DOI: https://doi.org/10.36719/2789-6919/32/86-97

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A PART OF THE SOLUTION: ORGANIC FARMING METHODS AND SUSTAINABLE DEVELOPMENT GOALS

Abstract

Amid escalating concerns worldwide about the environmental and socio-economic impacts of traditional agriculture, organic farming emerges as a viable alternative. This article explores the intricate relationship between organic farming practices and the attainment of Sustainable Development Goals (SDGs). Beginning with an explanation of organic farming principles and methods, the discussion examines its environmental, economic, and social aspects. An assessment of organic farming's alignment with specific SDGs highlights its potential to address global challenges such as food scarcity, climate change, and biodiversity loss. Despite its numerous benefits, challenges persist, necessitating strategic interventions. The article concludes by outlining potential pathways and recommendations, emphasizing the importance of research, policy frameworks, and innovative approaches to promote widespread adoption of organic farming. It advocates for a comprehensive and collaborative approach to agriculture, positioning organic farming as a key contributor to building resilient and sustainable food systems.

Keywords: *organic farming, Sustainable Development Goals, agriculture, environmental sustainability*

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Həllin bir hissəsi: orqanik əkin metodları və dayanıqlı inkişaf hədəfləri

Xülasə

Ənənəvi kənd təsərrüfatının ətraf mühitə və sosial-iqtisadi mühitə təsirlərinə dair dünya üzrə artan narahatlıqlar fonunda, orqanik əkinçilik əlverişli bir alternativ kimi çıxış edir. Bu məqalə orqanik əkinçilik təcrübələri ilə Dayanıqlı İnkişaf Hədəflərinə nail olmaq arasındakı əlaqəni araşdırır. Müzakirə orqanik əkinçilik prinsipləri və metodlarının izahı ilə başlayaraq, onun ekoloji, iqtisadi və sosial aspektlərini araşdırır. Orqanik əkinçiliyin xüsusi Dayanıqlı İnkişaf Hədəflərinə uyğunluğunun qiymətləndirilməsi onun qida çatışmazlığı, iqlim dəyişikliyi və biomüxtəlifliyin itirilməsi kimi qlobal problemləri həll etmək potensialını vurğulayır. Orqanik əkinçiliyin çoxsaylı faydalarına baxmayaraq, strateji müdaxilə tələb edən problemlər də, qalmaqda davam edir. Məqalə, orqanik əkinçiliyin geniş şəkildə mənimsənilməsini təşviq etmək üçün tədqiqatın, siyasət çərçivələrinin və innovativ yanaşmaların əhəmiyyətini vurğulayaraq, potensial yolları və tövsiyələri qeyd etməklə yekunlaşır.

Açar sözlər: *orqanik əkinçilik, dayanıqlı inkişaf hədəfləri, kənd təsərrüfatı, ekoloji dayanıqlılıq*

Introduction

The global agricultural landscape faces significant challenges that threaten food security and environmental sustainability. Conventional farming practices, characterized by intensive chemical inputs and monoculture, have led to soil degradation, loss of biodiversity, and water pollution. As the world's population continues to grow, reaching an estimated 9.7 billion by 2050 (United Nations, 2019), addressing these challenges becomes imperative. Conventional farming, while contributing to increased yields in the short term, has raised concerns about its long-term viability and impact on ecosystems. The excessive use of synthetic fertilizers and pesticides has resulted in soil erosion, degradation of soil structure, and contamination of water resources (Pretty et al., 2018). In response to these challenges, organic farming has emerged as a sustainable alternative that emphasizes ecological balance and natural processes. Organic farming involves the exclusion of synthetic chemicals and genetically modified organisms, promoting the use of organic inputs and sustainable agricultural techniques. The global organic farming area has witnessed significant growth, reaching 72.3 million hectares in 2019, a 2.9% increase from the previous year (FiBL & IFOAM - Organics International, 2021). This growth underscores the increasing recognition of organic farming as a viable solution to address the shortcomings of conventional agriculture.

The unsustainability of current agricultural practices poses a multifaceted problem encompassing environmental, economic, and social dimensions. According to the Food and Agriculture Organization (FAO), agriculture is a major contributor to climate change, accounting for 21% of global greenhouse gas emissions (FAO, 2016). Moreover, the increasing demand for food puts pressure on natural resources, leading to deforestation and depletion of arable land. Addressing these challenges requires a paradigm shift in agricultural practices, w Göndərildi: 10.03.2024 Qəbul edildi: 19.04.2024

ith a focus on sustainability. The question arises: Can organic farming play a pivotal role in achieving sustainable development goals (SDGs)? The SDGs provide a framework for addressing global challenges, including hunger, climate change, and biodiversity loss. This study aims to investigate the potential of organic farming as part of the solution, exploring its principles, benefits, challenges, and its contribution to specific SDGs.

Organic Farming: Principles and Practices

Definition and Principles

Organic farming is characterized by a holistic approach that emphasizes natural processes and the exclusion of synthetic chemicals and genetically modified organisms (IFOAM - Organics International, 2020). The core principles of organic farming include promoting soil health, biodiversity conservation, and ecological balance (Reganold & Wachter, 2016). One of the fundamental principles is the prohibition of synthetic pesticides and fertilizers. Organic farmers rely on natural alternatives, such as compost, manure, and cover crops, to enhance soil fertility (Reganold & Wachter, 2016). This contributes to the reduction of environmental pollution and minimizes the risk of chemical residues in food products (Magkos et al., 2006). The emphasis on soil health is crucial, as healthy soils are more resilient to pests and diseases, reducing the need for external interventions (Badgley et al., 2007). Another key principle is crop rotation and diversification, which helps break pest cycles and improves soil structure (Scialabba & Hattam, 2002). By cultivating a variety of crops, organic farmers enhance biodiversity and create a more resilient agroecosystem (Reganold & Wachter, 2016). This approach not only improves the nutritional content of the soil but also contributes to the overall stability of the farming system.

Sustainable Techniques

Crop Rotation, Diversification, and Integrated Pest Management (IPM)

Organic farming relies on sustainable techniques to manage pests and diseases. Crop rotation involves changing the type of crops planted in a specific area over time, disrupting the life cycles of pests and pathogens (Seufert et al., 2012). This method reduces the reliance on chemical pesticides, contributing to a healthier and more balanced ecosystem (Hole et al., 2005). Diversification, another sustainable technique, involves planting a variety of crops within the same area. This not only enhances biodiversity but also reduces the risk of crop failure due to pests or diseases (Altieri, 1999). Integrated Pest Management (IPM) is a comprehensive approach that combines biological, cultural, and mechanical methods to control pests effectively (Pretty, 2017).

IPM minimizes the use of synthetic pesticides, promoting a more ecologically sustainable farming system.

Soil Conservation and Organic Fertilizers

Organic farming places a strong emphasis on soil conservation practices. The use of cover crops, agroforestry, and minimal tillage helps prevent soil erosion, improve water retention, and enhance overall soil structure (Reganold & Wachter, 2016). These practices contribute to the long-term sustainability of agriculture by preserving one of the most critical resources - soil. Organic farmers avoid synthetic fertilizers and, instead, use organic alternatives such as compost and manure. This not only reduces the environmental impact associated with the production and application of synthetic fertilizers but also enhances the nutrient content and microbial activity in the soil (Zaller, 2007). The global adoption of organic farming practices is evident in the increasing organic farming area, which reached 72.3 million hectares in 2019, with growth observed across all continents (FiBL & IFOAM - Organics International, 2021). The principles and sustainable techniques of organic farming position it as a promising strategy to address the environmental and agricultural challenges posed by conventional farming.

Yield Gap amid Organic and Conventional Farming

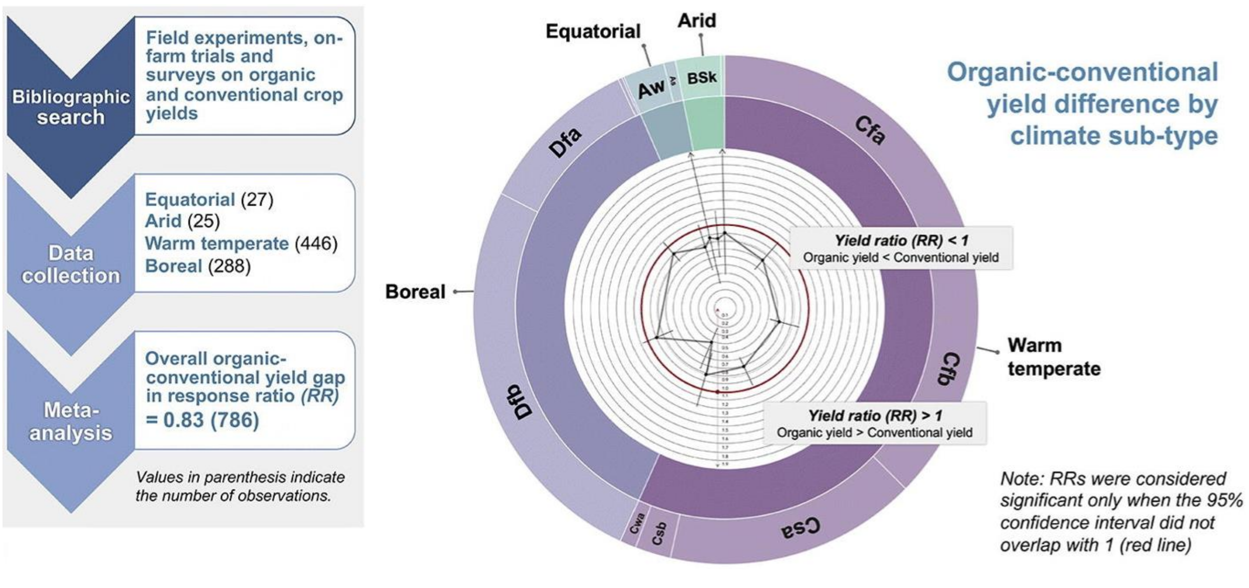
In referring statistical information regarding organic and conventional farming, the meta-analysis research by Tantriani et al. (2023) suggests that the yield exhibited a noteworthy reduction in organic farming compared to conventional farming across all categorical variables and diverse climate types. Figure 1 below depicts that, on average, organic yields are 18.4% less than yields in conventional farming systems. Furthermore, in specific warm temperature sub-types, crop types, geographical regions, and soil properties, organic yields exhibit a notable reduction compared to conventional yields.

Figure 1: Difference in yield between organic and conventional farming systems across various climatic conditions.

Source: Tantriani et al., 2023

In this meta-analysis, the data on yields were gathered from 105 studies that conducted a comparison between organic and conventional farming. A total of 786 pairwise observations were extracted, primarily sourced from prior meta-analyses and individual studies.

Another meta-analysis by Alvarez (2022) suggests that, on average, yields in organic farming were 25% lower than those in conventional farming, with cereals exhibiting a yield gap of 30%.



Additionally, the intensity of soil use was lower in organic systems, with the extent of reduction varying based on the study type: field experiments (7%) or on-farm studies (20%). When considering both the yield gap and the reduction in the number of crops harvested in the rotation, a productivity gap of 29% to 44% was estimated, depending on the types of crops included in the rotation. These findings highlight that the productivity gap surpasses the yield gap between organic and conventional farming.

Other meta studies suggest analogical results, demonstrating a substantial difference amid the two farming systems (e.g., Verdi et al., 2022). Nevertheless, it should be noted that, in spite of exhibiting lower yields, organic crop systems demonstrate superior environmental performance compared to conventional counterparts in areas such as climate change, ozone depletion, ecotoxicity, and resource utilization (Boschiero et al., 2023). Moreover, overall, organic systems exhibit lower environmental impacts than conventional systems concerning acidification, eutrophication, human toxicity, water consumption, and energy requirements (Boschiero et al., 2023).

Linking Organic Farming to Sustainable Development Goals

In the pursuit of global sustainability, the United Nations established the Sustainable Development Goals (SDGs) as a comprehensive framework to address pressing issues by 2030. Spanning 17 goals and 169 targets, the SDGs encompass diverse challenges, including poverty, hunger, health, education, gender equality, clean water, and climate action (United Nations, 2015). Central to achieving these goals is the agricultural sector, making it an integral component of the sustainable development agenda.

Zero Hunger (SDG 2)

SDG 2 focuses on ending hunger, ensuring food security, improving nutrition, and promoting sustainable agriculture. Organic farming aligns seamlessly with these objectives by emphasizing diverse and resilient agroecosystems. Research consistently indicates that organic agriculture contributes to food security by improving crop yields and enhancing the nutritional quality of produce (Badgley et al., 2007; Ponisio et al., 2015). The emphasis on diversified crops and sustainable practices in organic farming systems supports small-scale farmers, contributing to more inclusive and resilient food systems (UNESCO, 2013).

Given that more than 95% of the food supply is directly or indirectly reliant on soil (FAO, 2015), it's crucial to recognize that ensuring soil health is essential for addressing the zero-hunger goal. Approximately 10 million hectares of once-fertile land have been rendered unsuitable for agriculture due to soil degradation, such as erosion, frequently stemming from mismanagement (Meemken & Qaim, 2018). As stated by the Food and Agriculture Organization, around 25% of soils are experiencing significant degradation (FAO, 2017), soil degradation stands out as one of the most serious threats to both the environment and food security. Relating this to organic agriculture, organic methods such as the use of organic matter and implementing longer, more diverse crop rotations with cover and catch crops can help diminish soil erosion and fertility decline (Meemken & Qaim, 2018). Likewise, meta-analyses support the notion that organically managed fields exhibit higher levels of organic matter and more abundant and active soil microbial communities, which are critical indicators of soil quality (e.g., Tuomisto et al., 2012; Babayev & Babayev, 2013). Hence, despite the typically lower yields associated with organic farming, ranging from 19-25% (Meemken & Qaim, 2018), organic agriculture holds significant potential for ensuring long-term food provision. This is due to its ability to enhance soil quality, leading to reduced farmland loss over time and improved climate resilience (Scialabba & Müller-Lindenlauf, 2010).

Climate Action (SDG 13)

Climate change poses a formidable threat to global agriculture, impacting productivity, food security, and rural livelihoods. SDG 13 underscores the urgent need for action to combat climate change and its repercussions. The Figure 2 illustrates a consistent upward trend in global carbon emissions, vegetation carbon sequestration, and the Climate and Biodiversity Performance Index (CBPI) from the year 2000 to 2015. This notable increase over the specified period indicates a rising trajectory in carbon emissions, signifying a potential surge in anthropogenic contributions to atmospheric carbon dioxide. Simultaneously, the upward trend in vegetation carbon sequestration implies a heightened capacity of ecosystems to absorb and store carbon, showcasing a positive ecological response. The parallel increase in the CBPI suggests an overall improvement in climate and biodiversity performance during this timeframe. This could be attributed to global efforts and initiatives aimed at addressing climate change and enhancing biodiversity conservation. The synchronized elevation in these indicators underscores the interconnected nature of carbon dynamics, vegetation health, and climate and biodiversity performance on a global scale. Analyzing these trends is crucial for understanding the evolving environmental landscape and guiding future policies and actions to mitigate climate change and protect biodiversity.

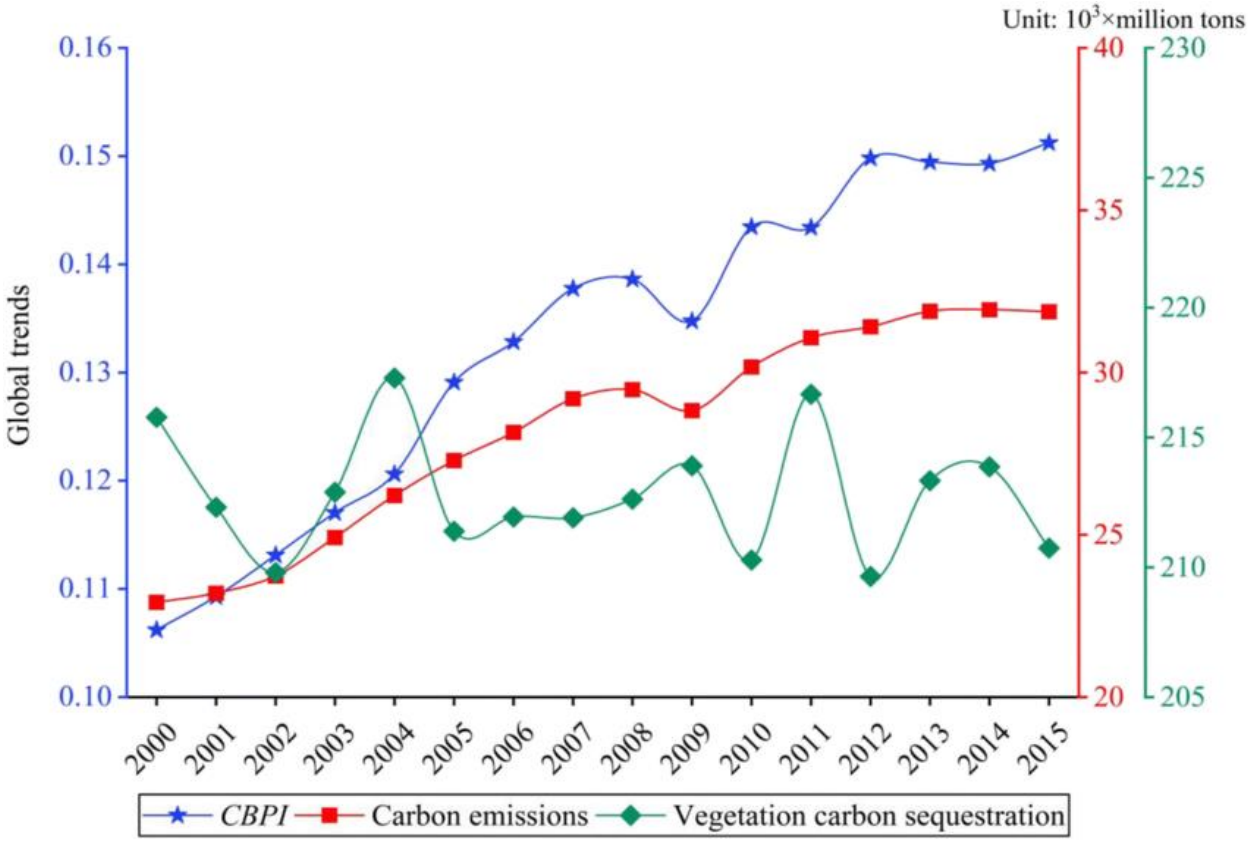


Figure 2: Temporal Trends (2000-2015) in Global Carbon Emissions, Vegetation Carbon Sequestration, and Climate & Biodiversity Performance Index (CBPI)
Source: Chen et al., 2021

Organic farming practices, with their emphasis on carbon sequestration and reduced greenhouse gas emissions, are well-aligned with the goals of climate action (Ponisio et al., 2015; Seufert et al., 2012). Studies consistently demonstrate that organic farming systems enhance soil carbon sequestration, offering a tangible solution to mitigate the effects of climate change on agriculture (Reganold & Wachter, 2016). By promoting resilient and adaptive farming practices, organic agriculture contributes significantly to building climate-resilient food systems.

Effectively managing nutrients and controlling pests within organic farming practices can significantly contribute to mitigating climate change, according to Scialabba & Müller-Lindenlauf, 2010). In line with organic guidelines, the use of synthetic inputs like mineral and chemical pesticides, which heavily rely on fossil fuels, is forbidden, which results in substantial reductions in carbon dioxide emissions (Khanal, 2009). For instance, in 2010, researchers estimated that the production of nitrogen fertilizers alone consumed energy equivalent to 0.4-0.6 gigatons of carbon dioxide, which amounts to approximately 10% of direct global agricultural emissions and about 1% of total human-induced greenhouse gas emissions (Scialabba & Müller-Lindenlauf, 2010). Organic agriculture largely avoids these emissions.

Another significant aspect of how organic agriculture aids in mitigating climate change is its impact on soil health (Scialabba & Müller-Lindenlauf, 2010). The report of FAO on Soil Organic Carbon underscores the critical importance of maintaining healthy soils: Soils represent a significant yet often overlooked carbon reservoir, holding more carbon than both the atmosphere and terrestrial vegetation combined (FAO, 2017). Carbon sequestration, involving the capture and long-term storage of atmospheric carbon dioxide through biological, chemical, or physical processes, can significantly transform soil into a net sink for greenhouse gas emissions. While quantifying the total extent of mitigation is challenging due to its dependence on local environmental conditions and management practices, research consistently demonstrates higher carbon sequestration in soils managed organically compared to conventional methods (Ziesemer, 2007).

The Role of Organic Farming in Achieving SDGs

Examining successful case studies provides valuable insights into the tangible impacts of organic farming on sustainable development goals. In Ethiopia, the adoption of organic farming practices has led to notable improvements in food security, increased income for farmers, and enhanced biodiversity (Jiang et al., 2022). The shift towards organic agriculture in India has resulted in improved soil fertility, reduced water consumption, and increased farmer income, emphasizing the multifaceted benefits of embracing organic practices (Zeweld et al., 2020). These case studies underscore the holistic potential of organic farming to address multiple dimensions of sustainable development.

Quantitative assessments further support the pivotal role of organic farming in achieving SDGs. A comprehensive meta-analysis comparing organic and conventional farming systems revealed that organic agriculture positively influences biodiversity, soil quality, and ecosystem services (Ponisio et al., 2015).

The study demonstrated that organic farms support a remarkable 34% higher biodiversity than their conventional counterparts, emphasizing the significant contribution of organic practices to the conservation of ecosystems. Moreover, a global assessment of the environmental impacts of organic and conventional farming systems found that organic agriculture exhibits lower environmental impacts concerning land use, eutrophication potential, and acidification potential (Tuomisto et al., 2012). These findings underscore the relevance of organic farming to SDG 15 (Life on Land) and SDG 6 (Clean Water and Sanitation), highlighting its potential to contribute substantially to environmental sustainability.

Beyond environmental considerations, the impact of organic farming extends to economic and social dimensions. Studies show that the adoption of organic practices can lead to increased income and improved livelihoods for smallholder farmers (Mäder et al., 2002; Kamau et al., 2019). Additionally, the growing global demand for organic products has created market opportunities, fostering economic growth in the organic sector (Willer et al., 2021). Inclusivity and fairness in the food system are further promoted through organic certification programs that ensure fair wages and working conditions for farmers and laborers (IFOAM - Organics International, 2017).

Benefits and Challenges

Environmental Benefits

Reduced Synthetic Inputs - One of the primary environmental benefits of organic farming lies in the reduced reliance on synthetic inputs, such as pesticides and fertilizers. Organic farming prohibits the use of synthetic chemicals, mitigating the negative environmental impacts associated with their production and application. Studies have shown that the exclusion of synthetic pesticides in organic systems leads to lower pesticide residues in soil and water, contributing to the preservation of biodiversity and the protection of ecosystems (Pimentel et al., 2005; Seufert et al., 2012).

Soil Health and Biodiversity Conservation - Organic farming practices, including crop rotation, minimal tillage, and the use of organic fertilizers, promote soil health and biodiversity conservation. The emphasis on maintaining healthy soils enhances soil structure, water retention, and microbial diversity (Reganold & Wachter, 2016). A meta-analysis comparing organic and conventional farming systems found that organic practices support 50% more beneficial organisms, such as earthworms and mycorrhizal fungi, contributing to improved soil fertility and resilience (Ponisio et al., 2015).

Carbon Sequestration - Organic farming's role in carbon sequestration is crucial for mitigating climate change. The incorporation of organic matter through cover cropping and organic inputs enhances carbon sequestration in soils. Research indicates that organic farming systems can sequester more carbon than conventional systems, thereby contributing to climate change mitigation (Smith et al., 2008; Reganold, Wachter, 2016).

Economic Benefits

Market Demand and Premium Prices - The economic benefits of organic farming extend beyond environmental considerations. The growing global demand for organic products has created market opportunities for farmers adopting organic practices. In 2019, the global organic market reached $106 billion, with organic sales accounting for a growing share of the overall food market (Willer et al., 2021). Organic certification provides farmers with access to premium markets, offering higher prices for their produce and contributing to increased farm incomes (Ewert et al., 2023).

Long-Term Sustainability for Farmers - The long-term sustainability of farming systems is a critical economic benefit associated with organic agriculture. Organic farming practices, by enhancing soil health and reducing dependence on external inputs, contribute to increased resilience against environmental stressors, market fluctuations, and the uncertainties of climate change (Reganold & Wachter, 2016). Studies suggest that organic systems can outperform conventional systems in terms of economic returns, particularly under conditions of environmental stress (Ponisio et al., 2015; Badgley et al., 2007).

Organic farming is implemented in 191 nations, with over 76 million hectares of agricultural land being cultivated organically by a minimum of 3.7 million farmers. The worldwide sales of organic food and beverages nearly reached 125 billion euros in the year 2021 (FiBL, 2023).

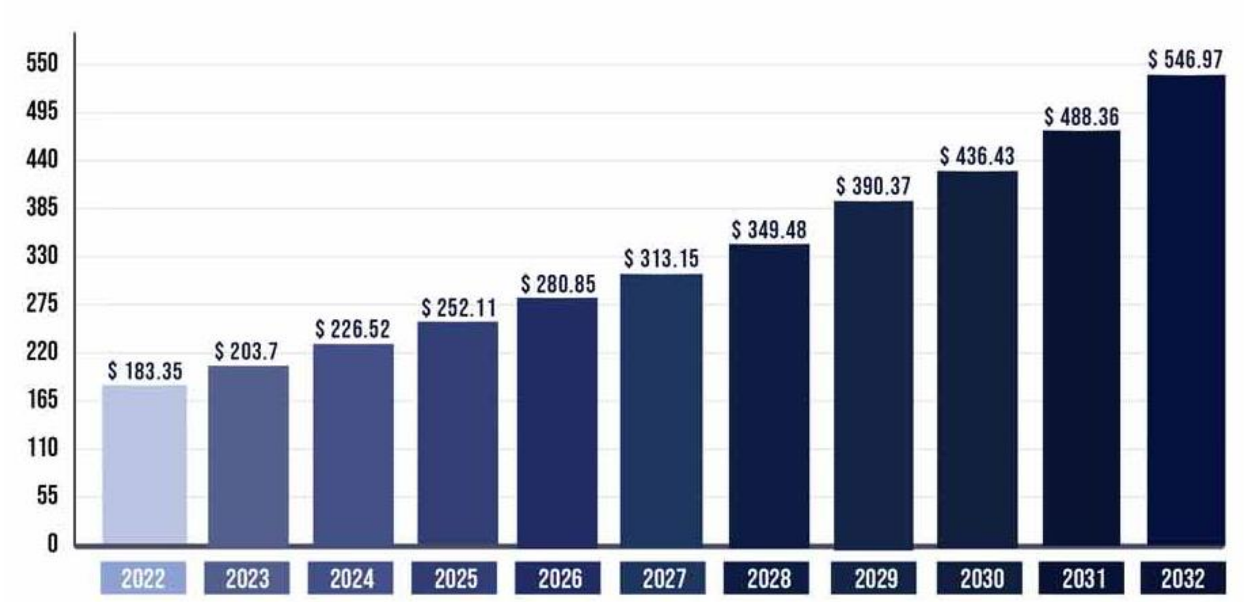


Figure 3: Organic food market size worldwide (2022-2032)
Source: Precedence Research, 2023

The size of the worldwide organic food market reached USD 183.35 billion in 2022 (Figure 4), with projections indicating an anticipated value of approximately USD 546.97 billion by 2032. This growth is expected to occur at a compound annual growth rate (CAGR) of 11.60% during the forecast period from 2023 to 2032 (Precedence Research, 2023).

Challenges and Criticisms

Limited Yield and Productivity - A persistent challenge associated with organic farming is the perception of lower yields compared to conventional methods. Studies have reported mixed findings, with some indicating that organic systems may have slightly lower yields, particularly in the initial years of transition (Seufert et al., 2012). However, a meta-analysis covering 293 studies found that in certain contexts and crop types, organic farming can achieve yields comparable to or even higher than conventional farming (Ponisio et al., 2015). The variability in results underscores the importance of considering local conditions, crop types, and management practices.

Transitioning from Conventional to Organic Farming - The transition from conventional to organic farming poses challenges for farmers, including the need for changes in management practices, potential yield fluctuations during the transition period, and the financial costs associated with certification (Müller et al., 2017). Farmers may face uncertainties and risks during this transitional phase, emphasizing the need for supportive policies, technical assistance, and financial incentives to facilitate a smoother shift toward organic practices (Ewert et al., 2023).

Market Access and Certification Issues - Market access and certification challenges can hinder the growth of organic farming. The certification process, while essential for ensuring organic integrity, can be demanding for small-scale farmers in terms of time, paperwork, and costs (IFOAM - Organics International, 2017; Babayev, 2007). Additionally, accessing organic markets and maintaining certification may be more challenging for farmers in remote or low-income regions. Addressing these issues requires targeted efforts to streamline certification processes, enhance market access, and support the inclusivity of diverse farming communities.

Future Directions and Recommendations

Research and Innovation

Improving Organic Farming Techniques

A crucial area for future research and innovation in organic farming lies in improving farming techniques to enhance productivity and sustainability. Investigating alternative pest and disease management strategies, developing resilient crop varieties, and optimizing organic fertilization methods can contribute to overcoming some of the challenges associated with organic farming (Reganold & Wachter, 2016; Ponisio et al., 2015). Research efforts should also focus on assessing the long-term impacts of organic farming on soil health, biodiversity, and ecosystem services, providing a robust scientific foundation for the continued expansion of organic agriculture (Pretty et al., 2018).

Technology Integration in Organic Farming

The integration of technology can play a pivotal role in advancing organic farming. Precision farming technologies, remote sensing, and data analytics can be harnessed to optimize resource use, monitor crop health, and enhance decision-making processes for organic farmers (Seufert et al., 2012). Emerging technologies, such as blockchain, can also contribute to improving traceability and transparency in organic supply chains, addressing concerns related to fraud and ensuring the integrity of organic products (Qu et al., 2023).

Sustainable Agroecological Practices

Promoting sustainable agroecological practices within the organic farming framework is essential for future development. Agroecology emphasizes the integration of ecological principles into agricultural systems, emphasizing the importance of biodiversity, natural resource management, and the enhancement of ecosystem services (Altieri, 1999). Further research should explore how agroecological principles can be effectively integrated into organic farming systems to enhance their resilience and sustainability (Pretty et al., 2018).

Policy Recommendations

Incentivizing Organic Practices

Governments and international organizations should implement policies that incentivize the adoption of organic farming practices. Financial incentives, such as subsidies or grants for transitioning farmers, can alleviate the initial economic challenges associated with the shift to organic methods (Ewert et al., 2023). Furthermore, differentiated support mechanisms for small-scale and marginalized farmers can ensure that the benefits of organic farming reach diverse farming communities, contributing to more inclusive and equitable agricultural systems (Müller et al., 2017).

Strengthening Certification Processes

Policy efforts should focus on strengthening and streamlining organic certification processes. This includes reducing certification costs, simplifying paperwork, and providing technical assistance to farmers during the certification process (IFOAM - Organics International, 2017). Collaboration between governmental bodies, certification agencies, and stakeholders is essential to create standardized and efficient certification systems that maintain the integrity of organic products while ensuring accessibility for farmers of varying scales and resources. An instance to this can be Ganja Agribusiness Association (GABA), which plays a critical role in the advancement of organic agriculture (Gengenbach, 2022). This association is the driving force behind the Azerbaijan Federation of Organic Agriculture Movements (AzFOAM) and has been a member of the International Federation of Organic Agriculture Movements (IFOAM) since 2002.

Integration of Organic Agriculture into National Strategies

Governments should integrate organic agriculture into broader national sustainable development strategies. Aligning organic farming with overarching agricultural policies, climate action plans, and sustainable development agendas can ensure that the potential of organic agriculture is maximized across multiple sectors (Müller et al., 2017). National strategies should recognize organic farming as a viable and beneficial approach, offering support through policy frameworks that prioritize environmental conservation, biodiversity, and the well-being of farming communities.

Research and Extension Support

Investments in research and extension services are critical for the success and growth of organic farming. Governments should allocate resources to support research on organic farming techniques, pest and disease management, and the development of sustainable agroecological practices (Reganold & Wachter, 2016). Extension services play a vital role in disseminating knowledge and best practices to farmers, facilitating the adoption of organic methods (Ewert et al., 2023). Strengthening research and extension networks ensures that farmers receive the necessary information and guidance to make informed decisions about transitioning to and practicing organic farming.

Conclusion

The examination of organic farming in sustainable development contexts has revealed its diverse contributions to addressing pressing global issues. Its environmental benefits, such as reduced synthetic inputs, improved soil health, and carbon sequestration, along with economic advantages like market demand and sustainability for farmers, position it as a promising solution for resilient and fair food systems. Organic farming aligns with specific Sustainable Development Goals like Zero Hunger and Climate Action, highlighting its potential to significantly aid global sustainability efforts. Nonetheless, challenges such as limited yields, transitioning hurdles, and market access barriers emphasize the need for strategic interventions to promote organic practices. Future directions include enhancing productivity and sustainability through research, innovation, and policy measures like incentivizing organic practices and strengthening certification processes. Collaborative efforts among researchers, policymakers, farmers, and consumers are crucial for maximizing the benefits of organic farming. Embracing a holistic approach that integrates sustainable practices, innovation, and supportive policies is pivotal for the future of agriculture. As awareness of the environmental and social impacts of conventional agriculture grows, organic farming emerges as a scalable solution for a more sustainable, resilient, and equitable food system. Achieving a future where organic farming plays a central role requires ongoing collaboration, research advancements, and policy reforms to foster a truly sustainable and regenerative agricultural paradigm.

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Received: 04.03.2024 Accepted: 17.04.2024