Pamukkale Üniversitesi
Sosyal Bilimler Enstitüsü Dergisi
Pamukkale University Journal of Social Sciences Institute
ISSN 1308-2922 E-ISSN 2147-6985

Article Info/Makale Bilgisi
√Received/Geliş: 02.10.2024 **√Accepted/Kabul:** 20.01.2025
DOI:10.30794/pausbed.1559707
Research Article/Araştırma Makalesi

Bayram, B. A. & Arabulan, S. (2025). "Evaluation of the Feasibility of Urban Agriculture in Edirne City Center", P*amukkale University Journal of Social Sciences Institute*, issue 67, pp. 291-311.

EVALUATION OF THE FEASIBILITY OF URBAN AGRICULTURE IN EDIRNE CITY CENTER

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Abstract

Today, with the concentration of the world population, migration from rural to urban areas has increased and the population is concentrated in cities. The unpredictable growth of cities has led to disproportionate use of resources and degradation of the natural environment. Forests and agricultural areas have been destroyed by urbanization and urban pressure has been created on existing agricultural areas. This pressure on agricultural areas has caused many socio-cultural, ecological, and economic problems, especially food problems. Urban agriculture is an important land use that offers solutions to these problems by combining the concepts of city and agriculture. Urban agriculture plays an important role in achieving sustainable development goals with many benefits, such as increasing food security in cities, reducing carbon footprint, protecting biodiversity, and strengthening social solidarity.

This study aims to identify and evaluate the urban agriculture potential in Edirne, based on the hypothesis of transforming passive areas into urban agricultural areas in Edirne province, where 93.9% of the population is engaged in agricultural activities and 68% of the central district lands are agricultural areas. By developing strategic recommendations on how urban agriculture projects can be implemented in the city, it shows that the sustainable development goals of the city can be achieved.

Within the scope of the study, a literature review was conducted on the general conceptual framework and importance of urban agriculture; the climate, topography, vegetation cover and land use conditions of Edirne city center were reported. In addition to these data, urban agriculture potential in the context of technological, economic, demographic, sociological and ecological structure was evaluated by SWOT analysis, and potential urban agriculture areas were suggested in the city center. It has been determined that urban agriculture practices in the city, where the existing structure is quite favorable for urban agriculture, can be evaluated as a strategic development tool with proper planning and management.

Keywords: *Urban Agriculture, Edirne, Urban Gardens.*

EDİRNE KENT MERKEZİNDE KENTSEL TARIMIN UYGULANABİLİRLİĞİNİN DEĞERLENDİRİLMESİ

Öz

Günümüzde dünya nüfusunun yoğunlaşması ile kırsaldan kente göç artmış ve nüfus kentlerde yoğunlaşmıştır. Kentlerin öngörülemez bir şekilde büyümesi, kaynakların orantısız kullanımına ve doğal çevrenin bozulmasına neden olmuştur. Kentleşme ile ormanlar ve tarım alanları tahrip edilmiş, mevcut tarım alanları üzerinde kent baskısı oluşmuştur. Tarım alanları üzerindeki bu baskı başta gıda sorunları olmak üzere birçok sosyo-kültürel, ekolojik ve ekonomik probleme neden olmuştur. Kentsel tarım, şehir ve tarım kavramlarını birleştirerek bu sorunlara çözüm sunan önemli bir arazi kullanımıdır. Kentsel tarımın şehirlerdeki gıda güvenliğini artırması, karbon ayak izini azaltması, biyoçeşitliliği koruması ve toplumsal dayanışmayı güçlendirmesi gibi birçok faydası ile sürdürülebilir gelişme hedeflerine ulaşmada önemli bir rol oynadığı görülmektedir.

Bu çalışma ile nüfusunun %93,9'u tarım faaliyetleri ile uğraşan ve merkez ilçe topraklarının %68'i tarım alanı olan Edirne ilindeki pasif alanların kentsel tarım alanlarına dönüştürülmesi hipotezinden yola çıkarak, Edirne'de kentsel tarım potansiyelinin belirlenmesi ve değerlendirilmesi amaçlanmıştır. Kentsel tarım projelerinin şehirde nasıl uygulanabileceğine dair stratejik öneriler geliştirilerek, şehrin sürdürülebilir kalkınma hedeflerine ulaşılabileceğini göstermektedir.

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Çalışma kapsamında kentsel tarımın genel kavramsal çerçevesi ve önemi üzerine literatür taraması yapılmış, Edirne il merkezinin iklim, topoğrafya, bitki örtüsü ve arazi kullanım durumları raporlanmış, bu verilere ek olarak teknolojik, ekonomik, demografik, sosyolojik ve ekolojik yapısı bağlamında kentsel tarım potansiyeli swot analizi ile değerlendirilmiş ve kent merkezi içerisinde potansiyel kentsel tarım alanı önerilerinde bulunulmuştur. Mevcut yapının kentsel tarım için oldukça elverişli olduğu kentte yapılacak kentsel tarım uygulamalarının, doğru planlama ve yönetim ile stratejik bir gelişim aracı olarak değerlendirilebileceği belirlenmiştir.

Anahtar kelimeler: *Kentsel Tarım, Edirne, Kent Bahçeleri.*

1. INTRODUCTION

Today, with the acceleration of the urbanization process, one of the biggest challenges facing cities is the creation of sustainable and livable urban environments. Factors such as increasing urban population, decreasing natural resources and climate change have made food security, environmental sustainability and social solidarity in cities even more important (Solduk, 2010, p.1; Tandoğan & Özdamar, 2022, p. 223). In this context, urban agriculture stands out as an approach that encourages food production in or around city centers, creates green spaces and increases social interaction.

Urban agriculture aims to utilize passive spaces in cities for agricultural production, increase local food production and strengthen social bonds among urban residents. In addition, urban agriculture practices make significant contributions to environmental sustainability, such as increasing green areas within the city, reducing carbon footprint and protecting biodiversity. Therefore, urban agriculture can play an important role in helping cities achieve their sustainable development goals (Türker, 2020, p. 1).

This study aims to assess the feasibility of urban agriculture in Edirne city center. Edirne is a city that stands out with its historical and cultural richness and has a high agricultural production potential. However, urbanization and population growth lead to a decrease in passive areas and limit agricultural activities. This situation increases the necessity and importance of urban agriculture practices in Edirne.

The main objective of the study is to identify suitable areas for urban agriculture in Edirne city center, to develop strategies for the effective use of these areas and to evaluate the potential benefits of urban agriculture projects for the city. In this context, the strengths, weaknesses, opportunities and threats (SWOT analysis) of urban agriculture were analyzed and strategic recommendations were developed in line with this analysis.

In the first part of the study, the conceptual framework of urban agriculture and its place in the literature, the historical development, current practices and theoretical foundations of urban agriculture are examined. In the second part, the current situation of Edirne city center was analyzed and passive areas, demographic structure and current agricultural practices in the city were evaluated. In the third part, a SWOT analysis on urban agriculture practices for Edirne province was presented and 6 potential urban agriculture points were identified in the city based on this analysis and urban agriculture criteria. These points provide concrete suggestions on how urban agriculture can be implemented in Edirne.

This study aims to contribute to the development of a sustainable urban agriculture model in the city by revealing the potential of urban agriculture in Edirne city center. It is envisaged that urban agriculture will make significant contributions to the social, economic and environmental sustainability of Edirne and the planning and implementations to be made in this direction will play a strategic role in achieving the city's sustainable development goals.

2. URBAN AGRICULTURE CONCEPT

Throughout history, urban agriculture has been practiced in an integrated manner with cities and has always maintained its existence in the historical process (Ertürk, 2019, p. 151). The increase in the world population and the accompanying increase in the urban population, and the intense migration from rural to urban areas with the industrial revolution have caused cities to grow in an unplanned and uncontrolled manner. Unplanned urban growth has created pressure on agricultural areas, causing the destruction of existing agricultural areas and the exclusion of existing areas in the urban periphery. One of the most important consequences of this situation is the problem of food demand that may arise in the future. The protection of these agricultural areas is important not only for sustainability but also for "food security" and "access to food". For this reason, urban agriculture is seen as "an important strategy in sustainable urban development policies in many countries".

By supporting local production systems and food security, urban agriculture ensures the resilience of cities against the food crisis, enabling urban dwellers to cope with the negative impacts of climate change and to fight against food security risks more strongly. Urban agriculture is considered as a strategic policy tool in terms of increasing the resilience of cities against crises and contributing to the urban ecosystem (Kıran & Yücel, 2022, p. 360).

Depending on the different effects of urban agriculture in the city, definitions have been made according to different perspectives on the concept:

United Nations Development Organization "To provide agricultural and livestock products to meet the daily demands of the inhabitants of towns, cities or metropolitan areas, spread over land and water in urban and peri-urban areas."

According to Kaldjian (1997) "The phenomenon of urban agriculture is a strategy that serves the process of the formation of cities that can meet their own needs by planning production areas within the scope of the principle of sustainability for the policy elements and development of the city."

According to Bailkey and Nasr (2000): "the growing, processing and distribution of food and other products through intensive plant cultivation and livestock breeding in and around cities"

According to Mougeot (2000): "Urban agriculture is an industry concerned with the production, distribution and marketing of food and related non-food products, largely through the use and transformation of resources inside and outside settlements"

According to De Zeeuw et al. (2011): "Urban agriculture is the cultivation of food crops and related activities within and on the periphery of the city"

According to Chenarides et al. (2021) "Urban agriculture is a growing sector within the agricultural industry that aims to increase overall food production in urban and peri-urban areas through the conversion of existing land into agricultural farms."

As can be seen from the definitions, urban agriculture is a phenomenon that integrates with the city and interacts with many elements of the city, especially economic and ecological systems (Mougeot, 2000, p. 10) (Figure 1).

Figure 1. Components of Urban Agriculture (Mougeot, 2000, p.10)

Urban agriculture is carried out by many governmental, non-governmental and commercial stakeholders for different purposes. Figure 2 shows the stakeholders of urban agriculture (Türker & Akten, 2020, p.13; Lohrberg et al., 2016 p.65).

Government	Civil Society	Commerce
•National	•Civil society organizations	•Commercial agriculture
•International	•Non-profit organizations	•Farmer associations
•Regional	•Fan providers	•Entrepreneurs
•Local	•Artists	•Funders
•State organizations	•Education institutions	•Distributors
•State Institutions	•Religious institutions	•Sellers
	•Volunteer individuals	

Figure 2. Urban Agriculture Stakeholders (Türker & Akten, 2020, p.13; Lohrberg et al., 2016 p.65)

The most important component for urban agriculture practices is the location of the agricultural area within the city. In this sense, it can be broadly categorized as urban and peri-urban agriculture.

Urban agriculture encompasses different forms of production (vegetable and fruit production, poultry farming, fish production, etc.) on small and medium-sized plots for household consumption or for sale. The main areas where urban agriculture is practiced are vacant plots, backyards of houses, border areas, inside containers, balconies, roofs, school gardens, open spaces, roadsides, power lines, riverbanks, community gardens (Solduk, 2010, p. 2; Bostancı, 2020, p. 27). Urban agriculture is classified as commercial, non-commercial and hybrid practices according to economic practices (Table 1). Commercial practices cover the equipment, materials and infrastructure required for the processing, distribution and sale of food products, and are market-oriented. "Non-commercial practices;" "non-commercial practices" range from private, community, institutional, demonstration and guerrilla gardens to edible landscaping, hobby beekeeping and cluster animal husbandry. "Hybrid practices" include social activities consisting of the production, processing, distribution and marketing of food, and free educational activities carried out by various institutions for social, economic or environmental purposes (Rasouli, 2012, p.14; Türker, 2020, p14; Tandoğan & Özdamar, 2022, p 225).

Table 1. Classification and Definitions of Urban Agricultural Forms

	Main Typology	Sub Typology	Production Scale	Description
Non-Commercial	Residential gardens		Micro	Production for quality food or to contribute to the family budget
	Community gardens	School	Micro	Agricultural activities for educational purposes
		Institutional	Micro	These are gardens where agricultural activities are carried out for various purposes in areas such as religious facilities, official institutions and private companies.
		Performance	Micro	Gardens that are offered free of charge to the public to display plant species for educational and recreational purposes
		Hobby	Micro	These are gardens where different or the same size parcels within a land are rented for a certain fee to be used for hobby agricultural activities.
		Association-Organization	Micro	Gardens managed by an association/organization where a group of volunteers grow agricultural products for a specific purpose.
	Guerilla gardens		Micro	These are gardens created by illegally occupying vacant and idle public or private spaces for agricultural activities.
Hybrid	Building integrated farms		Micro-Macro	It is the general name of areas where the inside and top of buildings in urban areas are used for agricultural activities.
	Edible gardens		Micro-Macro	It is the decoration of the exterior areas of accommodation, commercial and mixed-use areas in private and public property, operated by individuals or businesses, with food-producing plants.
Commercial	Market gardens		Micro-Macro	Gardens where agricultural activities are carried out in open areas or greenhouses where agricultural activities are carried out for retail or wholesale for commercial purposes.
	Urban Farms		Macro	Large-scale agricultural farms in urban peripheries on areas larger than 10 hectares.

(Tomar, 2013, p. 426; Türker, 2020, p.14; Türker & Akten, 2020, p. 14)

The criteria used in determining urban agricultural areas vary according to the region to be applied, but the basic criteria valid for each region include the demographic and physical characteristics of the city, land use policies and management approaches (Table 2). Urban agriculture takes place alongside other urban activities and urban systems within the city. In particular, it is integrally related to the local economy, land use, ecological and urban management systems, and the local, national and global food system (Solduk, 2010, p: 32; UNHP, 2020; Eldek & Kan, 2023, p. 31). Any plan for the management, development or transformation of urban agriculture has to ensure the relationship between the urban agriculture industry, its stakeholders and these systems.

According to these criteria, in order for agricultural activities in the city to be viable and sustainable, they must be able to cope effectively with the constraints of the city and utilize the values produced and mobilized by the city with the same efficiency. In other words, the extent to which agriculture is successful depends on the extent to which it uses the urban ecosystem and the extent to which the same ecosystem benefits from it (Mougeot, 2000).

Sustainable urban agriculture systems that are properly designed, comply with urban agriculture criteria and work in harmony with the city provide many benefits to the city in terms of social, economic and ecological aspects, especially in ensuring food security (Table 3). It helps to create more sustainable and greener cities.

Table 2. Criteria for Urban Agriculture

	CRITERIA	DEFINITION
DEMOGRAPHIC AND SOCIAL CRITERIA	Population Density	Agricultural activities should be planned in accordance with the population density of the city.
	Community Engagement	Support and participation of the urban population in agricultural projects.
	Food Security and Access	Urban agriculture increases food security and access, especially in low-income areas.
	Economic Sustainability	Sustainability of agricultural activities according to socio-economic structure.
	Cultural and Ethnic Diversity	Approaches of different cultural groups to agricultural practices.
PHYSICAL AND ENVIRONMENTAL CRITERIA	Soil Quality	Soil properties such as pH, organic matter content, drainage.
	Climate and Microclimate	Climatic factors such as rainfall regime, temperature ranges, wind influence.
	Water Resources	Availability of sufficient and clean water sources for irrigation
	Natural Habitat Protection	Controlling the environmental impacts of agriculture and protecting natural habitats.
LAND USE POLICIES	Land Planning	Bringing unused or idle land into agriculture
	Ownership and Use Rights	Clarifying the ownership status and usage rights of agricultural land.
	Infrastructure Support	Meeting infrastructure needs such as irrigation, roads and market access.
	Urban Expansion and Agriculture	Protecting agricultural land in the process of urbanization.
	Accessibility	Ensuring appropriate access to land and easy access
GOVERNANCE AND SUPPORTING POLICIES	The Role of Local Governments	Municipalities and local governments support agricultural projects.
	Education and Awareness Raising	Educating the public on agricultural techniques and sustainable practices.
	Financial Support and Incentives	Providing financial support and incentives for urban agriculture projects.
	Legal Regulations	Making legal regulations that support and facilitate urban agriculture and ensuring compliance with existing legal regulations
	Market Access	Ensuring market access for products and establishing sales channels.

(Akyol, 2013; Madre, Vergnes, Machon & Clergeau, 2014, 100–107; Camps-Calvet & Langemeyer, 2016, 14–23; Clerino & Fargue-Lelièvre, 2020)

Table 3. Benefits of Urban Agriculture Practices

Social	Social	-Strengthens social bonds by encouraging community members to support each other and act in solidarity. -It provides educational opportunities on ecology and sustainability, increases knowledge sharing among community members and creates a common consciousness. This awareness encourages the community to transition to a more sustainable lifestyle.
	Human Health	-Being with plants and taking care of them reduces stress, lowers blood pressure, has a therapeutic effect and therefore increases positive emotions. -Being with nature inspires people. -The aesthetic image created by green areas has a positive effect on human health and psychology. -Thanks to the oxygen produced by plants, air filtration and humidity control, air quality improves and disease rates decrease. -By creating a green area in the city, it offers a beautiful and spacious environment. Improves the quality of life of city dwellers. -Facilitates access to healthy food. Creates healthy food opportunities for all income levels.
Economical	-Supports the local economy by creating new job opportunities. -Contributes to household income by reducing food costs. -Increases the property value of the region. -Supports the local economy by ensuring that the money cycle is within the local community. -Provides money flow from outside with new tourism opportunities.	
Ecological	Biodiversity	-By hosting different species, it creates a habitat for organisms on building surfaces in the city. -It is also possible to create a suitable environment for wildlife -Contribute to biodiversity by designing ecosystems and habitats that are at risk and endangered -Can create habitats for endemic plants and living things.
	Water Management	- It can reduce the burden of water on urban infrastructure by converting rainwater and wastewater and using it in irrigation systems. -Prevent flooding by retaining water in areas with excessive rainfall -With the innovative agricultural systems used, it consumes much less water than traditional agriculture. -Water losses during the transportation of water to the agricultural area are prevented. -By increasing the amount of green space in the city, it encourages evaporation and supports the increase in the amount of precipitation.
	Air Quality	-Improves air quality by increasing the amount of green space in the city. -Captures and filters airborne particles, pollutants, improves air quality by reducing the impact of dust and particles carried by wind from dry surfaces, providing clean air -Improves air quality by reducing thermal mobility by cooling the surrounding air by evaporating moisture from the soil.
	Climate	-Plants create permeable surfaces within the city, absorbing sunlight, creating shade on hard surfaces and protecting them from excess heat, thus helping to reduce the urban heat island. -Plants help to cool the air by increasing humidity. -Reduce fossil fuel consumption by shortening the transportation distances of food.
	Wastes	-Creates and encourages the use of organic waste for composting and fertilizer production. -Contributes to less food waste in grocery stores and households by making locally produced fresh produce easily accessible. -Reduces the need for food packaging for safe transportation over long distances.

(Solduk, 2010, p. 41-63; Rasouli, 2012, p.29-32; Poulsen, Spiker, 2014, p.4-5; Aşılıoğlu & Çay, 2018, p.1; Kanbak, 2018, p.199; Ertürk, 2019, p. 154; Türker, 2020, p.16-20; Bostancı, 2020 p. 35-45; Karakaya 2022; Aydoğdu & Koç, 2023, p. 213)

3. CASE STUDY: EDİRNE

The province of Edirne, which was selected as the study area, is located in the Thracian Peninsula; Istranca Mountains in the north, Koru Mountains and Aegean Sea-Saroz Gulf in the south, Meriç River and Meriç Plain in the west, and Ergene Plain in the east, and 80% of the provincial territory is suitable for agriculture (EOİ, 2024).

3. 1. Climate

Edirne is a transition region under the influence of both the Mediterranean climate and the land climate specific to Central Europe. The region shows different climatic characteristics from time to time and from place to place with the effects of the Black Sea, Aegean and Marmara seas. Winters are mild and rainy when the Mediterranean climate is in effect, and quite harsh and snowy when the continental climate is in effect. Summers are hot and dry and spring is rainy. The Ergene Basin, which is important in terms of crop production, is characterized by a harsh continental climate. The fact that this region, which is surrounded by mountains, is closed to the softening effects coming from the seas reveals this climate structure (EOİ, 2024).

According to the available data, 107 days a year are sunny in Edirne Center. The average daily sunshine duration is 6.5 hours. It receives an average of 2300 hours of sunshine per year. The dominant wind direction is North (General Directorate of Meteorology [MGM], 2024).

According to the measurements made by the State Meteorological Service (Figure 3), the annual average temperature is 13.8°C. The annual average of daily maximum temperatures is 44.1°C and the annual average of daily minimum temperatures is -19.5°C. In 2023, the annual maximum temperature was 32.0°C (July and August) and the annual minimum temperature was -0.5°C (January). The hottest months in the province are June, July, August and the coldest months are December and January. The average summer temperature is 23.4° (MGM, 2024).

The average annual precipitation is 601.0 mm and the average annual relative humidity is 70%. The average total precipitation in January is the highest at 65.0 mm. August has the lowest average total precipitation of 23.3 mm. The average rainfall in the Central District is 580 mm (MGM, 2024).

EDIRNE	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Measuring Period 1930 - 2023)													
Average Temperature (°C)	2.7	4.4	7.6	12.8	18.0	22.2	24.7	24.5	20.1	14.5	9.2	4.6	13.8
Average Max. Temperature (°C)	6.7	9.4	13.4	19.3	24.8	29.2	32.0	32.0	27.4	20.8	14.2	8.6	19.8
Average Min. Temperature (°C)	-0.5	0.5	2.9	7.1	11.7	15.5	17.4	17.3	13.5	9.3	5.3	1.4	8.5
Average Sunshine Duration (Hour)	2.4	3.6	4.5	6.2	8.0	9.2	10.3	9.8	7.5	5.2	3.2	2.2	6.0
Number of Rainy Days	12.23	9.51	9.74	10.14	10.29	8.65	5.35	3.88	4.74	7.59	10.42	13.00	105.5
Monthly Average of Rainfall (mm)	65.0	52.2	50.1	48.7	52.4	47.1	31.7	23.3	35.9	56.7	67.3	70.6	601.0
Measuring Period (1930 - 2023)													
Max. Temperature (°C)	20.5	23.3	28.0	33.5	37.1	42.6	44.1	41.9	39.9	35.8	28.0	22.9	44.1
Min. Temperature (°C)	-19.5	-19.0	-12.0	-4.1	0.7	6.0	8.0	8.9	0.2	-3.7	-9.4	-14.9	-19.5

Figure 3. Climate data for Edirne province (MGM, 2024).

The amount of precipitation increases in winter and decreases in summer. In this way, the water deficiency in the first months of the developmental stages of natural plants is met from the moisture accumulated in the soil during the winter months. The relative humidity is quite high in the basin. This situation has a positive effect on the basin vegetation (Edirne Agriculture Master Plan [ETMP] 2005)

3. 2. Agro Ecological Subzones

Agro-ecological zoning refers to the division of the province into sub-areas with similar characteristics such as climate, land form, soil structure, yield, environmental characteristics of the land, socio-economic structure. Considering this situation, Edirne Province was divided into 4 sub-regions. The central district, which is considered within the scope of the study, is in Sub-region II and almost all of this sub-region has lowland fertile soils. Irrigated agriculture is practiced, especially vegetable and fruit growing is common in this sub-region (ETMP 2005).

Soil Properties

Soils vary depending on climate, vegetation, parent material and topography. There are six major soil groups in Edirne province (Table 4).

Table 4. Soil Characteristics of Edirne Province

Soil Group	Area/Hectare	Suitability for Agriculture (%)
Alluvial Soils	87.863	100
Hydromorphic Alluvial Soils	18.828	0
Brown Forest Soils	12.552	38,3
Non-calcareous Brown Forest Soils	200.830	41,8
Non-calcareous Brown Soils	201.100	82,6
Vertisols	100.415	93,8

(Edirne Provincial Directorate of Agriculture, 2004)

Edirne province has 63.306 ha. of Class I, 235.385 ha. Class II, 202.772 ha. of Class III, 48.025 ha. of Class IV and the remaining 78.107 ha. of Class V, VI, VII and VIII soils.

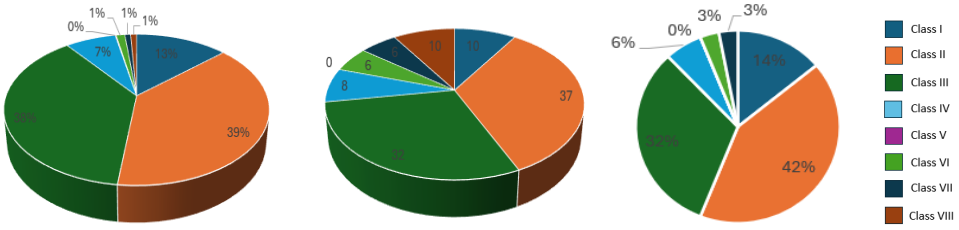

Figure 4. Distribution of Edirne Province Land Assets by Soil Classes , Distribution of Central District Land Assets by Soil Classes, Distribution of agricultural areas according to soil classes (Edirne Provincial Directorate of Rural Services)

The surface area of Sub-region II, where the central district is located, is 279,413 ha and this area consists of 37,473 Class I, 107,600 Class II, 105,168 Class III, 20,475 Class IV, 391 Class V (ha), 3,513 Class VI, 2,352 Class VII, 2,441 Class VIII soils.

In Edirne Province, 14.3% of the agricultural land is Class I, 41.2% is Class II, 32.2% is Class III, 5.9% is Class IV, 0.2% is Class V, 2.8% is Class VI and 3.4% is Class VII (Figure 4).

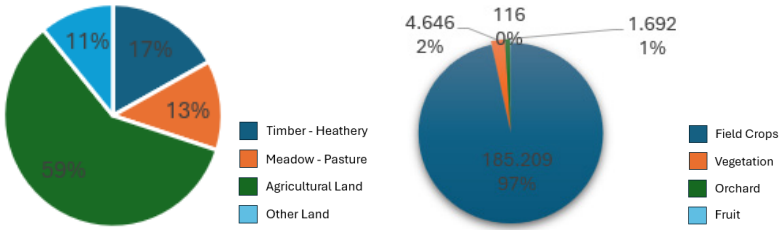

Figure 5. Land distribution in Edirne province, Distribution of the central district according to land use status (Edirne Provincial Directorate of Rural Services, 2004)

Table 5. Land Classes According to Major Soil Groups

Major Soil Groups	Soil. (%)	I. Class (%)	II. Class (%)	III. Class (%)	IV. Class (%)	V. Class (%)	VI. Class (%)	VII. Class (%)	VIII. Class (%)
Alluvial Soils	14	59	16	6	-	5	-	-	-
Hydromorphic Alluvial Soils	3	-	-	-	-	5	-	95	-
Brown Forest Soils	2	-	11	32	44	-	6	7	-
Calcareous Brown Forest Soils	32	3	26	36	10	-	14	11	-
Calcareous Brown Soils	32	6	44	38	8	-	2	2	-
Vertisols	16	1	69	30	-	-	-	-	-

(Edirne Provincial Directorate of Rural Services, 2004)

The total area of the province is 627,595 hectares. Of this area, 461,541 hectares is agricultural land and meadow pasture area and 104,228 hectares is forest land. The non-agricultural area is 61,826 hectares. Of the agricultural land, 365,976 hectares are cropland and constitute 79% of the total agricultural area, 81,279 hectares are meadow-pasture and constitute 18% of the total agricultural area and 14,286 hectares are vegetable, fruit and vineyard areas and constitute 3% of the total agricultural area (Figure 5, Table 5).

Table 6. Distribution of Edirne Province's Land by Sub-regions

District	Agricultural Land	Meadow - Pasture	Timber	Non-Agricultural	**TOTAL**
I. Sub Region	42.148	20.110	16.100	1.994	80.352
II. Sub Region	191.663	33.190	17.059	37.501	279.413
III. Sub Region	75.834	14.480	8.170	12.346	110.830
IV. Sub Region	70.617	13.499	62.899	9.985	157.000
Edirne	380.262	81.279	104.228	61.826	627.595
Edirne/ TR (%)	1,41	0,39	0,50	0,60	0,80
TURKIYE	26.968.000	20.500.000	20.703.000	10.184.700	78.355.700

(Edirne Provincial Directorate of Agriculture, 2004)

In the central district, which is located in Region II, there are field crops on 185,209 ha, vegetables on 4,646 ha, vineyards on 1,692 ha, and orchards on 116 ha within 191,663 ha of agricultural area.

3. 3. Population Analysis

As of 2023, the population of Edirne province: 442.834. 79.74% of this population lives in cities. While the village population was more than twice the city population in the 1950s and 1960s, the village population started to shift towards the cities after 1965.

The surface area of the province is 6.145 km2. There are 68 people per km2 in the province. This number is 237.22 in the central district with a population of 194,991. Central district has the highest population growth rate (Turkish Statistical Institute [TUIK], 2024).

In the 1980-2000 period, the share of the agricultural sector in the sectoral distribution of the employed has continuously decreased. While 65.3% of those employed in agriculture in 1980, this rate decreased to 49.6% in 2000. In 2000, 76.4% of employed women worked in agriculture, while 48.4% of employed men worked in the service sector. Almost all women employed in rural areas work in agriculture, while the majority of women employed in urban areas work in the service sector (Endeksa, 2024).

3. 4. Agricultural Production in Edirne

There are 42,292 households in Edirne. The number of households engaged in agricultural activities is 39,707, which is 93.9%. Of the households engaged in agricultural activities, 55.2% (23,331 units) are engaged in crop production and animal husbandry, 37.2% (15,747 units) are engaged only in crop production and 1.5% (629 units) are engaged only in animal husbandry. 2,585 households are not engaged in agricultural activities and the rate is 6.1% (Edirne Provincial Directorate of Agriculture, 2004) (Figure 6).

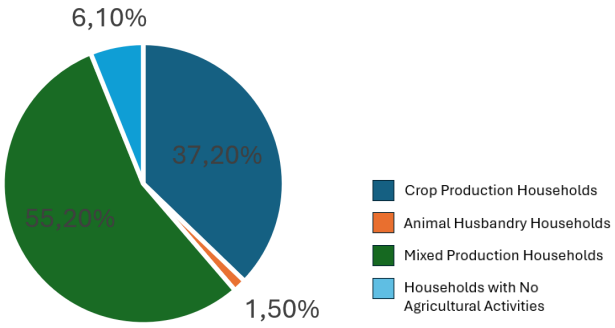

Figure 6. Distribution of Agricultural Enterprises by Fields of Activity in Edirne Province (Edirne Provincial Directorate of Rural Services 1984; 1993; Edirne Provincial Directorate of Agriculture,2004)

Agricultural production support services (distribution of inputs such as agricultural, technology, animal health, seed and breeding, and marketing) are largely provided by state institutions, cooperatives, NGOs and private sector organizations (Edirne Provincial Directorate of Agriculture, 2004).

4. EVALUATION OF URBAN AGRICULTURE - SWOT ANALYSIS

Urban agriculture practices have many advantages and disadvantages. Therefore, SWOT analysis method was used in this study to evaluate the applicability of urban agriculture in Edirne city center. SWOT analysis was used to identify and evaluate the internal and external factors that may affect urban agriculture in Edirne. This analysis is a method that focuses on strengths and weaknesses to reveal strengths, identify weaknesses and potential threats and develop plans to minimize them. In this context, SWOT analysis was used as a strategic assessment tool for the sustainable and effective implementation of urban agriculture in Edirne city center (Figure 7).

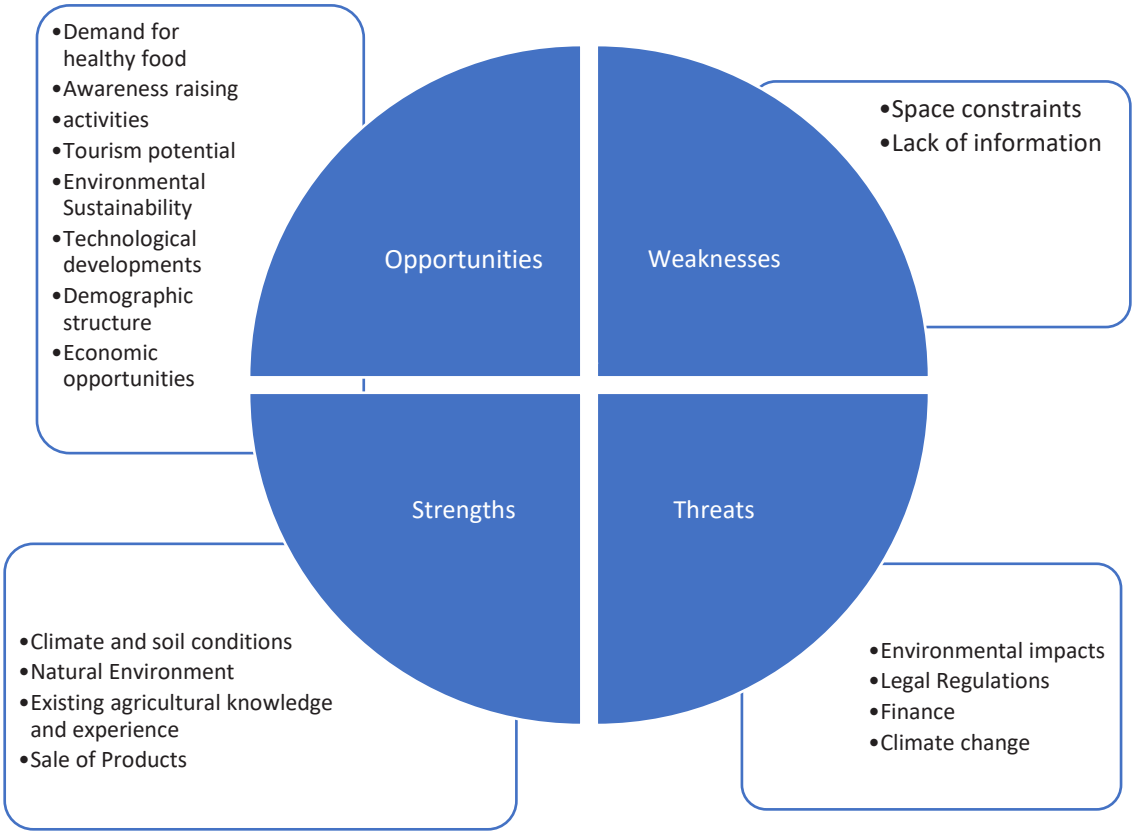

Figure 7. SWOT analysis (Prepared by the Author)

4.1. (S) Strengths

4.1.1. Climate and Soil Conditions

- Edirne province, which has a transitional climate between the Mediterranean climate and the Black Sea climate, has relatively balanced and mild weather conditions throughout the year and therefore has an ideal climate for the cultivation of various agricultural products.

- The average annual rainfall ranging between 600-700 mm provides sufficient water supply for agriculture.

- The long warm and sunny days in spring and summer support the photosynthesis and growth processes of plants. This allows many vegetable and fruit species to have more than one harvest period.

- Edirne has fertile soils enriched with alluvium brought by the Meriç River and other rivers. These soils are rich in plant nutrients and provide an excellent base for urban agriculture.

- Edirne's soils generally have neutral to slightly alkaline pH levels. This provides ideal conditions for many agricultural products, as most plants grow best in the neutral pH range.

4.1.2. Impact on the natural environment

- The ability to grow different plant species can increase soil fertility and biodiversity. This contributes to preserving natural ecosystems and promoting sustainable agricultural practices.

4.1.3. Existing Agricultural Knowledge and Experience

- Edirne is a region that has historically been engaged in agriculture and animal husbandry, and the extensive knowledge and experience of farmers in the region is a critical advantage for the planning, implementation and sustainability of urban agriculture projects.

4.1.4. Sale of Products

- Local markets in the city ensure that urban agricultural products can be easily sold.

- The ability to grow different crops increases the ability of local markets to respond to diverse consumer demands. This makes the market more flexible to fluctuations in demand.

4.2. (W) Weaknesses

4.2.1. Space constraints

- Dense residential, commercial and industrial zones in the central district prevent the availability of large areas of land suitable for agriculture. Passive areas in the city center are usually scattered in small parcels, and due to high land prices, these areas are allocated to more profitable projects such as housing and trade instead of agriculture.

- The small scale of potential urban agricultural areas limits urban agriculture to alternative methods such as hobby gardens or vertical farming, making large-scale, commercial agriculture difficult to realize.

- Vacant land in the center is often characterized by infrastructure deficiencies and contaminated soils.

4.2.2. Lack of information

- Lack of sufficient knowledge about urban agriculture among the public and local governments. It may prevent widespread implementation. It may make it difficult for the public to adopt projects.

- Failure to provide adequate support and incentives for urban agriculture projects may make the sustainability of projects difficult.

4.3. (O) Opportunities

4.3.1. Demand for healthy food

- People's demand for healthy and local food presents an important opportunity for urban agriculture practices. Fresh and organic produce grown in the city center plays a major role in meeting the healthy dietary needs of city dwellers.

- This demand provides direct support to local producers and enables faster and easier access to fresh produce for consumers.

- Consuming local food provides an environmentally friendly alternative by reducing the carbon footprint of the food transportation process.

- It increases food security in the city and reduces dependence on imported products. It also reinforces the city's residents' confidence in their food supply and stimulates the local economy.

- Increasing access to healthy and fresh food improves the quality of life in the city and positively impacts public health.

4.3.2. Awareness raising activities

- Organizing training programs and awareness campaigns on urban agriculture offers a great opportunity for the spread and success of urban agriculture practices in the central district of Edirne province.

- Activities organized for adults and children can reach a wide audience and contribute to increasing the awareness of sustainable agriculture throughout the society. The impacts of industrial agriculture can be minimized through social awareness.

- Awareness-raising activities can help city dwellers show more interest in urban agriculture and actively participate in projects in this field.

4.3.3. Tourism potential

- Edirne's rich historical and cultural heritage and existing touristic potential can be combined with urban agriculture projects to create new and attractive agro tourism opportunities.

- Urban agricultural areas close to Edirne's historical and touristic sites can increase the attractiveness of the city, contribute to the local economy, and encourage tourists to stay longer in Edirne by offering visitors an agricultural experience integrated with the cultural fabric of the city.

- Integration of urban agriculture projects with tourism can help local farmers and producers become economically stronger by enabling them to sell their products directly to tourists.

- Contributes to the development of sustainable tourism in the city and encourages the adoption of environmentally friendly tourism practices.

- It can increase tourists' awareness of natural and healthy living.

4.3.4. Environmental Sustainability

- Increasing green areas in the central district of Edirne province makes significant contributions to environmental sustainability and provides great opportunities to maintain ecological balance. Increasing green spaces helps to improve air quality in the city, reduce the urban heat island effect and improve the overall quality of life. Urban agricultural areas increase biodiversity and support the health of local ecosystems through the cultivation of diverse plant species.

- They contribute to the adoption of environmentally friendly agricultural practices and reduce the use of chemical pesticides and fertilizers. This helps to conserve soil and water resources and reduce environmental pollution.

- Urban agriculture can also offer sustainable solutions for water management and waste management. Practices such as rainwater harvesting and composting encourage water conservation and waste recycling. Such practices support sustainable resource use in the city and reduce its environmental footprint.

4.3.5. Technological Developments

- Smart agricultural technologies offer great opportunities to increase the productivity and sustainability of urban agricultural projects in the central district of Edirne province. These technologies offer various innovative solutions to optimize agricultural production processes and make resource use more efficient. By continuously monitoring plant health and growth conditions, smart agricultural technologies increase agricultural productivity and reduce resource waste.

4.3.6. Demographics

- The young and educated population living in the central district of Edirne province offers a great opportunity to increase the efficiency of urban agriculture projects with their predisposition to innovative agricultural techniques. Thanks to their ability to adapt quickly to technology and their innovative mindset, they are more willing to adopt smart agricultural technologies and modern agricultural practices. Thanks to their ability to keep abreast of the latest developments and scientific approaches in the field of agriculture, they can contribute to making urban agriculture projects more efficient and sustainable, and ensure that agricultural projects are implemented more quickly and effectively. Sustainable agricultural methods can be disseminated to wider masses under the leadership of these groups.

4.3.7. Economic Opportunities

- It offers a great opportunity to revitalize the local economy and create new job opportunities in the central district of Edirne province. Urban agriculture projects increase economic activity in the city by supporting the local production and consumption cycle. Local farmers, gardeners and agricultural entrepreneurs can take an

active role in urban agriculture projects and sell their products directly to the people of the city. This increases the income of local producers.

- The potential to revitalize the local economy is not limited to agricultural production, but also creates economic opportunities in ancillary sectors such as local food processing, packaging and distribution. Urban agriculture projects establish partnerships with local restaurants, cafes and markets, enabling local products to participate in the value chain. These partnerships contribute to the diversification and growth of the local economy.

4.4. (T) Threats

4.4.1. Environmental Impacts

- Heavy traffic, industrial activities and other sources of pollution in the city center can lead to poor air quality and soil contamination. This can prevent healthy plant growth and reduce agricultural productivity.

- Airborne pollutants can stick to plant leaves and surfaces, inhibiting the process of photosynthesis and slowing plant growth. In addition, some air pollutants, such as ozone, can damage plant tissues, reducing crop quality and reducing plant resistance to disease.

- Polluted environments can disrupt the ecological balance, creating favorable conditions for the spread of pests and diseases. This can increase farming costs and challenge the economic sustainability of urban agriculture.

4.4.2. Legal Regulations

- Legal regulations on land use and zoning plans may restrict the use of limited agricultural areas in the city center, making it difficult to initiate, expand, and sustainably conduct urban agriculture.

- The permitting and licensing processes required for urban agriculture projects to comply with legal regulations can be time-consuming and complex. These bureaucratic processes can delay the realization of projects and cause loss of motivation for entrepreneurs. Uncertainty or frequent changes in legal regulations can make long-term planning of projects difficult and increase financial risks.

4.4.3. Climate Change

- Urban agriculture projects in the central district of Edirne province may face various threats due to climate change. Climate change has significant impacts on factors such as temperature increase, drought, excessive rainfall, flooding and harmful weather conditions, which may negatively affect agricultural production.

4.4.4. Finance

- Failure to secure adequate financing for the operating costs required for urban agriculture during the growth phase of projects can negatively affect the sustainability and success of projects.

- Economic uncertainties and financial fluctuations can also negatively affect stability in the agricultural sector. Price fluctuations, increases in input costs and changes in exchange rates can challenge the profitability and financial soundness of urban agriculture projects.

Furthermore, economic recessions or sudden changes in market conditions can negatively affect the revenues and cash flows of projects.

5. POTENTIAL URBAN AGRICULTURAL AREAS FOR EDIRNE PROVINCE

Considering the results of the evaluation (SWOT analysis) and urban agriculture criteria for Edirne province, 6 potential urban agriculture areas that can set an example from the classes of residential gardens, educational gardens, institutional gardens, demonstration and market gardens, where urban agriculture can be applied in a sustainable manner were identified (Figure 8).

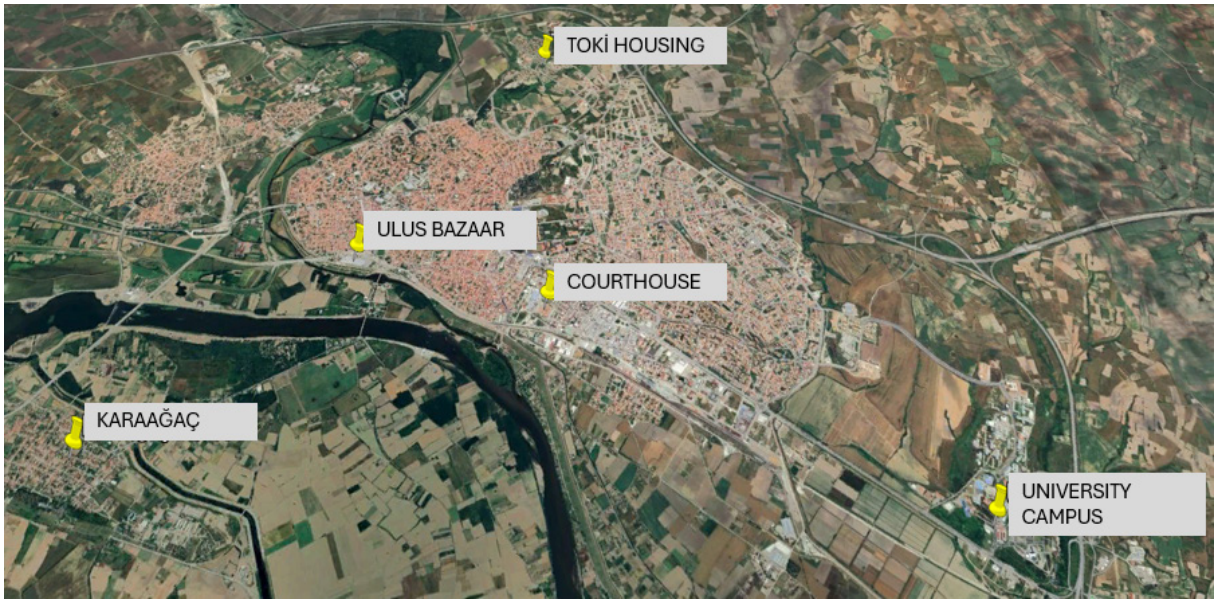

Figure 8. Potential Urban Agricultural Areas in Edirne Province (Edited from Earth, 2024)

5. 1. Housing Gardens- Toki Housing

The Toki housing in Barutluk neighborhood of the central district is located in a densely populated urban area that offers passive areas suitable for agriculture. Urban agriculture practices in this area can both increase food production through efficient use of existing green spaces and promote social integration and environmental awareness within the community. Furthermore, the fact that there are many individuals interested in agricultural activities among the residents of TOKI housing has the potential to increase the success of urban agriculture in these areas.

Figure 9. Edirne Province Potential Urban Agricultural Areas

5. 2. Educational Gardens - Trakya University Campus

Balkan Campus has large green areas and usable open spaces. These areas are suitable for agricultural activities and are ideal for creating educational gardens and community gardens. The university environment is the perfect place for agricultural education and research. Students and academics can study urban agriculture projects, conduct research and find hands-on learning opportunities. Residents living in close proximity to the university can participate in urban agriculture projects, receiving education and contributing to local food production. This can increase social interaction and solidarity within the community.

Figure 10. Educational Gardens - Trakya University Campus

5. 3. Institution Gardens - Courthouse

Edirne Courthouse, located in İstasyon neighborhood, is strategically located in the city center, where many people pass by on a daily basis. This increases the visibility of agricultural activities and spreads awareness. The courthouse and its surroundings have large and often unused open spaces. These areas can be utilized and greened for urban agriculture activities with the employees of the institution and the surrounding community. By participating in urban agriculture projects, courthouse staff and daily visitors can both receive training and actively engage in gardening. This can reduce employee stress levels and create a healthier environment in the workplace. Institutional gardens can help adopt environmentally sound practices and sustainable agricultural techniques. If an important institution like the Courthouse leads the way, it can inspire other public and private organizations.

Figure 11 Potential Urban Agricultural Area in Edirne Province

5. 4. Demonstration Gardens - Selimiye Square

Selimiye Mosque and Square is one of the most important historical and touristic areas of Edirne. Demonstration gardens in this area can contribute greatly to the promotion of urban agriculture by attracting a large number of visitors. The central location of the square ensures high visibility of the demonstration gardens. This can raise awareness and inspire both locals and tourists about the benefits of urban agriculture. The demonstration gardens provide an excellent setting for educational programs and workshops. Students, tourists and locals can gain practical knowledge on sustainable farming techniques and plant cultivation in these areas.

Figure 12. Edirne Province Potential Urban Agricultural Area

5. 5. Market Gardens - Ulus Bazaar

Ulus Bazaar is one of the busiest shopping destinations in Edirne. This density ensures that market gardens are seen and noticed by a large number of people, thus increasing awareness of urban agriculture. Market gardens provide market-goers with direct access to fresh and local food products. This is a great advantage for both vendors and consumers and increases local food security. Market gardens in the market area allow local producers and farmers to sell their products directly. This supports the local economy and increases the income of small-scale producers. Green spaces in the market area can be integrated into urban regeneration projects, beautifying the environment and increasing the amount of green space in the city. This provides environmental benefits and improves the quality of life in the city.

Figure 13. Potential Urban Agricultural Land in Edirne Province

5. 6. Hobby Gardens - Karaağaç Region

Karaağaç is a region close to the city center but with large and passive areas. These areas are of suitable size and potential for hobby gardens and provide an ideal environment for individuals to carry out personal agricultural activities. The Karaağaç region is generally quieter and away from residential areas. This increases the demand for hobby gardens and provides an environment where residents can be in touch with nature. Karaağaç is a region with a culture that is intertwined with agriculture and nature. Hobby gardens are generally well received by local residents and have become a popular activity among community members. This allows hobby garden owners to share knowledge and experience and increase social interaction.

Figure 14. Edirne Province Potential Urban Agricultural Area

6. CONCLUSION

This study was conducted to evaluate the feasibility of urban agriculture in Edirne city center. During the research process, the definition and importance of urban agriculture, Edirne's potential, applicability criteria and various urban agriculture practices were discussed. It was determined that urban agriculture has significant impacts in various areas such as food security, environmental sustainability, social solidarity and economic contributions. Considering the current demographic structure, land use and infrastructure of Edirne, it has been revealed that there are suitable areas for urban agriculture and many benefits can be provided to the city with the effective use of these areas.

In the study, the strengths, weaknesses, opportunities and threats of urban agriculture in Edirne were evaluated using SWOT analysis. The strengths of urban agriculture in Edirne include Edirne's agricultural production culture and history, and favorable climate. These factors constitute an important basis for urban agriculture practices. Weaknesses, on the other hand, are identified as the fact that urban agriculture is not yet sufficiently known, infrastructure deficiencies and the necessary legal regulations have not been fully implemented. In terms of opportunities, urban agriculture has the potential to increase food security, support the local economy and strengthen social solidarity in Edirne. In addition, urban agriculture projects are expected to make significant contributions to environmental sustainability efforts in the city. Threats are identified as climate change, economic fluctuations and urbanization of agricultural lands. Managing these threats is critical to the success of urban agriculture projects.

The feasibility of urban agriculture in Edirne city center is high and the social, economic and environmental sustainability of the city can be increased by implementing these practices. With proper planning and management, urban agriculture can be considered as a strategic development tool for the city of Edirne. In this context, the support of local governments and other relevant institutions, public education and awareness raising, encouraging social participation and making the necessary legal arrangements are of great importance. Financial support and incentives should be provided for urban agriculture projects and social solidarity should be strengthened through these projects. The importance of social solidarity and the difficulty of food supply in this process are experienced as a result of natural disasters with high destructive effects such as earthquakes. While climate change is an important threat on a global basis, it is extremely important to increase urban agriculture studies in order to raise awareness.

In our country, it is seen that there is no legal regulation on urban agriculture in terms of legal administration. However, in recent years, it is observed that local governments have been carrying out up-to-date studies with the increase in implementation examples. In this context, in Edirne, the Chamber of Agriculture, which organizes the producers in agriculture, the Chamber of Agricultural Engineers, which directs agriculture and supports the

producers, the Provincial Directorate of Food, Agriculture and Livestock, the Open Prison Directorate, which provides vegetables and other products to the city markets, Edirne Municipality and NGOs carry out joint activities in order to raise awareness of the citizens and increase agricultural activities. The activities focus on Karaağaç, Yıldırım and Yeni İmaret neighborhoods where agricultural activities are intensive and spread throughout the city.

In this research, qualitative methods were used to explain, analyze and interpret. However, in future studies on the subject, potential areas can be identified with the help of geographical information systems or the evaluability of the proposed areas within the scope of agriculture can be formulated and investigated qualitatively. The method used in the study can be used in cities with agricultural population and land potential.

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Disclosure Statements (Beyan ve Açıklamalar)

1. The authors of this article confirm that their work complies with the principles of research and publication ethics (Bu çalışmanın yazarları, araştırma ve yayın etiği ilkelerine uyduklarını kabul etmektedirler).

2. No potential conflict of interest was reported by the authors (Yazarlar tarafından herhangi bir çıkar çatışması beyan edilmemiştir).

3. This article was screened for potential plagiarism using a plagiarism screening program (Bu çalışma, intihal tarama programı kullanılarak intihal taramasından geçirilmiştir).