

REVIEW / DERLEME

Sustainable Urban Food Production with a Special Focus on Permaculture from Hungarian Perspectives

Macar Perspektifinden Permakültüre Özel bir Odaklanma ile Sürdürülebilir Kentsel Gıda Üretimi

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ABSTRACT

In recent years, there has been a growing interest in sustainable agriculture and food production in Hungary as well. Moreover, as today's climate change significantly impacts agriculture, there is increased scrutiny of conventional agriculture, with various sustainable agriculture concepts emerging, such as climate-smart agriculture, regenerative or conservation agriculture, organic farming, permaculture, and agroforestry. This review article compares different sustainable agriculture approaches in terms of their definitions and principles based on the scientific literature, showing that urban spaces are also suitable for sustainable food production. This study aims to provide insights into the current state of environmentally sustainable agriculture in Hungary, focusing specifically on permaculture as an innovative practice that is gaining traction in the country. Permaculture represents one of the most advanced forms of sustainable farming and gardening in Hungary. It benefits from a well-developed institutional framework, as well as robust educational and training resources. Moreover, permaculture can be practiced in both rural and urban areas, making it suitable for expansion across all regions. Additionally, successful examples of sustainable agriculture in Hungary may inspire similar initiatives in other countries, thus promoting the broader adoption of climate-friendly and environmentally sustainable food production methods. The paper seeks to answer several key questions: How do Hungarian farmers define permaculture? What advantages does this farming method offer? And how can its adoption be encouraged more widely throughout the country? Hungary's experiences can serve as a valuable model for other nations aiming to foster environmentally sustainable and climate-friendly farming practices.

Keywords: Farming; Hungary; permaculture; sustainable agriculture.

ÖZ

Son yıllarda Macaristan'da da sürdürülebilir tarım ve gıda üretimine yönelik ilgi giderek artmaktadır. Ayrıca, günümüzde iklim değişikliği tarımı önemli ölçüde etkilediğinden, konvansiyonel tarıma yönelik incelemeler artmakta ve iklim-akıllı tarım, rejeneratif veya korumacı tarım, organik tarım, permakültür ve agroforestri gibi çeşitli sürdürülebilir tarım kavramları ortaya çıkmaktadır. Bu derleme makalesi, farklı sürdürülebilir tarım yaklaşımlarını tanımları ve ilkeleri açısından bilimsel literatüre dayanarak karşılaştırmakta ve kentsel alanların da sürdürülebilir gıda üretimi için uygun olduğunu göstermektedir. Bu çalışma, Macaristan'da çevresel açıdan sürdürülebilir tarımın mevcut durumu hakkında bilgi vermeyi amaçlamakta ve özellikle ülkede ilgi gören yenilikçi bir uygulama olarak permakültüre odaklanmaktadır. Permakültür, Macaristan'da sürdürülebilir tarım ve bahçeciliğin en gelişmiş biçimlerinden birini temsil etmektedir. İyi geliştirilmiş bir kurumsal çerçevenin yanı sıra sağlam eğitim ve öğretim kaynaklarından faydalanmaktadır. Dahası, permakültür hem kırsal hem de kentsel alanlarda uygulanabilir, bu da onu tüm bölgelere yayılmaya uygun hale getirir. Ayrıca, Macaristan'daki başarılı sürdürülebilir tarım örnekleri diğer ülkelerdeki benzer girişimlere ilham verebilir, böylece iklim dostu ve çevresel açıdan sürdürülebilir gıda üretim yöntemlerinin daha geniş çapta benimsenmesini teşvik edebilir. Bu çalışma birkaç temel soruya yanıt aramaktadır: Macar çiftçiler permakültürü nasıl tanımlıyor? Bu tarım yöntemi ne gibi avantajlar sunuyor? Ve ülke genelinde benimsenmesi nasıl daha yaygın bir şekilde teşvik edilebilir? Macaristan'ın deneyimleri, çevresel açıdan sürdürülebilir ve iklim dostu tarım uygulamalarını teşvik etmeyi amaçlayan diğer ülkeler için değerli bir model oluşturabilir.

Anahtar sözcükler: Çiftçilik; Macaristan; permakültür; sürdürülebilir tarım.

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Introduction

The loss of biodiversity and degradation of soil, water, and ecosystems mean significant challenges for humanity. The depopulation of rural areas, health problems related to nutrition, and obstruction of access to quality and nutritious food all justify the initiation of drastic changes in the areas of food production, distribution, and consumption (Frison-IPEs-Food, 2016; Wezel et al., 2018; Balázs et al., 2020, 2021). Despite this, conventional agriculture is the most common typology in developed countries. This system is large-scale, dependent on inputs (synthetic fertilizers and agroprotectants), and highly mechanized. It has historically leveraged standard soil preparation methods (e.g., ploughing followed by sowing), and the yields per unit area are maximized. Conventional farming methods are highly context-dependent, meaning they only work with their full economic potential if production inputs are low, environmental factors and the market are stable, and an income exceeding the general cost of production can be realized (Molnár & Fraser, 2020). It is worth mentioning that monoculture plays a crucial role in land degradation (Pacheco et al., 2018), which over time develops into a myriad of other environmental (e.g., reduction in land productivity, soil erosion, water quality deterioration, loss of biodiversity, dysfunctionality of ecosystems, and so on) problems. As monoculture activities continue to intensify, soil and water erosion and fertility loss will affect the quality and productivity of soil health (Crews et al., 2018; McLennon et al., 2021). All in all, many questions arise about the long-term sustainability of such an approach (Durham & Mizik, 2021) since the expansion of conventional agricultural productive techniques is producing an ecological crisis worldwide (Martínez-Castillo, 2016). Numerous studies show that the critical factors are already and will continue to face increasingly significant challenges in the future, necessitating the well-founded debate on the future of agriculture (European Environment Agency, 2023), as well as rethinking and redesigning our food production systems (Perfecto et al., 2009; Ranganathan et al., 2018).

In response to various challenges related to conventional agriculture, the Common Agricultural Policy (CAP) 2023–27 entered into force on 1 January 2023. The CAP is built around three main goals to achieve a sustainable system of agriculture in the EU: economic sustainability, environmental sustainability, and the social sustainability of farms. To meet these goals, EU countries use a wide range of targeted actions to address each country's specific needs and create CAP Strategic Plans. Through these plans, EU countries provide income support to farmers, support them in the transition towards sustainable production, and contribute towards the ambitions of the EU Green Deal, the EU's sustainable and inclusive growth strategy. The European agriculture and food

system, supported by the CAP, is already a global standard in terms of safety, security of supply, nutrition, and quality. Now, it must also become the standard for sustainability (European Commission, 2024a, 2024b).

Hungary's CAP Strategic Plan (2023–2027) emphasizes the country's unique natural features contributing to favourable agricultural conditions. Since 2020, the size of Hungary's farmland has remained relatively stable, with 5.3 million hectares dedicated to agricultural cultivation. However, the number of agricultural operations has decreased by 19 percent due to ongoing consolidation in the sector. As of June 1, 2023, the inventories of cattle, swine, sheep, and turkeys were lower compared to the previous year, while the number of chickens, geese, and ducks had increased. The plant production within the country's agricultural economy continues to rise. Agriculture accounts for 4.8% of national employment, while the food industry makes up 3.2%. Hungary has approximately 430,000 farmers, around 30% of them over 64 years old. Additionally, forests cover 23% of the country's territory, and 43% of the land is protected by the Natura 2000 program (Foreign Agricultural Service, 2023).

The agri-food sector in Hungary is currently facing significant challenges, and its transformation is being driven by two key trends: digitization and ecologization, which means a more ecological approach. These trends align with the primary objectives of the Green Deal and the new Common Agricultural Policy (CAP) for the period following 2023. From a sustainability perspective, Hoyk et al. (2022a) identified five policy gaps in Hungarian strategies: (1) lack of an ecological approach, (2) climate change does not receive enough attention, (3) complex landscape management does not appear in the documents, (4) measures that increase inequalities between farmers, and (5) the Digital Food Industry Strategy does not deal with healthy food consumption and issues of food waste.

The study aims to shed light on the current situation of environmentally sustainable agriculture in Hungary, with a special focus on permaculture as an innovation that is increasingly spreading in the country. As we will see in the theoretical overview of the topic, there are many different types of sustainable agriculture. The present study focuses on permaculture because it is one of the most advanced types of sustainable farming and gardening in Hungary, with the most developed institutional framework and educational and training background, and because it can be applied not only in rural but also in urban areas so all regions can be suitable for the expansion. Good examples of sustainable agriculture in Hungary may inspire similar adaptations in other countries, thus helping to promote the wider spatial spread of climate and environmentally friendly food production. The paper tries to answer the question of how permaculture is defined

in Hungary by the farmers who practice it, what advantages this farming method offers, and how it can be more widely adopted throughout the country. Hungary's example can be a starting point for other countries to promote environmentally sustainable and climate-friendly farming.

Theoretical Framework: Agroecology and Sustainable Agriculture, with a Special Focus on Permaculture

The term “agroecology” first appeared in academic discourse in the early 20th century focused on pest management and soil biology. In the 1960s, as environmental movements gained momentum, agroecology shifted toward advocating for alternatives to industrial, chemical-intensive farming. This perspective encouraged agronomists to reconsider their practices' ecological and social impacts while promoting “natural ways of farming.” Over time, agroecology expanded beyond scientific circles to become a recognized social movement emphasizing sustainability and equitable benefits in agriculture. Agroecology continued to grow as both a science and a movement throughout the 1990s, particularly as the environmental agenda gained momentum in the USA and Latin America. By the 2000s, discussions around agroecology began to emphasize the entire food system, linking production with processing, distribution, and consumption (IPES-Food, 2022).

The terms “sustainable development” and “sustainability” have also been increasingly in the public consciousness from the 1960s to the present day (Carson, 1962; Centeri et al., 2002; Martinát et al., 2016; Hoyk et al., 2022b; Hardi, 2023), and there are many discussions and dialogues about what these concepts mean and how they can be applied (Meadows, 1972; VTA, 2000; Vida, 2004). The term “sustainability” already appeared in agriculture several decades ago, and in parallel, adaptation into practice was tried to find solutions and technologies faithful to the concept (Ángyán, 1991; Gliessman, 2006; FAO, 2014; Szilágyi et al., 2018). According to the definition of Rajbhandari (2019), agriculture and rural development are sustainable when they are ecologically non-degrading, economically viable, politically non-discriminatory, socially acceptable, technologically appropriate, and based on a holistic scientific and system approach. Sustainable agriculture and rural development can be described as an initiative meant to meet the food or nutritional requirements and other needs of present and future generations, providing durable and decent employment, maintaining and enhancing the productive and regenerative capacity of the natural resource base, as well as reducing vulnerability and strengthening self-reliance of local people, particularly farming communities. Sustainable agriculture is neither linked to any particular technological practice nor an exclusive domain of organic farming (Rajbhandari, 2019).

According to Atreya et al. (2020), farming systems can be classified into four distinct types based on their inputs and sustainability. Agriculture can be categorized into four distinct types based on their sustainability practices. The first category is chemical input-based agriculture, which includes traditional and industrial methods that are generally considered unsustainable. In contrast, the second category, biological input-focused agriculture, comprises practices such as organic farming, conservation agriculture, and integrated pest management. The sustainability of these methods is seen as debatable. The third category, food system-based agriculture, encompasses practices like community-supported agriculture and ecosystem-based farming, which are regarded as more sustainable. Finally, there is nature-based agriculture, which includes techniques such as permaculture, biodynamic, bio-intensive and regenerative agriculture. This category is viewed as the most sustainable, highlighting the importance of holistic approaches to farming that prioritize environmental health and sustainability (Fig. 1).

This paper focuses on nature-based and food system-based agriculture, as permaculture also falls into this group. As there are often difficulties in interpreting the concepts, Table I summarizes the definitions and principles of these approaches.

The table illustrates the distinctions between various types of farming, categorized as nature-based and food-system based agriculture. This study will now focus specifically on permaculture, which has an increasing significance in Hungary. The institutional framework and organizational system supporting this approach are continually evolving in the country. Professional organizations offer training courses throughout the year, host conferences, and facilitate community knowledge-sharing events, including popular visits to permaculture gardens. Permaculture is particularly engaging for a variety of disciplines beyond agriculture and agroecology, as it influences human behavior in many aspects of daily life. It promotes a minimalist lifestyle and encourages the use of local resources, extending beyond the garden. This shift can alter consumption patterns, steering individuals and households toward greater self-sufficiency rather than excessive reliance on industrial products, ultimately resulting in a higher quality of life. Furthermore, permaculture can be applied in both urban and rural settings, across varying scales, and can shape landscapes and communities through the development of permaculture gardens and groups. Additionally, a personal connection to permaculture—through owning a permaculture garden and participating in a professional permaculture group—has motivated the choice of this research topic.

First of all, it is important to mention that permaculture is not just a farming system but also a nature-centred approach based on ethical and management principles focused on conserving the Earth and nature (Centeri et al., 2021). The concept of permaculture has been defined in various ways. Bill

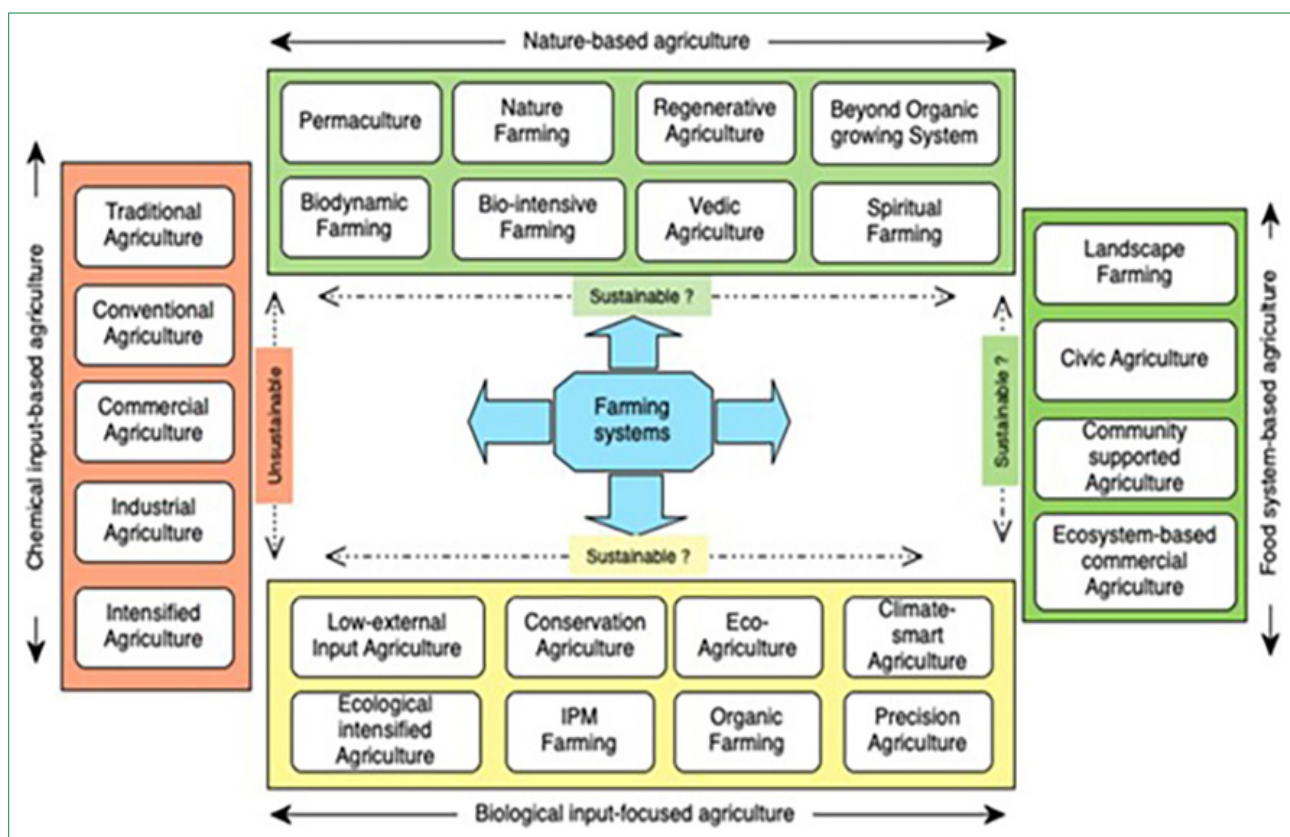


Figure 1. Classification of different forms of farming based on sustainability and main characteristics.

Source: Atreya et al. (2020).

Mollison, an Australian forester, teacher, hunter, and naturalist, and one of his students, David Holmgren, originally described the terms 'permanent culture' and 'permanent agriculture' in 1959 (Tóth, 2017). In 1988, Bill Mollison published a comprehensive guidebook entitled "Permaculture: A Designer's Manual," detailing the principles and methods behind permaculture. Permaculture emphasizes ecological design for sustainable human existence while integrating values, ethics, and personal responsibility for the Earth in its core principles (Flores, 2013). According to Mollison's definition, permaculture is "the conscious design and maintenance of agriculturally productive ecosystems with the diversity, stability, and resilience of natural ecosystems. It is the harmonious integration of landscape and people providing their food, energy, shelter, and other material and non-material needs sustainably" (Mollison, 1988). Based on current literature, Ferguson and Lovell (2014) also define permaculture as "the conscious design and maintenance of agriculturally productive ecosystems that have the diversity, stability, and resilience of natural ecosystems. It is the harmonious integration of landscape and people providing their food, energy, shelter, and other material and non-material needs in a sustainable way." The ethical principles of permaculture include the protection of the Earth, caring for people, and the fair

share of goods. Permaculture implements these ethical requirements using well-defined ecological principles, design aids, conscious planning, and continuous monitoring and redesign. This approach creates natural habitats and social environments (Holmgren, 2011). Based on the international scientific literature on innovations, permaculture farming can be considered a type of grassroots innovation (Orozco-Melendez & Paneque-Gálvez 2022) rather than rural innovation (Kézai et al., 2021; Szörényiné, 2015) since its elements and methods can be applied in urban spaces as well. Budapest, for example, is a pioneer in urban permaculture (e.g., Kispest garden-urban farm, Zugló climate garden, and Rosemary garden). More authors consider permaculture as one of the grassroots landscape management approaches, inspiring practices to increase an embedded relationship with the natural world and between people (Oliveira & Penha-Lopes, 2020; Ferguson & Lovell, 2014, 2015; Maye, 2018).

Permaculture uses various methods, such as plant combinations with protective plants, composting, mulching, rainwater harvesting, and improving plant resilience, to tackle the challenges posed by climate change. These practices help plants thrive even under extreme weather conditions, such as prolonged droughts, changing seasons, and soil erosion.

Table I. Summarizing the different forms of nature-based and food-system based agriculture

Nature-based agriculture		
Farming system	Definition	Examples of principles
Permaculture	“Permaculture (permanent agriculture) is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems. It is the harmonious integration of landscape and people providing their food, energy, shelter, and other material and non-material needs in a sustainable way. Without permanent agriculture there is no possibility of a stable social order.” (Mollison 1988)	Uses ethics and design principles, locally adopted practices Care of earth, people, fair share.
Nature farming	“Nature Farming is a farming method for producing healthy quality crops abundantly by allowing the soil to exert its power to the maximum without using pesticides and chemical fertilizers. It was first advocated in 1935 by Mokichi Okada (1882-1955), a philosopher and religious leader.” (INFRC 2025)	Principle: Allow the living soil to exert its great power.
Regenerative agriculture	“Regenerative agriculture is a way of farming that focuses on soil health. Regenerative farming methods include minimizing the ploughing of land.” (World Economic Forum 2022)	Don't disturb the soil, keep the soil surface covered, keep living roots in the soil, grow a diverse range of crops, and bring grazing animals back to the land.
Beyond organic growing system	“Beyond Organic farming does not have an official definition because it is not a government regulated label or certification. It generally refers to agronomic practices that go beyond what is required for organic certification and aim to build healthy soil, boost biodiversity, and draw carbon from the atmosphere via methods like cover cropping and minimum tillage.” (Zava Ranch 2023)	The principles of “beyond organic farming”, center on the assumption that living and holistic biosystem that is nature cannot be dissected or resolved into its parts.
Biodynamic farming	Biological dynamic agriculture is a system of agricultural management based on Rudolf Steiner's 1924 lecture series. (Muhie, 2023) Biodynamic farming is a form of organic agriculture with additional specificities in its standards and the particularity of explicitly postulating the existence of a non-material dimension (Wright 2021; Rigolot-Quantin 2022).	Restore the soil through the incorporation of organic matter, treat soil as a living system; create a system that brings all factors that maintain life into balance; encourage the use and significance of green manure, crop rotation, and cover crops; treat manure and compost in a biodynamic way; and have insights about the use of enzymes and hormones.
Bio-intensive farming	“Bio-intensive agriculture is an organic agricultural system that uses no fossil-fuel based fertilizers. The practice focuses on achieving maximum yields from a minimum area of land, while simultaneously increasing biodiversity and sustaining or restoring soil fertility.” (WCCI 2025)	It is regenerative, providing greater soil health over the long term without the cost and environmental burden of materials from external sources.
Vedic agriculture	“Vedic Farming is a Holistic approach aiming at purifying the ecosystem. Plants and animals play a very important role as the basic inputs used in the process of Vedic Farming like ghee, milk, honey, dung or botanical extracts are mainly derived from them.” (Guduru 2022)	It is the theory of agriculture expounded in such manner that the farmers would benefit by its proper implementation. This treatise includes observations on all aspects of agriculture such as meteorological observations relating to agriculture, management of agriculture, management of cattle, agricultural tools, seed collection and preservation, ploughing and all the agricultural processes involved right from seasonal field preparations to harvesting of crops and storage of output.

Table I (cont.). Summarizing the different forms of nature-based and food-system based agriculture

Nature-based agriculture		
Spiritual farming	Spiritual farming or Zero Budget Natural Farming (ZBNF) is the most effective way to lower farmers' input costs. (Ajaykumar et. al. 2025) The term 'budget' is used to describe credit and expenditures, and using no credit and without spending any money on purchased inputs is referred to as a "zero budget". 'Natural farming' refers to farming that is done in harmony with nature and without the use of chemicals (Smith et al., 2020).	Building elements of ZBNF are jeevamrith, bijamrith, mulching and soil aeration. These four principles contribute to improved soil health, microbial population and crop output. Intercropping, contour bunds, crop rotation, green manures, compost, and biological pest management is some of the other fundamental elements.
Food-system based agriculture		
Landscape farming	"Landscape approaches" seek to provide tools and concepts for allocating and managing land to achieve social, economic, and environmental objectives in areas where agriculture, mining, and other productive land uses compete with environmental and biodiversity goals. (Sayer et. al. 2013)	Continual learning and adaptive management, common concern entry point, multiple scales, multifunctionality, multiple stakeholders, negotiated and transparent change logic, clarification of rights and responsibilities, participatory and user-friendly monitoring, resilience, strengthened stakeholder capacity.
Civic agriculture	"Civic agriculture," a term first coined by rural sociologist Thomas Lyson, refers to forms of agriculture that occur on a local level, from production to consumption, and are linked to a community's social and economic development. (Kaika & Racelis 2021).	The food- from its production to its consumption - is a product of complex environmental and social interactions.
Community supported agriculture	Community-supported agriculture is "a direct partnership between a group of consumers and producer(s) whereby the risks, responsibilities and rewards of farming activities are shared through long-term agreements." (FAO 2016)	Shared benefits and liabilities, resilient communities, and agricultural economy, promote civic engagement.
Ecosystem-based commercial agriculture	The ecosystem-based approach (EBA) is a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way. (Richter et al. 2015)	Integrated management of land, water, and living resources.

Source: Own compilation and addition based on Ajaykumar et. al., 2025; FAO, 2016; INFRC, 2025; Guduru, 2022; Kaika & Racelis, 2021; Mollison, 1988; Muhie, 2023; Richter et al., 2015; Rigolot-Quantin, 2022; Sayer et al., 2013; Smith et al., 2020; WCCI, 2025; World Economic Forum, 2022; Wright, 2021; Zava Ranch, 2023.

Methodology

This paper aims to illustrate the current situation of environmentally sustainable agriculture in Hungary, focusing on permaculture as an innovative practice that is increasingly gaining traction in the country. Examples of successful sustainable agriculture in Hungary may inspire similar adaptations in other countries, thereby promoting the broader spread of climate-conscious and environmentally friendly food production. The paper addresses how farmers define permaculture in Hungary, the benefits this farming method offers, and ways to encourage its wider adoption throughout the country.

To achieve this goal, the paper uses primary and secondary data. The primary data for this study was collected through in-depth interviews with four permaculture farmers in Hungary in November 2023. These farmers were selected from the Hungarian Permaculture Association's map database, which is the main organization representing permaculture farmers in

Hungary. Among the interviewees, one is a full-time farmer, while the others are part-time permaculture practitioners. When selecting participants for the in-depth interviews, it was essential to include individuals from various regions of Hungary, specifically those whose permaculture farms are located in urban areas or agglomerations. Diversity was also a key factor regarding the size of the farms and their establishment dates. This included both new initiatives, such as the permaculture garden in Kunsziget, and farms that have been operational for at least ten years, like those in Törökbálint, Seregélyes, and Sokorópátka. Additionally, the farms vary in their farming objectives. For example, the farm in Törökbálint engages in commodity production, whereas the other three farms focus on achieving self-sufficiency for their families. The selected farms also differ in terms of the types of products they cultivate. In Törökbálint, Sokorópátka, and Seregélyes, livestock is integrated into their permaculture systems, while Kunsziget currently focuses exclusively on growing vegetables using a permaculture

approach. The interviews took the form of online discussions and covered the interviewee's definition of permaculture, how long they have been involved in it, what sources they use to learn about it, how they practice permaculture, and how they see the opportunities and obstacles to its spread.

In addition, monthly observations and knowledge-sharing took place at the Pannonhalma Permaculture Club (PAPEK) events for a year. These were occasional 3-hour meetings, where usually 10–12 people with a permaculture garden or farm could share their practical experience in person. Furthermore, four visits to permaculture and community gardens in urban agglomerations (near the city of Győr) supported the work, observing the practical side of this form of farming. As for secondary data, a review of relevant national and international literature on the topic supported the work.

Permaculture in Hungary: Benefits, Brief History and Main Characteristics

As far as permaculture and its benefits are concerned, it can be defined as an umbrella term that describes a broad range of practices and systems to optimize the interactions between the soil and plant systems. It efficiently utilizes various ecological functionalities to maximize ecosystem health and provide a broad suite of ecosystem services (Didarali & Gambiza, 2019; McLennon et al., 2021). These can be considered as environmental benefits. Besides this, there are also economic and social benefits to this form of farming. Economic benefits come from the potential for local job creation, lower food costs for residents, and reduced maintenance costs for green spaces. Last but not least, permaculture has social benefits as well. It can improve the mental health and well-being of the community and provide educational opportunities, and support community engagement, such as by thinking about the increasingly popular permaculture community gardens.

As far as the brief history is concerned, the first trials of Hungarian permaculture started in the 1990s. At this time, the first Hungarian ecovillage, “Gyűrűfű,” was created by a group of young Hungarian ecologists who dreamed of having a large plot of land protected by permaculture (Domingos, 2018). In 1994, this ecovillage became one of the locations of Hungary's first permaculture design course (Gyurufu.net, 2024). A grassroots initiative started in 2006 to promote permaculture in Hungary by enthusiastic practitioners. After 10 years, the Hungarian Permaculture Association (MAPER) has been established (Centeri et al., 2021) to introduce permaculture to even more people, organize permaculture education, and build relationships with permaculture organizations from other countries. The work teams of the association cover a wide spectrum of activities, including research, design, and education, as well as managing a club in Budapest (Hungarian Permaculture Association, 2024).

The professional community has developed enormously in Hungary in the last few years. Every year, more and more training courses, clubs, groups, and professional organizations are being set up, and more and more Hungarian literature on the subject is available. In addition, the number of permaculture designers and services is growing (Szabó, 2024). Permaculture design courses (PDCs) are offered by various organizations and individuals in Hungary. Moreover, some universities (like the Hungarian University of Agriculture and Life Sciences) are incorporating permaculture principles into their educational programs or providing one-day courses, which helps introduce permaculture concepts to a wider audience (Gál et al., 2022).

All in all, today, in Hungary, there is a wide variety of initiatives related to alternative, sustainable, environmentally friendly agriculture and food production in the fields of agricultural practice, distribution, agricultural research, and higher education, but these activities are fragmented and disjointed (Balázs et al., 2020). A map database about permaculture farms, households, and services in Hungary created by the Hungarian Permaculture Association (MAPER) currently presents 49 projects (01.08.2024). Based on this database, the period of 2011–2020 was the peak in terms of permaculture farm creation, with almost 60% of the farms registered so far. The establishment of the Hungarian Permaculture Association, which started to register this type of initiative and spread permaculture farming more widely, probably played a role in reaching this peak (Fig. 1).

These farms cover 354,9 hectares (3,5 km²), with 175 hectares occupied by the Gyűrűfű ecovillage, which is one of the first permaculture initiatives in Hungary. More than half of the farms are less than one hectare, and almost one-third are between one and 5 hectares. The permaculture approach can also be applied to larger plot sizes, over 15 hectares, and three examples are included in the Hungarian Permaculture Association's database (Figs. 2, 3).

Key Findings From In-depth Interviews with Permaculture Farmers in Hungary

Three of the four permaculture farmers (in Törökbálint, Seregélyes, and Sokorópátka) selected for the in-depth interviews in Hungary have been using this type of farming for more than ten years and have also obtained a permaculture design qualification (PDC), while one farmer (in Kunsziget) has been learning the method for three years and plans to continue practicing it in the future. In-depth interviews with four permaculture farmers can help answer the question of whether there are differences between the international literature and the Hungarian approach to permaculture. On this question, we see that the respondents have indeed reinterpreted Mollison's approach, developing their own vision and preference system for permaculture. According to one farmer in Western Hungary, permaculture can be defined as “an artificially engineered, chemical-free, sustainable ecosystem where

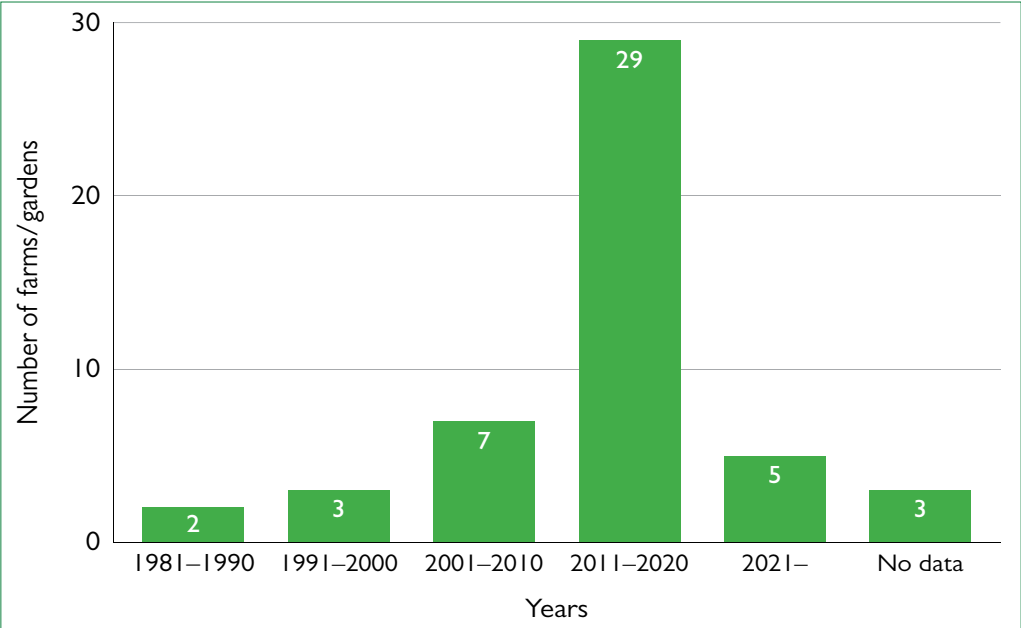


Figure 2. The year of creation of permaculture farms, households and services based on the Hungarian Permaculture Association's database (N=49).
Edited by author based on Hungarian Permaculture Association's map database, 2024.

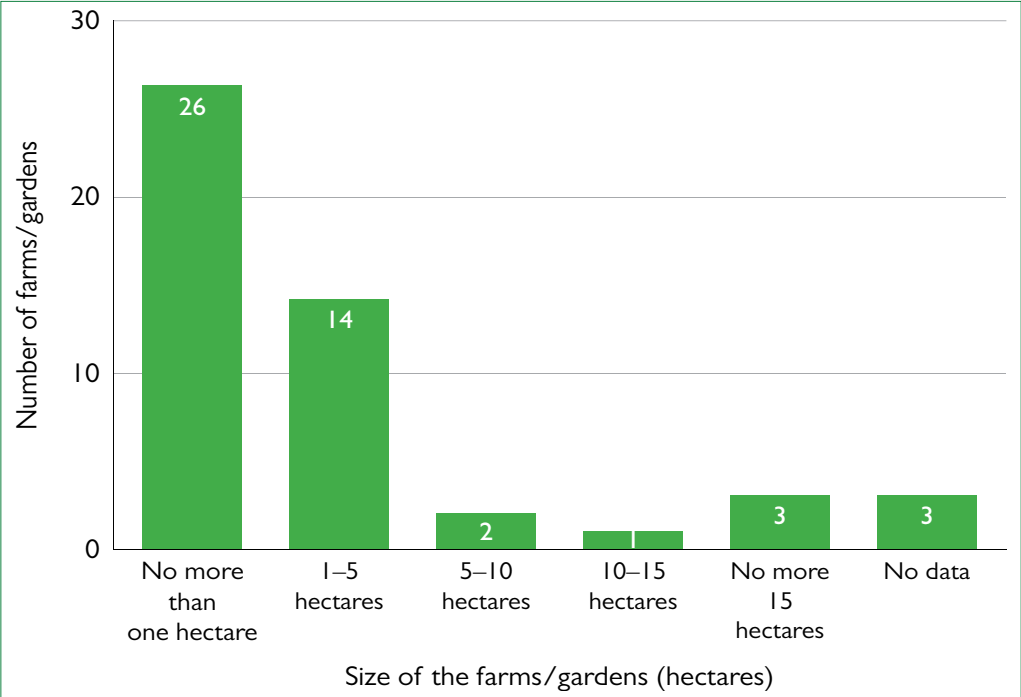


Figure 3. Plot size of permaculture farms, households and services based on the Hungarian Permaculture Association's database (N=49) (2024).
Edited by author based on Hungarian Permaculture Association's map database, 2024.

small- and large-scale ecosystems are best compatible with each other, both in terms of soil life and plant and animal communities. The aim is to maintain this balance in the long term.” Another farmer defines permaculture as “sustainable agriculture itself, a kind of green initiative in which we try to create a state close to nature, where man is part of nature and not exploiting it. The aim is to find a natural balance between society and the environment.”

Furthermore, the interviewee, who has a farm in the Budapest agglomeration (in Törökbálint), emphasized the importance of local communities. According to his approach, “permaculture is a systemic planning method based on ethical principles that aims to create well-functioning local communities in harmony with nature.” Another farmer in Western Hungary interpreted permaculture as a “complex approach to life that goes far beyond gardens and farms,” as he considers the use of permaculture techniques in harmony with nature as part of everyday life. It therefore requires a multidisciplinary approach, beyond the agroecological aspects of previous studies.

The interviewees’ responses were consistent in that they were looking for new ways and innovative solutions to produce healthier food and greater self-sufficiency while doubting the methods of industrial agriculture in the development of permaculture and in planning their gardens or farms. One of them now sells his produce locally, and three of them grow vegetables, fruit, herbs, and livestock for their own families. When asked about their primary sources of information when it comes to the development of their permaculture economy, all of them pointed out that there are excellent books on the subject, and they also mentioned online platforms, professional support available within the Hungarian Permaculture Association, the internal library, and personal contacts as important sources of information.

To investigate the spatial spread of permaculture, the in-depth interview asked whether the interviewees’ acquaintances, relatives, friends, or the local population were interested in this form of farming, or whether there were examples of people who had started permaculture in their locality or the wider community as a result of the interviewee. In this respect, an important finding of the interviewees is that there is still a high level of misunderstanding about permaculture. There is some interest and questions from people living in the environment, but no breakthroughs can be observed as a result of the permaculture farmer’s approach and knowledge transfer activities. In the case of one settlement, the permaculture farmer saw the lack of community life and social contacts as the main reason for this, while others explained that it takes time and that society needs to mature.

One important way of promoting permaculture is for farmers to offer individual or group visits to their gardens. There are examples of both types among the respondents. The age of visitors is quite heterogeneous. The age of individual visitors varies between 30 and 70 years. The farm in Budapest agglomeration does not receive individual visitors but regularly welcomes groups from kindergartens and schools for educational purposes. In addition, there is a large group of people over 60 who also visit the farm in an organised way. Their motivation is typically to overcome the challenges of declining health by learning new farming techniques.

Overall, based on the experiences of the in-depth interviews and the observations, it can be said that, despite the high level

of misunderstanding, there is a segment of the population that is receptive to this innovation, but it will take a long time before either permaculture or other forms of nature-based farming can become more widespread in Hungary.

Discussion and Conclusion

The demand for clean, chemical-free food has grown worldwide. The different forms of nature-based agriculture provide an opportunity to address these needs and foster community participation. Permaculture, the specific form examined in this study, is noteworthy for its adaptability, as, based on the Hungarian Permaculture Association’s database, it can be implemented in small gardens, large farms, and in rural and urban areas as well. In Hungary, the adoption of permaculture principles dates back to the 1990s, gaining popularity after 2010. The main motivations of the interviewed permaculture farmers are the more extreme conditions and access to clean and healthy food. Many initiatives, such as professional organisations (e.g., Hungarian Permaculture Association), educational institutions (e.g., a biogarden in permaculture approach at the Hungarian University of Agriculture and Life Sciences), and the activities of local groups (e.g., Pannonhalma Permaculture Club) have emerged to support individual or community-based food self-sufficiency and exchanges in Hungary. However, these efforts are currently relatively isolated across the country, with limited knowledge sharing. To fully leverage knowledge sharing and sustainable food production opportunities, there is a need for a well-organized national or even international network to bring together all such initiatives in the future, encompassing not only permaculture initiatives but also all existing forms of sustainable food production.

In summary, we can see that different forms of nature-based agriculture are increasingly gaining ground over traditional agriculture. Looking at permaculture farming critically, its acceptance in social contexts can vary. This lack of widespread acceptance may sometimes result in conflicts with neighbours, particularly concerning aspects like unmown lawns and what may be perceived as a disordered appearance in permaculture gardens. Such misunderstandings can arise from unfamiliarity with permaculture practices and principles. From an economic standpoint, while some permaculture farms successfully produce crops for sale, their yields can be less predictable when compared to those from standardized monocropping organic farms. Furthermore, the mechanization processes used in permaculture tend to be more complex and challenging than those utilized in conventional organic farming, which can impact operational efficiency.

The above findings, especially the high level of misunderstanding, were confirmed by the in-depth interviews conducted during the research, which could be promoted by informing local society, transferring knowledge to them, and strengthening social contacts and cooperation between professional organisations in the future.

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