

Organic Farming vs Chemical farming

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Organic farming and chemical farming represent two distinct approaches to agriculture, each with its own principles, benefits, and drawbacks. Both farming methods have distinctive use for fulfil the need of food requirement for the population in respect to the nutritional value of food. Organic farming focus on the quality and enriched nutritional food. Whereas chemical farming increases the productivity of food by using synthetic inputs.

Organic Farming

Organic farming emphasizes sustainability and ecological balance. It avoids synthetic pesticides, fertilizers, and genetically modified organisms (GMOs), instead relying on natural processes such as crop rotation, composting, and biological pest control. This method is known for promoting soil health and biodiversity, leading to potentially higher nutritional quality in crops due to enriched soil conditions.

Advantages:

- **Environmental Sustainability:** Organic practices reduce pollution and conserve water, contributing to healthier ecosystems.
- **Enhanced soil fertility:** Organic farming prioritizes soil health through practices like crop rotation and the use of organic fertilizers. This enhances soil fertility, promoting robust plant growth.

- **Minimal environmental impact:** By preventing the use of synthetic pesticides and fertilizers, organic farming minimizes the environmental impact associated with chemical runoff and soil degradation. This approach contributes to the preservation of biodiversity.
- **Production of healthier produce:** Organic farming emphasizes the use of natural inputs, resulting in produce that is free from synthetic chemicals. This focus on organic and chemical-free cultivation aligns with consumer preferences for healthier, nutrient-rich food.
- **Biodiversity preservation:** Organic farms often feature diverse ecosystems, supporting various plant and animal species. This biodiversity contributes to ecological balance and resilience against pests and diseases.
- **Soil Health:** Enhances soil fertility and structure, fostering a diverse microbial community.

Disadvantages:

- **Lower Yields:** Organic farming typically yields about 35% less than conventional methods, which raises concerns about food security for a growing population.

- **Vulnerability to pests:** Without the use of chemical interventions, organic crops may be more vulnerable to pest infestations. Balancing pest control without compromising organic principles remains a challenge.
- **Land use efficiency:** Organic farming may require more land to produce the same quantity of crops as conventional farming. This inefficiency poses challenges in meeting the global demand for food sustainably.
- **Transition period challenges:** Farmers transitioning from conventional to organic practices face challenges during the initial years. The adjustment period may result in lower yields and economic uncertainties.

Chemical Farming

Chemical farming, or conventional farming, utilizes synthetic inputs like fertilizers and pesticides to maximize crop yields. This method has significantly increased agricultural productivity and is often more economically viable in the short term.

Advantages:

- **Higher Yields:** General produces more food per acre, addressing immediate food supply needs.
- **Increased agricultural productivity:** Chemical farming has significantly boosted crop yields, ensuring a consistent and plentiful food supply to meet the demands of a growing global population.
- **Economic viability:** The use of synthetic inputs, including fertilizers and pesticides, has made large-scale agriculture economically viable. Farmers can produce more crops

efficiently and contribute to the global food market.

- **Year-round availability:** Chemical farming supports the production of crops throughout the year, reducing dependence on seasonal variations. This helps maintain a stable food supply even during off-season
- **Cost-Effectiveness:** Often requires lower initial investment compared to organic methods due to the reliance on chemical inputs.

Disadvantages:-

- **Environmental Impact:** Leads to soil degradation, water pollution, and potential health risks from chemical residues.
- **Non-Target Species:** Pesticides may harm non-target species, including beneficial insects, birds, and aquatic organisms. This can disrupt natural ecosystems and lead to declines in biodiversity.
- **Soil degradation:** Continuous use of synthetic fertilizers can lead to soil degradation. The loss of soil fertility affects long-term agricultural sustainability and can result in reduced crop yields over time.
- **Water pollution:** Runoff from fields treated with chemical inputs can lead to water pollution. Pesticides and fertilizers may contaminate water sources, posing risks to aquatic ecosystems and human health.
- **Chemical contaminant in food system:** Pesticide residues in the food system, originating from agricultural practices, may pose health risks. These contaminants, present on fruits and

vegetables, can accumulate through exposure, emphasizing the importance of monitoring and minimizing pesticide use for food safety and public health.

Role of technology in organic farming and chemical farming

Technology plays a crucial role in shaping how farmers grow our food, whether they follow organic or chemical farming methods. Let's take a closer look at how technology influences these practices:

Organic Farming:

- **Efficient composting:** Technology has improved the composting process in organic farming. Specialized equipment and techniques help farmers create nutrient-rich compost, enhancing soil fertility naturally.
- **Crop rotation planning:** Advanced tools aid farmers in planning effective crop rotation strategies. This ensures that different crops are grown in sequence, preventing soil depletion and promoting overall soil health.
- **Precision farming techniques:** Organic farmers embrace precision farming, using technology to apply the right amount of water, nutrients, and other inputs precisely where they are needed. This reduces waste and supports sustainable practices.

Chemical Farming

- **Genetically Modified Organisms (GMOs):** In chemical farming, technology has led to the development of GMOs, which are crops with altered genetic material. GMOs can resist pests, diseases, and harsh environmental conditions, contributing to increased yields.
- **Synthetic pesticides:** Technology plays a significant role in the production and application of synthetic pesticides in chemical farming. These pesticides help control pests and diseases, protecting crops from potential damage.
- **Precision agriculture:** Similar to organic farming, chemical farming utilizes precision agriculture. This involves using technology like GPS-guided tractors and sensors to optimize the use of resources such as water, fertilizers, and pesticides.

Technology, in the classical sense, includes the development and use of nutrients, pest control products, crop cultivars, and farm equipment; but it also includes the vision of genetically modified crops providing greater nutritional efficiency (more calories per yield, or more yield), manipulation of natural pest control agents, and use of farm management techniques that focus on whole-farm productivity over time, not just annual production per hectare.

Comparison of Chemical and Organic farming

Key Differences between Conventional and Organic Systems

Size	relatively small-scale, independent operations e.g. the family farm	large-scale, often owned by or economically tied to major food corporations
Methods	low use of purchased fertilizers and other inputs; low mechanization of the growing and harvesting process	Intensive chemical programmes and reliance on mechanized production, using specialized equipment and facilities
Markets	often local, direct to consumer, through on- farm outlet and farmers markets and through speciality wholesalers and retailers e.g. organic bazaar	Wholesale, with products distributed across large areas. Average supermarket produces travels hundreds to thousands of miles and sold through high-volume outlets.

Characteristics of Organic and Chemical farming

Organic farming	Chemical farming
<ol style="list-style-type: none"> 1) Smaller markets 2) Less accessible markets 3) Robust growth rates 4) Moderate competition 5) Rewarded for quality & process 6) Limited government support 7) Knowledge-intensive 8) Longer learning curve 9) Incorporates traceability, MRL, other standards 10) Price premium in the marketplace 	<ol style="list-style-type: none"> 1) Large markets 2) Easy market access 3) Modest growth 4) Intense competition 5) Rewarded for quality & low price 6) Govt. support: subsidy, R&D, extension 7) Capital-intensive 8) Short learning curve 9) May face more trade barriers 10) Strong downward price pressures

Why do people choose Organic food?

Consumers of organic products continue to buy these produces from known sources. A survey among these consumers as well as

proponents of organic farming revealed the following.

Better taste - Organic food tastes better; this is the simple message given by many people who eat organic.

Healthier -Organic foods have far less residues of pesticides, growth promoters and antibiotics. It has been shown in a number of studies that organic food contains more vitamins, nutrients and cancer-fighting antioxidants than non-organic food.

Animal friendly - Organic farming places great emphasis on animal welfare and is more animal friendly, where animals are not treated with synthetic growth hormones or drugs.

GMO free - Genetically Modified Organisms are not allowed in organic agriculture.

Fair Play - By avoiding expensive inputs of agrochemicals, organic farmers can manage to reduce production costs and get out of the debt trap. Fair prices additionally can enable farmers to get reasonable returns for their efforts.

More sustainable - Organic production aims, at all times towards Chemical Farming Vs sustainability while having best management of the environment and wildlife Organic Farming as a priority. This implies a sustainable management of natural resources; soil water and bio diversity. Organic systems are less dependent on non-renewable resources.

Traditions meeting Science - Organic systems rely on a modern and scientific understanding of ecology and soil science, while also integrating traditional agricultural knowledge.

Organic farming status in Uttarakhand

Organic area: In 2022-23, the organic area in Uttarakhand was 1.05 lakh hectares, which is an increase from 41,000 hectares in 2018-19. Recent data released by apeda.gov.in

Uttarakhand has Organic land 51,628.19 (in Ha) from total land area of 1,01,820.39 where Uttar Pradesh has 52,888.78 ha organic land. Leading states in organic farming with land area in Ha are;

1. Madhya Pradesh (6,12,816.04 ha),
2. Maharashtra (2,67,229.29 ha)
3. Rajasthan (2,15,299.29 ha)
4. Gujarat (92,333.51 ha)
5. Odisha (77,696.34 ha)
6. Sikkim (75,472.85 ha)
7. Uttar Pradesh (52,888.78 ha)
8. Uttarakhand (51,628.19 ha)
9. Kerala (36,208.78 ha)
10. Karnataka (30,612.23 ha)

Organic production: In 2022-23, Uttarakhand produced 43,900 tonnes of organic produce, and an additional 106 tonnes were collected from wild areas.

Organic certification: Uttarakhand was the first state in India to have an act on organic farming.

Uttarakhand Organic Commodity Board (UOCB): The UOCB has been spreading awareness about organic farming and promoting the sale of organic products.

Bhagwanpur In Bhagwanpur, 110 farmers are involved in organic farming, including 42 farmers who grow organic paddy, 25 who grow organic wheat, and 43 who grow organic sugarcane and gram.

Conclusion

Intensification of agriculture has largely been responsible for a spectacular achievement in the food grain production. However over exploitation of natural and renewable resources and indiscriminate and irrational use of synthetic inputs are being increasingly realized to seriously impair the ecological balance and also of animal origin at concentrations much higher than the permissible level of human body. A comparative review on these aspects were discussed here. Therefore the apparent

contradiction of our necessity for nutritional security on the one hand and environmental sustainability on the other makes it inevitable to resort to the organic farming system, as it appears to be a possible option to meet both these objectives. The latter implies a farming system that primarily aims at cultivating land and raising crops under ecologically favourable conditions. It emphasizes restricting the use of chemical inputs whether it is inorganic fertilizers or pesticides, and instead relies more on an integrated approach of crop management practices, making use of cultural, biological and natural inputs. The choice between organic and chemical farming involves weighing immediate productivity

against long-term sustainability and health considerations. A balanced approach that incorporates the strengths of both methods may be essential for future agricultural practices. Organic and chemical farming is not a binary one; it demands an understanding of their advantages, disadvantages, and the role of technology. A sustainable agricultural future necessitates a combination of the best practices from both approaches. By using technology responsibly and adopting ecologically sound methods, the agriculture sector can embark on a path that ensures food security, environmental conservation, and the well-being of future generations.