or component. The environmental effect decreases as natural processes take the place of external inputs more and more. Indian agriculture won't survive unless environmental services, including soil preservation, watershed services, biodiversity, and carbon sequestration, are preserved. These services are supported by sustainable agriculture. Regretfully, it is currently disappearing in India. Indian policies have encouraged a strong emphasis on cereal crops, such as wheat and paddy, which has resulted in land flattening and the loss of environmental services, including biodiversity, due to the careless use of inputs. The agricultural sector's unsustainable growth must be replaced with more environmentally friendly methods, or else both the environment and the economy will eventually suffer (Kumar and Manshi, 2023; Kareemulla et al., 2017; Saikanth et al., 2023).

The World Health Organization (WHO) reported that 20% of developing countries are lies in utilizing pesticides in Southeast Asia. India belongs to one of the major pesticide-producing countries in Asia with 90 thousand tonnes of annual production of organochlorine pesticides (benzene hexachloride and DTT). According to the Food and Agricultural Organization (FAO), pesticide application in India has surged hundreds of times compared to the previous seven decades (FAO, 2018). Pesticide usage in India has been hampered due to a lack of information on chemical pesticides on human and environmental health. The Figure 1.a. explains the percentage of pesticide consumption by different states in India. In this regard, WHO has prioritized public health by categorizing pesticides on their toxicity and harmful effects on consumers. The major deleterious effects of chemical fertilizers on human health are provided in Figure 1.b. (Pathak et al., 2022; Nayak and Solanki, 2021).

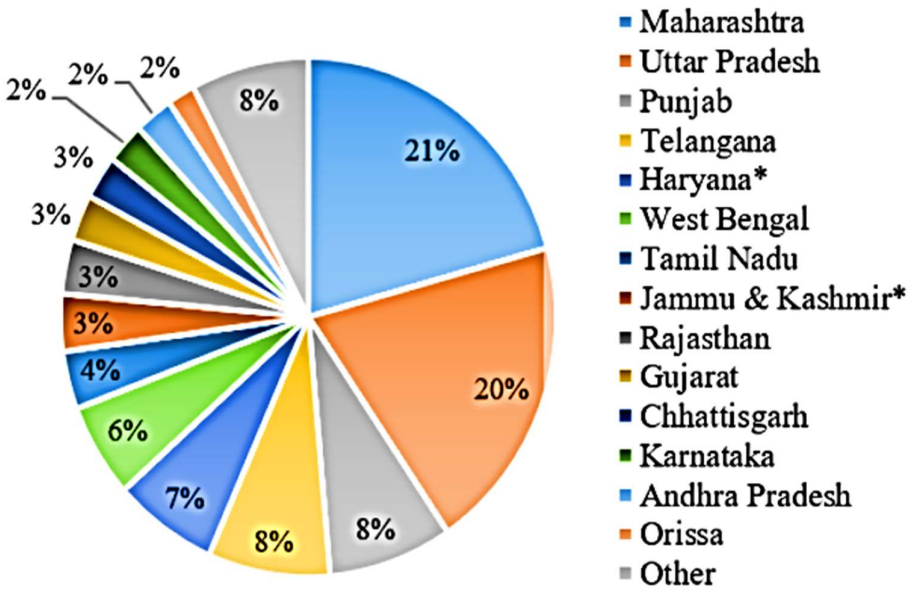
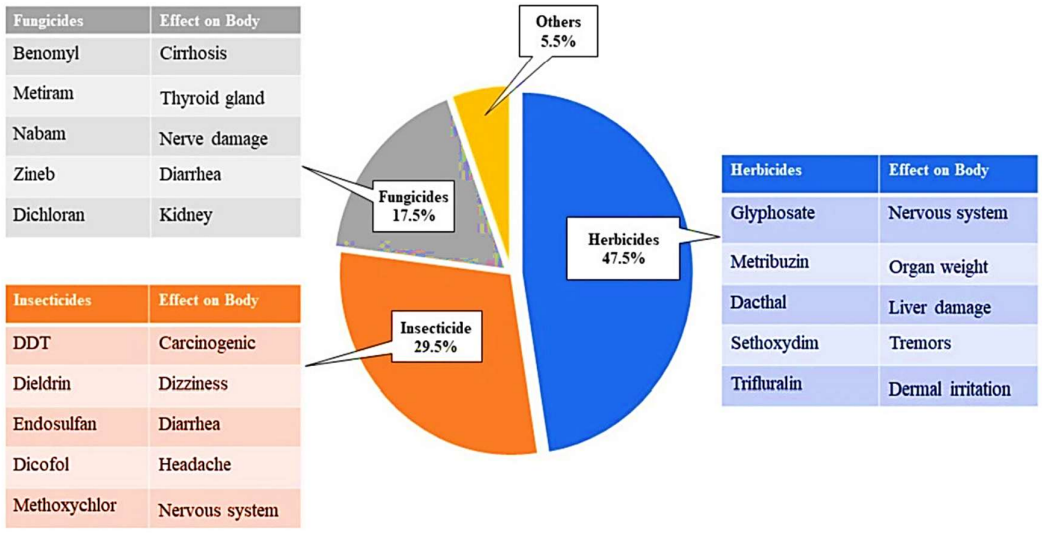


Figure 1.a. : Percentage of pesticide utilization by different states in India



Fungicides	Effect on Body
Benomyl	Cirrhosis
Metiram	Thyroid gland
Nabam	Nerve damage
Zineb	Diarrhea
Dichloran	Kidney

Herbicides	Effect on Body
Glyphosate	Nervous system
Metribuzin	Organ weight
Dacthal	Liver damage
Sethoxydim	Tremors
Trifluralin	Dermal irritation

Insecticides	Effect on Body
DDT	Carcinogenic
Dieldrin	Dizziness
Endosulfan	Diarrhea
Dicofol	Headache
Methoxychlor	Nervous system

Figure1.b.: Distribution and harmful effects of common chemical fertilizers used in India

Soni et al., (2022) recognized a total of 30 sustainable agricultural approaches (SAPs) in India. Organic farming is one such vital SAP for addressing India's current agricultural snags. Organic farming makes use of biological fertilizers and pest control, compost, as well environmentally friendly approaches like intercropping, mulching, crop rotations, etc. This system restricts the application of chemical fertilizers, growth regulators, pesticides, herbicides, and other chemical inputs. It also discourages and restricts the usage of ionizing radiation, sewage sludge, genetically modified organism, and antibiotics. The chief objective of organic farming is to increase the nutrition content and soil productivity and protect the environment. All these factors will eventually positively regulate the socioeconomic condition of our country. Major principles of organic farming defined by the International Federation of Organic Agriculture Movements (IFOAM) are principles of health, care, ecology, and fairness (Röös et al., 2018).

Solid waste management is a process of segregating solid wastes and converting or recycling them into new products for commercial applications. The generated solid waste can be used for various activities including composting and fertilizer preparations. Table I.a. provides the overall solid waste management in different states of India (CPCB, 2021-2022).

Table I.a. : Solid waste management in different states of India

Sl. No.	State	Waste generated (TPD)	Waste Collected (TPD)	Waste Processed / Treated (TPD)*	Waste Landfilled (TPD)**	Gap (TPD)
1	**Andhra Pradesh**	6,890	6,890	1,558	Not provided	5332
2	**Andaman and Nicobar**	79	78	74	2	3
3	**Arunachal Pradesh**	228	199	9	Not provided	219
4	**Assam**	1,589	1,333	575	744	270
5	**Bihar**	4,975	Not provided	Not provided	Not provided	4975
6	**Chandigarh**	540	540	83	486	-29***
7	**Chhattisgarh**	1,820	1,820	1,790	30	0
8	**DNH&DD**	267	267	246	21	0
9	**Delhi**	11,108	11,108	5,280	5,828	0
10	**Goa**	211	207	197	10	4
11	**Gujarat**	10,095	10,095	8,682	1,003	410
12	**Haryana**	8,766	6,691	4,297	2,218	2251
13	**Himachal Pradesh**	383	349	269	80	34
14	**Jammu & Kashmir**	1,550	1,540	606	390	554
15	**Jharkhand**	2,404	1,969	843	930	631
16	**Karnataka**	13,034	11,655	5,440	4,198	3396
17	**Kerala**	3,472	1,283 and1,048 decentralized processing	2,691	-	781
18	**Ladakh**	52	42	20	15	17
19	**Lakshadweep**	18	18	18	0	0
20	**Madhya Pradesh**	7,115	6,132	6,059	76	980
21	**Maharashtra**	23,531	23,044	19,980	2,067	1484
22	**Manipur**	282	199	133	66	83
23	**Meghalaya**	165	137	27	119	19
24	**Mizoram**	374	313	234	8	132

Sl. No.	State	Waste generated (TPD)	Waste Collected (TPD)	Waste Processed / Treated (TPD)*	Waste Landfilled (TPD)**	Gap (TPD)
25	**Nagaland**	664	306	116	299	249
26	**Odisha**	2,103	2,020	1,356	738	9
27	**Puducherry**	383	383	58	325	0
28	**Punjab**	4,222	4,207	1,471	2,736	15
29	**Rajasthan**	7,973	7,859	1,926	5,525	522
30	**Sikkim**	66	66	18	48	0
31	**Tamil Nadu**	14,586	14,471	7,206	6,776	604
32	**Telangana**	11,057	11,057	8,611	1,011	1435
33	**Tripura**	333	322	220	15	98
34	**Uttar Pradesh**	14,710	14,710	7,321	4,389	3000
35	**Uttarakhand**	1,585	1,452	1,050	115	420
36	**West Bengal**	13,709	13,687	3,047	1,187	9475
TOTAL		**1,70,339**	**1,56,449**	**91,511**	**41,455**	**37,373**

* *Includes information only on processing and treatment of waste. Disposal through sanitary landfill is not included in the column*

** *Includes information on disposal of waste through sanitary landfill only; does not include disposal of waste in dumpsites.*

*** *The preceding year unprocessed waste (+29 TPD) is being included in the present year treatment and landfilling of waste.*

The major components of organic farming include the management of soil, pesticides, weeds, and crop, recycling of waste, and use of bio-fertilizers. The soil fertility is maintained by using organic manures, following crop rotation, and planting cover crops. Pest diseases and weeds are managed via physical and biological control systems. Organic livestock is reared without the application of antibiotics and growth hormones. They are also given routine immunization, vitamins, and minerals supplementation (Lakner and Breustedt 2017).

Organic farming does not mean going 'back' to traditional methods. It is the integration of all sustainable approaches, found to fulfil the objectives of sustainable agriculture. These farming practices include inter-cropping, mulching, integration of crops and livestock manures while, prohibit the use of all synthetic inputs during this agriculture practiced. Their adverse effects on the environment are manifested through erosion, water shortages, salivation, soil

contamination, genetic erosion, etc. Apart from this the application of synthetic chemicals indiscriminate manner particularly in terms of the utilization of chemical fertilizers and pesticides all around us harms humans as well as ecological diversity (Gamage,2023). Organic farming is one of the most frequently accepted alternative farming systems to traditional ones, there is an urgent got to improve the sustainability of farming systems, which may cause better livelihoods for the farmers. Organic agriculture is the broad spectrum of production methods that are supportive of the environment and must need strong support thereto within the sort of subsidies, agricultural extension services, and research. Besides, the increased demand for food grains for the increasing population within the coming years would depend more on enhancing productivity through the utilization of family labour and farm power per unit of land rather than the expansion of the area under cultivation was mainly observed (Reganold and Wachter, 2016).

Organic agriculture may be a good choice among the farmers to concern about the ecological balance would be more significant in the present as well as prospects while, agrochemicals are produced from fuel and it is not renewable, diminishing in availability. It will become more costly in the future. Organic produced products are widely accepted throughout the world. The farmers market also helps in the commercialization of organic products regional and national levels (Reddy 2010). Besides this, the retail sales of organic products are expected to continue rising within the coming years at a rate of quite 20% yearly. Therefore, the rise in population in upcoming generation would be not only to stabilize agricultural production but also to extend it further in a sustainable manner. Therefore, scientists have realized that after the throughout the "Green Revolution" with high input use has crossed the maximum level, and is now sustained with diminishing return of falling dividends. Thus, a natural balance must be maintained in the least costs for the existence of life and property (Calicioglu et al., 2019).

Organic farming and integrated farming also represent real opportunities on several levels, contributing to vibrant rural economies through sustainable development. Indeed, new employment opportunities in farming, processing and related services are already evident in the growth of the organic sector. As well as the environmental advantages, these farming systems can bring significant benefits both to the economy and the social cohesion of rural areas. The availability of financial support and other incentives for farmers to convert to organic

production is designed to help the sector grow still further and to support associated businesses throughout the food chain (Rinaldi, 2017).

In organic agriculture, biodiversity is both instrument and aim. Natural ecological balance, below and above ground, is key to its success. A healthy soil is the base for food production and a diversity of plants and animals on land prevents pest and disease outbreaks. Although, organic agriculture is committed to the conservation and enhancement of biodiversity, many systems today remain limited to input substitution. To be unlocked, the real potential of organic agriculture on biodiversity requires a stronger shift to a systems approach, based on improved understanding of ecosystem functions (Tahat et al., 2020).

Building of soil fertility is the cornerstone of organic agriculture. Organic practices create suitable conditions for soil biotic and abiotic resources through manipulation of crop rotations and strip-cropping; green manuring and organic fertilization (animal manure, compost, crop residues); minimum tillage; and avoidance of pesticides and herbicides use. Scientific research in Europe has demonstrated that organically managed soils significantly increase biological activity and total density and diversity of soil microorganisms. Such biodiversity enhances nutrients recycling and soil structure (Taki et al., 2022).

There is no doubt that farmers are the most important managers of natural resources. Several studies indicate that organic agriculture safeguards non-agricultural biodiversity and offers a viable alternative in protected area categories where human activities are allowed. Most importantly, the huge land surface surrounding protected areas requires an agro-ecosystem management that preserves the safety and integrity of the landscape. If farmland bordering and connecting protected areas employ organic methods, there is no reason to fear the loss of wildlife or contamination of air, water and soil. These buffer zones are critical to the success of conservation in the protected areas. Organic agriculture enhances people's ability to live in harmony with nature and to derive economic benefit from their land. Considering that most protected areas traditionally belonged to local villagers, organic agriculture allows local people to maintain some control over their land, protect land and biodiversity through their farming practices, reap its benefits for themselves and, at the same time, conserve and improve the natural environment. The direct impact that organic agriculture has on ecosystems can be seen on different scales: on-farm, farm margins, and overall ecosystem. While on-farm biodiversity has been discussed in the sections above, the following

sections will consider the interactions of organic agriculture with the wider landscape, namely protected areas and buffer zones (Singh, 2021).

Summarize that Organic farming is a sustainable agricultural approach in India that focuses on increasing nutrition, soil productivity, and environmental protection. It involves biological fertilizers, pest control, compost, and environmentally friendly practices like intercropping and crop rotations. The principles of organic farming include health, care, ecology, and fairness. Support for organic farming requires subsidies, agricultural extension services, and research. It provides new employment opportunities and supports rural economies through sustainable development. Biodiversity is a key goal, and organic agriculture directly impacts ecosystems on various scales, including on-farm, farm margins, and overall ecosystem.

E. PRESENT STATUS OF ORGANIC FARMING PRACTICES

Today, organic farming is the focus of much public attention and agricultural industry debate. To date, small, independent producers and consumers have driven the rise of organic farming (Obach, 2015).

Farmers face many challenges during the establishment of organic farming, among these, some are the main constraints like high cost of organic inputs, certification need, insufficient marketplace for organic products, and low yield and tiny price, are found to be the main constraints. Besides this, a touch demand for organic products, inconvenience of using organic techniques, higher production risk, and unavailability of consolidated land suitable for organic farming. Another challenge is found that socio-economic constraints are the most problem followed by infrastructural, technological, and situational within the process of adoption of organic farming. It is more labor-intensive than conventional production. On the one hand, this increased labour cost is one factor that creates organic food costlier. Organic farming has not yet managed to assume the center-stage of Indian agriculture. These challenges, if left unresolved, can negatively affect the agricultural sector at policy, commercial and infrastructural levels as well as the expansion of organic farming, besides affecting the standard of organic food products. More importantly, it is crucial to address these issues to safeguard the financial security of the farming sector (Bhushan and Caspers, 2017).

One of the leading challenges is that the extensive use of pesticides and chemicals against insect pests and weed management caused an evolution of the pest and weed species. This is the primary hurdle within the transition from conventional farming to organic farming

(Reddy, 2010). The resulting finding after thorough investigation and conclude that acceleration of growth in agriculture. Many experts and well-informed farmers are not sure whether all the nutrients with the required quantities can be made available by organic materials. Even if this problem can be surmounted, they are of the view that the available organic matter is not simply enough to meet the requirements (Gour, 2016).

Disparity of Supply and Demand is also a major challenge in organic farming. Non-perishable grains can be grown anywhere and transported to any location, but this is not the case with fruits and vegetables. It should be produced locally for which there should be willing companies, aggregators, and farmers around that area from where the demand is coming. But generally, the demand comes from metros where there are no farmlands to produce organic fruits and vegetables. Smart transport and dedicated channels of supply are the solutions to this disparity (Kumar et al., 2022).

Another major challenge in adopting organic farming is time. Indeed, organic farming requires greater interaction between a farmer and his crop for observation, timely intervention, and weed control for instance. It is inherently more labor intensive than chemical/mechanical agriculture so that, naturally, a single farmer can produce more crops using industrial methods than he or she could buy solely organic methods (https://small-farm-permaculture-and-sustainable living.com/)

It is almost obvious that due to the extreme care taken to go along with organic farming, the results would be kept at a high price. Once sold to the market, most of the place is devoted to the sale of these organic fruits and vegetables. Most people do that to approve of organic products because of this. The items sold in the market are half the price of non-organic products. So, we can say that organic items are expensive, and not every consumer is willing to pay the price for them (http://www.akmindia.in/organic-farming-proscons/)

The lack of special infrastructure lies as a significant challenge in organic farming. Most large organic farms still operate in an industrialized agriculture style, including industrial transportation of the food from field to plate. Unfortunately, this involves the adoption of the same environmentally harmful practices as those of factory farms which are however hidden under the cover of being organic (https://greentumble.com/pros-and-cons-of-organic-farming.

India's urban population is becoming more health-conscious about organic farming, which can boost its growth and secure farmers' livelihoods. Farmers make up 50% of the

workforce and require government and non-profit support. Transitioning from conventional to organic farming is challenging, but ultimately benefits producers, consumers, and nature (Yousefian et al., 2022).

India's agriculture is crucial for livelihoods, with two-thirds of the workforce reliant on farming. Organic farming aims to create sustainable, integrated systems, conserving soil fertility and system stability. India's diverse agro-climatic regions offer potential for organic cultivation. Organic farming is a systems approach, involving interactions between crops, animals, insects, and soil. Farmers use crop rotations, cover crops, and compost instead of synthetic fertilizers and pesticides. Organic farming is an environmentally friendly alternative to conventional agriculture and food chains, based on principles and values (Baskaur et al., 2021).

Organic farmers nourish soil biota, build soil structure, and water-holding capacity through cover crops, compost, and biologically based soil amendments. They use cover crops and crop rotations to control pests and diseases, disrupting habitats for weeds, insects, and disease organisms. This prevents diseases and improves plant resistance to disease and insect predation (Meena and Jha, 2018). Organic farmers use soil organisms, beneficial insects, and birds to control pests. They use strategies like insect predators, mating disruption, traps, and barriers. Under the National Organic Rule, growers must use sanitation and cultural practices before using pesticides. Intensive agriculture with agrochemicals increases farm productivity but has adverse effects on soil structure, microflora, water quality, and food quality. Pesticides and nitrates are found in ground water, affecting human health and causing deaths. The World Health Organization estimates three million people are poisoned by pesticides annually (El-Shafie, 2019).

India's agriculture has experienced setbacks due to excessive use of fertilizers, insecticides, fungicides, and herbicides, leading to soil fertility decline, water resource pollution, and food grain contamination. Organic agriculture is crucial for sustainable agriculture and addressing environmental degradation, unsafe food, water pollution, degraded land, and various illnesses caused by unsustainable practices (Patel et al., 2020).

The majority of consumers in the market like organic items, and their prices are greater than those of other products. To increase their income, enhance their agricultural practices, and produce more nutritious produce, farmers are turning to organic farming in their fields. Elakkiya

and Karthikeyan (2020) have evaluated the training needs analysis of farmers on organic farming. The study's participants were the mango growers in Tamil Nadu's Krishnagiri area. The sample size was thirty, and the saturated sampling approach was used. The production of Panchakavya, vermicompost, and the use of fungicides and bioinsecticides were the training subjects that all farmers favored. The majority of farmers (83.34%) required training on the go, followed by training in an institution (16.66%). The majority of respondents (50.00%) desired a training period of three to five days, and half of them chose the agriculture office in their community. In terms of training season, the majority of farmers (66.68%) preferred training to take place in the summer, and 33.33% of farmers preferred their trainers to be scientists. Pamphlets were the preferred training tool, according to half of the farmers (50.00%).

Alotaibi et al., (2021) examine the information sources used by organic farmers and their attitudes toward extension services and it was conducted through in-depth interviews with 10 organic farmers in central Pennsylvania. The research utilized a qualitative methodology involving verbatim transcription and thematic analysis. Findings revealed that organic farmers primarily rely on peer networks and organizations dedicated to organic agriculture rather than extension services for information. These farmers demonstrated strong social capital in seeking solutions to their challenges, particularly in managing pests, weeds, and weather-related issues. The study also highlighted the importance of adaptive capacities to climate change and certification processes as critical factors for successful organic production. Overall, the research offers valuable insights into farmers' perceptions of organic agriculture and extension services, which can help planners, policymakers, and Cooperative Extension personnel develop effective policies and strategies addressing the farmers' needs and challenges.

According to Longkumer et al., (2023), many sectors embrace scientific innovations, agriculture remains unique by increasingly adopting traditional organic farming practices.

This shift reflects growing concerns about health, environmental sustainability, and soil health. Consequently, there is a pressing need to assess farmers' knowledge and adoption levels regarding organic farming. The study employed a descriptive research design, focusing on four villages in the Longchem block of Mokokchung district, Nagaland, where 120 organic farmers were selected as primary respondents. Data were gathered through personal interviews using a pre-tested questionnaire. Results indicated that a significant portion of organic farmers exhibited a medium level of knowledge (59.20%) and adoption (74.10%) of organic practices. Factors such as education, information sources, risk orientation, and landholding were

positively and significantly associated with their knowledge and adoption levels. To enhance organic farming practices, the study recommends organizing vocational training programs and establishing robust marketing infrastructure for both input procurement and the sale of organic products.

Organic farming essentially aims to recycle waste materials that come from plants and animals to replenish the soil with nutrients. The Krishi Vigyan Kendra (KVK) is intended to provide extension workers, practicing farmers, and rural adolescents with need-based and skill-orientated training. The study was carried out in five KVK-adopted villages using a structured interview schedule with 150 trained farmers in the Katihar district, which is home to the KVK and is operated by the Bihar Agricultural University, Sabour, Bhagalpur. Before participating in training, just 4.67 percent of the respondents had a positive impression of organic agricultural practices; this percentage rose to 28.0 percent after the training. Difficult techniques of preparing organic inputs were named top by farmers (73.33%) as the main constraint encountered during the adoption of organic agricultural practices; high input costs came in second with 69.67% of the vote (Kumar et al., 2018).

Organic agriculture addresses environmental degradation, unsafe food, water pollution, and land degradation. It maintains soil health, protects the environment, and sustains crop productivity. In line with traditional Indian agro-systems, it ensures ecological balance and human health (Ali et al., 2021). India's agriculture has always relied on natural farming, ensuring that all nutrients needed for crop production were readily available in the soil, thereby maintaining soil productivity without the need for external inorganic nutrient addition (Palaniappan and Annadurai, 2018).

Switching to organic farming may initially decrease production due to the extraction of nutrients from soil through intensive agriculture. However, soil fertility improves over time, and by 5 years, production may reach pre-organic levels. This sustainable farming approach minimizes pest and disease problems, reduces irrigation, and encourages the return of living forms like earthworms. Organic farming reduces costs on fertilizers, micronutrients, pesticides, and irrigation, resulting in more economic returns for farmers and reduced medicine expenditure (Mie et al, 2017).

Organic agriculture offers additional revenue for farmers, reduces input costs, and improves soil fertility, leading to increased produce per unit area. Long-term economic benefits

include eliminating market-purchased inputs and reducing diseases associated with market-purchased inputs (Meemken and Qaim 2018). Excessive use of chemical fertilizers in agriculture, particularly in Punjab state, has led to soil infertility and disease. The excessive use of fertilizers has increased wheat and paddy production, but 25 per cent of the population suffers from diabetes. Zinc deficiency in the diet is a contributing factor. Pesticides have also been linked to diseases like cancer. Despite increased food availability per capita, the pollution of food, water, soil, and air due to excessive use of chemicals has negatively impacted human health (Shennan et al., 2017).

In brief it can be concluded that if one shifts from chemical agriculture to organic agriculture, in the first year there may be 30-40 per cent loss in production which will come down to 15-20 per cent in the second year and 5-10 per cent in the third year. This loss will be compensated by additional income the farmer will get by marketing good quality organic produce. In subsequent years the production will reach the pre-organic level and may increase further over the years. Some loss will also be compensated by lower cost of input in organic agriculture (Edwards, 2020).

It first happened in Brazil. And even the internationally acclaimed agricultural scientist, Novel Laureate Dr. Norman Borlaug, could not first believe it. To grow a bumper crop of soybean and that too without chemical fertilizers, it was beyond the imagination of Dr Borlaug. Prof. Johanna Dobereiner of the Third World Academy of Sciences persuaded Dr. Borlaug to visit Brazil and see the miracle in crop cultivation without nitrogen fertilizer. Almost the entire soybean crop in Brazil today is grown without the application of nitrogen fertilizers. And unlike the soybean growing tracts of India, which suffer from excessive usage of fertilizers, the entire soybean growing belt in Brazil is healthy, shows no sign of degradation and fatigue. In other words, absence of nitrogen fertilizers has encouraged sustainable cultivation of soybean (Kastner et al., 2021).

Necessity is the mother of invention. With nitrogen fertilizers not subsidized in Brazil, and obviously priced beyond the reach of farmers, soybean growers were left with no choice but to depend upon organic sources. Agriculture scientists too were forced to undertake research on increasing the efficiency of organic manures. As result of not applying synthetic nitrogen, Brazil is incurring an annual saving of US $3.2 billion (Boincean and Dent, 2019). Between 1971 and 1981, chemical fertilizers increased groundwater nitrate content by 2.5 times, posing serious health risks. High levels can cause birth defects, nervous breakdown, and cancer. Heavy

metal contamination from phosphatic fertilizers and the Ozone Hole are also hidden threats (Nelson et al., 2019).

Organic farming is a sustainable method that uses locally available resources, organic matter, and soil health to produce various agricultural products. It involves crop rotations, residues, animal manure, and pest control to maintain productivity and control weeds, acknowledging the interconnectedness of all living things (Leksono, 2017).

Organic growing involves treating soil and environment as resources for future generations, providing balanced food supply through composts, manures, and organic materials. Choosing renewable resources reduces environmental pollution and recycles waste. Organic manures improve soil fertility, affecting rhizophere environment and microflora. They contain essential nutrients for crops (Krishnamurthi, 2016).

Earthworms are crucial for aeration, soil turnover, and plant growth. In soil with organic matter and moisture content, 50,000-4,00,000 earthworms can produce 25-30 tonnes of castings, rich in nutrients like nitrogen, sulphur, potash, calcium, and magnesium (Singh, 2021).

Around 40% of global ice-free land is used for agricultural production, with continuous land-use change causing environmental problems like biodiversity loss and soil carbon release. Balancing food production and environmental goals requires efficient use of natural resources. Organic systems have lower land-use efficiency than conventional systems, with lower crop yields and longer production cycles. Environmental impacts are typically expressed per unit of land and per unit of output, but measuring per unit of output may underestimate the environmental effects of large-scale conversion to organic agriculture (Leifeld, 2016).

Studies show that organic farming has lower impacts on greenhouse gas emissions per unit of land, but not per unit of output. Balancing nutrient supply and plant demand is challenging, and organic systems have higher soil carbon stocks and sequestration rates in crop production and livestock production. However, the evidence does not support the notion of organic agriculture being more climate friendly. (WBA 2016).Das and Chatterjee (2020) highlight that organic cultivation requires higher labor and generates more income-generating jobs. Organic products cost 10-15% more than conventional crops, influenced by factors like certification, manpower, and subsidies. However, increasing health awareness and short supply can lead to increased costs .

Organic farming reduces farmers' yearly inputs, improves occupational health, and offers longer shelf life due to lesser nitrates and antioxidants. It's an expanding economic sector, with farmers increasingly favoring organic farming due to increased profits and improved health (Yadav et al., 2020). Organic farming is beneficial for environmental conservation as it avoids synthetic pesticides, sustaining biodiversity through crop rotation, and improving soil properties. It also uses less energy and produces less waste, resulting in higher yields even during drought. Organic farming also enhances soil quality and water retention capacity, making it a sustainable choice (Das et al., 2020).

The increasing demand for organically farmed fresh products has sparked interest in their nutritional value. Organic foods, particularly leafy vegetables and tubers, have higher dry matter, higher quality proteins, and higher amino acid scores (Popa et al., 2019). In a study conducted by organically grazed cows and sheep contain less fat and more lean meat as compared to conventional counterparts. Organically fed cow's muscle contains fourfold more linolenic acid, which is a recommended cardio-protective ω-3 fatty acid, with accompanying decrease in oleic acid and linoleic acid. Found that meat from an organically grazed cow contains high amounts of polyunsaturated fatty acids. The milk produced from the organic farm contains higher polyunsaturated fatty acids and vitamin E. Vitamin E and carotenoids are found in a nutritionally desirable amount in organic milk. Higher oleic acid has been found in organic virgin olive oil. Organic plants contain significantly more magnesium, iron, and phosphorous. They also contain more calcium, sodium, and potassium as major elements and manganese, iodine, chromium, molybdenum, selenium, boron, copper, vanadium, and zinc as trace elements (Garcia and Teixeira, 2017).

Barroso et al., 2019 review, based on AFSSA, found that organic products are rich in dry matter, minerals, and antioxidants, and contain no pesticide residues. Organic fruits and vegetables contain 27% more vitamin C than conventional ones, providing significant cellular regulatory effects and potential protection against diseases like cancer and chronic inflammation (Khadda, 2021). Organic foods like corn, strawberries, and marion-berries contain over 30% of cancer-fighting antioxidants, with phenols and polyphenolic antioxidants being higher in organic fruits and vegetables. Organic tomatoes contain more salicylic acid, which has anti-inflammatory and anti-stress effects. Organic fruits have higher total sugar content, making them taste better and have better flavor and crumb elasticity.

Organic vegetables have less nitrate content, which can be converted into nitrates, a public health concern. Organic foods are less contaminated with pesticide residue and pathogenic organisms (Garcia and Teixeira, 2017). Organic foods are perceived as healthier and more nutritious than conventional ones due to lower contamination and higher nutritional content, with significant differences in chemical composition compared to conventional foods (Seufert et al., 2017).

Organic food contains lower levels of chemical pesticide residues, nitrate, and cadmium, and no significant difference in fungal or bacterial contamination. However, the impact on human health depends on the types and quantities of pesticides used in conventional farming (Mditshwa et al., 2017).

Rea and Patel (2017) suggest a definitive study on organic food is lacking due to various factors like crop variety, post-harvest handling, and soil type, which affect nutritional quality. Organic food is less likely to contain pesticide residues. Organic food is safe to consume, with lower pesticide residues and a lower risk of *E.coli* contamination due to raw manure application. Organic standards set strict guidelines for manure use, either composting or applying at least 90 days before harvest, allowing for microbial breakdown (Rana and Paul, 2017).

Regarding nutritionally desirable components, most reviews suggest that organic plant products contain moderately higher concentrations of secondary metabolites such as phenolics. Concerning vitamin C and carotenoids, the results are mixed. Higher levels of omega-3 fatty acids were found in organic milk and chicken. On the other hand, slightly lower concentrations of proteins and amino acids were found in organic foods. However, it is not clear whether these differences in nutritionally desirable components between organic and conventional foods are clinically relevant. Certain differences in the composition of organic and conventional foods may not be surprising, as farming practices can affect plant chemistry. Lower cadmium and nitrate levels in organic plants are linked to synthetic fertilizers not being allowed in organic farming (Meemken and Qaim, 2018).

Beyond the chemical composition of foods, several studies have examined possible human health effects of organic diets through observational data from consumers. A few studies suggest that the consumption of organic foods can be associated with a lower risk of allergies and eczema in infants. A cohort study carried out in France showed that regular consumption of organic food is associated with lower rates of obesity (Suciu et al., 2019).

However, a systematic review did not find differences in health outcomes. Generally, it is difficult to prove causality with observational data. Organic consumers are known to make different often healthier food and lifestyle, which can lead to selection bias in impact evaluation. Given the limited evidence, general conclusions about health effects of organic food consumption cannot be drawn (Baranski et al., 2017).

Green Revolution has reached a plateau, and alternative techniques are needed to address pollution. India produced 2.75 million MT of certified organic products in 2019-20, including oil seeds, sugar cane, cereals, millets, cotton, pulses, and medicinal plants. Madhya Pradesh is the largest producer, followed by Maharashtra, Karnataka, Uttar Pradesh, and Rajasthan. The total volume of exports was 6.389 lakh MT, with an export value realization of INR 4,686 crore (689 million USD). Organic products are exported to various countries (Elayaraja and Vijay, 2020).

India's rapidly growing population relies on agriculture for 30% of its income, with 67% of its population and 55% of manpower relying on farming. Despite indigenous organic farming practices, modern techniques and population burdens have led to a preference for conventional farming (Vineetha and Sparjanbabu, 2021).

India's growing demand for organic produce is driven by increased food safety, quality, and soil health benefits. Organic cultivation offers income generation and benefits from naturally available organic nutrient resources in India's soil (Deshmukh and Babar, 2015). India is a country with a concrete traditional farming system, ingenious farmers, extensive dry lands, and nominal use of chemical fertilizers and pesticides. Moreover, adequate rainfall in north-east hilly regions of the country where few negligible chemicals are employed for a long period of time, come to fruition as naturally organic lands (Gour, 2016).

Indian traditional farmers possess a deep insight based on their knowledge, extensive observation, perseverance and practices for maintaining soil fertility, and pest management which are found effective in strengthening organic production and subsequent economic growth in India. The progress in organic agriculture is quite commendable. Currently, India has become the largest organic producer in the globe and ranked eighth having 1.78 million ha of organic agriculture land in the world in 2017 (Willer and Lernoud, 2019).

Organic farming has seen advancements in technology, including the integration of mycorrhizal fungi and nano-bio stimulants, sensor technology for mapping cultivation areas,

3D printers for smallholders, and sustainable practices like drip irrigation and precision agriculture. The Bee Scanning App aids beekeepers in mite control and breeding programs (Niggli et al., 2017). Inhana Rational Farming Technology, based on ancient Indian philosophy and modern scientific knowledge, is an organic method for ecologically and economically sustainable crop production. It energizes soil systems by restoring native microflora and plant defense mechanisms (Barik et al., 2019).

Organic farming is a long-term, sustainable approach to food production. Organic farming takes a proactive, preventative approach instead of dealing with problems after they emerge which can be too late. Both soil improvement and the concept of keeping the ground "covered" as much as possible, either by mulches or cover crops, reduce soil erosion. Soils with improved structure and higher content of organic matter and the more compact growth of an organic crop also reduce water consumption in agriculture (Funk and Kennedy 2016).

Organic food is increasing in popularity. The growing demand is mainly attributable to consumer concerns about negative implications of conventional agriculture for human health and the environment. Especially in developed countries, most consumers consider organic food to be safer and healthier than conventionally produced food. Rich-country consumers often also perceive organic farming to be better for the environment, climate protection, and animal welfare (Seufert et al., 2017).

The concept of sustainable agriculture integrates three main goals environmental health, economic profitability, and social and economic equity. The concept of sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs (Kumar et al., 2022).

Organic farming is a sustainable approach that involves improving the natural landscape, avoiding overexploitation, minimizing energy consumption, and promoting soil health through organic manures. It offers optimal economic returns and acknowledges indigenous knowledge and traditional farming practices. Organic farming is more profitable due to its premium price and benefits from a safe, secure, and healthy working environment. Implementing strategies like food security, rural employment, poverty alleviation, resource conservation, export-oriented production, sound infrastructure, government participation, and private-public sector involvement can help revamp economic sustainability in agriculture (Soumya et al., 2015).

Social sustainability as a process or framework that promotes well-being of members of an organization while supporting the ability of future generations to maintain a healthy community. Social sustainability can be improved by enabling the rural poor to get benefit from agricultural development, giving respect to indigenous knowledge and practices along with modern technologies, promoting gender equality in labour, full participation of vibrant rural communities to enhance their confidence and mental health, and thus decreasing suicidal rates among the farmers. Organic farming appears to generate 30% more employment in rural areas and labour achieves higher returns per unit of labour input (Kanwar and Dhakad, 2022).

Organic farming is gaining popularity due to its nutritional and safe benefits, as consumers seek healthier, safer options. It is eco-friendly and promotes soil health, promoting consumer health. The organic produce market is rapidly growing globally, including India. Encouraging organic farming can lead to a healthier, ecological, and economically prosperous nation in the future (Lalhmingsanga et al., 2022).

Nandwani and Nwosisi's (2016) study on global trends in organic agriculture examines certification processes, challenges, benefits, government positions, policies, and consumer behaviour. Organic agriculture advocates against chemical and GM materials, with growth of 20% annually due to healthier food choices and environmental concerns. It aims to increase food security and create a sustainable environment for future generations.

Summarize that India is embracing organic farming as a sustainable solution to environmental degradation, unsafe food, polluted water, degraded land, and agro-maladies. Organic farming focuses on creating integrated, environmentally, and economically sustainable agricultural production systems, conserving soil fertility, and supporting micro-organism life. India's diverse agro-climatic regions offer potential for producing various types of organic products. Organic farming management involves developing biological diversity to disrupt pest habitats and maintain soil fertility. Balancing food production and environmental goals requires efficient use of land and natural resources. Organic foods contain more dry matter, minerals, and antioxidants, with no pesticide residues compared to conventionally grown foods. India has become the largest organic producer in the world, ranking eighth with 1.78 million ha of organic agricultural land in 2017.

All the existing review of literature pertaining to the present research concluded that the study highlights the knowledge gap among farmers regarding ustilization of organic waste for organic farming technologies, such as organic fertilizers, growth boosters, and pesticides. This lack of understanding hinders widespread adoption of these practices, which promote sustainability and environmental conservation. To address this, the study proposes a comprehensive training and awareness programmes to equip farmers with the necessary skills to integrate organic waste for organic farming into their operations. This not only benefits individual farmers but also contributes to broader sustainability goals in agriculture and environment, such as reducing environmental pollution and improving soil health. In addition, it will teach farmers how to turn organic waste into organic inputs. Generating organic input not only improves their utilisation, but it can also be used to produce revenue by selling it, allowing them to manage their families with the utmost happiness.