



**Intala Lab**

Intelligent Agriculture and Livestock Applications Laboratory

# Intelligent

Agriculture and Livestock Applications

# Laboratory

Digital Solutions for  
Agriculture and Livestock Challenges



## WHAT WE STAND FOR

- Team
- Partners
- Projects



Our Website

[intalalab.isikun.edu.tr](http://intalalab.isikun.edu.tr)

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## Foreword



INTALA LAB is a vibrant research laboratory where academics, researchers, and industry professionals collaborate to develop impactful solutions. By utilizing advanced technologies such as open data, artificial intelligence, geographic information systems, and IoT, the lab produces practical outcomes that contribute significantly to our nation's agricultural and livestock industries.

As a member of the Advisory Board for the international project Top4HoneyChains and a proud member of this large family, I am pleased to present the 2024 bulletin of INTALA LAB. This research laboratory makes significant contributions to addressing the challenges of the agriculture and livestock sectors through its innovative and collaborative efforts.

Through its national and international projects, INTALA LAB embodies our commitment to fostering research that creates lasting societal and environmental benefits. The collaborative efforts within the lab reflect a shared dedication to innovation, sustainability, and the advancement of these vital sectors.

I invite you to explore this bulletin, which highlights the remarkable achievements and aspirations of INTALA LAB in 2024. May it inspire continued progress and stand as a testament to the transformative power of research and collaboration.

Sincerely,  
Mehmet Serdar Sarigül  
Işık University Board of Trustees President



## Foreword



Positioned at the intersection of science and technology, precisely at the critical threshold where theory transforms into practice, INTALA LAB is not merely a research laboratory but a think-tank contributing to the intellectual and practical architecture of the future.

In the information age, data is not merely a record; it is a transformative force. INTALA LAB's digital transformation projects in agriculture and animal husbandry elevate the crucial contemporary issue of "sustainability" from academic discourse to societal practice.

Today, our university's mission of "enlightenment" illuminates fields, farms, and food supply chains through INTALA LAB's technological innovations. This illumination is not merely a technical advancement but an epistemological expansion—an intellectual leap prompting us to reconsider paradigms regarding how knowledge is generated, disseminated, and utilized. Moreover, sustainability is one of the cornerstones of Işık University's Strategic Plan, a vital concept we prioritize to secure our collective future.

The work carried out within the scope of international projects in 2024 vividly demonstrates how academic knowledge evolves dynamically through interaction with society. Particularly, AI-driven early-warning systems and precision agriculture practices are compelling examples of embedding scientific knowledge into the fabric of everyday life.

Our laboratory's interdisciplinary projects signify more than technological advancement—they represent an expression of our sense of social responsibility. Today's global challenges cannot be solved by a single discipline or viewpoint alone. This concept, fundamental to Işık University's educational philosophy, is among the key concepts of our era.

Each research project, discovery, and article from INTALA LAB highlights the collective power of intellect and creativity. Behind this work stand academics and researchers at various levels who have not lost their curiosity, maintain the courage to question, and most importantly, believe in the transformative potential of knowledge for societal benefit.

This bulletin is more than an activity report; it is a map of thought—an intellectual compass uniting past achievements, current endeavors, and future possibilities.

Reading it will not only inform but will also open doors to critical thinking and inquiry.

Prof. Dr. Hasan Bülent Kahraman  
Işık University Rector



## Foreword



Welcome to the latest edition of the INTALA LAB Bulletin! As the founder of the Intelligent Agriculture and Livestock Applications Laboratory (INTALA LAB) at Işık University, it brings me immense pride to share the remarkable progress and achievements we've made in the fields of agriculture and livestock technology. Our laboratory stands at the intersection of innovation and research, striving to contribute meaningful advancements through interdisciplinary collaboration and the application of cutting-edge technologies.

At INTALA LAB, we are committed to developing smart solutions that address the evolving challenges in agriculture and livestock, with a focus on areas such as open data, IoT, artificial intelligence, machine learning, geographic information systems, remote sensing, and service-oriented architecture. By working closely with esteemed academic institutions, researchers, and industry partners, we continue to push the boundaries of what's possible, both in Türkiye and on the global stage.

Our work has seen us lead national and international projects that leverage digital technologies to solve complex problems in the agricultural sector. Notably, our collaboration on the TOP4HoneyChains project with partners from Argentina, Latvia, and Poland aims to revolutionize the honey value chain through a data-driven, open platform that enhances traceability, sustainability, and transparency.

In addition, we are excited about our involvement in the BEE-OPTECH4HONEY project, which is exploring the quality of honey produced in Malta and Türkiye through spatial and temporal analysis of beehive distributions. These projects highlight our ongoing commitment to applying innovative research to real-world challenges in beekeeping, one of the key areas of focus for INTALA LAB.

As we continue to grow, we look forward to expanding our research initiatives and fostering new collaborations that will contribute to the advancement of smart agricultural and livestock applications. Thank you for being a part of this exciting journey. We invite you to explore the pages of this bulletin for the latest updates and insights into our work.

Warm regards,

Dr. Şahin Aydın  
Founder and Principal Researcher  
Intelligent Agriculture and Livestock Applications Laboratory (INTALA LAB)  
Işık University, Türkiye



# OUR TEAM



ASSOC. PROF.DR. MEHMET N. AYDIN  
Researcher



DR. ÇIĞDEM ÇAVDAROĞLU  
Researcher



DR. ELİF DENİZ YELMENOĞLU  
Researcher



DR. DEMET ÜNLÜAKIN  
Researcher



DR. SONYA JAVADI  
Researcher



BUSENUR TÜRKALİ  
Researcher



DR. AYKUT ÇAYIR  
Sector Advisor



DR. BAHADIR ÖDEVÇİ  
Sector Advisor



ÇIĞDEM KILIÇ  
Sector Advisor

# OUR TEAM



**ECE DALPOLAT**  
Graduate Scholar



**HÜSEYİN DENİZ**  
Graduate Scholar



**HASAN KIVRAKDAL**  
Undergraduate Scholar



**ALİ ÖZGÜR ÇAKMAK**  
Undergraduate Scholar



**BÜŞRANUR ATALAY**  
Undergraduate Scholar



**SERDAR ONUR KARADAĞ**  
Undergraduate Scholar

## Beekeeping Research Institute

Established as the Ordu Beekeeping Production Station Directorate by the Council of Ministers Decision dated December 22, 1994, and numbered 94/22149, the institution was later transformed into the Beekeeping Research Institute Directorate with the Ministerial Approval dated May 30, 1995. Subsequently, with Decree Law No. 639 dated June 3, 2011, it was renamed as the Beekeeping Research Station Directorate.

A location 12 kilometers from the Ordu city center, within the boundaries of Dedeli Neighborhood along the Ordu-Sivas highway, was chosen as the campus area. Covering 87 decares, construction of the institution's service buildings began in 1998. Until 2005, the institution carried out its activities within the service buildings of the Ordu Provincial Directorate of Agriculture.

On January 10, 2005, the institution relocated to the Dedeli Campus, where construction work had been completed, and began providing services there.



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## Aegean Agricultural Research Institute

The infrastructure of the Agricultural Research Institute, located within the Ege University Bornova campus, was transferred to the Faculty of Agriculture at Ege University, and to carry out its duties more comprehensively, the Aegean Regional Agricultural Research Institute was established on March 1, 1963. On July 1, 1964, within the current institute campus, the Plant Research and Introduction Center began its activities in collaboration with the institute as part of an agreement between F.A.O. and the Government of the Republic of Türkiye. This center focused on the collection, preservation, and evaluation of materials related to plant genetic resources originating from our country.

In 1967, the Institute and the Introduction Center merged to form the Agricultural Research and Introduction Center. Between 1974 and 1987, it continued its activities under the name Aegean Regional Agricultural Research Institute. Following a restructuring in 1987, the organization was renamed the Aegean Agricultural Research Institute.



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## Kadir Has University

The establishment efforts of the university began in 1992 under the leadership of the late Kadir Has and through the Kadir Has Foundation (HASVAK). Its official establishment was achieved on May 28, 1997, through Law No. 4263. The construction of the Selimpaşa Campus began in 1998, while the restoration of the historic Tekel Cibali Tobacco Factory, which forms a significant part of the Central Campus located along the shores of the Golden Horn, started in 1999.

The university began utilizing the Bahçelievler Campus during the 2000-2001 academic year and expanded its activities to all three campuses—Cibali, Selimpaşa, and Bahçelievler—from the 2001-2002 academic year onwards. At the end of 2007, the modern D Block, designed to expand the Cibali Campus, was constructed. In 2008, the Sports Hall and related facilities were built in collaboration with the Fatih Municipality. On March 28, 2007, the name of the Cibali Campus was officially changed to the Kadir Has Campus.



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## Malta University

The roots of the University of Malta trace back to 1592, when the Collegium Melitense was established by the Jesuits. Initially focused on Philosophy and Theology, the institution later expanded to cover other subjects. The origins of the Faculty of Medicine date back to 1676, with the appointment of Fra Dr. Giuseppe Zammit to teach Anatomy and Surgery.

Following the expulsion of the Jesuit Order in 1769, Grandmaster Pinto formally established the University through a decree signed on November 22. The Faculty of Medicine was founded in 1771, initially staffed by local educators. During the French rule in 1798, the University faced significant challenges but was re-established shortly after the French departure under the leadership of Sir Alexander Ball. Under British administration, the University underwent legal reforms and adopted its current emblem and motto in 1923. The title "Royal" was conferred upon the University between 1937 and 1974.



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## INTA

In 1932, Argentina established its first agricultural research institution, the "Instituto Experimental de Investigación Agrícola y Ganadera." By 1956, facing economic challenges and relying heavily on agriculture, Argentina sought to accelerate economic development by boosting agricultural activity. In response, the UN/Argentine Government Joint Commission proposed the establishment of a specialized institute. On December 4, 1956, the National Institute of Agricultural Technology (INTA) was founded.

INTA's mission was to promote agricultural research, extension, and technology transfer to improve agricultural enterprises and rural life. The institute inherited 18 experimental stations from the previous forty years, and its funding was tied to a percentage of exported agricultural products. During the presidency of Arturo Frondizi in 1958, INTA's role expanded with the establishment of new experimental stations. This period also saw the unification of professional councils, including the Council of Agricultural Engineering Professionals, which formed a historic partnership with INTA.



**INTA**



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## KATOWICE UNIVERSITY OF ECONOMICS

Founded in 1937 in Katowice, the University of Economics is the largest and oldest business school in the region, ranking among the best universities in Poland. It hosts over 8,000 Polish and international students pursuing education at various levels in Finance, Economics, Information and Communication, and Management.

The institution's educational opportunities and lifelong learning programs attract students globally by balancing academic excellence with social skills. Its emphasis on professional career services ensures high employability for its graduates. Maintaining strong ties with both local and international alumni, the university is committed to preparing today's managers for the challenges of tomorrow.



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## LATVIA LIFE SCIENCES AND UNIVERSITY OF TECHNOLOGIES

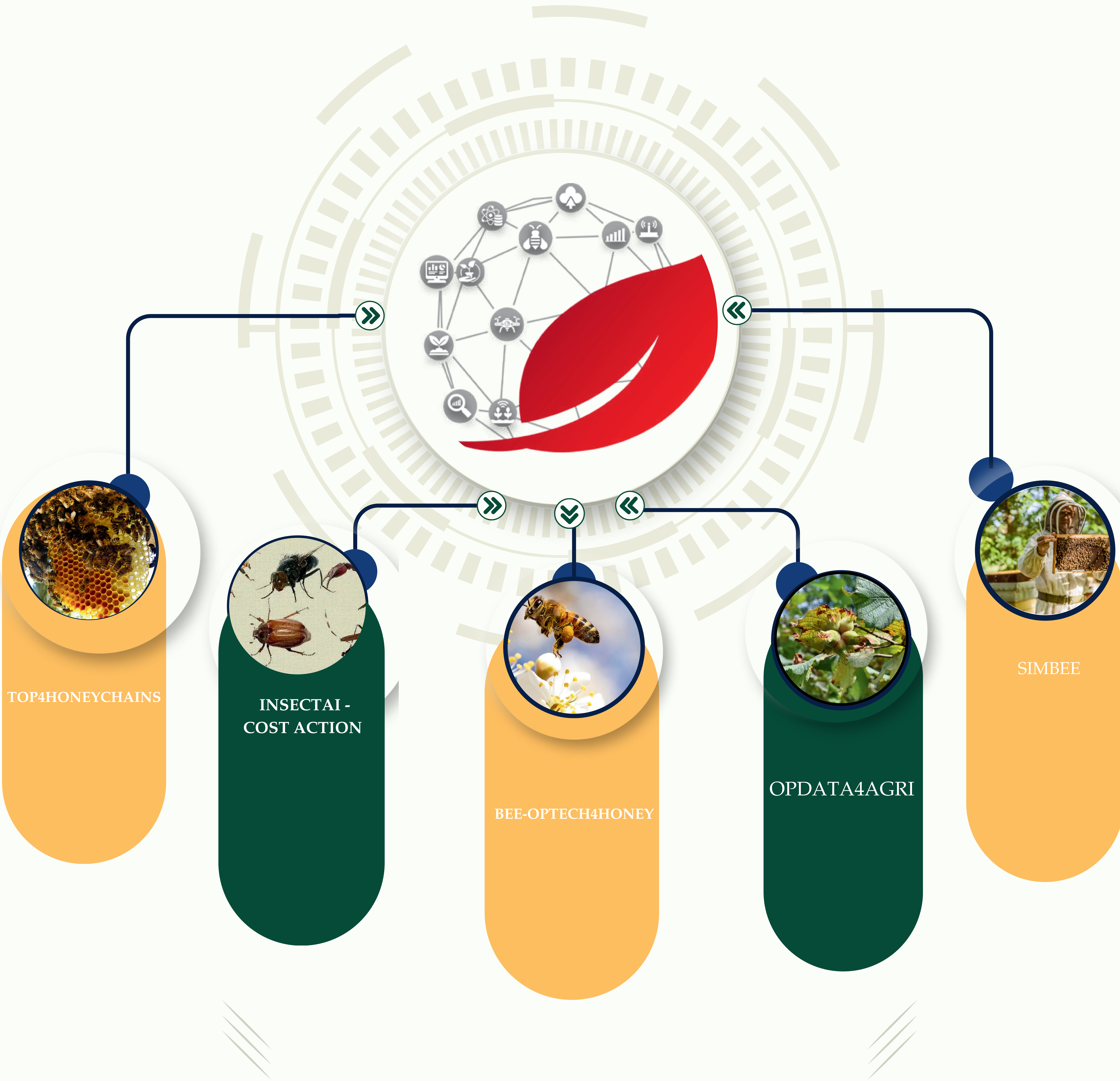
Established in 1863, the Latvia University of Life Sciences and Technologies is one of Latvia's leading higher education and research institutions. Initially founded as the Jelgava Agricultural Academy in 1938, the university underwent several relocations and transformations. Renamed in 1991, it achieved state accreditation in 2001 and adopted its current name, "Latvia University of Life Sciences and Technologies," in 2018.

Actively participating in the European higher education and scientific community, the university aims to contribute to Latvia's sustainable development, particularly in rural areas.



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# PROJECTS



TOP4HONEYCHAINS

INSECTAI -  
COST ACTION

BEE-OPTECH4HONEY

OPDATA4AGRI

SIMBEE

# TRUSTABLE AND SUSTAINABLE OPEN PLATFORM FOR SMART HONEY VALUE CHAINS (TOP4HONEYCHAINS)

INTERNATIONAL MULTILATERAL  
COOPERATION 15/09/2023 - 15/09/2026

Supporting Institutions

- ERA-NET ICT-AGRI-FOOD
- TÜBİTAK



## PARTNERS

### Türkiye

- Kadir Has University
- Işık University
- Apiculture Research Institute

### Poland

- University of Economics in Katowice

### Latvia

- Latvia University of Life Sciences and Technologies

### Argentina

- Instituto Nacional de Tecnología Agropecuaria (INTA)
- NEXCO S.A
- Cooperativa Agropecuaria y Apícola Norte Grande Limitada
- Alimentos Naturales Natural Foods S.A

Open Platform for Reliable and Sustainable Smart Honey Value Chains (TOP4HoneyChains) bees have played a critical role in flowering plants for over 140 million years, and the honeybee is one of the most significant insects for humanity. Although Argentina and Türkiye rank among the top three global honey producers, they are not internationally recognized for high-value end products. In recent years, honey fraud has affected the international market.

The project aims to establish a smart value chain driven by market preferences and consumer demands, based on recorded and transparent quality processes, from beekeeping sites to the processing of collected honey. This approach seeks to build trust between buyers and sellers. A transparent, efficient, and effective honey value chain is essential to achieve a dynamic and responsive honey-food system capable of addressing global and local challenges.

The primary objective of TOP4HoneyChains is to develop a system enabling smart honey value chains in Türkiye and Argentina using a transnational approach in collaboration with Polish partner UEKat and Latvian partner LBTU. The main goal is to enhance the effectiveness of traceability and transparency to achieve smart honey value chains.



# BIT-Supported Beekeeping Activity Sites and Beekeeper Route Optimization for Efficient Honey Production (BEE-OPTECH4HONEY)

**INTERNATIONAL / BILATERAL  
COOPERATION 01/12/2023-01/12/2025**

**Supporting Institutions**

- MCST
- TÜBİTAK
- PRIMA



## **PARTNERS**

### **Türkiye**

- Işık University

### **Malta**

- University of Malta

BIT-Supported Beekeeping Collection Areas and Beekeeper Route Optimization for Efficient Honey Production (BEE-OPTECH4Honey) aims to examine and develop a traditional agricultural practice and elevate it to an industrial level with better marketing opportunities. Based on validating real-world data using a decision support model, an optimization model, and GIS-based image processing, the goal is to increase the technology readiness level (TRL).

BEE-OPTECH4Honey seeks to demonstrate the effectiveness of an integrated system using interconnected digital technologies, the optimization model, and the GIS-based image processing model in providing beneficiaries with access to and addressability of data related to production processes. The proposed system will be validated through a simulated environment that evaluates its performance against predefined criteria.

The aim is to offer a comprehensive and robust solution that can increase the efficiency, productivity, and sustainability of beekeeping operations while facilitating the production of high-quality beekeeping food products. Through this validation process, the project intends to determine the reliability and validity of the proposed system, providing a strong foundation for its potential deployment in real-world scenarios.



# INSECTAI - Image-Based Artificial Intelligence for Insect Monitoring and Protection COST Action

**INTERNATIONAL MULTILATERAL  
COOPERATION 25/10/2023 - 24/10/2027**

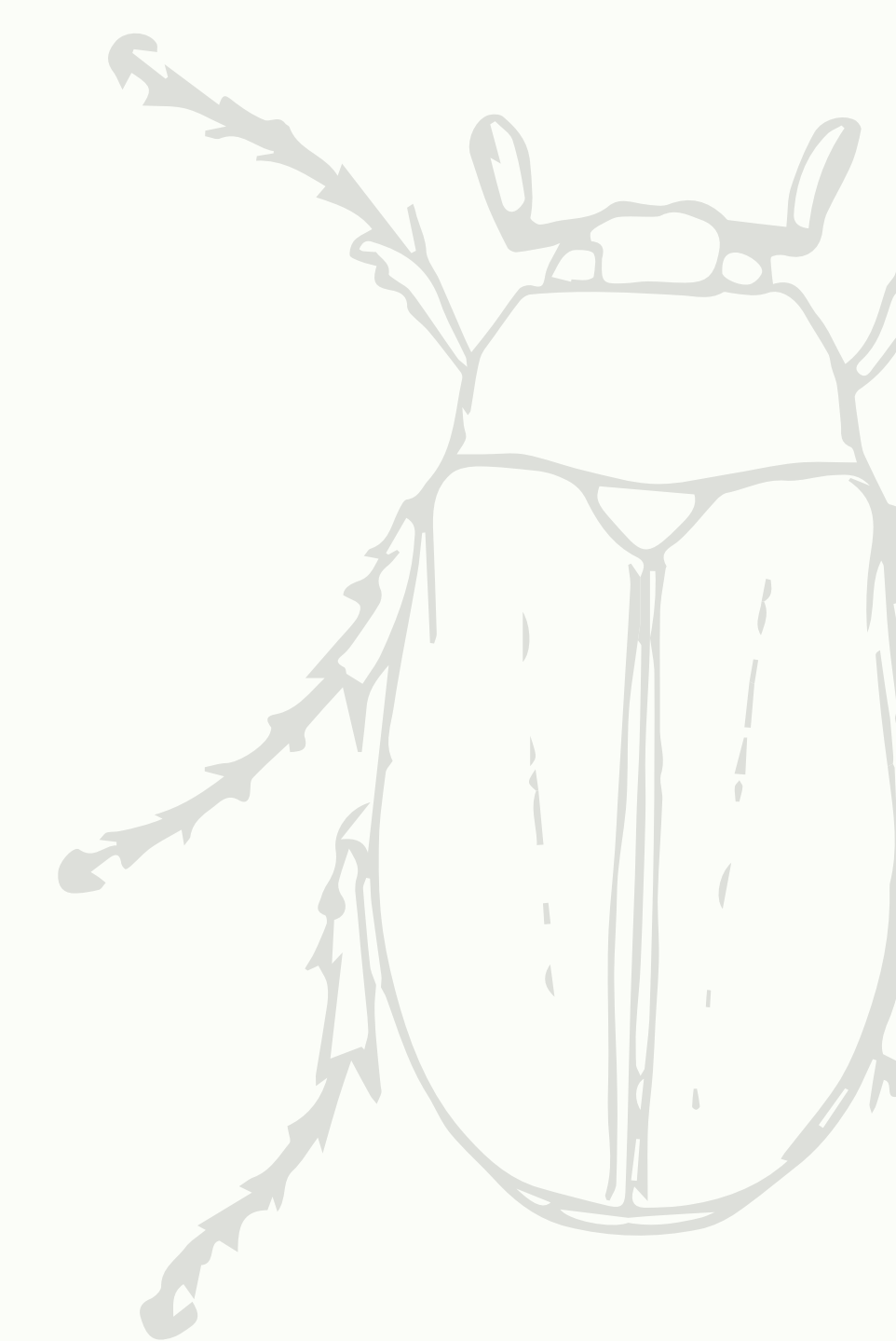
**Supporting Institutions**

- European Union



**PARTNERS**

**ALL EUROPEAN UNION MEMBERS**



InsectAI COST Action will support insect monitoring and protection at national and continental levels to understand and combat widespread insect declines. The initiative will bring together a critical group of researchers and stakeholders in image-based insect artificial intelligence technologies to guide the research agenda, build research capacity across Europe, and foster innovation and application.

The InsectAI COST Action will organize workshops, conferences, short-term scientific missions, hackathons, design sprints, and more across four working groups. These groups will focus on how image-based insect AI technologies can best address societal needs, support innovation in image collection hardware, establish standard approaches for image processing, and develop new data analysis and integration methods to transform data into actionable insights.

Dr. Aydın will lead research activities within the Image Processing and Data Analysis & Integration working groups as part of this action.



# Open Data Platform for Precision Agriculture (OPDATA4AGRI)

**BAP**

**01/09/2021 - 01/09/2023**

**Supporting Institutions**

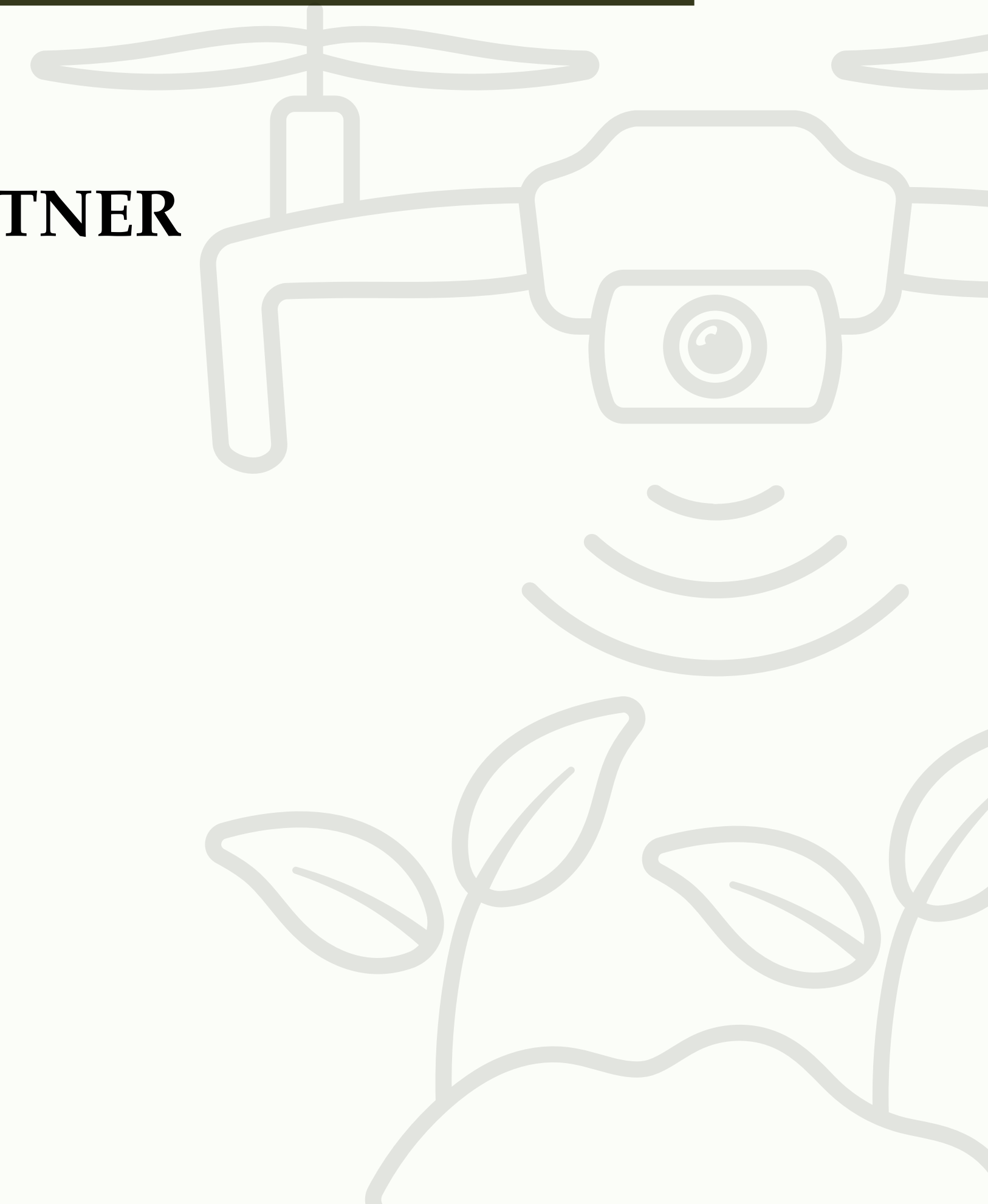
- Işık University



**PARTNER**

**Türkiye**

- Işık University



This project aims to develop a holistic and integrative platform by aggregating software components constructed on an open data processing model to support precision agriculture activities and advance the development of an open data platform for the agricultural sector.

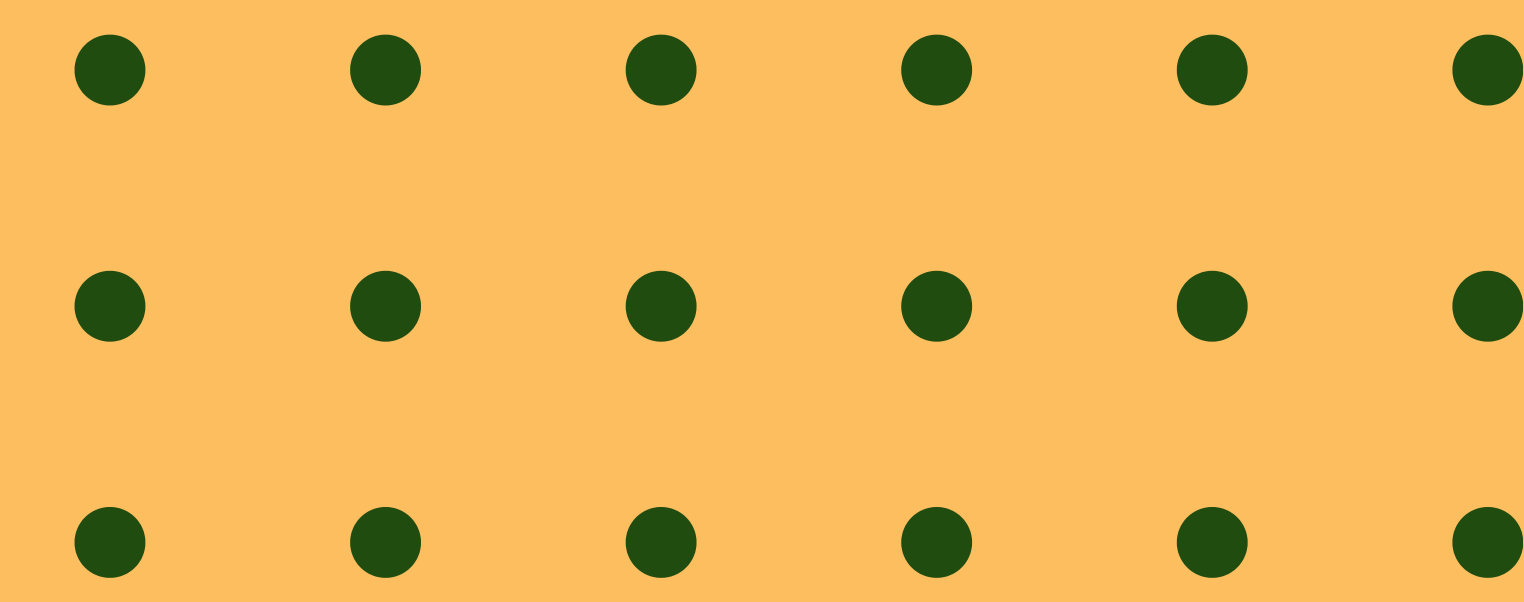
A primary objective is to design data collection forms based on dynamic and contemporary software design patterns, utilizing ontologies specific to agricultural products, thereby facilitating the aggregation of product-specific structured data from field partners. Additionally, the project seeks to establish a web-based open data platform by employing a data integration methodology that ensures semantic and syntactic interoperability.

This platform will publish structured, linked open data specific to agricultural products using open standards and formats, and leverage modern computational methodologies, including machine learning, deep learning, and artificial intelligence, to extract meaningful and actionable insights from the collected datasets, thereby contributing to the production of valuable knowledge for the agricultural domain.





**EVENTS  
&  
FIELDWORKS**



## **Kırklareli, Lüleburgaz, Evrensekiz**

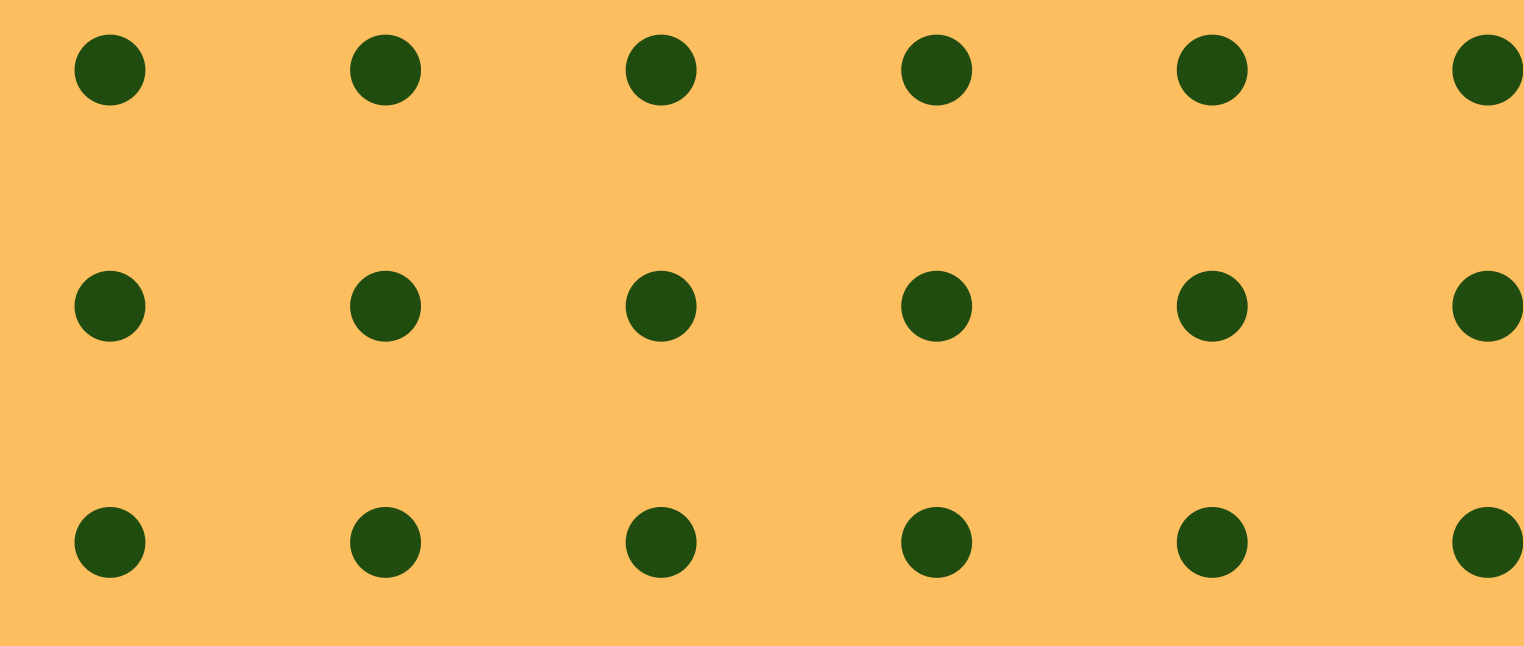
In Evrensekiz, Lüleburgaz, Kırklareli, the project carried out detailed fieldwork focusing on sunflower honey. Through drone imaging and GIS-based analyses, the density and health status of sunflower plants were identified, and this data was incorporated into models aimed at enhancing honey production.

Sunflower honey samples were collected in compliance with the SOP, stored in 850-gram glass jars, labeled, and all related data was recorded using Google Forms. The samples were subsequently analyzed at the Ordu Beekeeping Institute, and the results were documented in Excel format.

These analyses identified the quality parameters of sunflower honey and provided valuable insights for producing this honey type to higher standards. The studies in Evrensekiz not only supported local beekeepers in achieving more efficient production but also contributed to improving the international competitiveness of the honey produced.

### **Conclusion**

The detailed field studies conducted in Denizli and Kırklareli played a significant role in achieving the objectives of the BEE-OPTECH4HONEY project. These efforts have enhanced local apiculture activities and made the honey produced more competitive in both national and international markets.



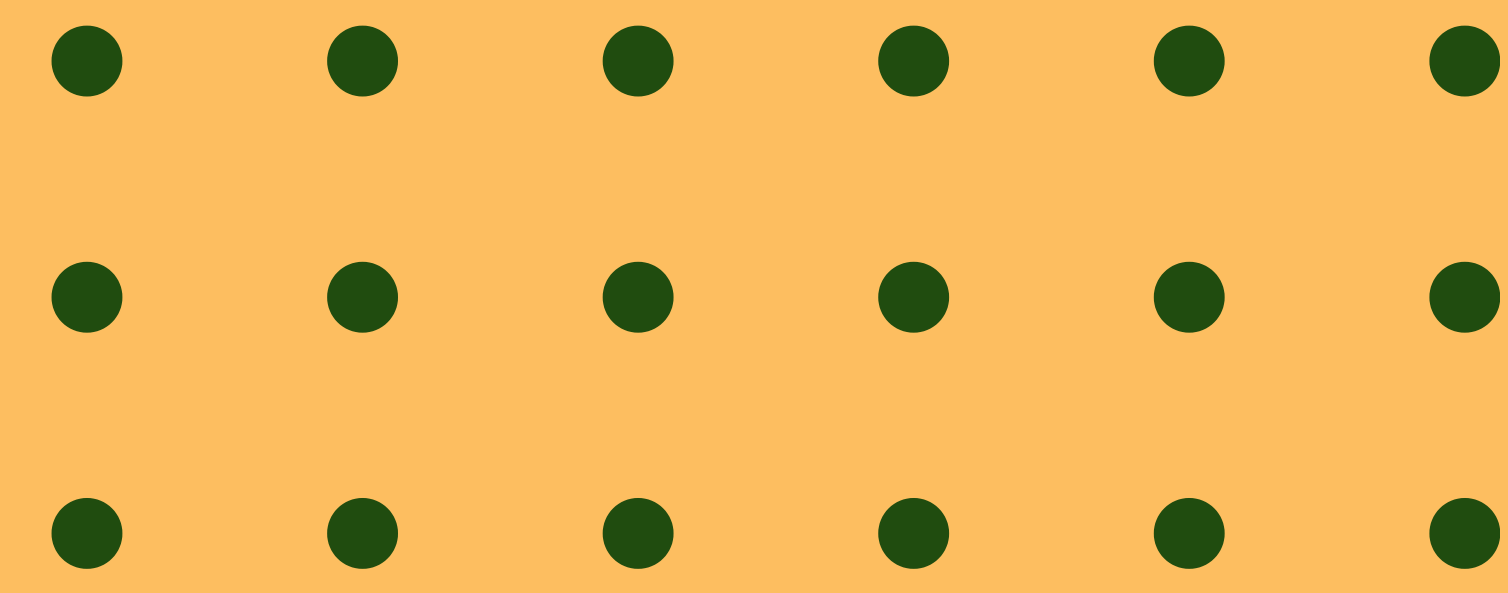
### **Buldan, Bozalan, Denizli**

Within the scope of the BEE-OPTECH4HONEY project, comprehensive field studies were conducted in Bozalan, Buldan, Denizli, focusing on thyme honey production. The project team employed drone-assisted analyses to identify thyme plant density, optimize honey production, and ensure the scientific characterization of thyme honey.

During these studies, honey samples were harvested when two-thirds of the honeycomb frames in the colonies were capped. Following the Standard Operating Procedure (SOP), the samples were collected in 850-gram glass jars, labeled, and stored under appropriate conditions before being sent to the Ordu Beekeeping Institute for analysis. The analysis results were documented in Excel format to evaluate the honey's quality parameters.

The analyses successfully achieved the scientific characterization of thyme honey, paving the way for its designation as a geographically indicated product. These efforts not only enhanced apiculture activities in the region but also contributed to improving the income levels of local producers.





### **Our Project in the News**

On August 6, 2024, İhlas News Agency published a report highlighting the fieldwork of the BEE-OPTECH4HONEY project, conducted in collaboration between Türkiye and Malta. The report emphasized the thyme honey-focused research carried out in the Buldan district of Denizli and its contributions to local apiculture.

### **Thyme Honey Research and Geographical Indication Efforts**

According to the report, the fieldwork conducted in Buldan successfully achieved the scientific characterization of thyme honey and made significant progress toward obtaining a geographical indication for the product. The project also aimed to enhance the production quantity and quality of honey in local apiculture businesses. These field studies were carried out under the leadership of Dr. Şahin Aydın from Işık University, Agricultural Engineer Gökhan Akdeniz from the Aegean Agricultural Research Institute, and Biologist Arthur Lamolier from the University of Malta, with support from the Buldan District Directorate of Agriculture and Forestry and the Denizli Beekeepers' Association.

### **Contributions to Local Apiculture**

Hakan Aytekin, a board member of the Denizli Beekeepers' Association, expressed his satisfaction with the benefits these studies brought to local apiculture and producers' income levels. He stated, "I believe these scientifically driven studies will positively contribute to the Buldan region, our bees, and our producers."

This news article highlights the importance of the project's fieldwork and its positive impact on local producers. The BEE-OPTECH4HONEY project aims not only to achieve scientific objectives but also to support the local economy and community.

<https://www.iha.com.tr/denizli-haberleri/buldan-balina-bilimsel-bakis-105356685>



# INTALA LAB

*Digital Solutions for Agriculture and Livestock Challenges*

*3. YEAR*



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