
**International Journal of Innovative Technologies in Social Science**

e-ISSN: 2544-9435

**Scholarly Publisher**
**RS Global Sp. z O.O.**
ISNI: 0000 0004 8495 2390

Dolna 17, Warsaw,
Poland 00-773
+48 226 0 227 03
editorial_office@rsglobal.pl

| | |
|---|---|
| **ARTICLE TITLE** | THE REQUALIFICATION OF THE URBAN SPACE OF DELLY IBRAHIM IN ALGIERS BY PERI-URBAN AGRICULTURE |
| **ARTICLE INFO** | Bacha Nesrine, Hadj Mohamed Naima. (2024) The Requalification of The Urban Space of Delly Ibrahim in Algiers by Peri-Urban Agriculture. *International Journal of Innovative Technologies in Social Science*. 4(44). doi: 10.31435/ijitss.4(44).2024.2955 |
| **DOI** | https://doi.org/10.31435/ijitss.4(44).2024.2955 |
| **RECEIVED** | 02 October 2024 |
| **ACCEPTED** | 20 November 2024 |
| **PUBLISHED** | 25 November 2024 |
| **LICENSE** | The article is licensed under a **Creative Commons Attribution 4.0 International License.** |

# THE REQUALIFICATION OF THE URBAN SPACE OF DELLY IBRAHIM IN ALGIERS BY PERI-URBAN AGRICULTURE

***Bacha Nesrine***
*Doctoral student, University of Algiers 1 Benyoucef Benkhedda, Algeria*
*Email: n.bacha@univ-alger.dz*
*ORCID ID: 0009-0000-5676-0795*

***Hadj Mohamed Naima***
*Professor, LMS Laboratory, Tahri Mohamed University Bechar, Algeria*
*ORCID ID: 0000-0002-0553-1308*

**ABSTRACT**

Algerian cities are facing uncontrolled urbanization, leading to the loss of vital resources. Algiers, for instance, is rapidly expanding into its outskirts, reducing the agricultural area per inhabitant from 0.82 hectares in 1962 to 0.18 hectares in 2010. This study aims to assess the integration of urban and peri-urban agriculture (UPA) in Delly Ibrahim to restore ecological and economic balance while enhancing local food security.We employ historical analyses, interviews, and field observations to explore the impact of urban sprawl on agricultural practices. Our findings reveal that peri-urban agriculture can play a crucial role in territorial planning, helping to mitigate the negative effects of urbanization. The results indicate that sustainable management of urban resources through UPA can preserve remaining agricultural land, ensure secure local food supplies, and promote environmentally friendly development. Specifically, enhancing green spaces, modernizing traditional agricultural practices, and supporting local food circuits can help balance urban expansion with farmland conservation.In conclusion, integrating UPA in Delly Ibrahim not only addresses the challenges of urban sprawl but also contributes to environmental sustainability and food security. Strengthening these practices is essential for maintaining the region's agricultural heritage and ecological health.

**KEYWORDS**

Urban Sprawl, Sustainable City

**CITATION**

Bacha Nesrine, Hadj Mohamed Naima. (2024) The Requalification of The Urban Space of Delly Ibrahim in Algiers by Peri-Urban Agriculture. *International Journal of Innovative Technologies in Social Science*. 4(44). doi: 10.31435/ijitss.4(44).2024.2955



## Introduction.

Urban sprawl is a global phenomenon with significant repercussions on the outskirts of cities, leading to the loss of agricultural land, increased pollution, and ecological fragmentation (Véron, 2008; Pumain et al., 2006). This issue is particularly pronounced in peri-urban areas around the capital of Algiers, such as the Delly Brahim agglomeration. The increasing pressure of urbanization threatens the preservation of valuable green spaces and the sustainability of urban agriculture. In this context, urban and peri-urban agriculture (UPA) is emerging as a potential solution to address these challenges. This study focuses on the potential future of agricultural practices amidst the current expansion of Algiers. We address various concerns related to the balance between urban and agricultural spaces, including the preservation of green areas and the environmental and food sustainability of the city's agriculture. The central question is how agricultural practices can adapt and thrive in a rapidly changing environment. Analyzing the spatial and temporal dynamics of urban expansion is crucial to understanding its impacts on agricultural land in Delly Brahim. By assessing the sustainability of remaining agricultural systems, we aim to demonstrate their importance for food security and the resilience of urban environments. Successful examples of UPA in other regions, such as Canada and Mediterranean

countries, highlight the need for public support and community engagement to ensure the success of these initiatives. Our objectives include analyzing the dynamics of urban expansion from Algiers to its outskirts and examining the impacts of this urbanization on agricultural land in Delly Brahim. We also aim to assess the environmental and food sustainability of the remaining agricultural systems to ensure the viability of peri-urban agriculture within the city. By integrating these measures, we demonstrate that UPA not only contributes to urban food supply but also enhances the structuring and resilience of urban environments.

**Methodology.**

**1. Study Design**

The study was designed to analyze the interactions between the urbanization of Algiers and peri-urban agriculture in Delly Brahim. By integrating both qualitative and quantitative analyses, we aimed to understand the effects of urban expansion on agricultural land and to develop requalification strategies to protect these vital spaces.

**2. Data Collection**

- **Analysis of Urban Transformation in Algiers**: We traced the phases of urbanization and identified the influencing factors. This analysis revealed the dynamics of urban sprawl and its impact on peripheral farmland, providing a foundation for developing protection strategies.
- **Impact Analysis of Urbanization on Delly Brahim Farmland**: This analysis was essential for understanding the dynamics of urban expansion and its effects on agricultural land. We assessed the loss of arable land and changes in agricultural production patterns, collecting valuable data to identify necessary measures for protecting remaining farmland within the new approach to peri-urban agriculture.
- **In-depth Environmental and Socio-economic Analyses** : These assessments were conducted to ensure the effective integration of peri-urban agriculture in Delly Brahim, aligned with local data and the new directions of the master plan for development and urban planning of the wilaya of Algiers.

**3. Analysis Techniques**

The following methods were utilized for data collection and analysis:

- **Cartographic Approach**: Mapping tools were used to visualize spatial transformations and identify areas of conflict between urbanization and agriculture.
- **Semi-structured Interviews** : We conducted interviews with key players in peri-urban agriculture in Delly Brahim, such as farmers, local administration representatives, agricultural associations, and technical stakeholders. These interviews provided crucial qualitative insights into the challenges and opportunities related to peri-urban agriculture.
- **Consultation of Archives and Questionnaires** : The research also involved consulting historical archives and administering questionnaires to gather data on agricultural practices and local stakeholder perceptions.
- **Field Observations** : Field observations were carried out to complement the collected data and provide a direct insight into agricultural practices and the impacts of urbanization.

By combining these methods, we obtained a comprehensive view of the challenges facing peri-urban agriculture in Delly Brahim and proposed suitable solutions to ensure its viability and sustainability.

**Results.**

**1. Dynamics of urbanization in Algiers and its effects on agricultural land:**

By tracing the phases of urbanization and the influencing factors, this study assesses the impact of Algiers' urban expansion on the agriculture of its outskirts. This historical perspective is essential for developing requalification strategies aimed at protecting agricultural land while meeting the needs of a growing urban population. Urban sprawl, a global phenomenon, is characterized by the expansion of cities towards their peripheries, leading to an increase in urbanized areas and a sprawl of urban populations and activities (Véron, 2008; Pumain, 2006). Although this phenomenon is perceived as a response to demographic growth and housing crises, it leads to the consumption of fertile and natural land, particularly impacting surrounding agricultural areas (Nemouchi, 2011). Peri-urbanization, a modern form of urbanization favoring polycentricity and green spaces, creates mixed-use areas that are often unplanned and intensifies competition for land with agriculture (Dubois-Taine and Chalas, 1997). Prost (1994) points out that outlying areas, often reserved for urban expansion, threaten local agriculture by causing crops to be abandoned and landscapes to be devalued. This phenomenon creates a conflict between agricultural activities and new construction, thus weakening

agriculture. Today, it poses major challenges for sustainable land management, requiring a review of urban and peri-urban land use to ensure a sustainable future (Jouve et al, 2007). In North African cities such as Algiers, urban sprawl is progressively reducing the fertile land of the Mitidja, marking a significant urban evolution in several key phases.

### 1.1. Initial urbanization and gradual expansion

The urban sprawl of Algiers from 1830 to 2002 (Benazzouz Belhai, 2010) shows progressifs and extensive urbanization. In 1830, urbanization began around the Casbah, the city's historic core. European neighborhoods soon emerged outside the old city walls, diversifying the urban landscape. Expansion into agricultural villages such as Hussein Dey transformed them into residential areas, illustrating growing integration. This trend has continued with the integration of other villages, underlining the ongoing expansion into outlying areas. The search for quality residences and new commercial spaces accelerated expansion into neighborhoods such as El Biar and Chéraga, diversifying urban needs with the development of leisure and secondary residential areas.

### 1.2. Rapid urbanization and modernization

After independence in 1962, urbanization, marked by the departure of the European population, necessitated the planning of social housing projects followed by the modernization of urban infrastructures, leading to rapid expansion. Territorial rebalancing plans from 1966 to 1977 (Zitoun, 2014) clearly demonstrated the start of the spatial growth process, albeit at a relatively moderate pace. From 1977 to 1987, urbanization accelerated with plans including residential, commercial and industrial developments. The Master Plan for Urban Planning and Development (PDAU) initiated in 1989 enabled urban expansion, which intensified with a significant increase in the number of settlements (Bakour et al, 2015; Sahli, 1993). By 2002, urbanization had merged the outlying agglomerations, transforming Algiers into a vast polycentric metropolis with several hubs of activity, reflecting continuous expansion and progressive densification.

### 1.3. Growing pressure and transformation of the agricultural landscape

Since 2008, rurbanization has continued to alter the agricultural landscape, reducing arable land and posing environmental challenges. The hierarchy of urban areas is also evolving, with secondary centers gaining in importance where business parks and large-scale projects are being built. These changes reflect an ongoing urbanization dynamic, where the city expands and adapts to meet the needs of a rapidly growing population (Bakour, 2015). This territorial dynamic has led to the zoning of the Algiers metropolitan area into three concentric rings : the communes of central Algiers, a pericentral area and a third peri-urban ring. is made up of three concentric rings: the communes of central Algiers, a pericentral area and a third peri-urban ring.

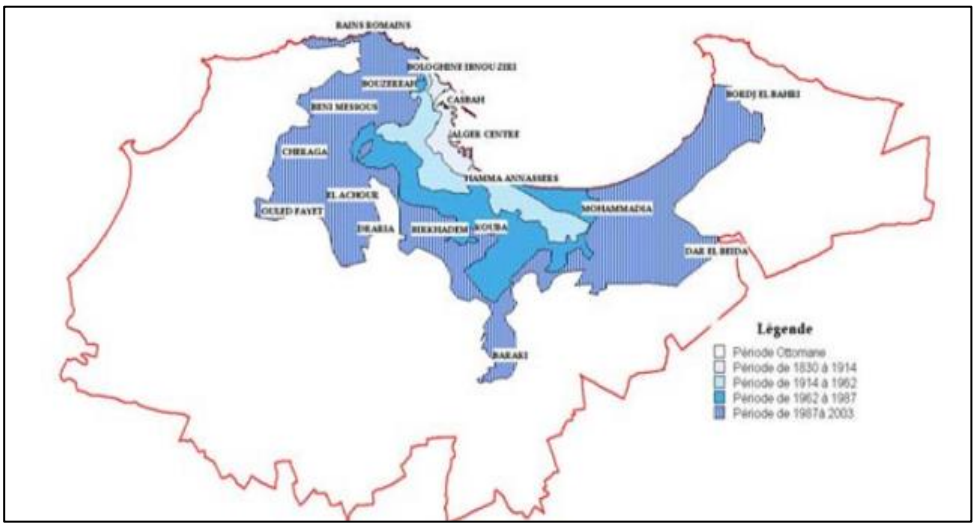



*Fig1. Geographical location of Algiers (Bakour, Benazzouz, & Durbiano, 2015)*

This rapid urbanization has had a significant impact on peripheral agriculture and biodiversity, posing growing environmental challenges. According to the 2002 coastal development program, uncontrolled

urbanization since 1992 has swallowed up 1,400 km² of fertile land, with more than 15,000 ha of agricultural land lost between 1987 and 1997, and more than a third of the useful agricultural area built up between 1972 and 1999. Recent annual statistics from the Algiers Agricultural Services Department reveal that the average annual loss of farmland in Algiers, which was 650 ha between 1987 and 2008, is now around 500 ha per year due to urban expansion. According to SRAT, these losses are due to the small size of farms, the ageing of farmers and their low level of education. In recent years, urban sprawl has intensified to the west, particularly around Delly Ibrahim, which has been transformed from a peripheral agricultural zone into a dynamic urban center with improved road infrastructure and public services. These results demonstrate the need for a detailed analysis of the impact of urbanization on Delly Ibrahim's agricultural land, in order to preserve this land and ensure sustainable management of urbanization in this western part of Algiers.

## 2. Consequences of urbanization on farmland in Delly Ibrahim

Analysis of the impact of urbanization on farmland in Delly Brahim enables us to assess this process by measuring the loss of arable land and observing its impact on agricultural production methods. This analysis provides valuable data for identifying the measures needed to protect the remaining farmland and promote more balanced urbanization between urban development and agricultural activities.Delly Brahim is a commune located to the west of Algiers, around 10 kilometers from the city center, in an urban area made up of the original consolidated nuclei of the ancient (Fahs) of Algiers, recent residential neighborhoods and infrastructure, all interspersed with remnants of natural areas (POS, 2020). This area is the result of a process of intensive urbanization and peri-urbanization, extending over the Sahel hill in a hilly relief, offering a particular landscape and natural value.

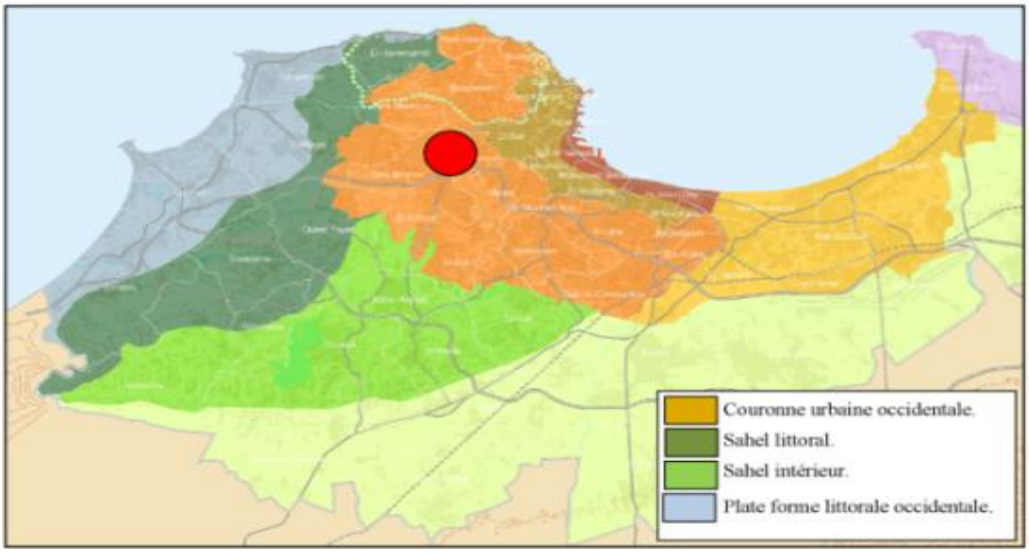
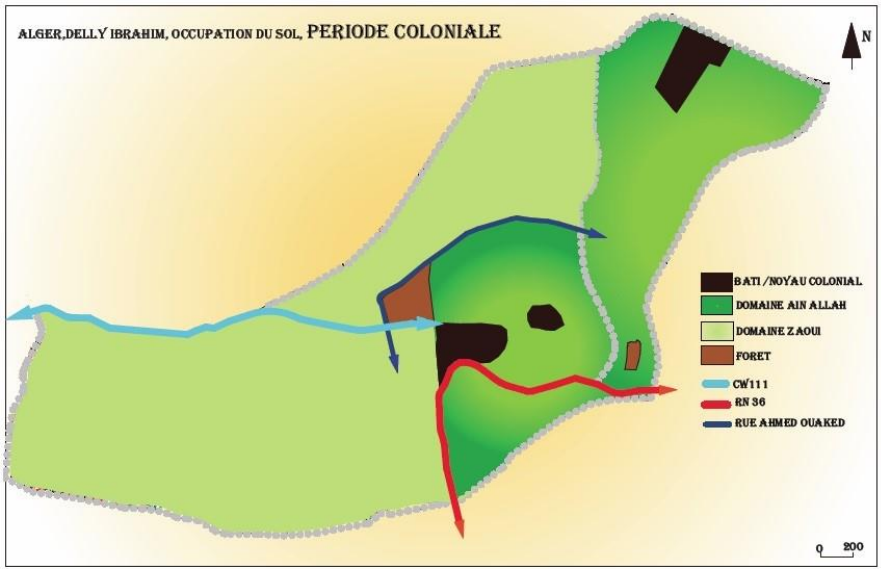



*Fig 2. Constitution of the rings around Algiers over time (Benazzouz, 2010)*

### 2.1. The urbanization process: (Global marper and archicad)

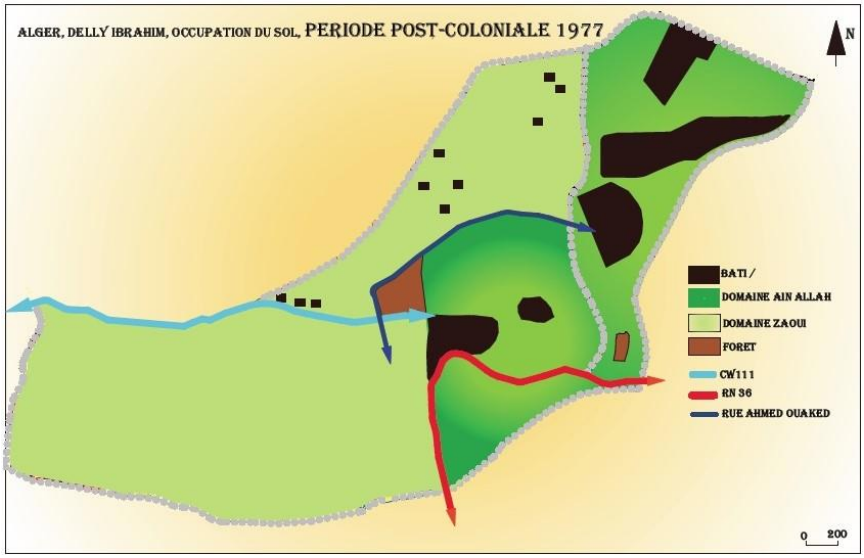
Formerly known as Domaine Zaoui, Delly Brahim is a commune whose history is deeply rooted in agriculture. Officially identified by royal decree on December 21, 1832 by the Duc de Rovigo (commune archives), this colonial village was originally a regional control center established on the “Haouch Deli-Ibrahim” farm. Historically, the town's vast agricultural estates were dedicated to a variety of crops, including cereals, vegetables and orchards, as well as livestock. Collective and individual farms (EAC and EAI) played a key role, supplying essential products and making a significant contribution to the local economy. Since then, Delly Brahim has undergone profound transformations, with its peri-urban territory facing competition between urbanization and existing agricultural activity (Nemouchi, 2011). The history of its urban development reflects a diversity of changes influenced by various political, economic and social contexts. Each historical period, from French colonization to the contemporary era, has left its mark on the city's landscape and urban structure.

| **Colonial period** | |
|---|---|
| **Urbanization process** | After 1945: Reduction of the commune's boundaries<br>1946: Creation of leisure areas such as the Country Club d'Alger golf course.<br>Early 1950s: Creation of new housing estates (Parc de Miremont, the small buildings of Printania and Mansouria, the Chevally housing estate, the Clairval housing estate and the buildings of Cité Fougeroux).<br>1945-1958: Urban growth with social housing built by the CIA and HLM offices, notably Cité Armaf. |
| **Reduction of agricultural land** | Part of Delly Ibrahim's territory was ceded to create new communes, such as Beni Messous and Bouzaréah.<br>This new urbanization has reduced agricultural land by 93%, creating residential and leisure areas with :<br><br>- Predominantly agricultural areas, 93% : Ain Allah and Zaoui estates<br>- Forest areas 3%<br>- Built-up areas and infrastructure 3%<br>- Main highways: CW 11 and RS 36 1%. |
| **Impact of colonial urbanization** | Limited urbanization: few built-up areas, minimal impact of urbanization on farmland. |

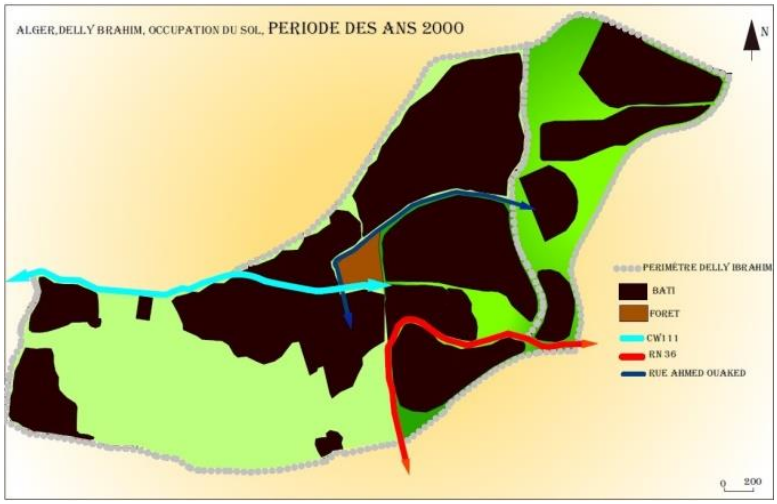


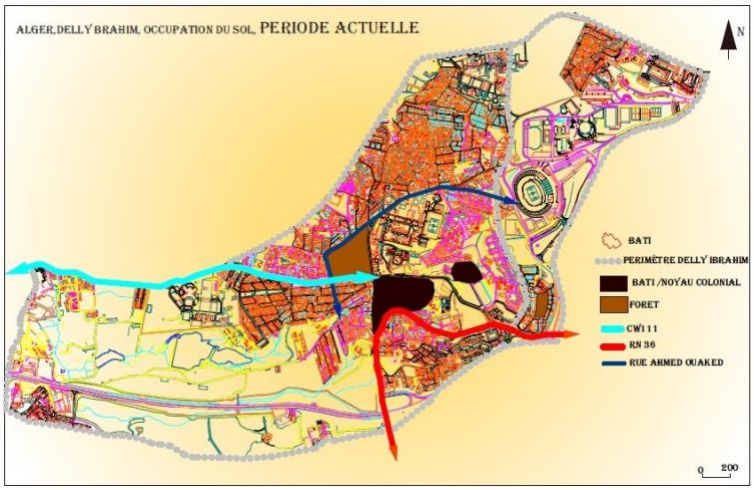

| **Post-colonial period (1964-1987)** | |
|---|---|
| **Urbanization process** | Between 1964 and 1972: Major projects such as the Olympic stadium in the Oued Lekhal valley in Chateauneuf.<br>In 1987: Group housing projects such as the Ain Allah housing estate, the Danois housing estate and Djenane Achabou. |
| **Reduction of agricultural land** | Post-colonial urban expansion has intensified the conversion of agricultural land to residential areas and public infrastructure by 92%, with :<br>- Dominant agricultural areas92% : AinAllah and Zaoui estates<br>- Forested areas 3%<br>- Built-up areas and infrastructure 4%<br>- Main highways: CW 11 and RS 36 1%. |
| **Impact of post-colonial urbanization** | Growth of residential areas: New residential constructions have emerged, further reducing agricultural land. |

**Post-colonial period (1964-1987)**




| **Period 1980-2010** | |
|---|---|
| **Urbanization process** | From the 1980s: Creation of housing cooperatives (El Amel, El Mostakbal and El Bourouj cooperatives).<br>1990's and 2000's: the freeing up of land allowed the emergence of private real estate cooperatives for the extension of certain nuclei on the outskirts.<br>Since 2000-2010: a metro line linking Place des Martyrs, Delly Ibrahim, Chéraga, Ouled Fayet and Draria. |
| **Reduction of agricultural land** | A large proportion of agricultural land has been converted to residential and commercial areas, reducing the space available for agriculture by52% with :<br>- Predominantly agricultural areas 40% :Ain Allah and Zaoui estates<br>- Maintenance of Forests 3%.<br>- Significant 54% increase in built-up areas covering a large part of the territory.<br>- Main roads: extension of road infrastructure, with CW 11 and RS 36 still present.3%. |
| **Impact of urbanization 1980-2010** | Urban expansion: Accelerated urban growth leading to fragmentation of the agricultural landscape.<br>- Effect on local ecology: The reduction in forest and agricultural areas has had negative ecological impacts, such as reduced biodiversity and disruption of local ecosystems. |



| Current period | |
|---|---|
| **Urbanization process** | -New Urban Projects: Continued urbanization with real estate projects and infrastructure developments, including roads, shopping centers and residential complexes.<br>-Metro and Public Transport: Extension of the metro network linking Delly Ibrahim to Algiers and other communes, facilitating mobility and attracting new populations. |
| **Reduction of agricultural land** | Continued erosion of agricultural land: Urban pressure continues to reduce agricultural land by 62%, transforming it into residential and commercial areas:<br>- Dominant agricultural areas 20% :Ain Allah and Zaoui estates<br>- Maintenance of Forests 3%<br>- Significant increase in built-up areas covering a large part of the territory: 64%.<br>- Main roads: extension of road infrastructure, with CW 11 and RS 36 still present 3%. |
| **Impact of recent urbanization** | - Intensification of urbanization: increased urban density, exacerbating problems linked to land use, waste management and demand for natural resources.<br>- Diversification of urban typologies, some of which derive from the modern movement, marking a clear break with traditional urban scale and language.<br>- A complex, fragmented urban mesh, formed through a process of successive additions.<br>- Ecological challenges: The gradual disappearance of agricultural land and green spaces poses ecological challenges, particularly in terms of water management, biodiversity and air quality. |
|  | |

The evolution of Delly Ibrahim shows a marked transition from predominantly agricultural land to extensive urbanization. This transition led to a considerable reduction in fertile land, profoundly altering the landscape. Despite these urban transformations, the remnants of these former agricultural estates are still visible in the city's recent map, testifying to the evolution of land use in the region. Delly Ibrahim currently retains various typologies of agricultural spaces, such as private urban farms, gardens associated with housing, wasteland gardens, agri-parks and forests. What's more, according to our surveys and data from the commune's agricultural services, farming in this peri-urban town remains an essential source of income for 100% of fellahs from older families, and accounts for 30% of secondary activities for middle-income families, and serves as a leisure and relaxation activity for retirees. Unemployed young people cultivate carob and olive trees to market their harvests, contributing around 7 tonnes of carob per year and 500 liters of olive oil per season to the local economy (Services agricoles, 2024).

### 2.2. The need to integrate urban and peri-urban agriculture

Today, the remains of former farms in this city illustrate the crucial importance of reassessing the balance between urban development and farmland preservation. The need to rethink this relationship is becoming increasingly evident, particularly with the emergence of strategies aimed at requalifying urban spaces while promoting urban agriculture and raising awareness of its vital role in our environment. The Plan

Directeur d'Aménagement et d'Urbanisme (PDAU) Horizon 2029, which features advanced strategic planning, highlights this priority, with an innovative approach that includes the creation of a green plan and the promotion of urban agriculture. This ambitious plan seeks to control urban sprawl while mitigating its environmental and socio-economic impacts. The implementation of a green plan, in particular, is designed to promote sustainability by integrating agricultural practices into urban environments, which could contribute to a more harmonious balance between urbanization and land conservation. In this context, it is imperative to take into account the data from this analysis revealing the potential of urban requalification that integrates urban and peri-urban agriculture as a novel approach and an essential strategy for ensuring long-term sustainability (Vidal and Fleury, 2009; Nahmías and Le Caro, 2012). The next two chapters will then seek to assess in depth the environmental and socio-economic sustainability of landscape and agricultural activities in Delly Ibrahim. This assessment will aim to ensure that the integration of urban and peri-urban agriculture will be effectively aligned with the city's data and the new orientations of the PDAU.

## 3. Analysis of the sustainability of the agricultural and landscape environment for the promotion of AUP in Delly Brahim:

Situated between three distinct landscape units: the heights of Algiers, the coastal Sahel and the inland Sahel, Delly Brahim enjoys significant ecological, natural, tourism, agricultural and recreational potential. This compact urban area occupies the highest points of Algiers and extends southwards to the ring road, a clear physical boundary (Mebarki et al, 2019). Urbanization, though dense, runs through tree-lined enclaves that surround the territory and cover the most rugged areas with gardens, woods and parks. This network of green spaces constitutes a valuable ecological and landscape heritage, essential to defining the environmental system of the Delly Brahim commune.

This system comprises natural areas, an agricultural reserve including fertile land, farms, forests, gardens, parks and other green spaces integrated into urban areas (POS, 2020). Together, they maintain an ecological balance by offering not only agricultural spaces, but also places for recreation and rest. The analysis of these main areas aims to assess their sustainability in order to ensure their preservation and contribution to the protection of the region's natural environment.

### 3.1. Agri-parc Dounia or wind park:

Parc Dounia, also known as Parc des Grands Vents, is one of the commune's most important landscape units, often referred to as the “Lung of the Capital” (Ministry of the Environment, 2012). This national-scale park covers an overall area of 1,059 hectares, of which 196 hectares are incorporated into the Delly Ibrahim commune, in accordance with the decree of April 11, 2012. According to the typology of green spaces and Algerian regulations, in particular Law 07/06 of May 13, 2007 on the management, protection and promotion of green spaces, Parc Dounia is classified as an urban park (article 4). Close to the city, the park offers relaxation facilities, playgrounds, sports attractions and catering areas. It also plays a crucial ecological role, promoting biological diversification and contributing to its balance. As an ecological corridor, it connects different reservoirs of biodiversity thanks to its wetlands. In addition, the park houses an energy farm with three wind turbines and 1100 photovoltaic panels, reinforcing its role in promoting renewable energies.

*Fig 4. L'Agri-Parc « Dounia ». Authors*

A sustainability analysis of the Dounia park shows that it has considerable potential for : promote and develop peri-urban agriculture in the region. Its recreational infrastructure, ecological role and commitment to renewable energies provide a solid foundation for this transition. The sustainability of this potential can be optimized, according to the agricultural services, by the following actions:

- Increasing the number of growing areas and community gardens.
- Encouraging community participation in urban agriculture projects.
- Use of renewable energy resources to support agricultural activities.
- Development of training and awareness programs for peri-urban agriculture.

By adopting these measures, Dounia Park can become a model of urban sustainability, harmoniously integrating ecology, leisure and agriculture for the benefit of the city of Delly Brahim and its inhabitants.

### 3.2. Forests:

Urban forests play a vital role in the environmental system, providing valuable green spaces that improve air quality, regulate temperatures, and offer habitats for local biodiversity. In addition to their ecological benefits, they serve as places of recreation and relaxation for local residents, contributing to their physical and mental well-being. Harmoniously integrated into urban infrastructure, forests also support urban agricultural activities, such as agroforestry, which combines food production with sustainable forest management (Cheikh et al, 2018).

- **Bois Des Cars forest:**

Covering 5 hectares, the Bois des Cars forest was classified as a recreational forest in 1985. Located in the heart of the urban environment, it is an important green zone for the region. The forest is dominated by resinous species such as Algerian pine, cypress and eucalyptus. Inside the forest, amenities such as playgrounds, soccer pitches and a village hall are present, making this area one of the main woods in the wilaya of Algiers.

- **El Kharoub forest**

The Caroubier forest, covering 4 hectares, is one of the region's most emblematic natural areas. Dominated by carob trees, this forest offers a rich biodiversity and plays a crucial role in local agriculture. Carob trees, known for their medicinal properties and edible fruit, provide significant ecological and economic value (Benmahioul et al, 2011). Carob production, used in food and pharmaceuticals, contributes to the local economy and promotes sustainable agriculture. The forest is also an essential recreational area for local residents, with hiking trails, picnic areas and recreational spaces. In addition to these functions, it regulates the local climate, purifies the air and reduces urban temperatures. It is therefore a vital natural heritage for Delly Brahim, combining ecology, agriculture and local development.

These urban forests thus offer valuable assets for the region, providing ecological, recreational and economic benefits. Their sustainability can be enhanced by supporting peri-urban agriculture through:

- Promoting public-private partnerships and encouraging agroforestry practices to combine food production and sustainable forest management (Barthel et al, 2013).
- Developing educational programs to raise awareness of the benefits of urban agriculture and sustainable farming practices.
- Expansion of growing spaces and community gardens within these urban forests to support local food production.
- Optimization of recreational and leisure spaces while integrating agricultural elements to encourage community participation.

By adopting these measures, Delly Brahim's two urban forests can become models of sustainability, effectively integrating ecology, recreation and agriculture for the benefit of local communities.

*Fig. 5. Forêts Bois des Cars et Caroubiers. Authors*

### 3.3. Green spaces:

Green spaces, also known as ecological green spaces, natural spaces or urban nature spaces, are governed by law 07/06 of May 13, 2007. According to articles 03 and 04 of this law, these spaces include botanical gardens, collective gardens, residential gardens, private gardens and avenue trees. In Delly Brahim, there are several notable community gardens, including those at the old people's home, the SAMU, the polyclinic, the Ain Allah housing estate, the 550-housing estate, the Grands Vents housing estate and the OPLA head office. There are also green spaces such as the Delly Brahim town center square and the APC square. The green space at the Institut Pasteur, classified as a collective garden accompanying a facility, is another significant example. Private gardens, which cover a significant portion of the territory, are essential spaces spread throughout individual residences. They play a crucial role in reflecting the economic and socio-cultural values of the local communities that enjoy them.Delly Brahim's tree lines are important green spots and provide significant areas of vegetation. These include the tree lines along the RN36 trunk road, the communal Christian cemetery, the road linking the Ain Allah roundabout to Ouled Fayet, the 11 Décembre housing estates, the southern bypass and the wadis and adjacent areas, such as Oued Bouchebouk and Oued le ravin de Grand Vent. These green spaces play a crucial role in Delly Brahim's urban ecosystem and contribute to residents' quality of life by providing places for relaxation, leisure and contact with nature. They also offer considerable potential for the promotion and development of peri-urban agriculture, for example:

- Transforming some collective gardens into community vegetable gardens to encourage local food culture and education in sustainable agriculture.
- Supporting private gardens to maximize their use for growing food.
- Integrating urban agriculture practices such as growing edible plants along tree lines to optimize space and improve food production.

By adopting these strategies, Delly Brahim can strengthen the integration of agriculture into its urban environment, improve the sustainability of green spaces, and promote the well-being of residents.

### 3.4. Farms and gardens associated with housing:

The farms and private gardens associated with Delly Brahim's housing, dating from the colonial period, are essential elements of the region's peri-urban agriculture. These agricultural spaces, integrated into the urban fabric, play a crucial role in local food security by providing fresh, diversified produce. They illustrate a model of harmonious urban development, taking advantage of soil fertility to combine agricultural production with living spaces. These farms and gardens also provide green spaces that enhance residents' quality of life. They promote biodiversity, create beneficial microclimates and meet growing food needs while preserving the region's landscape character.

*Fig. 7. Agricultural practice in gardens associated with housing. Authors*

What's more, these private farms and gardens support the local economy by creating jobs and supplying produce to local markets. They also encourage sustainable farming practices, reducing the ecological footprint associated with food transportation. Farming practices in these areas also help preserve traditional local techniques.

### 3.5. Westland Gardens:

The wasteland gardens are initiated by local communities and associations in Delly Brahim and play an important role in urban revitalization. They contribute to environmental sustainability by transforming vacant land into green and agricultural spaces, thereby reducing the impact of urbanization. By also incorporating

sustainable practices such as organic gardening, these gardens contribute to better waste management and reduced consumption of non-renewable resources. These gardens not only transform unused land into productive space, they also embody a model of environmental sustainability. They demonstrate how local community initiatives can play a vital role in creating greener, more sustainable cities.All these landscape and agricultural activities represent a major asset for the sustainable development of peri-urban agriculture, which can be reinforced by more marked delimitation of agricultural zones and the development of regenerative agriculture. They offer a valuable combination of food production, improved quality of life and support for the local economy. With a view to preserving and optimizing their potential, the municipality's agricultural services are planning to promote the expansion of these areas and strengthen their role in food production. These measures will enable agriculture to be better integrated into the urban environment, while improving its sustainability and socio-economic contribution to the region.

## 4. Analysis of peri-urban farming practices in Delly Brahim and promotion of food security:

Analysis of farming practices in this area highlights the challenges and opportunities inherent in integrating agriculture within a rapidly expanding urban environment. This study aims to assess how local farmers are adapting their methods to meet growing food needs while preserving natural resources and enhancing the economic resilience of communities. By examining production systems, distribution scales and local policies, this analysis offers an in-depth perspective on the potential of peri-urban agriculture as a vector for sustainable development and food security in Delly Brahim.

### 4.1. Urban agricultural production in Delly Brahim: Data and trends

**Based on an examination of the agricultural archives of the Delly Brahim commune:**

Covering the post-colonial period to the present day, the following data on existing agricultural practices have been extracted:

From 1962 to 1988:

- Collective farms (EAC):
  - EAC 1: Forage and dairy cow and bull breeding on 46.2 ha with a capacity of 83 head.
  - EAC 2: Forage, livestock (poultry center) and plantations on 21.5 ha.
  - EAC 3 : Forage on 42 ha.
  - EAC 4: Cattle breeding and plantations on 40 ha with a capacity of 500 head.
- Individual farms (EAI) :
  - EAI 1: Forage, market gardening and cattle rearing on 4 ha with a capacity of 3,000 head.
  - EAI 2: Plasticulture, arboriculture and snail farming on 1.2 ha.

During this period, peri-urban agriculture in Delly Brahim was mainly focused on livestock, as the archives show. Collective and individual farms focused mainly on cattle and fodder production, with areas ranging from 21.5 to 46.2 ha in the case of collective farms, and varied activities including market gardening and plasticulture in the case of individual farms.

From 1988 to the present day:

- Two farms (Ain Allah farm and Reguieg farm).
- Harvesting of carob and olive trees in the El Kharoub forest.
- Exploitation of collective and individual gardens integrated into housing.
- Management of wasteland gardens (cultivation of unsuitable land).

Since 1988, agriculture in Delly Brahim has evolved towards a diversification of activities. In contrast to the previous period, this period is characterized by the existence of two agricultural farms, the cultivation of carob and olive trees and the increasing integration of collective and individual gardens into urban housing. The use of wasteland gardens also shows an adaptation to new agricultural practices. This transition indicates a shift from a predominantly livestock-based agriculture to a more varied approach favouring plant production and the use of urban spaces for agriculture.

**Statistical data from the 2024 agricultural subdivision:**

Concerning the number of livestock in the commune, recent statistics for 2024 indicate a total of 68 cattle, including 56 dairy cows (48 of which are lactating), 3 bulls, 4 bull calves, 2 12-month calves and 3 12-month calves. Sheep numbers 51 goats and 64 sheep, divided between several breeders. Finally, the equine herd includes 60 males, 150 mares, 25 foals and 65 fillies (agricultural subdivision of the Delly Ibrahim commune). These data show a significant distribution of livestock numbers in the commune, underlining the

diversity and importance of peri-urban agriculture despite increasing urbanization. Cattle dominate in terms of numbers, with a majority of dairy cows. Sheep and horse numbers vary considerably from one farmer to another, illustrating the diversity of livestock farming practices in the region.

### 4.2. Socio-economic study

The socio-economic analysis of peri-urban agriculture in Delly Brahim (based on data from the subdivision of agriculture, 2024) highlights the dynamics and importance of this practice in the region. By examining the number of people involved, the role of production in food security, and the economic contribution of different agricultural activities, this study offers a detailed perspective on how peri-urban agriculture influences the socio-economic sustainability of Delly Brahim.The number of people involved in agriculture reveals a varied distribution of activities. Livestock farming is mainly carried out by families of 5 to 7 members. Olive-growing, meanwhile, is managed by groups of unemployed young people, each comprising 3 to 5 members. Arboriculture and planting activities are carried out by 2 to 3 families per collective block, or by 1 to 2 members per family in individual dwellings. In addition, 25 people are involved in commercial activities linked to the distribution, sale and transport of agricultural produce. In terms of the contribution of production to food security, peri-urban agriculture generates around DA 350,000 per year for primary activities, DA 30,000 per month for secondary activities, and DA 1,400,000 per season for seasonal activities. These figures clearly illustrate the economic importance of peri-urban agriculture in the region. The different types of production have a specific importance. Livestock farming provides around 250 liters of milk per day, while olive growing produces around 200 liters of olive oil per year. Arboriculture provides around 30 kg of fruit and vegetables every month, and planting offers culinary and decorative plants all year round. On the other hand, the details of production reveal some interesting specificities. In the private sector, farms produce 20 to 25 liters of milk per day, with a monthly income of 70,000 to 120,000 DA for 10 to 18 cows. They also produce 10 to 16 eggs a day and sell around 30 sheep a season at prices ranging from DA40,000 to DA70,000 each. The agri-parks breed 300 horses for leisure. In the public sector, gardens associated with housing grow various fruits and vegetables, shared between 3 to 5 families. The carob forest produces 500 liters of olive oil per year, at a price of 1,200 DA per liter. The gardens and forests harvest 7 tons of carob, raw or processed into cocoa, per season, at 175 DA per kg, as well as 240 kg of lemons per year for more than 5 families. Overgrown gardens provide between 16 and 40 kg of vegetables per month, shared between 5 and 7 families. Analysis of these data reveals a significant transition in Delly Brahim's peri-urban agriculture, from a model based mainly on livestock farming to a more diversified and sustainable approach. Typologies of peri-urban agriculture have evolved to include urban farms, integrated gardens and wasteland gardens, reflecting an adaptation to local socio-economic needs. Peri-urban agriculture plays a crucial role in food security, providing substantial income both as a primary and secondary activity, and making a significant contribution to local food production.

### 4.3. Impact and distribution of agricultural production in Delly Brahim by Semiology

The distribution and impact of agricultural production in Delly Brahim can be seen on several scales: that of the commune, that of the Algiers region, and that of the Maghreb. This analysis looks at the local, regional and wider effects of agricultural and leisure practices in this region, showing how agricultural production in Delly Brahim has a varied impact depending on the geographical scales considered.

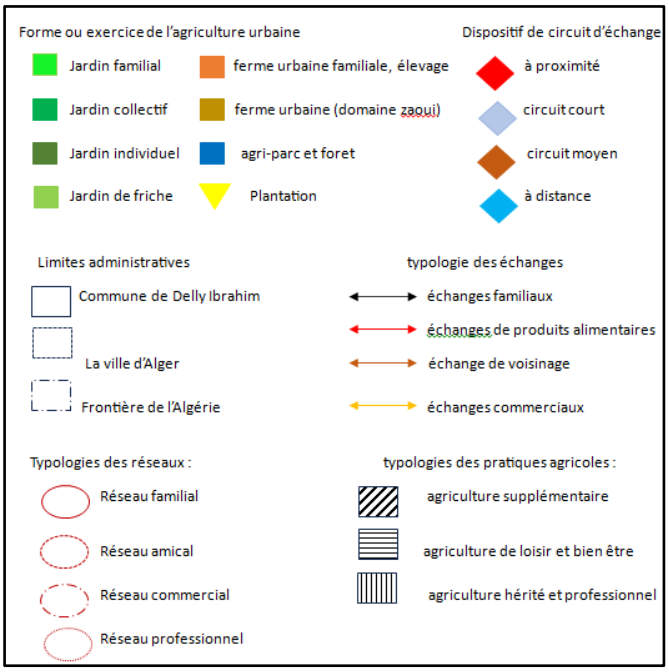
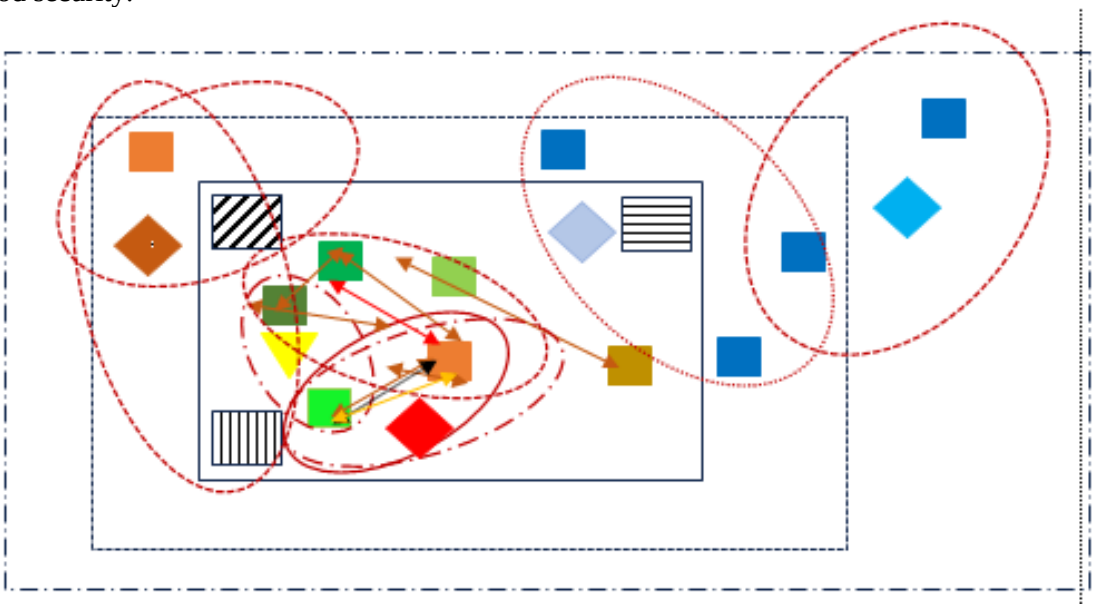



*Fig. 8. Legend for analysis by semiology of agricultural production in Delly Brahim. Authors*

- **Local scale : Agricultural production and leisure activities :**

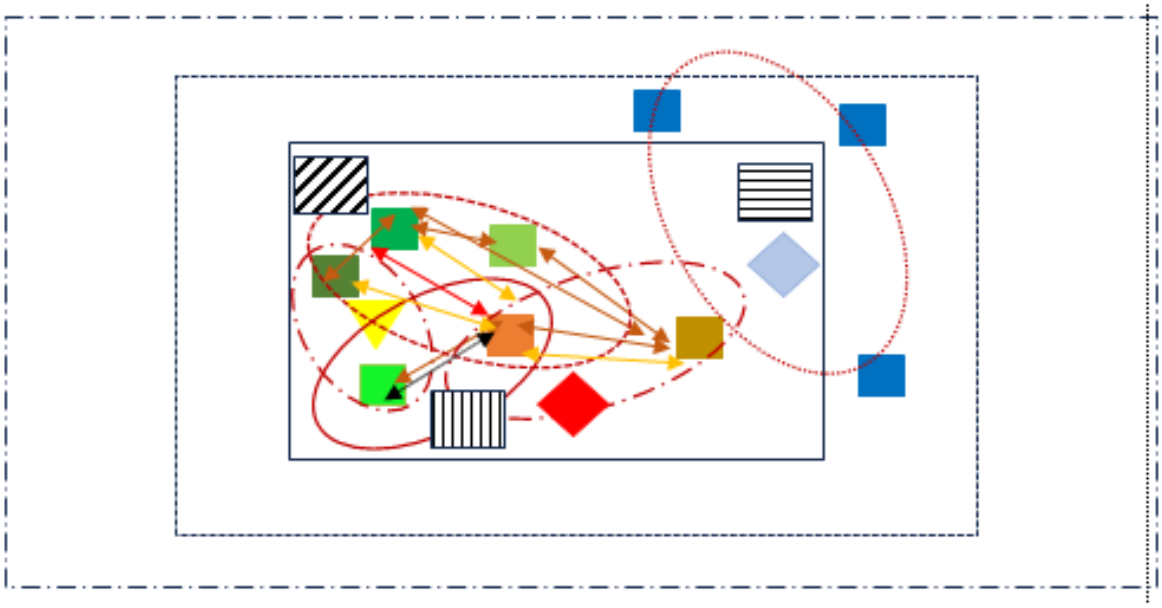
In the commune of Delly Brahim, agriculture plays a crucial role in the local economy and lifestyle. Agricultural production is varied, including market gardening, fruit and cereal crops. Fields of vegetables such as tomatoes, zucchinis and carrots are particularly prominent, as are orchards of fruit such as oranges and apples. Agricultural practices in this commune are also associated with leisure activities. Community gardens, small urban farms and privately cultivated plots are also an important part of Delly Brahim's agricultural landscape. These activities offer local residents an opportunity to reconnect with nature while contributing to local food security.



- **Regional scale: Impact of agricultural structures:**

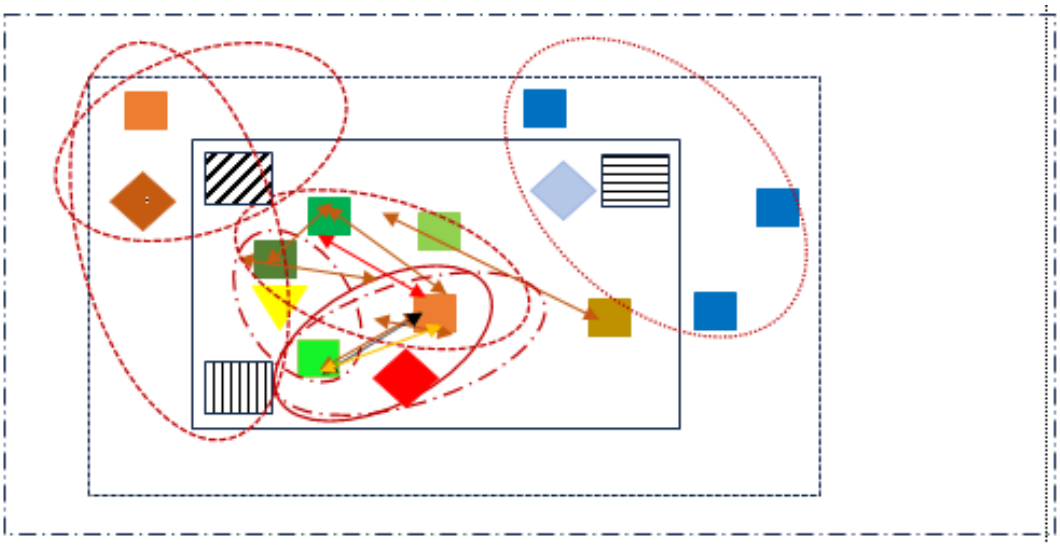
Moving on to the regional scale, Delly Brahim's agricultural structures, such as agri-parks and urban forests, show a more extensive influence. Agri-parks, which combine agriculture and recreation, promote not only local production but also public awareness of sustainable practices outside the commune. They play an educational and recreational role, while producing produce that supplies the Algiers region. Urban farms, with their innovative approach to urban agriculture, also contribute to regional impact. They offer intensive farming

solutions in small spaces, increasing production efficiency while reducing the need for transport. These structures support regional sustainability by improving access to fresh produce and reducing the carbon footprint associated with food transport.



- **Maghreb scale: Carob and livestock production:**

broader scale, Delly Brahim's agricultural production extends beyond local and regional borders. The carob tree, for example, is a crop that extends beyond the borders of the commune and the region. Its production is significant at the Maghreb level due to its use in various traditional recipes and its nutritional properties. The carob tree contributes not only to the local economy but also to the region's gastronomic wealth. What's more, certain livestock products from the Delly Brahim farms also have an impact on the Maghreb. Products such as milk, artisan cheeses and meats are appreciated throughout the region for their quality and local origin. This extended reach shows how local farming practices can influence wider markets and contribute to food diversity on a large scale.



At the end of this analysis, it appears that agricultural production in Delly Brahim has a significant impact on several scales. It is therefore appropriate to optimize this production by promoting sustainable agricultural practices and encouraging the development of innovative structures such as agri-parks and urban farms. The promotion of local products, such as carob and livestock products, should be intensified through

regional marketing initiatives. In addition, supporting agricultural leisure activities and establishing regional partnerships to share best practices will enhance sustainability and maximize benefits at all scales.

**Discussion.**

This study on the integration of peri-urban agriculture (PA) in Delly Ibrahim, Algiers, reveals significant insights into how urban agriculture can address the pressing challenges posed by urban sprawl. The findings underscore the multifaceted benefits of integrating PA into urban spaces, contributing not only to environmental preservation but also to food security, local job creation, and enhanced quality of life for residents.

**Significance of Findings**

1. **Environmental and Socio-economic Benefits**: The literature review and analysis highlight that urban agriculture can play a vital role in mitigating the adverse effects of urban sprawl. By creating small-scale farms, particularly for youth, PA fosters local food production while serving as venues for environmental education and community engagement. This aligns with global trends emphasizing the multifunctionality of agriculture, suggesting that these spaces can contribute significantly to social cohesion and environmental awareness.
2. **Impact on Agricultural Land**: The study's findings regarding the reduction of arable land in Algiers illustrate a critical need for detailed assessments of urbanization's impact on agricultural areas. The data gathered provides a solid foundation for developing strategies aimed at preserving agricultural spaces. This is essential for maintaining biodiversity and ensuring the availability of local food sources amidst rapid urban growth.
3. **Sustainability Assessments**: The results also highlight the importance of assessing the sustainability of agricultural activities in Delly Ibrahim. The connection drawn between regenerative agriculture practices and environmental sustainability presents a compelling case for their adoption in urban planning. This alignment with local data and the master plan for urban development suggests that integrating agricultural considerations into urban policy can enhance the viability of PA.
4. **Public-Private Partnerships**: Promoting public-private partnerships and specific agroforestry practices indicates innovative approaches tailored to local contexts. These partnerships can facilitate resource sharing and expertise, driving the implementation of sustainable practices that benefit both agricultural and urban communities.
5. **Cultural Dimensions**: The exploration of socio-economic and cultural dimensions emphasizes the importance of agricultural traditions among the "Fellahs" families. Recognizing and incorporating these traditions into modern agricultural practices not only preserves local heritage but also enhances community buy-in for sustainability initiatives. This cultural relevance is crucial for fostering a sense of ownership and participation among local residents.

**Implications for the Field**

The implications of these findings are substantial for urban planners, policymakers, and agricultural stakeholders.

- **Policy Development**: The study advocates for the formulation of a local food policy that promotes short distribution channels and supports local farmers' markets. This policy shift can significantly enhance the sustainability of urban agriculture by ensuring that local produce is prioritized, thereby reducing food miles and supporting the local economy.
- **Community Engagement**: The emphasis on training and awareness-raising initiatives is vital for encouraging community participation in peri-urban agriculture. Building capacity within local communities will empower residents to adopt sustainable agricultural practices and engage actively in preserving their agricultural heritage.
- **Innovative Practices**: The proposed measures, such as community gardens and the use of renewable energy resources, can serve as models for other urban areas facing similar challenges. This study provides a framework for leveraging urban agriculture to enhance resilience against urbanization pressures.

In conclusion, the integration of peri-urban agriculture in Delly Ibrahim represents a promising strategy for creating sustainable urban environments. By addressing environmental, social, and economic challenges through this integrated approach, the study paves the way for future research and initiatives aimed at harnessing the potential of urban agriculture for holistic urban development.

**Conclusions.**

In conclusion, this study makes a significant contribution to the field of urban agriculture by providing localized empirical data and an integrated socio-economic and cultural perspective. Focusing specifically on Delly Brahim, the research enhances our understanding of the unique challenges and opportunities in the region, ultimately proposing practical solutions that blend agricultural traditions with modern innovations.

**Key Findings**

1. **Integration of Peri-Urban Agriculture**: The study emphasizes the crucial role of peri-urban agriculture in mitigating the impacts of urban sprawl, improving local food security, and enhancing community well-being.
2. **Sustainability and Resilience**: By advocating for regenerative agricultural practices, the findings highlight pathways to achieve environmental sustainability and resilience within urban systems.
3. **Cultural Relevance**: The importance of preserving local agricultural traditions, particularly from the "Fellahs" families, underscores the need for culturally sensitive approaches in modern agricultural practices.
4. **Community Engagement**: The research identifies community participation as vital for the successful implementation of peri-urban agriculture, suggesting that training and awareness-raising initiatives are essential for fostering local ownership and commitment.
5. **Public-Private Partnerships**: The promotion of partnerships between public and private sectors is identified as a means to enhance resource allocation and support innovative agricultural practices tailored to local contexts.

**Directions for Future Research**

1. **Broader Comparative Studies**: Future research could explore the applicability of the models proposed in Delly Brahim to other urban regions facing similar challenges, facilitating a comparative analysis of success factors and barriers.
2. **Longitudinal Impact Assessments**: Conducting longitudinal studies to evaluate the long-term impacts of implemented peri-urban agriculture initiatives on environmental, social, and economic outcomes would provide deeper insights into their effectiveness.
3. **Technological Innovations**: Investigating the role of emerging technologies in enhancing urban agricultural practices, such as vertical farming or precision agriculture, could provide additional pathways for sustainability.
4. **Policy Frameworks**: Future studies could focus on developing robust policy frameworks that support the integration of peri-urban agriculture into urban planning, ensuring that these initiatives are well-supported and sustainable.
5. **Cultural Heritage and Modern Practices**: Further exploration of the intersection between cultural heritage and contemporary agricultural practices could yield innovative solutions that respect traditional knowledge while embracing modern techniques.

By addressing these potential research directions, we can further enhance the resilience and sustainability of urban agricultural systems, contributing to the broader goals of sustainable urban development.

## REFERENCES


1. Bakour, M., Benazzouz, B., & Durbiano, A. (2015). Étalement urbain et dynamique des agglomérations à Alger : Quel rôle pour la promotion administrative? *Cahiers de géographie du Québec, 59*(168), 377-406. https://doi.org/10.7202/1032177ar
2. Benmahioul, B., Kaïd-Harche, M., & Daguin, F. (2011). Le caroubier, une espèce méditerranéenne à usages multiples. *Forêt méditerranéenne, 32*(1), 37-42.
3. Bryld, E. (2003). Potentials, problems, and policy implications for urban agriculture in developing countries. *Agriculture and Human Values, 20*(1), 79-86. https://doi.org/10.1023/A:1021954216700
4. Cheikh, A., Benseddik, N., & Meziane, R. (2018). Étude des forêts urbaines et leur impact sur l'environnement. *Journal of Environmental Management, 30*(4), 345-360. https://doi.org/10.1016/j.jenvman.2018.05.004
5. Durbiano, A. (2005). Multifonctionnalité de l'agriculture. *Cahiers de géographie du Québec, 49*(138), 143-154.
6. Jouve, A. M., Bouchard, C., & Al Khatib, I. (2007). Les agricultures périurbaines méditerranéennes à l'épreuve de la multifonctionnalité : Comment fournir aux villes une nourriture et des paysages de qualité? *Cahiers Agricultures, 16*(4), 311-317. https://doi.org/10.1684/agr.2007.0177

7. Mebarki, H., Dahmani, M., & Belkacem, S. (2019). Analyse du potentiel écologique et touristique de Delly Brahim. *Revue des Sciences de l'Environnement, 25*(2), 145-160. https://doi.org/10.36745/rse.2019.0027
8. Nahmias, P., & Le Caro, Y. (2012). Pour une définition de l'agriculture urbaine : Réciprocité fonctionnelle et diversité des formes spatiales. *Environnement urbain, 6*, 1-16. https://doi.org/10.7202/1014557ar
9. Véron, J. (2008). Enjeux économiques, sociaux et environnementaux de l'urbanisation du monde. *Mondes en développement, 2*(142), 39-52.
10. Benazzouz, B. (2010). *Le foncier, vecteur de l'étalement urbain algérois*.
11. Dubois-Taine, G., & Chalas, Y. (1997). *La ville émergente*. La Tour d'Aigues: Éditions de L'Aube.
12. Food and Agriculture Organization (FAO). (2021). *Urban and peri-urban agriculture and forestry*. http://www.fao.org/publications
13. Mougeot, L. J. A. (2000). Urban agriculture: Definition, presence, potentials and risks. In N. Bakker, M. Dubbeling, S. Gündel, U. Sabel-Koschella, & H. de Zeeuw (Eds.), *Growing cities, growing food: Urban agriculture on the policy agenda* (pp. 15-20). DSE.
14. Pumain, D., Paquot, T., & Kleinschmager, R. (2006). *Dictionnaire la ville et l'urbain*. Paris: Economica.
15. Deelstra, T., & Girardet, H. (2000). Urban agriculture and sustainable cities. In N. Bakker, M. Dubbeling, S. Gündel, U. Sabel-Koschella, & H. de Zeeuw (Eds.), *Growing cities, growing food: Urban agriculture on the policy agenda* (pp. 32-40). DSE.
16. Ministère de l'Agriculture. (2015). *Plan de développement agricole pour la région de Delly Brahim*. Rapport annuel.
17. Ministère de l'Environnement. (2012). Le parc Dounia : Un modèle de parc urbain écologique. *Bulletin de l'Environnement, 14*(1), 22-35.
18. Programme d'aménagement côtier. (2002). *Rapport de lancement*. Algiers.
19. Services agricoles de la commune de Delly Brahim. (2024).
20. René van Veenhuizen, R. (2006). *Cities farming for the future: Urban agriculture for green and productive cities*. RUAF Foundation, IDRC, and IIRR.
21. Smit, J., & Nasr, J. (1992). Urban agriculture for sustainable cities: Using wastes and idle land and water bodies as resources. *Environment and Urbanization, 4*(2), 141-152. https://doi.org/10.1177/095624789200400213
22. Vidal, R., & Fleury, A. (n.d.). La place de l'agriculture dans la métropole verte. *Projets de paysage*.