

ORGANIC FARMING: A WAY FORWARD FOR SUSTAINABLE DEVELOPMENT

Abstract

The era of the Green Revolution brought about significant changes in agricultural practices, aiming to increase productivity and address food shortages. However, the heavy reliance on synthetic inputs led to environmental degradation and concerns about human health. This prompted the rise of organic farming, which emphasizes natural and sustainable practices, avoiding synthetic fertilizers, pesticides, GMOs, antibiotics, and growth hormones. Biofertilizers and biodynamic play essential roles in organic farming, promoting soil health, plant growth, and disease suppression. EM technology harnesses beneficial microorganisms to enhance soil fertility and reduce reliance on synthetic inputs. Indigenous practices of organic farming incorporate traditional knowledge, emphasizing sustainable soil fertility management, crop rotation, intercropping, and the preservation of traditional seeds. Certification of organic products involves adhering to strict standards and regulations, including organic farming practices, record-keeping, prohibited substance avoidance, buffer zone establishment, inspections, and compliance with labelling and packaging requirements. These constraints aim to maintain the authenticity and integrity of organic labelling, providing accurate information to consumers. In the context of exporting organic products, they can be categorized into organic food products, organic textiles and fibers, and organic cosmetics and personal care products. Exporters must comply with organic standards and regulations, obtain certifications, and work closely with relevant agencies and certification bodies to ensure compliance and facilitate market access. The demand for organic products in international markets is driven by health and environmental concerns, leading to increased export opportunities. IFOAM (International Federation of Organic Agriculture Movements) is a global organization representing the organic

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agriculture movement. It works to promote and support organic farming and the organic food industry worldwide. It collaborates with governments and international organizations to establish organic standards and regulations, while also increasing consumer awareness through education and outreach programs. By facilitating international cooperation and knowledge-sharing, also contributes to the growth of the organic movement. In the context of post-harvest management, proper handling, storage, cleaning, sanitation, packaging, and transportation are crucial for maintaining the quality and organic integrity of organic produce. Effective post-harvest practices ensure the preservation of organic products and meet consumer expectations. These practices offer valuable insights into maintaining soil health, promoting biodiversity, and fostering a holistic connection between farmers, land, and communities.

Keywords: Green revolution, Organic farming, biofertilizers, certification of organic produce, post-harvest management

I. INTRODUCTION

During the era of the Green Revolution, which took place from the 1940s to the 1960s, agricultural practices and management underwent significant changes. The Green Revolution was characterized by the introduction of high-yielding crop varieties, increased use of synthetic fertilizers and pesticides, and advancements in irrigation techniques. These changes aimed to increase agricultural productivity and address food shortages in developing countries.

The management of agricultural practices during the Green Revolution focused on maximizing crop yields through the adoption of modern techniques. Farmers were encouraged to use improved seed varieties that had higher yields and were more resistant to pests and diseases. They were also advised to apply synthetic fertilizers to provide essential nutrients to the crops and use pesticides to control pests and diseases. Additionally, the promotion of irrigation systems, such as tube wells and canal irrigation, helped farmers overcome water scarcity and expand their cultivated areas.

However, the management of the Green Revolution practices also faced challenges. The heavy reliance on synthetic fertilizers and pesticides led to concerns about their environmental impacts, including soil degradation, water pollution, and biodiversity loss. Over time, the excessive use of these inputs resulted in diminishing returns, as pests and diseases developed resistance to pesticides, and soil fertility declined. Additionally, the high-cost inputs associated with the Green Revolution limited small-scale farmers' access to these technologies, leading to disparities in agricultural development.

The intensive use of inputs not only polluted the soil, water and the environment causing their slow degradation but also affected the human being. It is because of these the health-conscious countries like Germany, Japan, and USA. Netherlands etc. are ready to pay a premium for food raised without the use of chemicals. Seufert, V., Ramankutty, N., & Foley, J. A. (2012) conducted a global analysis of organic farming systems and concluded that organic agriculture has environmental benefits, such as lower energy use, reduced greenhouse gas emissions, and improved water quality. Thus, a natural balance needs to be maintained for survival and well-being of human being, plant and animal kingdom. It is felt necessary to advocate the use of the age-old practice of organic farming not only to ensure uncontaminated food production but also to sustain the agriculture by keeping the land in a healthy condition. The idea of natural farming was first advocated by Mokichi Okada, in 1935 in Japan aims at “practicing agricultural production without interrupting the natural ecosystem and without the use of chemical fertilizers and other agricultural chemicals” is gaining attention of the agricultural scientists and environmentalists.

Organic farming is a method of agricultural production that emphasizes the use of natural and sustainable practices while avoiding the use of synthetic fertilizers, pesticides, genetically modified organisms (GMOs), antibiotics, and growth hormones. It focuses on maintaining soil fertility, promoting biodiversity, and preserving the overall health of the ecosystem. Organic farming relies on techniques such as crop rotation, composting, biological pest control, and the use of organic inputs. Reganold, J. P., & Wachter, J. M. (2016) conducted a comprehensive meta-analysis comparing organic and conventional farming systems. They found that organic farming promotes soil health, reduces soil erosion, and enhances biodiversity.

II. HISTORY OF ORGANIC FARMING

Organic farming has a rich history that dates back to ancient agricultural practices, but the modern organic farming movement emerged in the early 20th century as a response to concerns about industrialization, synthetic chemicals, and the degradation of soil and ecosystems. Early agricultural civilizations relied on sustainable farming methods, including crop rotation, natural pest control, and composting, which laid the foundation for organic farming principles.

In the early 20th century, the work of Sir Albert Howard played a pivotal role in shaping modern organic farming. Howard, a British botanist and agricultural scientist, conducted extensive research in India. His studies on traditional farming systems, particularly the use of compost and organic matter, demonstrated the importance of maintaining soil fertility and led to the development of organic farming practices. Around the same time, Austrian philosopher Rudolf Steiner introduced biodynamic farming in the 1920s. Biodynamic agriculture emphasized the integration of the farm as a holistic organism, incorporating spiritual and cosmic influences into farming practices. Steiner, principles included the use of biodynamic preparations and following the lunar calendar for planting and harvesting.

In the United States, J.I. Rodale played a significant role in advocating for organic farming. In the 1940s, Rodale founded Organic Farming and Gardening magazine (now Organic Gardening) and established the Rodale Institute. The institute conducted research on organic methods and promoted organic gardening and farming practices through publications and educational initiatives, raising awareness about the benefits of organic agriculture. The rise of the Green Revolution in the mid-20th century, which heavily relied on synthetic fertilizers, pesticides, and high-yielding crop varieties, triggered concerns about environmental degradation and human health impacts. This led to a backlash against conventional farming practices and an increasing interest in alternative, sustainable approaches like organic farming.

In the 1970s, the concept of organic certification began to take shape. Various organizations and countries developed standards and certification programs to establish guidelines for organic practices, provide transparency to consumers, and ensure the integrity of organic products. This step marked an important milestone in the history of organic farming, as certification became an essential aspect of organic agriculture. Since then, the organic farming movement has continued to gain momentum and expand globally. Organic farming associations, advocacy groups, and research institutions have played a vital role in the development and dissemination of organic farming practices. Governments in many countries have recognized the importance of organic farming and have implemented regulations and support programs to encourage its adoption, further contributing to its growth.

Today, organic farming is recognized as an important alternative to conventional agriculture, promoting sustainable practices, environmental stewardship, and the production of organic food with reduced reliance on synthetic inputs. The history of organic farming reflects the continuous evolution and adaptation of farming practices, combining traditional knowledge, scientific research, and technological advancements to create a more sustainable and environmentally friendly agricultural system.

1. Synonyms for organic farming include:

- Biological farming
- Ecological farming
- Sustainable farming
- Natural farming
- Agroecology

2. Misnomers Associated with Organic Farming may Include

- **Chemical-free Farming:** While organic farming avoids the use of synthetic chemicals, it still utilizes naturally occurring substances like copper sulfate and pyrethrin for pest control. Therefore, it is not entirely free from chemicals.
- **Pesticide-free Farming:** Organic farming employs natural pesticides, such as neem oil or diatomaceous earth, to manage pests. Although these substances are derived from natural sources, they are still used for pest control.
- **Non-GMO Farming:** While organic farming prohibits the use of genetically modified organisms (GMOs), it does not guarantee that all organic products are completely free from GMO contamination. Organic certification standards generally require that organic products contain less than a certain percentage of GMOs, but cross-pollination or unintentional mixing can result in minimal GMO presence.
- **Small-scale Farming:** Organic farming is often associated with small-scale operations, but it can also be practiced on larger farms and in commercial agriculture.

III. PRINCIPLES AND METHODS COMMONLY ASSOCIATED WITH ORGANIC FARMING (LAMPKIN, N. 1990)

- **Soil Health:** Organic farming prioritizes the maintenance and improvement of soil health. It focuses on building organic matter, enhancing soil fertility, and nurturing beneficial soil microorganisms. Techniques like composting, crop rotation, and cover cropping are used to improve soil structure and nutrient content.
- **Crop Rotation:** Organic farmers often practice crop rotation, which involves planting different crops in a particular field in successive seasons or years. This helps break pest and disease cycles, prevents nutrient depletion, and improves soil health by diversifying the plant species grown.
- **Biological Pest Control:** Organic farming relies on natural methods for pest control rather than synthetic pesticides. Beneficial insects, birds, and other organisms are encouraged to manage pests by preying on or parasitizing them. Additionally, crop diversity, habitat manipulation, and physical barriers can be employed to minimize pest damage.

- **Weed Management:** Organic farmers use various techniques to manage weeds without relying heavily on synthetic herbicides. This may include mulching, hand weeding, cultivation, and the use of cover crops to suppress weed growth.
 - **Nutrient Management:** Organic farming emphasizes the use of natural sources of nutrients to maintain soil fertility. Techniques such as crop rotation, green manure (cover crops that are ploughed under to enrich the soil), composting, and animal manure are used to provide essential nutrients for plants.
 - **Avoidance of Synthetic Inputs:** Organic farming prohibits the use of synthetic pesticides, herbicides, fertilizers, and genetically modified organisms (GMOs). Instead, organic farmers rely on natural inputs and methods to address plant nutrition, pest control, and weed management.
 - **Animal Welfare:** Organic livestock farming places a strong emphasis on animal welfare. Animals are provided with access to the outdoors, space to move and exhibit natural behaviours, and a diet consisting of organic feed that meets their nutritional needs. The use of growth hormones and antibiotics is restricted or prohibited.
- 1. Role of Biofertilizers & Biodynamics:** Biofertilizers and biodynamics play crucial roles in sustainable agriculture by promoting healthy soil, enhancing plant growth, and minimizing the use of chemical inputs. Biofertilizers are biological products that contain beneficial microorganisms, such as bacteria, fungi, and algae. These microorganisms establish symbiotic relationships with plants, helping them in nutrient uptake, improving soil structure, and protecting against pests and diseases. For example, nitrogen-fixing bacteria convert atmospheric nitrogen into a form that plants can utilize, reducing the need for synthetic nitrogen fertilizers. Similarly, mycorrhizal fungi form associations with plant roots, increasing nutrient absorption and water uptake. Biofertilizers not only improve soil fertility but also contribute to sustainable farming practices by reducing the environmental impact of chemical fertilizers. (Meena, V. et.al. 2014)

On the other hand, biodynamics is an ecological and holistic approach to farming that considers the farm as a self-sustaining organism. It incorporates various practices aimed at enhancing the vitality and biodiversity of the farm ecosystem. Biodynamic farming involves the use of specific preparations made from plants, minerals, and animal substances that are applied to the soil, compost, and plants. These preparations stimulate soil microbiology, enhance nutrient availability, and foster plant resilience. Biodynamics also emphasizes the importance of working in harmony with natural rhythms and cosmic influences. Farmers following biodynamic principles consider the lunar and celestial cycles when timing their planting, cultivating, and harvesting activities. They believe that aligning agricultural tasks with these cosmic rhythms can optimize plant growth and overall farm vitality.

The combination of biofertilizers and biodynamics offers a powerful synergy in sustainable agriculture. Biofertilizers enhance soil fertility and plant health through the introduction of beneficial microorganisms, while biodynamics provides a holistic framework for farm management, promoting biodiversity, and fostering ecological

balance. Together, these practices contribute to resilient and regenerative farming systems that reduce reliance on synthetic inputs and support long-term sustainability.

- 2. EM technology and its Impact in Organic Farming:** EM technology involves the use of beneficial microorganisms to enhance soil fertility, plant growth, and disease suppression. These microorganisms are typically a combination of beneficial bacteria, yeasts, and fungi. When applied to the soil or sprayed onto crops, EM helps establish a diverse and balanced microbial community, which contributes to soil health and plant vitality. The microorganisms in EM break down organic matter, promoting composting and decomposition processes. This results in the release of nutrients and the formation of humus, which improves soil structure, water-holding capacity, and nutrient availability. Additionally, the microorganisms in EM can suppress harmful pathogens and pests by competing for resources and producing natural antibiotics. EM technology also supports the development of beneficial relationships between plants and microorganisms, such as mycorrhizal associations. Mycorrhizal fungi form symbiotic relationships with plant roots, enhancing nutrient uptake and improving plant resilience to stress conditions. (Higa T. 1991)

In organic farming, the application of EM technology can help reduce the reliance on synthetic fertilizers and pesticides while improving soil fertility and plant health. It promotes sustainable farming practices by enhancing nutrient cycling, reducing nutrient loss, and minimizing the environmental impact of agricultural activities.

Furthermore, the use of EM in organic farming aligns with the holistic approach of organic systems, which aim to foster a healthy and biodiverse agroecosystem. By harnessing the power of beneficial microorganisms, organic farmers can enhance the biological diversity of their soils, improve plant nutrition, and contribute to the overall sustainability of their farming operations. Overall, EM technology offers organic farmers a valuable tool to support their efforts in maintaining healthy soils, promoting plant growth, and reducing reliance on external inputs, while staying true to the principles of organic farming.

- 3. Indigenous Practices of Organic Farming, Sustainable Soil Fertility Management:** Indigenous practices of organic farming encompass a wealth of traditional knowledge and wisdom that have been passed down through generations. These practices emphasize sustainable soil fertility management, focusing on long-term productivity and the preservation of natural resources. One key aspect of indigenous organic farming practices is the use of natural fertilizers and soil amendments. Farmers often rely on locally available organic materials such as compost, animal manure, crop residues, and plant-based extracts. These materials are carefully sourced and prepared to maintain a balance of nutrients and organic matter in the soil. The application of these natural fertilizers not only enriches the soil but also improves its structure, water-holding capacity, and nutrient availability. Crop rotation and intercropping are also commonly employed in indigenous organic farming. These practices help break pest and disease cycles, enhance nutrient cycling, and promote biodiversity. Different crops are grown in sequence or together, allowing for complementary nutrient requirements and improved soil health. Intercropping also provides natural pest control as certain plant combinations repel pests or attract beneficial insects.

Traditional land management techniques are another integral part of indigenous organic farming. For instance, indigenous communities often practice agroforestry, where trees and crops are grown together. The trees provide shade, improve soil structure, and contribute leaf litter as organic matter. Additionally, terracing and contouring are used to prevent soil erosion on sloping lands, preserving soil fertility and water resources. Gattinger, A., et al.(2012) conducted a meta-analysis of long-term field experiments and concluded that organic farming, coupled with agroecological practices, promotes soil fertility, nutrient cycling, and pest regulation.

Indigenous farmers also emphasize the importance of preserving and utilizing traditional seed varieties. These locally adapted seeds have evolved over time to thrive in specific environments, making them resilient to pests, diseases, and changing climatic conditions. By saving and exchanging seeds, indigenous farmers maintain genetic diversity, promote crop resilience, and preserve cultural heritage.

Furthermore, indigenous organic farming practices often incorporate spiritual and cultural dimensions. Rituals, ceremonies, and traditional knowledge systems are interwoven with agricultural practices, fostering a deep connection between the land, farmers, and their communities. This holistic approach recognizes the interdependence of humans, nature, and the importance of maintaining harmony and balance.

The indigenous practices of organic farming exemplify the sustainable management of soil fertility. By drawing on traditional knowledge, these practices promote soil health, biodiversity conservation, and long-term productivity. They offer valuable lessons for modern agricultural systems, highlighting the importance of sustainable farming methods that work in harmony with nature while nourishing both the land and the communities that depend on it.

- 4. Weed Management Practices in Organic Farming, Biological /Natural Control of Pests and Diseases:** In organic farming, weed management is achieved through practices that prioritize ecological balance and sustainability. Crop rotation, mulching, hand weeding, cultural practices, and flame weeding are commonly employed to control weeds without synthetic herbicides. When it comes to pest and disease control, organic farmers rely on biological and natural methods. Beneficial insects, such as ladybugs and parasitic wasps, are introduced or conserved to prey on pests. Biological control agents like *Bacillus thuringiensis* (Bt) and *Trichoderma* are used to combat specific pests and soil-borne diseases. Gurr, G. M., et al. (2017). Multi-country evidence that crop diversification promotes ecological intensification of agriculture. *Nature Plants*, 3(3), 17088. This study highlights the importance of crop diversification as an effective IPM strategy in organic farming. It emphasizes the role of diverse crop rotations, intercropping, and agroforestry in promoting natural pest control and reducing pest pressures. Crop diversification, cultural practices, and physical barriers are also utilized to disrupt pest and disease cycles and maintain plant health. By adopting an integrated approach, organic farmers strive to manage weeds, pests, and diseases in a manner that is environmentally friendly and sustainable. Altieri, M. A., et al. (2015). The scaling up of agroecology: spreading the hope for food sovereignty and resiliency. *Agronomy for Sustainable Development*, 35(3), 1237-1245. They highlight the role of cultural practices, such as crop rotation, intercropping, and trap cropping, in organic pest management. It

emphasizes the use of ecological principles and traditional knowledge to enhance pest resistance and reduce reliance on external inputs.

5. Organic Farming Practices can Contribute to the Improvement of Crop Quality:

Organic farming practices offer numerous benefits that contribute to the improvement of crop quality. Firstly, organic farmers prioritize soil health through practices such as composting; cover cropping, and crop rotation. By enhancing soil fertility and structure, organic farming provides crops with a rich and diverse nutrient base. This leads to the production of crops with higher nutrient content, including essential vitamins, minerals, and antioxidants. Additionally, organic farming methods promote the development of stronger and more extensive root systems in plants, allowing them to access nutrients more efficiently and leading to improved crop quality.

Secondly, organic farming avoids the use of synthetic pesticides and genetically modified organisms (GMOs). Instead, organic farmers employ natural pest control methods such as beneficial insects, crop diversification, and cultural practices. This approach minimizes chemical residues in crops, resulting in reduced exposure to potentially harmful substances for both consumers and the environment. By avoiding GMOs, organic farming preserves the integrity and natural genetic composition of crops, which can contribute to improved crop quality in terms of flavor, texture, and overall genetic diversity. Baranski, M., et al. (2014) conducted a meta-analysis of existing studies and found that organic crops have higher levels of certain nutrients and antioxidants compared to conventionally grown crops.

Furthermore, organic farming practices focus on promoting the overall health and resilience of plants. By utilizing organic fertilizers and adopting sustainable agricultural practices, organic farmers create optimal growing conditions that enable crops to develop robust immune systems. As a result, organic crops often exhibit greater resistance to diseases, pests, and environmental stressors. This resilience translates into improved crop quality, as healthier plants are better equipped to produce higher yields, maintain better nutrient profiles, and exhibit enhanced flavor, aroma, and appearance.

IV. GAP PRINCIPLES AND MANAGEMENT

Good Agricultural Practices (GAP) is a set of guidelines and standards aimed at promoting sustainable and responsible agricultural practices. These practices encompass various aspects of farming, including crop production, livestock management, and environmental stewardship. The management of GAP involves implementing and maintaining these practices to ensure the production of safe and high-quality agricultural products while minimizing negative impacts on the environment and human health. (Buntong, B., &Vannoorenberghe, N. 2021)

In order to effectively manage GAP, farmers and agricultural producers need to establish robust systems and processes. This includes conducting regular soil testing and analysis to determine the appropriate use of fertilizers and pesticides, as well as adopting integrated pest management strategies to minimize the reliance on chemical inputs. Additionally, farmers need to implement proper irrigation techniques to conserve water and prevent water pollution. Adequate waste management practices, such as composting and

recycling, should be implemented to reduce the environmental impact of agricultural operations.

Another crucial aspect of GAP management is the establishment of traceability and documentation systems. This involves keeping detailed records of inputs used in the production process, such as seeds, fertilizers, and pesticides, as well as monitoring and documenting the handling and storage of agricultural products. This traceability ensures that the entire production chain can be tracked, allowing for quick identification and resolution of any issues related to product safety or quality. Effective management of GAP also involves continuous training and education of farmers and workers to ensure they are up to date with the latest practices and standards.

Overall, the management of GAP is essential for promoting sustainable agriculture and ensuring the production of safe and high-quality food. By implementing and maintaining good agricultural practices, farmers can protect the environment, minimize the use of harmful inputs, and meet consumer demand for responsibly produced agricultural products. Effectivemanagement involves the establishment of robust systems, traceability and documentation, and ongoing training and education to continuously improve farming practices and ensure compliance with GAP standards.

V. HACCP EXERCISE, CERTIFICATION OF ORGANIC PRODUCTS AND SYSTEM

HACCP (Hazard Analysis and Critical Control Points) system and the certification process for organic products (Codex Alimentarius Commission. 2003):

1. HACCP Exercise: Let's consider a hypothetical scenario of a vegetable processing facility that produces packaged organic salads. We will outline the steps involved in implementing the HACCP system for this facility:

- **Step 1:** Conduct a Hazard Analysis Identify and assess potential biological, chemical, and physical hazards associated with the salad production process. Examples may include microbial contamination, chemical residues, foreign objects, or allergens.
- **Step 2:** Determine Critical Control Points (CCPs) Identify the points in the production process where control measures can be applied to prevent, eliminate, or reduce the identified hazards to acceptable levels. For salads, examples of CCPs may include washing and sanitizing vegetables, controlling temperature during storage, and packaging.
- **Step 3:** Establish Critical Limits Define the maximum or minimum values for parameters that must be met at each CCP to ensure food safety. For instance, the critical limit for vegetable washing may be a specific concentration of a food-grade sanitizer or a certain water temperature.
- **Step 4:** Implement Monitoring Procedures Establish procedures to monitor and verify that CCPs are under control. This can involve visual inspections, testing, and measurements at specified intervals.

- **Step 5: Establish Corrective Actions** Develop protocols to take corrective actions when monitoring indicates that a CCP is not under control. This may involve identifying the root cause of the deviation and implementing corrective measures to bring the process back into control.
 - **Step 6: Establish Verification Procedures** Implement procedures to verify the effectiveness of the HACCP system. This can include reviewing records, conducting internal audits, and periodic testing.
 - **Step 7: Establish Documentation and Recordkeeping** Create and maintain records related to the implementation of the HACCP system, including hazard analysis, CCPs, critical limits, monitoring results, corrective actions, and verification activities.
- 2. Certification of Organic Products:** To obtain certification for organic products, farms and processing facilities must adhere to specific standards and undergo a certification process. Here are the general steps involved:
- **Step 1: Compliance with Organic Standards** Ensure that all practices, inputs, and processes used in production align with the organic standards set by the certifying organization or regulatory body in the respective country. This includes following guidelines for soil management, pest and weed control, animal welfare, and the use of organic inputs.
 - **Step 2: Application for Certification** Submit an application to the designated certifying organization, providing detailed information about the farm or facility, including production methods, inputs used, and a history of the land. Pay any applicable fees associated with the certification process.
 - **Step 3: Inspection and Documentation Review** The certifying organization will conduct on-site inspections to verify compliance with organic standards. Inspectors will review records, practices, and procedures, and may take samples for testing. They will also assess the traceability of organic inputs and the prevention of commingling or contamination.
 - **Step 4: Compliance Resolution** If any non-compliance issues are identified during the inspection, the farm or facility will receive a report detailing the deficiencies. They must address and rectify these issues within a specified timeframe.
 - **Step 5: Certification Decision** Based on the inspection findings, documentation review, and compliance resolution, the certifying organization will make a decision regarding organic certification. If compliance is confirmed, the farm or facility will receive an organic certification.
 - **Step 6: Annual Renewal and Ongoing Compliance** Organic certification is typically valid for a specific period, often one year. Farms and facilities must undergo an annual renewal process, including inspections and documentation review, to maintain

their organic certification. They must also continue to comply with organic standards and keep detailed records of their practices.

- 3. Agencies Involved at National and International for Organic Farming and Products:** Organic farming and the production of organic products involve various agencies at national and international levels. These agencies play critical roles in regulating, certifying, and promoting organic practices and ensuring consumer confidence in organic products. Here is a paragraph summarizing some of the key agencies involved:

At the national level, countries typically have their own organic certification bodies or agencies responsible for overseeing organic farming and certification processes. For example, in the United States, the National Organic Program (NOP), which operates under the United States Department of Agriculture (USDA), sets the standards for organic production, regulates organic labelling, and accredits certifying agents. Similarly, other countries have their own national organic programs and bodies, such as the Soil Association in the United Kingdom and the Agriculture and Agri-Food Canada (AAFC) in Canada. (USDA, 2023).

Internationally, the International Federation of Organic Agriculture Movements (IFOAM) plays a significant role. IFOAM is a global umbrella organization representing the organic movement and advocating for organic agriculture worldwide. It sets international organic standards and supports the development of organic farming practices and markets. IFOAM works closely with national and regional organic farming associations and certification bodies to harmonize organic standards and promote organic trade across borders.

Another notable international agency is the Organic Trade Association (OTA), based in the United States. The OTA represents the organic industry's interests and acts as an advocate for organic agriculture and trade. It works to educate policymakers, consumers, and businesses about the benefits of organic products and supports market development and expansion of organic farming practices.

Additionally, various international organizations, such as the Food and Agriculture Organization (FAO) of the United Nations and the International Trade Centre (ITC), have programs and initiatives focused on promoting sustainable agriculture, including organic farming. These organizations provide technical assistance, knowledge sharing platforms, and support for capacity building in organic farming practices, particularly in developing countries.

Overall, these national and international agencies collaborate to establish and enforce organic standards, facilitate trade, raise awareness, and promote the growth of organic farming and the availability of organic products worldwide.

- 4. Constraints in Certification of Organic Products:** Certification of organic products entails adhering to strict standards and regulations set by organic certification bodies. The process involves various constraints to ensure the authenticity and integrity of organic labelling. These constraints include the implementation of organic farming practices, such as avoiding synthetic pesticides, fertilizers, and GMOs, while promoting ecological balance and animal welfare. Record-keeping and documentation play a crucial role in the

certification process, as farmers and producers must maintain comprehensive records of their farming practices, including seed sources, inputs used, and pest management strategies. Prohibited substances, like synthetic pesticides and antibiotics, are strictly forbidden in organic production. The establishment of buffer zones is necessary to prevent contamination from neighbouring non-organic farms, and regular inspections and residue testing are conducted to ensure compliance. Additionally, compliance with labelling and packaging requirements, as well as payment of inspection and certification fees, are essential for maintaining organic certification. These constraints aim to uphold consumer trust and provide accurate information about organic products.

Overall, the certification of organic products encompasses several constraints. These include adherence to organic farming practices, meticulous record-keeping, avoidance of prohibited substances, establishment of buffer zones, compliance with labelling requirements, and payment of fees. These constraints ensure that organic products meet specific standards and maintain their authenticity, allowing consumers to make informed choices and trust the organic labelling.

- **Organic Products Export:** Organic products have gained significant popularity worldwide due to their perceived health benefits and environmental sustainability. When it comes to exporting organic products, they can be broadly categorized into three main categories based on their nature and origin. These categories are:
- **Organic Food Products:** This category includes organic fruits, vegetables, grains, dairy products, meat, poultry, seafood, and processed food items made from organically grown ingredients. Organic food products are produced without the use of synthetic pesticides, genetically modified organisms (GMOs), antibiotics, growth hormones, or chemical fertilizers. These products are exported to meet the growing demand for organic and healthy food options in various countries.
- **Organic Textiles and Fibers:** Organic textiles are produced from fibers that are grown without the use of synthetic chemicals, pesticides, or fertilizers. This category includes organic cotton, organic silk, organic wool, and other natural fibers. The demand for organic textiles has been increasing due to concerns about the environmental impact of conventional textile production and the desire for chemical-free clothing and home textiles. These products are exported to countries where sustainable and eco-friendly textile options are in demand.
- **Organic Cosmetics and Personal Care Products:** This category encompasses organic skincare, hair care, bath and body products, and cosmetics made from natural and organic ingredients. Organic personal care products are manufactured without the use of synthetic chemicals, artificial fragrances, parabens, or sulfates. The demand for organic cosmetics and personal care products has been rising as consumers seek natural alternatives that are free from potentially harmful substances. These products are exported to cater to the growing market of eco-conscious and health-conscious consumers. Lampkin, N., et al. (2015) conducted a review of case studies and economic analyses and found that organic farming can be economically viable, particularly in certain niche markets with higher consumer demand and premium prices.

Exporting organic products requires compliance with the organic standards and regulations of both the exporting and importing countries. Additionally, obtaining organic certifications from recognized certification bodies adds credibility to the products and facilitates their export to various international markets. Mie, A., et al. (2017) conducted a comprehensive review of studies and concluded that organic food has lower pesticide residues and reduced exposure to antibiotic-resistant bacteria, contributing to improved food safety.

It is important for exporters to work closely with relevant government agencies, trade associations, and certification bodies to ensure compliance, facilitate market access, and stay updated on the evolving export regulations and requirements for organic products.

VI. IFOAM AND ITS GLOBAL SCENARIO OF ORGANIC MOVEMENT

IFOAM (International Federation of Organic Agriculture Movements) is a global organization that represents the organic agriculture movement. It serves as an umbrella organization for more than 800 member organizations from around the world, including farmers, processors, retailers, and consumers. IFOAM's primary goal is to promote and support the development of organic farming and the organic food industry on a global scale. In the global scenario of the organic movement, IFOAM plays a crucial role in shaping policies and advocating for organic agriculture. It works closely with governments, international organizations, and other stakeholders to establish and maintain organic standards, certifications, and regulations. IFOAM's efforts aim to ensure the integrity of organic products, protect the environment, and promote sustainable agricultural practices. Additionally, IFOAM works towards increasing consumer awareness and demand for organic products through education and outreach programs. It organizes conferences, workshops, and campaigns to raise awareness about the benefits of organic farming, such as environmental sustainability, biodiversity conservation, and improved food quality. By fostering collaboration and knowledge-sharing among its members, IFOAM contributes to the growth and expansion of the organic movement worldwide, supporting farmers and businesses in adopting organic practices and meeting the increasing demand for organic products. Lernoud, J., Willer, H., & Solfanelli, F. (2021) published the "World of Organic Agriculture" report, providing insights into the global organic market. The report highlights the increasing market demand and growth of organic farming worldwide.

Overall, IFOAM's global scenario of the organic movement involves facilitating international cooperation, setting standards, and promoting organic agriculture as a viable and sustainable solution for food production and consumption. Through its inclusive and collaborative approach, IFOAM continues to advance the organic movement, striving for a more sustainable and healthier future for agriculture and the planet.

- 1. Post Harvest Management of Organic Produce:** Post-harvest management of organic produce plays a crucial role in maintaining the quality and shelf life of these products while preserving their organic integrity. The following paragraphs outline key practices in post-harvest management for organic produce. (USDA, 2016).
- 2. Proper Handling and Storage:** After harvesting, organic produce should be handled carefully to prevent damage and contamination. This includes gentle handling to avoid

bruising or mechanical injuries that can lead to spoilage. Organic produce should be sorted and graded based on quality parameters to separate damaged or diseased items from the healthy ones. Additionally, it is essential to store organic produce under suitable conditions, such as maintaining optimal temperature and humidity levels, to prolong shelf life and prevent microbial growth.

3. **Cleaning and Sanitation:** Thorough cleaning and sanitation are essential steps in post-harvest management of organic produce. Cleaning helps remove dirt, debris, and potential contaminants from the surface, while sanitation helps control microbial populations. Organic produce should be washed using clean, potable water, and organic-approved detergents or sanitizers. It is important to use approved cleaning agents that do not leave harmful residues on the produce. Proper cleaning and sanitation practices reduce the risk of foodborne illnesses and ensure the safety of organic produce.
4. **Packaging and Transportation:** Packaging organic produce serves multiple purposes, including protecting the items from physical damage, preserving freshness, and preventing contamination. Organic-approved packaging materials, such as biodegradable or recyclable options, should be used to maintain the organic integrity of the produce. Additionally, proper ventilation in packaging helps reduce moisture build-up and prevent mold growth. During transportation, it is important to handle organic produce with care, maintaining appropriate temperature and humidity conditions. Timely delivery to the market or consumers is crucial to ensure that organic produce reaches its destination in the best possible condition.

By implementing effective post-harvest management practices, organic farmers and producers can maximize the value of their produce, maintain its quality, and meet consumer expectations for organic products.

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