

# Sustainability of Organic Farming: A Review via Three Pillar Approach

## Sostenibilidad de la agricultura ecológica: una revisión a través del enfoque de tres pilares

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### ABSTRACT

Organic farming (OF) whose primary feature is the avoidance of chemical inputs, offers multiple economic, environmental, and social benefits, and is one obvious facet of efforts to make agribusiness more sustainable. The concept of sustainable organic farming was first introduced in the mid-90s. Major studies on sustainable organic farming indicate that it encompasses three pillars: a) economic, b) environmental, and c) social. OF has been studied in the existing literature from the perspectives of these pillars, but these perspectives have not yet been sufficiently combined. In response, this paper summarizes the current state of the literature on OF in the context of sustainability pillars, to do so the study conducts a review, based on academic articles, which are thematically selected, analyzed, and categorized according to sustainability pillars (economic, environment, and social) vis-à-vis OF. These research and literary sources linking OF with sustainability pillars are analyzed and discussed based on current developments. First, this study develops a comprehensive view of organic farming in terms of sustainability. It further elucidates the research findings related to each pillar. This paper also brings out how the function of organic farming contributes to long-term sustainability by enhancing environmental conservation, economic viability, and farmer welfare and product quality. The findings indicate that i) OF is gaining popularity as a

research area in relation to sustainability pillars ii) there is a paucity of published research that combines all the three pillars in the context of organic farming and iii) the social aspect of organic farming is very less addressed.

Keywords- Organic Farming; Sustainability; Sustainable Organic farming; Economic Sustainability; Environmental Sustainability; Social Sustainability

## RESUMEN

La agricultura orgánica (OF), cuya característica principal es evitar los insumos químicos, ofrece múltiples beneficios económicos, ambientales y sociales, y es una faceta obvia de los esfuerzos para hacer que la agroindustria sea más sostenible. El concepto de agricultura orgánica sostenible se introdujo por primera vez a mediados de los años noventa. Los principales estudios sobre agricultura orgánica sostenible indican que abarca tres pilares: a) económico, b) ambiental y c) social. La OF se ha estudiado en la literatura existente desde la perspectiva de estos pilares, pero estas perspectivas aún no se han combinado lo suficiente. En respuesta, este trabajo resume el estado actual de la literatura sobre OF en el contexto de pilares de sustentabilidad, para ello el estudio realiza una revisión, con base en artículos académicos, los cuales son seleccionados temáticamente, analizados y categorizados según pilares de sustentabilidad (económico, medioambiental y social) frente a OF. Estas fuentes de investigación y literarias que vinculan la OF con los pilares de la sostenibilidad se analizan y discuten con base en los desarrollos actuales. Primero, este estudio desarrolla una visión integral de la agricultura orgánica en términos de sostenibilidad. Además, aclara los resultados de la investigación relacionados con cada pilar. Este documento también destaca cómo la función de la agricultura orgánica contribuye a la sostenibilidad a largo plazo al mejorar la conservación del medio ambiente, la viabilidad económica y el bienestar de los agricultores y la calidad del producto. Los hallazgos indican que i) la OF está ganando popularidad como área de investigación en relación con los pilares de sostenibilidad ii) hay una escasez de investigaciones publicadas que combinen los tres pilares en el contexto de la agricultura orgánica y iii) el aspecto social de la agricultura orgánica es muy menos abordado.

Palabras clave- Agricultura ecológica; Sustentabilidad; Agricultura ecológica sostenible; Sustentabilidad económica; Sustentabilidad del medio ambiente; Sustentabilidad social

## INTRODUCTION

Organic farming (OF) is an agro-production method that primarily supports the human, animal, plant, and land health, maintains biodiversity and ecological balance, provides fairness in the environment and life possibilities, and protects the health of the world's present and future generations. All these dimensions refer to The International Federation of Organic Agriculture Movements (IFOAM's) four principles of Health, Ecology, Fairness, and Care (IFOAM, 2016). Organic farming blends tradition, creativity, and science to benefit the common environment while also promoting equitable relationships and a higher quality of life for all those involved, whether directly or indirectly (Paull, 2010). The *Codex Alimentarius* Guidelines (developed by the United Nations Food and Agricultural Organization (FAO) and the World Health Organization) and the IFOAM's Basic Standards govern organic farming globally. The *Codex Alimentarius* Guidelines and the IFOAM Basic Standards serve as the basis for national and regional standards around the world. National standards are more stringent than IFOAM Basic Standards since they take into account local conditions.

The fundamental concepts of organic farming are thought to have been proposed in the early 1900s by Sir Albert Howard, F.H. King, Rudolf Steiner, and others who believed that the use of residential manure, cover crops, crop rotation, and biological pest controls laid the groundwork for a better farming system (Heckman, 2006). This primitive but ecologically symbiotic farming practiced by mankind for millennia prior to the emergence of conventional agriculture is now heavily influencing environmentalists with its coexistence factor (Siddique et al., 2014). Consequently, substituting current conventional agro practices with organic farming and avoiding the use of chemicals is an apt remedy to human as well as environmental issues (Sharma and Singhvi, 2017). According to surveys conducted in 2019 by the world's top institutes in organic agriculture, Research Institute of Organic Agriculture (FiBL), and IFOAM, organic farming has increased dramatically in recent years. As per current data as of 2018, organic farming is practiced in 186 countries worldwide on approximately 1.5 percent of agricultural land (IFOAM, 2020). Organic farming, formerly a specialist activity, has grown into a well-established production and livelihood activity, requiring major human and financial resources. The graphical representation (Fig.1) of the area under organic farming worldwide from 2000 to 2019 evidently depicts the expanding global prospect of organic farming.

## Organic farming area worldwide from 2000 to 2019 (in million hectares)

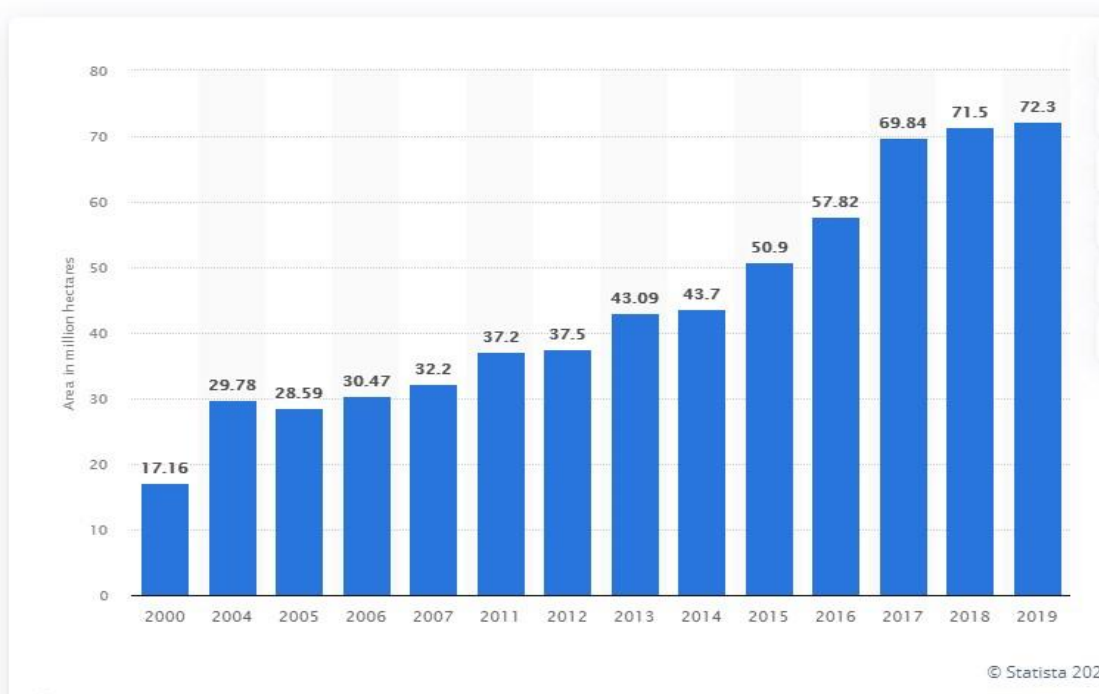


Figure 1. Organic farming area worldwide 2000-2019 (in million hectares) (Source: [www.statista.com](http://www.statista.com) 2021)

Humankind has only lately come to realize the multiple advantages of organic farming, which range from ecosystem services (Hahn et al., 2018) to the production of healthier foods (Mie et al., 2017). Organic farming is not only better for the environment than conventional farming, but it also produces equivalent yields of both products and earnings as Badgley and Perfecto (2007) and Deka and Goswami (2020) found that organic farming is profitable and a viable option in the long-term. OF advantages include environmental conservation and improved adaptability to environmental conditions, increased farm income and lower external input costs, improved social capability, and increased employment prospects (Jouzi et al., 2017). Organic farming has an immense potential to repair depleted soils, avoid land contamination, and even tackle greenhouse-effect concerns without sacrificing production. As Binta and Bruno (2015) concluded that the reduction in carbon emissions in OF compared with conventional farming shows organic systems are more successful at reducing climate change. According to Fess and Benedito (2018) chemical or synthetic fertilizers, pesticides and herbicides are prohibited in organic farming since it relies entirely on bio-fertilizers, natural pathogens, and pest control, and thereby benefits the sick planet.

Researchers have pointed out the negative aspects of organic farming as well, for example, the study conducted by Tuomisto et al., (2012) indicated that organic agricultural approaches have typically positive environmental consequences per unit of the area; however, the scenario is reversed per product unit. Patil S. et al., (2014) pointed out that the benefits of organic farming are often site-dependent, and if livestock density and manure production are insufficient, OF may lead to soil mineral and nutrient exhaustion and decreased yields. Many other researchers (van Bueren et al., 2011; Aune, 2012; Ponisio et al., 2015) have also stated that yields in organic farming are lower as compared to conventional agriculture. Furthermore, Ramakrishnan et al., (2021) stated that if proper organic farming is not followed, biodiversity, food safety, and human health are jeopardized.

The purpose of the present study is to review and understand the work done so far on sustainability pillars in OF. Since, organic farming promises a future wherein food and other farm products are produced and distributed in a healthy, ecologically responsible, genuinely sustainable, and egalitarian manner. According to Padel (2001) the overarching goal of organic farming is to ensure sustainable production in order to increase, or at the very least preserve, agricultural output.

In the agro sector, the sustainability dimensions have been studied around the world for a decade or so. Here the conceptual frame of sustainability is the same since sustainable organic farming also addresses three critical pillars: economic, environmental, and social (Robert et al., 2005; Kuhlman and Farrington, 2010). The economic pillar refers to the coherence of the economy and its efficiency and dynamics. The environmental pillar is concerned with environmental stewardship, natural dynamics, and resource management. The social pillar addresses issues of social equality, solidarity, social bonds, and shared culture. This is in line with research done by Dhar et al., (2020) wherein they proposed that the sustainability of organic production is from the standpoint of economic feasibility, environmental protection, and social equity. Thus, organic farming strictly adheres to sustainable agricultural productivity in its existing context (Smith and Lampkin 2019) and continuously catalyzes efforts to increase the agro-food system's sustainability (Muller et al., 2017; Jouzi et al., 2017).

## METHODOLOGY

The data for the article was gathered from secondary literature sources about sustainable organic farming. To conduct this research, pre-defined keywords such as "organic farming," "sustainability and organic farming," and "sustainability pillars and organic farming" were searched in various bibliographic databases such as *Science Direct*, *Google Scholar*, and

*MDPI (Multidisciplinary Digital Publishing Institute)* for articles published in the last ten years (2010–2021). A substantial number of possibly relevant publications (<300) were found, including papers, reports, and other material. Research on related topics such as the green agro-economy, sustainable industrial practices, and so on was omitted. Unpublished manuscripts were also removed. Shortlisting was carried out after thorough consideration and selection. Only peer-reviewed English-language journal publications were examined.

Studies with duplicate entries or basic missing data were eliminated. Because of the expanding market and popularity of organic farming, as well as the significance of sustainable practices in the agricultural sector in enhancing the economic, environmental, and social setup throughout this period, publications from the recent decade (2010–2021) were included.

Unless the title and/or abstract were judged to be relevant to the topic of interest or general approach, the manuscripts were eliminated. All of the research studies that were chosen had to assess whether or not organic farming has any relationship with sustainability. In addition, other research was manually included by examining the references of the articles assessed using the previous procedure. Not all of the publications analyzed were relevant for the study based on the topic and quality screen. This investigation contained 80 research papers out of 302 possible publications. Except for a few reviews, conceptual and case studies, the majority of the research publications were empirical (quantitative and qualitative).

Except for a few papers, which were based on secondary data, the majority of the publications evaluated used original data. The majority of primary data was acquired by survey, whether face-to-face or online, questionnaire, and interview. In some study publications, focus groups were utilized. Regression (linear, logistic, and hierarchical) and structural equation modelling (SEM) were the most used data analysis approaches. The research publications were from both high-income economies as well as emerging economies.

The data and review was presented firstly in the general conceptual frame of organic farming vis-à-vis sustainability followed by specific to Economic sustainability, Environmental sustainability, and Social Sustainability. In the end, an overview of research work regarding organic farming and sustainability pillars was tabulated and major findings of the papers were presented according to economic, environmental, and social pillars.

## ORGANIC FARMING VIS-À-VIS SUSTAINABILITY

Sustainability has not only been a buzzword in academia and research, but also an issue of many development strategies and policy frameworks and to accomplish the optimum for the present without jeopardizing resources for future generations (Sullivan et al., 2003). Tracing the evolution of sustainability, the Brundtland Commission Report of 1987 was the first to provide the notion of sustainability as a policy concept (Kuhlman and Farrington, 2010), with its three intersecting and ranked hierarchically pillars (economic, environmental, and social). Later triple bottom line model of sustainability by Elkington (1997) was drawn and included people, the planet, and profit into its ambit. The growing concern for the planet and human health is forcing the people to inculcate a 360° approach of sustainability at each step and every sector. When it became clear that the green revolution would not be the ideal method to address the issues of food insecurity, resource depletion, and regional imbalance of benefits, the notion of sustainability gained popularity in the farming sector (Singh and Maharjan, 2017). Organic farming is regarded as a significant and comprehensive toolset to meet the growing challenge of sustainability (IFOAM, 2010). Singh and Maharjan (2017) defined a farming system's sustainability as the phenomenon of stabilizing the quality and quantity of farm produce throughout time without jeopardizing the ecosystem equilibrium on which plants and animals rely for productivity. According to Rahmann et al., (2016) rural empowerment, eco functional intensification, and the development of agro produce for health and well-being are three prime aspects of sustainable organic farming. Daniel (2020) indicated that OF is a sustainable and adaptable farming system in terms of climate change mitigation, and it is in accordance with the United Nations' Sustainable Development Goals (SDGs) adopted in 2015. Two of the seventeen SDGs are particularly relevant to Organic strategies: Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture and Goal 12: Ensure sustainable consumption and production patterns.

Sustainability is commonly viewed in terms of its economic, environmental, and social dimensions. Organic farming supporters emphasize the system's sustainability, particularly because it improves organic matter related to soil quality (Leifeld, 2012); aims for environmentally friendly production (Seufert et al., 2012), and also improves the sustainability of production systems (Aghasafari et al., 2020). Various other researchers like (Badgley and Perfecto, 2007; Azadi et al., 2011; Schoonbeek et al., 2013; Seufert et al., 2012) have indicated that organic farming is an environmentally friendly and ecologically sound agro system. Purushothaman et al., (2011) carried out a study in Karnataka, India, and concluded that farmers and local experts believe that organic farming can improve the

economic, environmental, and social sustainability of their farms. This further supports the study conducted by Tilman et al., (2011) in the USA wherein they indicated that organic farming, particularly in emerging economies, can contribute to profound socio-economic upheaval and sustainable development. As per the study of Ferella et al., (2019) sustainable organic farming is the result of integrating environmental protection and economic opportunity. The ecological or environmental benefits of sustainable organic farming can be manifold, first and foremost, recycled organic waste increases composted organic matter of soil (Ulm et al., 2019); secondly, increasing organic farmer's responsible conduct and sustainable behavior helps to reduce harmful pollution and contamination, which ultimately has tangible benefits for human health and well-being (Yanakittkul and Aungvaravong, 2017). Choi (2016) establishes organic farming as a realistic solution for agricultural sustainability since it reduces agrochemical substances and wastes which are one of the biggest challenges for sustainability. Apart from being environmentally beneficial, organic farming is economically viable as it has the ability to boost net returns while decreasing crop failure risks in comparison to conventional farming (Patil S. et al., 2014). Kisaka-Lwayo and Obi (2014) establish the practice of organic farming as a means of achieving long-term sustainable development and increased food security. Similarly, Luh et al., (2020) conducted an empirical study on farmers in Taiwan and concluded that the ultimate purpose of organic farming development is to enhance agricultural sustainability. Mhlophe (2016) also views organic food products as more sustainable alternatives to conventional ones. Thus, organic farming is considered a catalyst for sustainable growth because it contributes to environmental stewardship. Also, Azadi et al., (2011) found that fostering organic agriculture, in particular, has immense potential to improve farmers' livelihoods and lead to long-term development sustainably.

The growing population is directly related to the food and resources demanded. The task of feeding a burgeoning population, which is anticipated to reach 9 to 10 billion people by 2050, while also conserving the environment is formidable. Adopting truly sustainable agricultural techniques on a large scale is the greatest way to solve this big challenge while also ensuring future food and ecosystem security and sustainability (Reganold and Wachter, 2016). Sustainable organic farming can and must contribute significantly in resolving various food production challenges. The limited number of external inputs, along with sustainability skills, reduces environmental deterioration and can assist in sustainably feeding the rising population while minimizing environmental damage. Furthermore, sustainability is acknowledged as an essential component in ensuring an agro-production system's social, ecological, and economic viability. According to Columbian academics Quintero-Angel and



Gonzalez-Acevedo (2018) who researched agricultural sustainability assessment, the development and maintenance of sustainability necessitates the application of extensive evaluation and analytical methods that are appropriate for the task. Since, Perez (2007) had already indicated that comprehensive sustainability techniques that take into account the system's ecological, economic, and social characteristics provide relevant data on the current condition of agricultural ecosystem interventions.

So it can be concluded that organic farming is in tune with the pillars of sustainability. This view is further supported by Ahlem and Hammas (2017) who pointed out that organic farming contributes to ongoing sustainability in three ways: for society (health benefits, job creation), the environment (lowering methane emissions, enhancing water resources), and the economy (improving financial condition).

Organic farming and its aims following the pillars of sustainability can be best illustrated as in Fig.2.

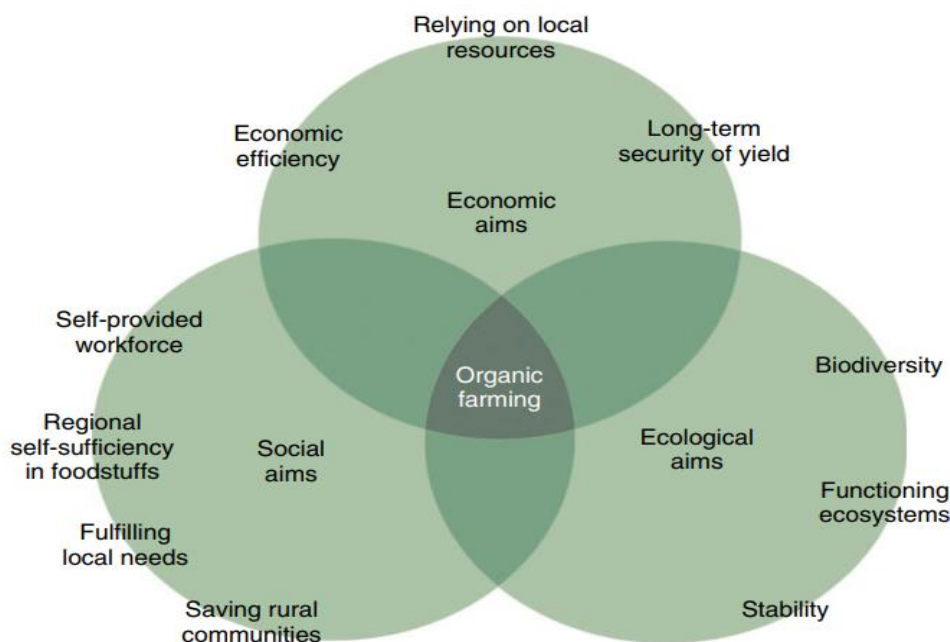


Figure 2. (The importance of Sustainable OF). Adapted from Altieri MA (1994) Biodiversity and Pest Management in Agroecosystems. New York: Haworth Press.

### ECONOMIC SUSTAINABILITY

An agricultural system is deemed economically viable if expected revenues and returns are sufficient enough to support livelihoods and associated risks are minimal (Sattler et al., 2010). In the agro sector, economic sustainability cannot simply mean traditional profit out of farming practices. The farming system can survive in the future as it contributes to the

overall economic health of support networks and communities involved in farming practices. There is a need to continuously motivate and encourage farmers to embrace and practice organic farming to assist them to attain economic sustainability (better revenues).

Organic farming is found to be economically viable from a long-term perspective (Deka and Goswami, 2020). Delbridge et al., (2011) pointed that in terms of profit gain, organic farming is economically sustainable. The economic pillar of sustainability is always associated with risks as Delbridge et al., (2011) indicated these long-term risks are introduced into the agro-system by variations in agricultural output, cost of production, and commodity prices. Valuable research has been conducted on the economic sustainability of organic agricultural systems in various sizes using economic indices. Like Asadollahpour et al., (2016), investigated the scale economies and the production structure of rapeseed in Iran and indicated that farm size is inversely proportional to the production costs. Halberg and Muller (2013) indicated that OF production is cost-effective.

Few studies highlight the role of external factors and stakeholders as prominent in the economic dimension of organic farming e.g. Sgroi et al., (2015) found that the higher profitability of organic olive in the Mediterranean region is the result of subsidy and suitable economic policy in that region. Similarly, Luh et al., (2020) stated that farmers' perceptions of the economic consequences of organic farming are based on their responses to questions about the cost, returns, government subsidies, and financial support. Some scholars also contend that small agricultural areas under sustainable organic farming are more productive than large agro areas as a result of family members' work on small farms (Shahraki et al., 2008). Researchers like De-Cock, 2005; Lapple and Kelley, 2013; Luh et al., 2020, considered organic farming's economic effects, such as support payments, greater price premiums, and profit margins, as motivation or behavioral variables. Likewise, Halberg and Muller (2013) ascertained that organic farming can improve food access for small-scale farmers by gradually increasing yield and revenue on their small-holdings resulting in greater purchasing power. Similarly, Pařšová et al., (2014) stated that the state's support for farmers' choices to switch from traditional to organic farming is unquestionably motivating. Enhanced sales cum market for organic goods, better counseling structure, and endorsement are all examples of this assistance. Therefore, the motivation of higher returns and increase in purchasing power of farmers and institutional support plays a prominent role in the bloom of the organic farming sector.

Organic farming can only assist long-term and sustainable agricultural development if farmers find it lucrative. A recent meta-analysis (Crowder and Reganold, 2015) examined this problem and included studies from 14 different nations, with the findings indicating that

organic farming is, on average, 25–35 percent more commercially viable than conventional agriculture. According to Amiri et al., (2019), the economic sustainability of farming systems can be improved by including tiny amounts of revenue into the total production system. The economic pillar of sustainable organic farming is an indispensable part of the environment pillar and is associated with its ecological impact and both are interrelated and framed together.

#### ENVIRONMENTAL SUSTAINABILITY

The concept of the environmental sustainability is central in the sustainability discourse (Sala, 2020). Today, there is a continuing discussion over environmental sustainability in all production systems, and organic farming is not immune. Environmentally sustainable agriculture as a concept can be defined as "environmentally friendly farming systems that allow for efficient crop or livestock production while sustaining the natural environment." (United Nations, 2006; SAI Platform, 2018). In this specific context, organic farming is one of the options for moving towards a more sustainable farming system, as organic agriculture defined by the United Nations is a "holistic production management whose primary goal is to optimize the health and productivity of interdependent communities of soil life, plants, animals, and people." (United Nations, 2006).

Brown and Ulgiati (1997) pointed out that the environmental sustainability index (ESI) is a tool that highlights the environmental bottom line by indicating whether it is possible to develop a method that works successfully while putting very little strain on the environment and ecology while retaining a satisfactory yield. Several research studies have highlighted the environmental pillar of sustainable organic farming. According to (Badgley and Perfecto, 2007; Reganold and Wachter, 2016) organic farming has enormous potential to feed the growing population in an environmentally responsible manner. Hahn et al., (2018) state that sustainable organic farming reduces the environmental impact of humans by tackling environmental issues like soil degradation, ecological imbalance, climate variability, and resource depletion. Thus, according to Azadi et al., (2011) OF can better handle significant food security risks such as soil degradation, climate change, and pest concerns. And according to Sattler et al., (2010), an environmentally sustainable farming system can be maintained throughout time without diminishing natural resources. Leifeld (2012), pointed out that in its actual sense, organic farming is environmentally friendly since it does not utilize chemical mineral fertilizers or pesticides. Amiri et al., (2019) carried out a study in Iran and proposed that scientific methods for holistic environmental management, notably the enhancement of soil organic matter and the mitigation of its degradation, can increase the ecological sustainability of the commercial rapeseed production system. As per Cisilino et al., (2019)

organic farms have a less environmental impact on the land because they use fewer pesticides and fertilizers, and they promote biodiversity by increasing crop rotation.

Furthermore, in recent decades, agriculture-based researchers and managers have focused on cleaner production and have introduced environmental protection as the foundation for future production and higher sustainability, owing to increased pro-environment awareness and demand for environmentally acceptable methods of production (Khoshnevisan et al., 2015). Literary sources based on comparative analysis of organic farming and conventional farming have also found that OF is eco-friendly. Boone et al., (2019) used the comprehensive environmental assessment instrument 'life cycle assessment' to compare the environmental effect and productivity of conventional and organic farming methods, and concluded that the environmental and ecological benefits of organic farming outweigh its low yield when compared to conventional farming.

#### SOCIAL SUSTAINABILITY

Substantial research has been done in the past few years in the economic and environmental dimensions of sustainability. However, very less focused literature is available concerning the social dimension of sustainability (Mani et al., 2016). According to von Wirén-Lehr, (2001) social viability, which is linked to the social network and capital, is a crucial component of social sustainability that is rarely addressed. In addendum, literature about social sustainability is chiefly based on a specific research contextual frame, thus reducing the achievement of a well-versed, comprehensive foundation for social sustainability (Weingaertner et al., 2014). The social dimension of organic farming is represented through measures relating to the farmer's overall well-being, inclusivity of gender equity and empowerment, domestic labor supply, and cultural connections (Pretty et al., 2011). Similarly, Mutyasira et al., (2018) highlighted household wealth, involvement in farmer groups, gender role, and family workforce as markers for analyzing the social sustainability of organic farming. Calker et al., (2008) classified social sustainability into two categories: i) internal or physical health, which deals with the farm operator's and employees' qualitative and quantitative working conditions, and ii) external or societal sustainability, which deals with sociocultural concerns regarding agriculture's influence on humans and animals' well-being. Likewise, Lebacqz et al., (2013) stated in case an organic farmer is dealing with animal husbandry or cattle-rearing social sustainability encompasses both animal and farmer welfare. Traldi (2021) undertook a thorough evaluation of the data for agricultural sustainability standards and determined that the most prominent themes in social sustainability are a) perception and satisfaction with technical support, cooperatives, and economic health; b)

social networks such as participation in agrarian associations; c) food and nutrition security, including the degree of nutrient and energy shortfalls, and d) gender, including resource control, assets, and decision-making within the household, as well as taking part in agriculture. Shreck et al., (2005) conducted an exploratory study to better illustrate the link between social sustainability and organic farming by focusing on issues influencing farmworkers' contribution and labor activity, and they proposed that incorporating ethical values and social standards in employment norms of organic farming are critical for sustainability.

Research studies carried out on the social pillar of organic farming practices are stressing development and improving the quality of life. Torres et al., (2016) stated that through the social sustainability prism, organic farming results in a notable improvement in employment and a gradual decrease in gender parity at the farm level. In the same fashion Elzakker and Eyhorn (2010) concluded that organic farming is a labor-intensive technique that can enhance rural employment prospects and enable farmers to afford better healthcare and education due to greater incomes generated by organic farming practices. De Los Ros et al., (2015) determined that organic farming production practices boost rural prosperity by providing a good standard of living to the agricultural community and protecting its generational takeover ability. According to Palová et al., (2014) organic farming delivers value in terms of boosting life quality and development. OF also promotes women empowerment and social stability as Altenbuchner et al., (2017) correctly stated that special efforts on 'knowledge delivery,' such as professional knowledge about organic agriculture and working outside of conventional social structures, are vital to enable women empowerment, bridge gender disparities, and boost social sustainability. In the same fashion Dhar et al., (2020) recommended that organic farmers should follow good management practices to ensure reduced risk factors like a disease outbreak, soil degradation, and biodiversity loss.

Furthermore, co-learning farmers' greater understanding of their farm system allows them to improve future farm management and respond to threats, which helps social sustainability (Marinus et al., 2020). Therefore, the addition of the social dimension enables the improvement of sustainable production methods without neglecting the well-being and demands of farmers in order to make a fair return and earn a better living.

AN OVERVIEW OF RESEARCH WORK REGARDING ORGANIC FARMING AND SUSTAINABILITY  
PILLARS.

Pillar	Author (Year)	Country	Methodology	Major Findings
Economic Sustainability	Deka and Goswami (2020).	India	Case study (Qualitative)	Organic farming is found to be economically viable in a long-term perspective hence enhancing economic sustainability.
	Aghasaf ari et al., (2020)	Iran	Empirical (a hybrid SWOT-fuzzy ANP)	Organic farming contributes to sustainable agricultural development and the long-term viability of food systems.
	Amiri et al., (2019).	Iran	Empirical (Quantitative & Qualitative)	Farming systems' economic sustainability can be reinforced by incorporating small amounts of revenue into the overall production system and enhancing farmers' technical abilities.
	Mutyasira et al., (2018)	Ethiopia	Empirical (Quantitative & Qualitative)	Farm size, market access, off-farm income, agricultural loans, and agricultural extension and demonstration plots are all important factors in agricultural sustainability.
	Jouzi et al., (2017)		Review	Organic farming's economic sustainability focuses on improving farmer revenue and lowering external input costs.
	Delbridge et al., (2011)	U.S.A	Empirical (Quantitative)	In terms of profit gain, organic farming is economically viable.
	Sattler et al., (2010)	Germany	Empirical (Quantitative & Qualitative)	If net returns are high enough to support livelihoods and uncertainties are low enough, a farming system can be deemed economically viable.

Environmental Sustainability	Ulm et al., (2019)	Portugal	Empirical (Quantitative & Qualitative)	The recycled organic waste increases organic soil matter and eventually higher nutrient concentrations without accumulating heavy metals.
	Boone et al., (2019)	Belgium	Empirical	The environmental and ecological benefits of organic farming outweigh its low yield compared to conventional farming.
	Cisilino, et al., (2019)	Italy	Empirical (Qualitative)	Organic farms use fewer pesticides and fertilizers, putting less pressure on the soil, and diversified crop rotation improves biodiversity.
	Jouzi et al., (2017)		Review	Organic farming's environmental sustainability focuses on environmental conservation and increased resistance to environmental change.
	Choi (2016)	Korea	Empirical (Quantitative)	A transition to organic farming is a system-building process in which agro-innovations are developed on the one hand and farmers embrace and use them instead of agrochemical substances for sustainability.
	Sattler et al., (2010)	Germany	Empirical (Quantitative & Qualitative)	An agricultural system can be ecologically responsible if it can be maintained throughout time without diminishing natural resources.
Social Sustainability	Dhar et al., (2020)	Bangladesh	Empirical (Quantitative & Qualitative)	Organic farmers should use sound management methods to reduce disease outbreaks and soil degradation in order to ensure the social sustainability of organic production.
	Jouzi et al., (2017).		Review	Organic farming's social sustainability focuses on social capacity and improving employment opportunities.
	Altenbuchner et al., (2017)	India	Qualitative Field Study	Special efforts on 'knowledge delivery,' like technical expertise and professional training on organic farming practices and working beyond traditional social institutions, are necessary to empower women, overcome gender disparities, and improve social sustainability.

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Torres et al., (2016)	Spain	Empirical (Quantitative & Qualitative)	Organic farming, from the standpoint of social sustainability, leads to a significant increase in employment and a progressive drop in gender parity at the farm level.
De Los Ríos et al., (2015)	Spain	Empirical (Quantitative & Qualitative)	Organic farming production practices boost rural wealth by providing a high quality of life to the farming community and protecting its generational takeover ability.
Pašová et al., (2014)	Slovak Republic	Empirical (Quantitative & Qualitative)	Organic farming, as a sustainable agriculture approach, contributes in terms of increasing people's standard of living and development.

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#### APPLICABILITY AND FUTURE RESEARCH DIRECTIONS

The review's applicability is that it attempts to explain the sustainability scenarios of organic farming as indicated by literary sources and previous studies. The study provides insights into the use of organic farming techniques for economic, environmental, and social objectives. It also offers a comprehensive approach to improving the overall social and economic well-being of those involved, while keeping an eye on the ecological balance. Furthermore, the study also tries to enlighten policymakers and government organizations to create a road plan for realizing the huge, untapped development potential of sustainable organic farming through a three-pillar sustainability methodology. This will result in a substantial payoff to organic farmers in improved economic viability, social well-being, and health concerns in the current Covid-19 scenario. The future research directions are:

In this paper, the work published between 2010 and 2021 was primarily taken into account, the researcher can include time frames before that as well.

This study primarily focused on three pillars of sustainability, the researcher can take other dimensions (human, wellbeing, welfare, and culture) as well.

The social dimension of Organic Farming needs to be inculcated in the research discourse.

#### CONCLUSION

This study enables a comprehensive examination of sustainable organic farming practices, taking into account the economic, environmental, and social pillars of sustainability. Considering the scale of current sustainability demand, it is more necessary than ever to comprehend the state of research on these pillars in organic farming and consequent



initiatives for local communities and ecosystems. This review articulates the important pillars of sustainability vis-à-vis organic farming for evaluation of current research developments and pays a way in moving forward. Organic farming has experienced considerable growth in recent years. Organic farming, formerly a niche activity, has grown into a well-established production and livelihood activity, requiring major financial and human resources. Statistics as of 2018 show that organic farming is currently being practiced in 186 countries around the world on 1.5% of agricultural land and is continuously growing.

From the study, it is evident that organic farming is a farming perspective that has a favorable impact on environmental and ecological setup simultaneously addressing varied economic and social aspects as well. As far as economic benefits are considered, OF is a cost-effective, entrepreneurial activity and there is improved income for organic farmers. Ecologically OF is environmentally friendly as it enhances organic matter related to soil quality and discards the use of chemical fertilizers or pesticides it also improves the sustainability of production systems. From the lens of a social prism OF contributes to profound socio-economic upheaval by improvement in employment and gender equality.

Sustainable OF initiatives can contribute to more than one area of agriculture's sustainable growth, increasing the adaptability and applicability of organic farming practices. OF adds value through boosting one's quality of life and also acting as a medium of sustainable development of the agro system by focusing on the protection of all elements of the setting. When analyzing the research it is evident that the ecological and economic dimensions of organic farming are the most frequently analyzed, with fewer studies analyzing economic, social, and environmental indicators concurrently. The social dimension is very less researched and there is a need to inculcate in the research discourse.

#### DECLARATIONS

*Conflicts of interest/Competing interests:* The authors declare that they have no conflicts of interest/competing interests.

*Authors' contributions:* All authors contributed equally to this study and write/revise the manuscript. All authors read and approved the final manuscript.

#### REFERENCES

Aghasafari H, Karbasi A, & Mohammadi H, Calisti R (2020) Determination of the best strategies for development of organic farming: A SWOT-Fuzzy Analytic Network Process approach. *Journal of Cleaner Production*. 277.

- Ahlem Z, Hammam MA. Organic Farming: A Path of Sustainable Development. *Int. JI of Eco and Mgt Sc.* 2017;6:456-457
- Altenbuchner C, Vogel S, Larcher M (2017) Effects of organic farming on the empowerment of women: A case study on the perception of female farmers in Odisha, India, *Women's Studies International Forum.* 64:28-33,
- Altieri M., Nicholls C. (2018) *Biodiversity and Pest Management in Agroecosystems.* 3<sup>rd</sup> ed.; The Haworth Press, Binghamton, New York USA
- Amiri Z, Asgharipour MR, Campbell DE, Armin M (2019) A sustainability analysis of two rapeseed farming ecosystems in Khorramabad, Iran, based on energy and economic analyses. *Journal of Cleaner Production.* 226:1051-1066.
- Area of organic farming worldwide 2000-2019.  
<https://www.statista.com/statistics/268763/organic-farming-area-worldwide-since-2000/> Accessed 07 May 2021
- Asadollahpour F, Yazdani S, Roustani A, Nekofar F (2016) Study of production structure and efficiency on rapeseed production scale in Iran. *J. Agric. Devel. Econ.* 47:23-33 (in Persian).(CrossRef)
- Aune JB. (2012) Conventional, Organic and Conservation Agriculture: Production and Environmental Impact. In: Lichtfouse E. editor. *Agroecology and Strategies for Climate Change.* Springer, Dordrecht, pp. 149-165
- Azadi H, Schoonbeek S, Mahmoudi H, Derudder B & De Maeyer P, Witloxa F (2011). Organic agriculture and sustainable food production system: Main potentials. *Agri. Ecos. & Env.* 2011
- Badgley C, Perfecto I (2007) Can organic agriculture feed the world? *Renewable Agriculture and Food Systems.* 22(2):80-86.
- Binta BA, Bruno B (2015) Economic and Environmental Performances of Organic Farming System Compared to Conventional Farming System: A Case Study of the Horticulture Sector in the Niayes Region of Senegal. *Pro. Env. Sc.;*29:17-19.
- Boone L, Roldán-Ruiz I, Linden VV, Muylle H, Dewulf J (2019) Environmental sustainability of conventional and organic farming: Accounting for ecosystem services in life cycle assessment. *Sc. of The Total Env.* 695
- Brown MT, Ulgiati S (1997) Emergy-based indices and ratios to evaluate sustainability: monitoring economies and technology toward environmentally sound innovation. *Ecological Engineering.* 9(1-2):51-69.

- Calker KJ, Berentsen PBM, Giesen GWJ, Huirne RBM (2008), Maximising sustainability of Dutch dairy farming systems for different stakeholders: A modelling approach, *Ecol. Eco.* 65(2):407-419.
- Choi H. (2016) A typology of agro-innovation adoptions: the case of organic farming in Korea. *Reg Environ Change* 16:1847–1857
- Cisilino F, Bodini A, Zanolli A. (2019) Rural development programs' impact on environment: An ex-post evaluation of organic farming. *Land Use Policy.* 85:454-462.
- Crowder DW, Reganold JP. (2015) Financial competitiveness of organic agriculture on a global scale. *PNAS* 2015;112:7611–16
- Daniel EC (2020) Towards Sustainable Organic Farming Systems. *Sustainability* 12:3119.
- De Cock L (2005) Determinants of organic farming conversion. In: 6th International Congress of the EAAE.
- De los Ríos I, Rivera M, García C.(2016)Redefining rural prosperity through social learning in the cooperative sector: 25 years of experience from organic agriculture in Spain. *Land Use Policy.* 54:85-94
- Deka N, Goswami K (2021) Economic sustainability of organic cultivation of Assam tea produced by small-scale growers, *Sustainable Production and Consumption.* 26:111-125.
- Delbridge TA, Coulter JA, King RP, Sheaffer CC, Wyse DL (2011) Economic performance of long-term organic and conventional cropping systems in Minnesota. *Agronomy Journal* 103:1372-1382.
- Dhar AR, TajUddin M, Roy MK. (2020) Assessment of organic shrimp farming sustainability from economic and environmental viewpoints in Bangladesh. *Envl. Re.* 180.
- Elkington, J. (1997) *Cannibals with Forks: the TBL of the 21st century Business.* Oxford, Capstone. Global Reporting Initiative.
- Ferella F, Cucchiella F, D'Adamo I, Gallucci K (2019) A techno-economic assessment of biogas upgrading in a developed market. *Journal of Cleaner Production.* 210:945–957
- Fess TL, Benedito VA. (2018) Organic versus Conventional Cropping Sustainability: A Comparative System Analysis. *Sustainability.* 10(1):272.
- Hahn R, Spieth P, Ince I (2018) Business model design in sustainable entrepreneurship: Illuminating the commercial logic of hybrid businesses. *Journal of Cleaner Production.* 176:439-451.
- Halberg N, Muller A. (2013) *Organic agriculture, livelihoods and development.* Earthscan London.

- Heckman, J. (2006). A history of organic farming: Transitions from Sir Albert Howard's War in the Soil to USDA National Organic Program. *Renewable Agriculture and Food Systems*, 21(3) :143-150.
- Helga Willer, Bernhard Schlatter, Jan Trávníček, Laura Kemper and Julia Lernoud (Eds.) FiBL and IFOAM, 2020. *The World of Organic Agriculture 2020. Statistics and Emerging Trends*, FiBL, IFOAM: Switzerland. pp. 21–22.
- IFOAM (International Federation of Organic Agriculture Movements). Principles of organic agriculture. <https://www.ifoam.bio/why-organic/shaping-agriculture/four-principles-organic>. Accessed 25 Mar 2021
- Jouzi Z, Azadi H et al. (2017) Organic Farming and Small-Scale Farmers: Main Opportunities and Challenges *Ecological Economics*. 132:144-154.
- Khoshnevisan B, Bolandnazar E, Shamshirband S, Motamed H, Badrul N, Mat L, Kiah, MLM (2015) Decreasing environmental impacts of cropping systems using life cycle assessment (LCA) and multi-objective genetic algorithm. *Journal of Cleaner Production*. 86:67-77.
- Kisaka-Lwayo M, Obi A, (2014) Analysis of Production and Consumption of Organic Products in South Africa. In: *Organic Agriculture towards Sustainability*. Intech. pp. 25-50.
- Kuhlman, T., Farrington, J.( 2010) What is sustainability? *Sustainability*. 2:3436–3448.
- Lapple, D, Kelley H (2013) Understanding the uptake of organic farming: accounting for heterogeneities among Irish farmers. *Ecological Economics*. 88:11-19.
- Lebacqz T, Baret PV, Stilmant D (2013) Sustainability indicators for livestock farming. A review. *Agronomy for Sus. Dev.* 33:311–327.
- Leifeld J (2012) How sustainable is organic farming? *Agri., Ecos & Env.*150:121-122.
- Luh YH, Tsai MH, Fang CL (2020) Do first-movers in the organic market stand to gain? Implications for promoting cleaner production alternatives. *Journal of Cleaner Production*. 262
- Mani V, Agarwal R, Gunasekaran A, Papadopoulos T, Dubey R, Childe S (2016) Social sustainability in the supply chain: Construct development and measurement validation. *Ecological Indicators* 71:270–279
- Marinus W, Descheemaeker KKE, van de Ven GWJ, Waswa W, Mukalama J, Vanlauwe B, Giller KE (2021) "That is my farm" – An integrated co-learning approach for whole-farm sustainable intensification in smallholder farming. *Agri. Sys.*188. ,
- Mie, A., Andersen, H.R., Gunnarsson, S. et al. (2017). Human health implications of organic food and organic agriculture: a comprehensive review. *Environ Health* 16, 111

- Mhlophe B (2016) Consumer purchase intentions towards organic food: insight from South Africa. *BSSJ* 1(1):1-32.
- Muller A, Schader C, Scialabba NE, Brüggemann J, Isensee A, Erb K., Smith P, Klocke P, Leiber F, Stolze M, Niggli U, (2017). Strategies for feeding the world more sustainably with organic agriculture. *Nat. Comm.* 8(1):1-13.
- Mutyasira V, Hoag D, Pendell D, Manning DT, Berhe M (2018) Assessing the relative sustainability of smallholder farming systems in Ethiopian highlands, *Agricultural Systems.* 167:83-91.
- Padel, S. (2001) Conversion to organic farming: a typical example of the diffusion of an innovation? *Sociologia Ruralis.* 41:40–61.
- Paľšová L, Schwarczová L, Schwarcz P, Bandlerová A (2014) The Support of Implementation of Organic Farming in the Slovak Republic in the Context of Sustainable Development, *Procedia - Social and Behavioral Sciences.* 110:520-529.
- Patil S, Reidsma P, Shah P, Purushothaman S, Wolf J (2014) Comparing conventional and organic agriculture in Karnataka, India: Where and when can organic farming be sustainable? *Land Use Policy.* 37:40-51.
- Paull J (2010) From France to the world: The International Federation of Organic Agriculture Movements (IFOAM's) *Journal of Social Research and Policy* 1(2)
- Perez, M.A.P. (2007) International trade and environment in Colombia: view from the ecological economy. *Programa Editorial Universidad del Valle.*
- Platform, S.A.I., 2021. Farm sustainability assessment. Sustainable Agriculture Initiative Platform. <https://saiplatform.org/fsa/> Accessed on 25 Mar 2021
- Ponisio LC, M'Gonigle LK, Mace KC, Palomino J, de Valpine P, Kremen C (2015) Diversification practices reduce organic to conventional yield gap. *Pro of the Ro So. B.* 282:20141396.
- Pretty J, Toulmin C, Williams S. (2011) Sustainable intensification in African agriculture. *Int. Journal of Agrl. Sust.* 9:5-24.
- Purushothaman S, Kashyap S. (2010) Trends in land use and crop acreages in Karnataka and their repercussions. *Karnataka Journal of Agricultural Sciences* 23(2):330–333.
- Quintero-Angel M, Gonzalez-Acevedo A. (2018) Tendencies and challenges for the assessment of agricultural sustainability. *Agri, Ecos. & Env.* 254:273-281.
- Rahmann G, Ardakani R, M., Bàrberi P. et al. (2017) Organic Agriculture 3.0 is innovation with research. *Org. Agr.* 7;169–197
- Ramakrishnan B, Maddela NR, Venkateswarlu K, Megharaj M (2021) Organic farming: Does it contribute to contaminant-free produce and ensure food safety? *Sc. of The To. Env.* 769

- Reganold JP, Wachter JM (2016) Organic agriculture in the twenty-first century. *Nature Plants*. 2:15221.
- Robert KW, Parris TM., Leiserowitz AA (2005) What is Sustainable Development? Goals, Indicators, Values, and Practice, *Environment: Science and Policy for Sustainable Development*. 47:3, 8-21,
- Sala S (2020). Triple bottom line, sustainability and sustainability assessment, an overview. Book: *Biofuels for a More Sustainable Future*.
- Sattler C, Nagel U, & Werner A, Zander P (2010) Integrated assessment of agricultural production practices to enhance sustainable development in agricultural landscapes. *Ecological Indicators*. 10(1):49-61
- Schoonbeek S, Azadi H, Mahmoudi H, Derudder B, De Maeyer P, Witlox F.(2013) Organic agriculture and undernourishment in developing countries: main potentials and challenges. *Crit Rev Food Sci Nutr*. 53(9):917-928.
- Seufert V, Ramankutty N, Foley JA (2012) Comparing the yields of organic and conventional agriculture. *Nature* 485(7397):229–232
- Sgroi F, Fodera M, Trapani AM, Tudsica S, Testa R (2015) Cost-benefit Analysis: a Comparison between Conventional and Organic Olive growing in Mediterranean area. *Eco. Eng.* 82:542–546.
- Shahraki DA., Kashani A, Mesgarbashi M, Nabipour M, KouhiDehkordi A (2008) The effect of plant densities and time of nitrogen application on some agronomic characteristic of rapeseed. *Appl. Field Crop. Res.* 79:10-17 (in Persian) (CrossRef)
- Sharma N, Singhvi R (2017) Effects of chemical fertilizers and pesticides on human health and environment: a review. *Int. J. of Agri, Env. & Biotech.* 10(6):675–679.
- Shreck A, Getz C, Feenstra G (2006) Social sustainability, farm labor, and organic agriculture: Findings from an exploratory analysis. *Agriculture and Human Values* 23:439–449.
- Siddique, S., Hamid, M., Tariq, A., & Kazi, A. G. (2014). *Organic Farming: The Return to Nature*. In book: *Improvement of Crops in the era of Climate Change, Vol 2* : 249–281, Springer Science, New York.
- Singh M, Maharjan KL. (2017) Organic Farming from Perspective of Three Pillars of Sustainability. In: *Sustainability of Organic Farming in Nepal*. Springer, Singapore. pp. 179-192
- Smith LG, Lampkin NH (2019) Greener farming: managing carbon and nitrogen cycles to reduce greenhouse gas emissions from agriculture. In: Letcher, T.M. editor. *Managing Global Warming*. Academic Press, United Kingdom, pp.553-577.

- Sullivan MG., Weerawardena J., Carnegie K (2003) Social entrepreneurship: towards conceptualisation. *Int. J. Nonprofit Voluntary Sect. Mark.* 8(1):76-88
- Tilman D, Balzer C, Hill J, Befort BL (2011) Global food demand and the sustainable intensification of agriculture. *Proc. Natl. Acad. Sci. USA.* 108(50):20260-20264
- Torres J, Valera DL, Belmonte LJ, Herrero-Sánchez C (2016) Economic and Social Sustainability through Organic Agriculture: Study of the Restructuring of the Citrus Sector in the “*Bajo Andarax*” District (Spain). *Sustainability.* 8(9):918.
- Traldi R (2021) Progress and pitfalls: A systematic review of the evidence for agricultural sustainability standards. *Ecological Indicators* 125.
- Tuomisto HL, Hodge ID, Riordan P, Macdonald DW (2012) Does organic farming reduce environmental impacts? – A meta-analysis of European research. *J. of Envntl. Mgt.* 112: 309-320.
- Ulm F, Avelar D, Hobson P, Penha-Lopes G, Dias, T., M aguas C, Cruz C, (2019). Sustainable urban agriculture using compost and an open-pollinated maize variety. *Journal of Cleaner Production.* 212:622–
- United Nations, 2006. Trade and environment review. New York and Geneva, United Nations [https://unctad.org/en/docs/ditcte200512\\_en.pdf](https://unctad.org/en/docs/ditcte200512_en.pdf)
- Van Bueren ET, Jones SS, Tamm L, Murphy KM, Myers JR, Leifert C, Messmer MM (2011) The need to breed crop varieties suitable for organic farming, using wheat, tomato and broccoli as examples: A review. *NJAS.* 58(3–4):193-205.
- Van Elzakker B, Eyhorn F. (2010) *The Organic Business Guide. Developing sustainable value chains with small-holders*, first ed. IFOAM, Switzerland.
- Von WL (2001) Sustainability in agriculture—an evaluation of principal goal oriented concepts to close the gap between theory and practice. *Agric. Ecosyst. Environ.* 84:115–129.
- Weingaertner C, Mober A (2014) Exploring social sustainability: Learning from perspectives on urban development and companies and products. *Sustainable Development* 22:122–133.
- Willer H, Schlatter B, Trávníček J, Kemper L, Lernoud J (2020). The world of organic agriculture. Statistics and emerging trends 2020. The world of organic agriculture. Statistics and emerging trends 2020. <http://www.fao.org/agroecology/database/detail/en/c/1262695> Accessed 04 Apr 2021.
- Yanakittkul P, Aungvaravong C. (2017) Proposed conceptual framework for studying the organic farmer behaviors. *Kasetsart. J. Soc. Sci.*

