



Received 27 February 2024, Evaluated 15 May 2024, Revised 5 June 2024, Accepted 20 June 2024

Abstract: We are at a turning point towards more sustainable socio-economic systems that will shape the future of the agri-food sector by configuring improved production models. This article contends that research, experimentation, vocational training, and cooperation are essential to carry out the transformations needed. To support this contention, this article assesses the evolution of *Sa Granja* from its creation in Menorca in 1922 until today and its transformation from a General Agricultural Station to a Rural Lab in line with the “living lab” model. It also explores the reasons that made *Sa Granja* become a benchmark for innovation and training and its contribution to Menorcan agriculture as well as to the transition to a more sustainable agriculture. Finally, some best practices that can be applied elsewhere are highlighted.

Keywords: *Sa Granja*, agricultural research, agricultural innovation, agricultural training, Rural Lab, Living Lab, cooperation, Menorca, Spain

Resumen: Nos encontramos en un punto de inflexión hacia sistemas socioeconómicos más sostenibles que marcarán el futuro del sector agroalimentario configurando mejores modelos productivos. Este artículo sostiene que la investigación, la experimentación, la formación profesional y la cooperación son esenciales para llevar a cabo las transformaciones necesarias. Para sustentar esta afirmación el artículo evalúa la evolución de Sa Granja desde su creación en 1922 hasta la actualidad, y su transformación de Estación General Agrícola a *Rural Lab*, alineado con el modelo de “living lab”. También explora los motivos que han convertido a Sa Granja en un referente de innovación y formación, así como su contribución a la agricultura menorquina y a la transición hacia un modelo agrícola más sostenible. Finalmente, se destacan algunas buenas prácticas que pueden aplicarse en otros lugares.

¹ Josep Pastrana-Huguet, PhD., coreresponding author, Consell Insular de Menorca, Balearic Islands, Maó, Spain. ORCID: 0000-0003-1929-6940, e-mail: joseppastrana@gmail.com

² Maria-Francisca Casado-Claro, PhD., Universidad Europea, Madrid, Spain. ORCID: 0000-0002-4395-9620, e-mail: mariafrancisca.casado@gmail.com

Highlights

- Founded in 1922, Sa Granja has provided agricultural solutions to rural Menorca
 - Its activities focus on satisfying farmers' needs through innovation
 - It carries out research and development, communication, and agricultural training
 - Its latest endeavor is a living lab called HUB Agrari Sa Granja International Rural Lab
 - The article identifies best practices that can be useful elsewhere
-

1. Introduction

Feeding a growing human population while complying with sustainability criteria against the backdrop of the threat of climate change is one of the main food security-related challenges in the 21st century (Beddington et al., 2012). Climate change will affect the availability of natural resources and how food is produced (Firdaus et al., 2019; El Bilal, 2020; Belay, 2021). Solving wicked problems is a complex challenge requiring diverse and coordinated measures. Success will depend on key factors such as scientific advancements and technological innovations that enable a more efficient use of available resources to improve harvests and provide quality food for the entire world population. There is room for improvement in agricultural productivity until the areas where production is lower catch up with those with more efficient food production systems. In other words, part of the solution consists in producing more with less by improving the performance of the crops (Arús, 2020).

Depopulation, poor accessibility to services, and low potential for innovation are some of the biggest challenges that rural areas must address globally (Zavratnik et al., 2019). Therefore, fostering the environmental and social sustainability of food production models and creating favorable living conditions for farmers will determine rural areas' future development. Furthermore, to achieve more with less, a coordinated multi-level response across various fields, including politics, sociology, economics, technology, and education, is needed to undertake actions that address these challenges.

To reactivate rural economies, emphasis has been placed on non-agrarian activities in rural areas, many of which are based on environmental conservation and territorial balance (Tolón & Lastra, 2007). Lacambra (2001) points out that rural economies are no longer synonymous with agriculture as, in many aspects, they have diversified and gotten integrated into national economies, which are embedded into broader economic globalization. Due to the transformations that the countryside has experienced, rural economies have become one of the fields in which governments face the double challenge of developing and adapting their institutional frameworks to keep up with economic globalization.

The profound economic, political, and social changes brought about by increased global competitiveness, rapid technological transformation, and new demands in the workplace are forcing organizations to rethink the development of their human resources to improve their effectiveness (Guevara et al., 2013). These changes also affect the primary sector, where the promotion of new technologies and suitable human resources training will be essential in the coming years.

According to Carson (2017), the agricultural sector's labor demand will be divided into two categories. In the short term, there will be a demand for workers with limited agricultural training willing to work long hours for low wages in horticulture, fruit growing, pork and poultry production, and intensive dairy farms. However, in the medium term, as a result of the Third Industrial Revolution, there will be a need for a trained workforce capable of using information technologies to boost performance and who feel comfortable working with results-oriented management techniques. These transformations will cause the loss of some professions in the primary sector, especially in agriculture, where within ten years various functions and professions are doomed to disappear (Martín, 2016).

In contrast to the stereotyped conception usually held, the agricultural sector boasts a high level of technological innovation (Palacios et al., 2020). Therefore, agricultural and agri-food training represents one of the strategic pillars of rural development and modernization. In line with this, future farming and cattle-raising professionals will need to undergo basic and specific training that enable them to face new challenges, become technology-savvy, and, if possible, acquire a basic foreign language knowledge that will allow them to access farming-related information and contact clients and suppliers abroad (Turrado, 2017). Furthermore, Sumane et al. (2018) argued that agricultural innovation requires the participation of multiple actors. Therefore, farmer training becomes essential to successfully implement new approaches that foster innovation in these new complex and multi-stakeholder rural environments (Cascone et al., 2024).

Guaranteeing the incorporation of young farmers is one of the most significant challenges facing the agri-food sector, especially considering the predominant type of agricultural operation in Europe, where generational succession usually occurs within the same family unit (Alberdi, 2023). However, there is a new generation of farmers, many of them without agricultural roots and often of urban origin, who require a different kind of support than the one needed by traditional farmers because they lack the practical experience and tools needed to cultivate the soil, among other key aspects (Lozano et al., 2020). This presents both a challenge and an opportunity for VET (Vocational Education and Training), which should satisfy the needs of both traditional farmers and newcomers while working for and with society.

To sum up, agriculture is a strategic economic sector for most countries worldwide since its performance not only affects other economic sectors but also shapes the identity of each country or territory (Palacios et al., 2020). Even though, over the last decades, agriculture and livestock farming have been losing economic importance in developed countries within the European Union, Spain remains one of the leaders in agriculture (Nekhay & Salazar, 2021). Moreover, the relevance of Spain's agricultural sector goes beyond its economic impact, providing significant social, territorial, and environmental value (Oller & Benito, 2020).

In Spain and worldwide, the future of rural economies rests on three pillars: research and development, human resources training, and agricultural innovation. This article illustrates the efforts of *Sa Granja* to remain relevant in those three fields throughout the years by adapting its activity to the needs of the times. *Sa Granja* is an institution on the island of Menorca that started operations in 1922 as a center for experimentation and has kept on seeking solutions to the agricultural challenges of the island through research and experimentation; training and knowledge dissemination; and innovation. *Sa Granja* remains active in the 21st century with a clear vision of its mid and long-term contribution to the island's agri-food industry, keeping up with the need for environmental and social sustainability.

To identify valuable lessons, the article studies *Sa Granja's* socioeconomic context, the current agricultural VET system in Spain, and the role the center has played in developing the Balearic Islands. The article also explores how agriculture has been essential in Menorca's natural conservation. Then, *Sa Granja's* activities and contributions to Menorcan agriculture from its origins are assessed before addressing its future endeavors, such as the creation of a Rural Lab. In the discussion section, research questions are answered, and best practices are presented. Finally, some conclusions are drawn. Some lessons presented in the article will be useful for professionals and policymakers elsewhere.

2. Methodology

The paper follows a descriptive and interpretive approach to qualitative research by carrying out a bibliographical revision of documentary sources to find answers to open exploratory research questions in line with the methodology proposed by Elliott and Timulak (2005). This approach starts by formulating the problem. Then, data are collected, sorted out, and analyzed. Finally, the main findings are interpreted, and some conclusions are extracted.

Therefore, the problem is firstly formulated in terms of the research questions (RQ) that this article intends to answer. Although other questions and issues are also addressed, the following are the research questions (RQ) that have guided the authors' research:

- RQ 1: "How does an institution like Sa Granja benefit the island of Menorca and foster its food security?"
- RQ 2: "What role does it play in transitioning towards a more sustainable agriculture and cattle farming production model?"
- RQ 3: "What are the best practices that can be used elsewhere?"

Secondly, after prospective research and data gathering, a selection of primary and secondary sources is made by choosing bibliographical resources that might prove helpful not only to understand the problem and set it in context, but also to answer the research questions. Thirdly, bibliographical resources are organized systematically to facilitate their comprehensive analysis and interpretation, leading to the findings presented in this article.

3. Agricultural research and training in Spain in perspective

Fernández (1990) argues that despite an interest in agricultural research in Spain from the 16th century, the first great impulse to agricultural education dates to the Age of Enlightenment, in the last third of the 17th century. From then onwards, an agricultural revolution took place in Europe, as science began to be applied to improve production systems.

The 19th century saw profound changes in European and Spanish agriculture in terms of research and training. The new knowledge produced a new agricultural conception, in which the experimental method became essential for studying agriculture (Calatayud, 1999). The Agrarian Education Law sought to promote farm experimentation and research and provide direct advice to farmers (Cartañà, 2000). As a result, "Agronomic Stations" were designed for research and experimentation, while "Experimental Farms" were dedicated to teaching and training professionals (Piqueras, 2009).

In 1978, the Spanish Constitution established the territorial division of the country into 17 Autonomous Communities, that were granted powers in agricultural research. Moreover, regional governments inherited state-owned infrastructure, farms, buildings, laboratories, and other agricultural research facilities and expanded them over the years. Farms have often been dedicated to actions other than research (Albisu, 2004).

3.1 Agricultural VET in Spain today

In 1951, the Spanish government passed a Decree establishing rules for agricultural training (Cardona, 2006). Nevertheless, the basis for establishing Agrarian VET as we know it today is the reform promoted in 1970 by the General Education Law, which integrated vocational training into comprehensive education. The law was modified to establish a dual training system in 1974 by the Decree on the Organization of Vocational Training (Merino, 2005). The professionalization and improvement of agricultural VET has grown through the continuous and intensive training of experienced farmers and by offering basic training to people without prior experience. At present, one of the objectives of agricultural VET is to create an environment where entrepreneurship and innovation thrive by introducing an authentic business culture and promoting entrepreneurship among farmers (Ramos & Izquierdo, 2019).

Currently, there are three types of VET in Spain grouped in "professional families" covering practically all productive sectors: (1) Formal vocational training, (2) Certificates of Professional Standards, and (3) labor market-oriented training actions seeking short-term incorporations to work. Table 1 reflects the current VET offer of studies in agriculture.

Tab 1. Current Vocational Education and Training (VET) in Agriculture in Spain. Source: Own elaboration based on the laws that regulate VET in 2024

VET TYPE	LEVEL	STUDIES
FORMAL VOCATIONAL TRAINING	<i>Basic Degree Training Cycles</i>	• Agricultural Activities • Agro-gardening and Floral Compositions • Forestry Harvesting
	<i>Intermediate Degree Training Cycles</i>	• Equestrian Activities • Use and Conservation of the Natural Environment Gardening and Floristry • Agroecological Production • Agricultural Production
	<i>High-Level Training Cycles</i>	• Livestock and Animal Health Assistance • Forestry and Natural Environment Management • Landscaping and Rural Environment
CERTIFICATES OF PROFESSIONAL STANDARDS	<i>Level 1</i>	6 Professional Certificates
	<i>Level 2</i>	25 Professional Certificates
	<i>Level 3</i>	16 Professional Certificates
NON-FORMAL TRAINING ACTIONS	• Training actions aimed at incorporation into the labor market • Specialization courses	

Whereas formal vocational training is part of the Spanish educational system and is regulated by the Ministry of Education, the Certificates of Professional Standards are issued by the Spanish National Employment Service (SEPE) and consist of non-regulated job training that certify professional qualifications for the performance of a specific job. Both are recognized at the European level and there is a correspondence between both types of VET in terms of the competencies acquired (Ministry of Education and Vocational Training, 2023).

4. The role of agriculture in environmental conservation on the island of Menorca

Located in the Mediterranean Sea off the east coast of mainland Spain, Menorca is part of the Balearic Islands archipelago (see Figure 1). Measuring approximately 700 km², Menorca has a Mediterranean climate characterized by warm temperatures with maximum rainfall in autumn and low rainfall in summer (Jansà et al., 1981). One of the characteristics of the island is that there are no rivers or reservoirs, making Menorca exclusively dependent on the water reserves in its subsoil.



Fig 1. Geographic location of the island of Menorca. Source: own elaboration

According to Spain's National Institute of Statistics (INE), Menorca's population, as of October 1, 2023, was 101,245 inhabitants (INE, 2023). However, according to the Institute of Statistics of the Balearic Islands (IBESTAT), in 2023 the island received 1,659,862 visitors with the ensuing human pressure on its resources.

Menorcan economy has evolved somewhat differently from the rest of the Balearic Islands. While Ibiza and Mallorca have mainly relied on tourism, Menorca boasts a marked intersectoral balance combining agriculture, industry, and trade that has gained the appellation "the Minorcan Way of Growth" (Beltrán & Manera, 2015). However, its economic model began to experience transformations that caused a decline in agriculture and livestock farming due to the emergence of tourism in the 1970s (Casasnovas, 2016). At present, tourism represents 80% of the island's active economy, and although the economic importance of agriculture and livestock farming has dwindled, they remain strategic for the territory in socioeconomic and environmental terms, as they play a fundamental role in maintaining biodiversity and modeling the typical mosaic landscape (Esnouf, 2011).



Fig 2. Menorcan mosaic landscape, an example of nature preservation. Source: author's picture

4.1 UNESCO's recognition of natural and cultural heritage preservation

National and international initiatives have echoed the preservation of the island's natural and cultural heritage, to which agriculture and livestock farming have largely contributed. In 1993, UNESCO recognized Menorca as a Biosphere Reserve because of its success developing economic activities while preserving its cultural heritage and natural landscape, contributing to the diversity of Mediterranean habitats. Furthermore, Menorca is the largest Marine Biosphere Reserve in the Mediterranean, that is protected by The Menorca Biosphere Reserve Law, and in 2023 UNESCO declared Talayotic Menorca a World Heritage Site owing to the large number of archaeological sites of the Talayotic culture located in agropastoral landscapes.

Moreover, the island government, the Consell Insular de Menorca (CIME, henceforth) created the Biosphere Reserve Agrarian Contract (CARB), as an instrument to support the profitability of traditional agricultural holdings and recognize the environmental services and cultural activities that farmers contribute to the Biosphere Reserve. It is an agreement between the CIME and the farm owner,

through which farmers commit to use environmentally friendly agricultural practices in exchange for economic compensation and services (Biosphere Reserve Agency of Menorca, s.f.).

4.2 Agriculture in Menorca today

Rustic land represents 97.5% of the island, whereas the useful agricultural area represents 63% of the territory (Cardona et al., 201). Regarding the size of farms (see Figure 3), the dominant type measures more than 50 hectares (Madeo et al., 2021).

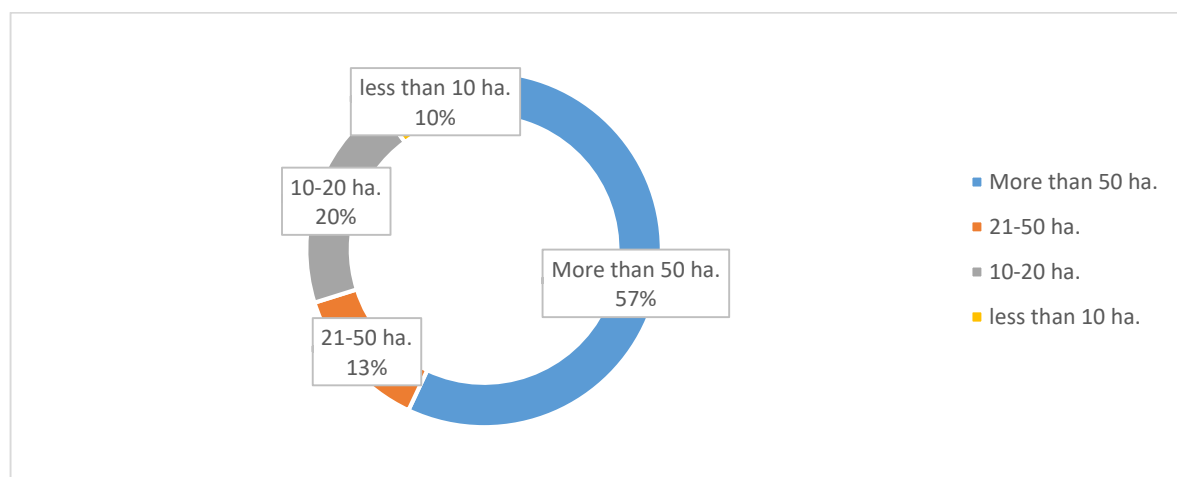


Fig 3. Average farm size in Menorca. Source: Madeo et al. 2021

4.3 History and development

Since the end of the 19th century and for much of the 20th century, Menorca's rural model has revolved around livestock farming. The birth in 1931 and the development of local company *Industrial Quesera Menorquina*, which introduced processed cheese in Spain under the brand 'El Caserío' (Beltrán & Manera, 2015; Sudrià, 2017), has conditioned the agricultural production of the island (Morán, 2022), that was geared to producing milk. Thus, the island's traditional cattle herds gave way to more productive imported Friesian cows. This focus on milk production earned it the nickname "the Mediterranean island of dairy monoculture" (Madeo et al., 2021, p. 4).

Another singularity of Menorca's livestock farming and agriculture is that farms are run under the "joint management system," a private civil partnership contract signed between the farm owner and the actual farmer, who act jointly to exploit a property in close collaboration. It was already present around the 18th century (Seguí, 2001). On the other hand, the sharecropping regime still plays a key role. It is supported by the Menorcan Rural Society, a legal figure specific to the island developed ad hoc during the 1950s (Madeo et al., 2021).

Nowadays, the main challenge for the agricultural sector of the Balearic Islands is the extra costs of insularity, which, in the case of Menorca, is worsened by its "double insularity": needing on the one hand maritime or air transport to bring in any input not produced on the island, and, on the other hand, the costs involved in exporting the products made on the island (Groizard et al. 2016).

5. Sa Granja: an innovative agricultural research and training center

Presently owned by the CIME, *Sa Granja* is located near the s'Albufera d'Es Grau Natural Park, in the municipality of Maó, in a property of 92,650 m², with nearly 5,000 m² corresponding to buildings. *Sa Granja* also manages 30 hectares of the *Milà Nou*. Its facilities, in addition to a school, house different guidance and advisory departments, the Regulatory Council of the Protected Denomination of Origin *Mahón-Menorca* cheese, and Leader Menorca. Furthermore, the Menorca Biosphere Reserve Agency,

and the Environment Department are hosted in *Es Castellet* (*Sa Granja's* original building). Likewise, there is a house to accommodate visiting experts researching the Biosphere Reserve.

5.1 *Sa Granja's* origins as a driver for agricultural innovation and modernization

During the late 19th and early 20th centuries, industrialization consolidated in Menorca (Casasnovas, 2005). However, agriculture only modernized at the beginning of the 20th century (Casasnovas, 2003). Aware of the need to modernize the Menorcan countryside, the Agrarian Chamber insisted on creating an Agricultural Station. To this end, in 1918, the Island's Town Councils agreed to request the Minister of Public Works its creation. Authorized in 1919 (Mir, 1921), the Agricultural Station started operations in 1922 to introduce the scientific-technical advances produced by agronomic science (Cartañà, 2000; Seguí, 2022). The Spanish government was responsible for the technical design, machinery, laboratory instruments, and staff, while the Provincial Councils and City Councils assumed the costs of land and buildings (Piqueras, 2009; Seguí, 2022).



Fig 4. Agricultural Station Building (Notice the central inscription, reading “ESTACIÓN DE AGRICULTURA MCMXXII”). Source: author's picture

The Spanish Civil War (1936–1939) halted the advance of all social and economic structures. Improvements in agriculture experienced a setback or stagnated (Binimelis et al., 2004). At the end of the Spanish Civil War, *Sa Granja* was on the verge of disappearing. Nevertheless, without financial contributions for experimentation, the Center functioned as a regular farm until 1948 (Seguí, 2022).

In the 1950s, Spain experienced accelerated growth and transformation thanks to its increased productivity resulting from technological and organizational innovations, greater external openness, and the abatement of the traditional peasant system (Palacios et al., 2020). During this period, numerous activities related to experimentation, improvement of livestock farming, and dissemination were carried out in *Sa Granja*. Thus, in terms of crop experimentation, 27 types of forage and cereals were grown, seeking to improve performance. Research findings were disseminated through peasant brotherhoods and broadcasts on radio Menorca (Seguí, 2022; Bustamante, 2022). But, the most relevant innovation of the period was the island's first forage silage, introduced in 1957.

In 1955, the Spanish Agricultural Extension Service was created to increase agriculture productivity on the wake of the “green revolution” (Seguí, 2022) and to help farmers use their resources through assistance, technical advice, and training. As it evolved, the model sought a more comprehensive

orientation, fostering the social dimension of agriculture (Gómez & Luque, 2007, p. 132). Two of these institutions opened operations in Menorca, one on each end of the island (Bustamante, 2022).

In terms of research and dissemination, three studies covering livestock feeding, fruit growing, and the correct use of fertilizers were written and published in Maó in the 1960s, and three technical notes on sulla, tree alfalfa, and forage pea were published by the Spanish Ministry of Agriculture. On the other hand, an example of the interrelation between Experimentation Centers was the collaboration with the Burjassot Center in Valencia, which planted an orange tree nursery free of a viral disease called "citrus sadness" (Seguí, 2022).

During this period, the bovine sector experienced a highpoint. To feed the milk-producing livestock herds, cereal crops were replaced by forage (Hernández, 2005). Dairy industry expanded significantly during the 1960s and 1970s, causing the specialization of Menorcan cheese farms and distressing agrarian diversification (Beltrán & Manera, 2015; Méndez, 2007). In a few years' time, Menorca changed its production model from agriculture and wheat to livestock, producing meat and cheese for export (Bisson, 2007). In this context, Sa Granja dedicated its efforts to research forage species that adapted to the island's climate conditions to help reduce livestock production costs (Baret, 2018).

In 1980, *Sa Granja* was transferred to the *Consell Interinsular*, a pre-autonomous institution of the Balearic Islands, and later on to the government of the Balearic Islands. Finally, the CIME assumed its ownership on January 1, 2000. Ever since, it has improved its facilities and continued to be a referent in training, research, scientific cooperation, and communication. Some of its achievements in these fields are addressed in the following paragraphs.

As for research and development, new tests on forage crops, trials with ryegrass, and French honeysuckle stand out, while other experimental crops continued, such as forage in varieties of ray grass and legumes: French honeysuckle, Alexandria clover, subterranean clover and bean, and forage cereals (sagranja.cime.es).

Regarding its research communication, from 1992 to 2018, the Center's technicians published 74 technical notes on diverse agricultural topics to respond to farmers' concerns about new technologies and advances in the sector (Seguí, 2022). Moreover, from 2003 until 2005, the center participated in the scientific meetings of the Spanish Society for the Study of Pastures (SEEP), presenting three communications on the production of forages, and in 2004 at the IV Dairy Beef Technical Conference of the Higher Technical School of Agri-Food Engineering (ETSEA) of the University of Lleida, presenting a study on the rations for grazing of dairy cows (sagranja.cime.es).

As for technical and scientific collaboration, Sa Granja participated in the European project "Strategy for energy efficiency in dairy farms in the Euroregion. Selection and comparison of standard analysis tools and methodologies" led by the *Agroteritori* Foundation (Catalonia) in collaboration with the Agrarian Chamber of Ariège (France) and the Agrarian Chamber of Lozère (France), financed by the Pyrenees Mediterranean Euroregion in the Call for Projects for Sustainable Development 2013. The project sought to acquire basic knowledge of the energy needs of dairy farms in the Euroregion and establish the essential mechanisms to promote responsible and efficient energy use in milk production processes, publishing a guide to good energy practices in dairy farms.

5.2 Sa Granja's development as an Agricultural Training Center

Sa Granja's agrarian training project began in 1968, when the center was assigned to the General Directorate of Agrarian Training. The opening of the Training Center in 1972 was the most notable events in Sa Granja's centenary history. It was conceived as an agricultural operation applying modern techniques and accommodating 240 students from all over the Balearic Islands, including 60 boarding and 90 half-board students. Although innovative, the project failed due to its inadequate construction in a problematic location (Seguí, 2022).

The school's first challenge was breaking the preconception that it was not necessary to study to be a farmer. However, 40 students enrolled in the first academic year thanks to an agreement with

the General Directorate for Agriculture to implement a half-board regime two days a week for students, who could do a traineeship on their farms the rest of the week (Seguí, 2022). These measures prevented disinterest. Since its opening, 1,709 students have completed their studies in its facilities.



Fig 5. The Agrarian Training and Experimentation Center today. Source: author's picture

The Center began teaching first-degree Agricultural VET on “Head of Agricultural Operations” and the “Agricultural Foreman” was introduced in 1984. The educational curriculum changed in the mid-1990s, and the 1996–1997 academic year was the last in which compulsory education ended at the age of 14. Nowadays, compulsory education in Spain finishes at 16. The transition from one educational system to the other is to blame for the decrease in enrollment at Sa Granja during the following academic years. In 2002, when the Agricultural Foreman teachings disappeared, Sa Granja was left without official studies, with the ensuing fall in student enrolment and the need to reorganize. These fluctuations are shown in Figure 6.

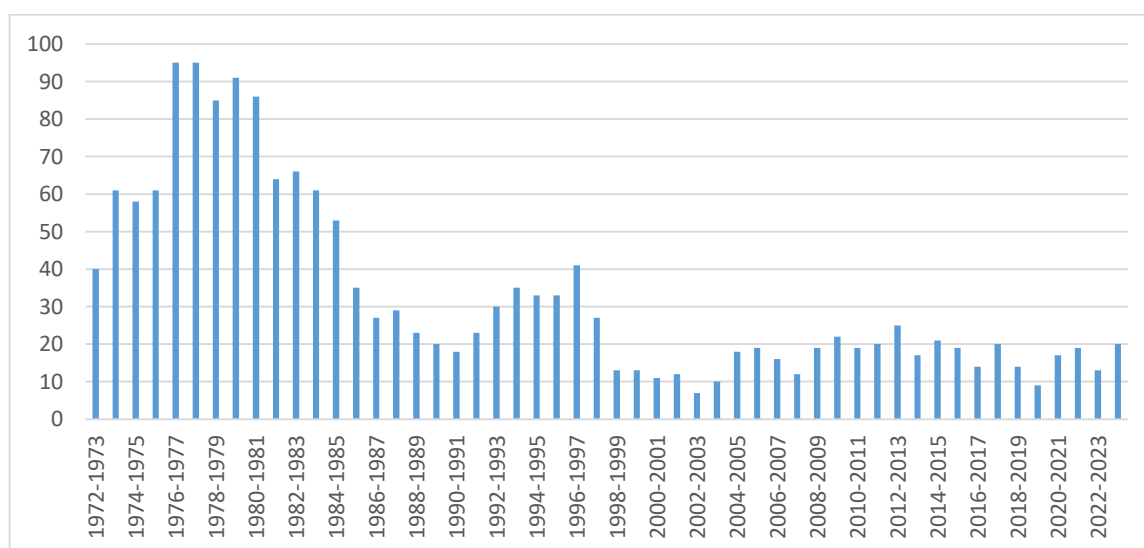


Fig 6. Total number of students per academic year from 1972 until 2023. Source: data provided by the Agricultural Training School

Currently, the Center offers the Intermediate Degree Training Cycle in Agricultural Production through a cooperation agreement between the CIME and the Department of Education and Vocational Training of

the Balearic Islands as a center attached to the *Pasqual Calbó y Caldés* Institute. The technical-practical studies aim to train future farmers to make decisions, manage, and adapt to new agricultural and livestock farming techniques while generating environmental awareness (Lamo, 1996).

In 2022, the Autonomous Community and the CIME agreed to include a new Certificate of Professional Standards in Agroecology, which was not implemented eventually due to a lack of students.

Other non-formal training activities are regularly carried out to respond to the demands of the agricultural sector, such as introductory courses in computer science applied to farm management, animal healthcare and hygiene, treatment, and prevention of diseases, artificial insemination of cattle, nutrition, first aid, and farm facility maintenance, amongst others. As an added value, since students from the Training Center participate in experimentation activities, research results are disseminated throughout the island.

A summary of some Sa Granja's relevant achievements presented in this article is available in Table 2.

Tab 2. Sa Granja's activities for the period 1923–2023. Source: own elaboration based on the information collected

AREA	LANDMARK
Research & Development	• Crop experimentation, seeking to improve grain yield (27 types of forages and cereals) • First forage silage on the island • Research collaboration with the Burjassot Center (Valencia) on "citrus sadness" • Research on forage species adapted to Menorcan climate • Project "Strategy for energy efficiency in dairy farms in the Euroregion". • Recovery and improvement of native breeds. • Introduction of new breeds of cows for milk production
Communication	• 3 Technical notes (on sulla, tree alfalfa, forage pea) • 74 technical information notes on agriculture and livestock farming topics • 3 communications about the production of forages • Study on dairy cows' grazing rations • Guide to good energy practices in dairy farms • Broadcasts in Radio Menorca for 30 years
Training	• 1,709 students trained at the Agricultural Training School • Non-formal training activities
Others	• Guidance and advisory departments for the agricultural sector • Headquarters: - Regulatory Council of the PDO <i>Mahón-Menorca</i> cheese - Leader Menorca. - Menorca Biosphere Reserve Agency - CIME's Environment Department

6. Future vision: Sa Granja Rural Lab

In January 2017, the CIME joined the Milan Urban Food Policy Pact (2015), seeking to foster sustainability on the island and commitment to its primary sector and local products. Thanks to this Pact, Menorca is the only Balearic Island with a Strategic Food Plan that promotes sustainable and healthy diets, raises awareness about product seasonality, and promotes short distribution circuits. It also incorporates measures to promote social and solidarity economy in food, to increase agroecology-based food production and to recover local varieties (Mesquida, 2019).

Furthermore, following UNESCO's Man and the Biosphere (MAB) 2015–2025 Strategy materialized in the Lima Action Plan (2016), the Menorca Biosphere Reserve Agency released in 2019 the Action Plan for the Menorca Biosphere Reserve to activate Menorca as a sustainability laboratory in terms of conservation, economic development, and logistical support, through actions for agricultural training, experimentation, and dissemination, especially in agroecology at *Sa Granja*.

In 2021, the CIME, in cooperation with Leader Menorca, presented the "Agrarian Strategy of Menorca: Action Plan for the Sustainability of Menorcan Agriculture". Its main objective is to plan and guide agricultural activity over the following five years. The document envisions Sa Granja as a multifunctional Rural Lab that acts as a neuralgic center to reactivate the Menorcan countryside. This model is based on the Living Lab concept, a tool for participatory planning and design aligned with the Sustainable Development Goals and used in various sectors to foster sustainability, environmental management, conservation, and nature-based solutions (Soini et al., 2023).

Living labs are user-centered open innovation ecosystems that combine simultaneous research and innovation processes through public-private partnerships by developing Multi-Actor Platforms (MAPs), whose performance depends on establishing sustainable collaboration among stakeholders. However, their success, as well as their objectives and ambitions, are determined by their specific context and ability to build a governance network that fosters sustainable economies, social innovation, and policy coherence at all levels (Vilcu et al., 2023).

McPhee et al. (2021) sustain that the innovative approach of living labs increases the sustainability and resilience of agriculture in response to environmental, economic, and social challenges. Thus, Rural Labs are being implemented in rural and peri-urban areas as social innovation laboratories to generate spaces for dialogue, participation, co-creation, learning, and research (Schaffers et al., 2007). They are the kind of hub where a new generation of farmers should be willing to assemble, so they can participate in providing solutions to the economic, environmental and social challenges, while getting the support and training they need.

In line with the Living Lab concept, the *HUB Agrari Sa Granja International Rural Lab* is a project that seeks to gather in its facilities key agents of the Menorcan agri-food sector and to train new generations of farmers. The Rural Lab is conceived as a space to generate knowledge and apply new techniques and technologies to the agri-food sector, enabling Menorca to become an international agricultural referent true to the original values that have guided Sa Granja's evolution since its foundation as a General Agricultural Station (Font et al., 2020).

Aware of the Rural Lab's projection, the CIME applied in 2023 for funds from the Recovery, Transformation, and Resilience Plan of the Spanish government under Line 2 of the "Program to Foster the Rehabilitation of Public Buildings" (PIREP), obtaining a subsidy of 3 million euros in European funds, a financial aid fundamental for the viability of the project. The funds will be used to update *Sa Granja's* facilities to meet the needs of the Rural Hub while finding a balance between environmental sustainability and energy efficiency.



Fig 7. Sa Granja Rural Lab Project. Source: architectural studio La Mar d'Arquitectes

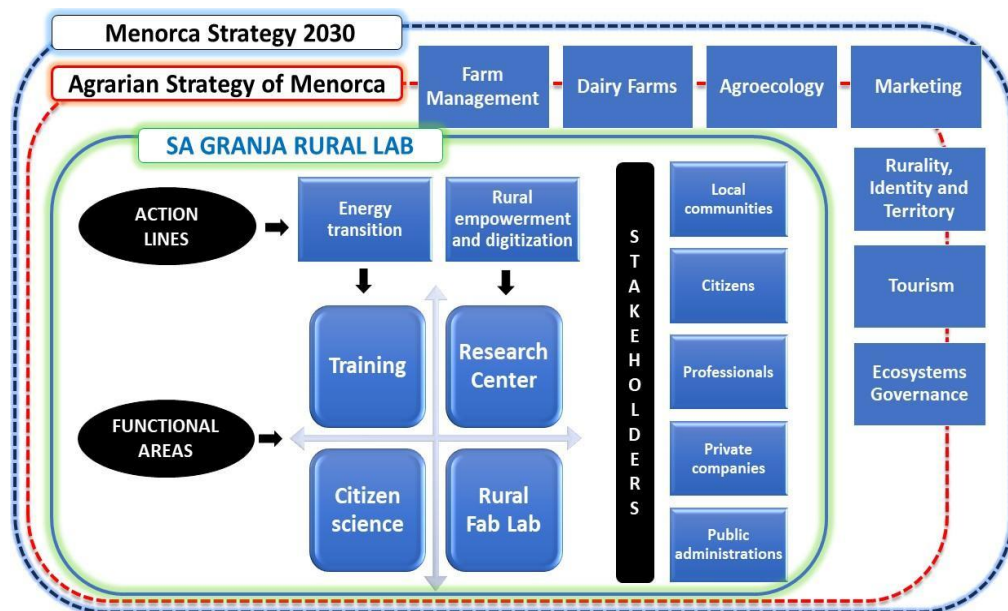


Fig 8. Sa Granja Rural Lab, its action lines, and functional areas within its regulatory framework. Source: own elaboration, based on the HUB Agrari Sa Granja International Rural Lab

The Rural Lab two main action lines (energy transition in rural environments and rural empowerment and digitalization) are further developed in four functional areas (Figure 9), reaching out to all stakeholders involved (private companies, public administration, citizens, professionals, and local communities), as can be observed in Figure 8.

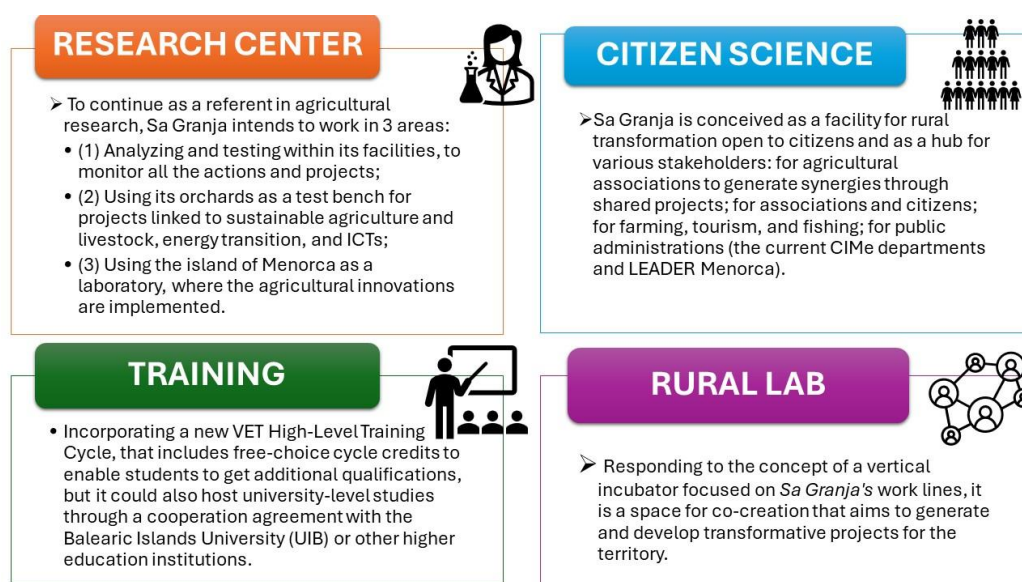


Fig 9. Functional areas. Source: own elaboration, based on the HUB Agrari Sa Granja International Rural Lab

7. Discussion

For centuries agriculture has shaped Menorca's landscape. Since its foundation, one hundred years ago, *Sa Granja* has played a key role in the island's agriculture by proactively responding to the sector's needs. Thus, its activities evolved from research and development (originally referred to as "experimentation") and results communication to training professionals. To remain relevant, at present, the center is in the process of becoming a Living Lab called HUB Agrari Sa Granja International Rural Lab, that attracts multiple stakeholders and fosters economic revitalization by giving a new orientation to the Menorcan countryside.

The UN defines food security as the state in "which people at all times have physical, social and economic access to sufficient and nutritious food that meets their dietary needs for a healthy and active life" (FAO, 1996). The Global Food Security Index (GFSI)³ definition goes beyond hunger to the underlying factors affecting food insecurity. It rests on four pillars: affordability, availability, quality and safety, and sustainability and adaptation, which assess a country's exposure to climate change.

Access to agricultural technology, education, and resources plays an important role in food security. According to the GFSI 2022 (published in 2023), there was a fall in the two pillars of affordability and food quality and safety, and the gap between the top ten performers and the counties at the bottom of the index continued widening. Moreover, the survey concludes that "innovation is essential to building resilience" since countries where governments invest in R&D and innovative technology are more likely to achieve higher scores in GFSI.

To answer RQ 1, this article has analyzed the initiatives undertaken by Sa Granja in its lines of action, that have strengthened Menorca's food security: research and development, communication, education and training, and continuous innovation. Since Menorca is an island that bears the impact of "double insularity," its food security is enhanced when variables such as Km 0 production, sustainable agriculture, and agroecological and local products are present in the equation. Moreover, working in this line contributes to sustainability by shortening supply chains, reducing CO2 emissions, and helping to preserve biodiversity.

Research communication has been one of the keystones in Sa Granja's work. Research results have been disseminated through publications and conferences directed to national and international experts, as well as technical information sheets aiming to keep farmers up to date on various issues in the agricultural

³ Prepared by The Economist Intelligence Unit, the GFSI is a composite index that analyses 28 indicators, ranking both developed and developing countries.

sector. These activities attest to the relevance and quality of the scientific research conducted by Sa Granja staff. Furthermore, no less important is the diffusion of current events in the Menorcan countryside through a radio program broadcast for decades, that made it possible for information to reach not only primary sector stakeholders but also the entire society, establishing closer links between rural and urban environments.

Sa Granja has seen mostly lights in its endeavors, but also some shadows. A milestone was the incorporation of formal training in agriculture adapted to the needs of rural Menorca. Although the center did not become the Balearic reference that it was initially expected to be, since the 1970s, most of the island's farmers have been trained at its facilities. To get an idea of overarching influence of the agricultural training school, the number of people trained at the center represents 1.7% of the island's current population.

As for RQ 2, regarding the challenge of agricultural transition and food sovereignty, Sa Granja should prioritize innovation in its training and practices, as well as sustainable agriculture training to ensure that all the stakeholders involved can advance together. These efforts should be aligned with the Menorca Strategic Guidelines (DEM) and the Menorca Strategy 2030, two frameworks that pursue more sustainable livelihoods and land use and include an agricultural strategy that defines an action plan for sustainable agriculture. On the other hand, the Center has supported research on agricultural sustainability, as can be inferred from its participation in the project Strategy for Energy Efficiency in Dairy Farms, funded by the European Commission.

To answer RQ 3, four lessons from Sa Granja's experience are discussed here. One of the lessons that Sa Granja offers is that it is essential to recognize the community's needs and wants so that services are adapted to their demands. Despite all the difficulties it has experienced throughout the years, Sa Granja has shown its capacity to focus on the rural community's demands. Thus, from the 1950s onwards, it became an engine of innovation and modernization for the island's agricultural sector, receiving a new boost in the 1970s by incorporating formal training in its facilities.

A second lesson that can be extracted is the need to evolve without losing focus. Research through experimentation was the primary mission for which the center was originally conceived, but over the years, it has added new activities remaining true to its mission of providing solutions for Menorca's agriculture.

A third lesson is to articulate a clear vision for the future that enables the institution to continue at the forefront. *Sa Granja* has always been a reference in the Balearic Islands and beyond, as its cooperation with various agriculture-related organizations attests. The HUB Agrari *Sa Granja* International Rural Lab seeks to balance environmental protection, social well-being, and economic prosperity through co-creation. This innovative initiative follows the Living Lab model.

Finally, stakeholder involvement is essential in the endeavors of every organization to create mutually beneficial cooperation networks. Even though community-focused, these networks should reach out to the world. For example, to carry out joint research and projects, such as the collaboration of Sa Granja with the Burjassot Center in Valencia. Moreover, in the case of living labs, stakeholder involvement should be geared to creating innovation ecosystems that foster entrepreneurship.

8. Conclusions

Since *Sa Granja* began its journey over a century ago as an experimental center whose mission was to provide solutions for Menorcan agriculture, it has evolved and grown by offering services adjusted to its stakeholders' needs. Its activities currently rest on four pillars: research and development, communication, agricultural training, and innovation. Looking into the future, its role will be relevant in the mitigation of climate change and the transition towards a more sustainable food security model for the island, in line with its Agrarian Strategy, Food Strategy, and the objectives of the Biosphere Reserve, among other regional, national, and international frameworks, such as the Agenda 2030 or the European Green Deal.

Although the center has always been responsive to the sector's needs, in the 1970s, it overly focused on the dairy sector at the expense of diversification. At the time, Sa Granja prioritized research on forage intended for livestock farming, introducing in Spain new forage varieties, such as *sulla*, which helped boost Menorca's dairy industry. To counter the negative effects of monoculture farming and respond to the challenges of climate change, new farming methods, and crop diversification to guarantee food security will be necessary. This is even more so in the case of islands, that should avoid becoming completely dependent on the outside by fostering greater autonomy, which in turn contributes to their food sovereignty.

On the other hand, Sa Granja has always been involved in continuous training, either on its own initiative or in collaboration with different organizations, which has allowed for constant skill updating of the island's farmers. Furthermore, in 2022, it implemented training in ecological farming, an initiative that has not yet achieved its expected results.

Sustainable agriculture is one of the main concerns at present and various regulations and strategies seek to improve it. Thus, the Menorca Biosphere Reserve Law includes specific articles to foster the sustainability of the agri-food system. To achieve this goal, it establishes the public policies necessary to consolidate agriculture and livestock farming as strategic sectors for the Menorcan economy and territory, guaranteeing the well-being of farmers and their families. It also promotes sustainable agricultural and livestock management practices, as well as the digitalization of production processes and product marketing.

Few organizations can boast a centenary history. The secret of its resilience lies in its ability to adapt and innovate. Thus, although it was about to disappear during the Spanish Civil War and the post-war period for economic reasons, it survived by functioning as an agricultural operation. On the other hand, its latest addition, the HUB Agrari Sa Granja International Rural Lab represents an opportunity to continue at the forefront and give a new orientation to the Menorcan countryside.

Whereas some rural labs seek to develop basic digital skills in rural areas, the vision of Sa Granja's Rural Lab is more ambitious as it is intended to represent a new turning point for the institution without leaving its original mission and keeping up with the activities that have made it so successful (research, communication, training, innovation). This article has contended that Sa Granja's Rural Lab follows the living lab model, which has spread worldwide to boost innovation through co-creation and stakeholder engagement, creating a prosperous entrepreneurship ecosystem.

"Through our research, we have come across the EU Mission: A Soil Deal for Europe, whose goal is to implement 100 living labs and lighthouses throughout the EU to lead Europe's transition towards healthy soils by 2030, in line with the SDGs and the European Green Deal. According to the European Commission, EU Missions are one of the elements of Horizon Europe (the EU research and innovation funding program for the period 2021-2027), that seek concrete solutions to humanity's big challenges and will deliver concrete results by 2030. There are five EU Missions dealing with wicked problems such as adaptation to climate change, restoration of oceans and waters, smart cities, cancer, and soils.

Even though Sa Granja's Rural Lab is not part of the EU Mission: A Soil Deal for Europe, they have a shared philosophy and use similar tools to accomplish their visions. The European Commission defines living labs as places "to experiment on the ground" and lighthouses as "single sites, like a farm or a park, where to showcase good practices," but communication and training are also part of their activities. Furthermore, they both seek to involve stakeholders in co-creation processes to provide real-life solutions to revitalize their territories."

In our opinion, the big difference between them is that while the EU Mission: A Soil Deal for Europe creates living labs *ex-novo*, Sa Granja's Rural Lab is the product of a centenary evolution. On the other hand, compared to other rural labs, its role goes beyond training the locals in digital skills. It fosters knowledge creation and entrepreneurship through quality research for and with society. Nevertheless, these novel projects are still at an early stage, and it will be necessary to assess their results once they are consolidated.

To conclude, a final lesson that can be extracted from the analysis presented in this article that could prove useful for policy and decision-makers is the importance of fostering entrepreneurship and seeking continuous improvement and innovation with a long-term vision that integrates social and environmental sustainability involving various stakeholders (local communities, citizens, farmers, experts, private companies, and public administrations), and most of all working for and with society.

Acknowledgments

The authors sincerely thank the valuable support of the director of the Agrarian Training School, Sa Granja, Antoni Allés, Dr. Antoni Seguí, and the architecture studio La Mar d'Arquitectes for transferring images of the Rural Lab preliminary project.

Academic references

- [1] Alberdi Collantes, J. C. (2023). De la formación a la instalación: un modelo de espacio test agrario para el País Vasco (España). *Revista Española De Estudios Agrosociales y Pesqueros*, (260), 267–297. DOI: 10.24197/reeap.260.2023.267-297.
- [2] Albisu, L. M. (2004). La investigación agraria en las comunidades autónomas. [Documento de trabajo, 04/8]. Zaragoza: CITA.
- [3] Arús, P. (2020). The agriculture of the future: Science and technology for sustainable agricultural development. *Mètode Science Studies Journal: Annual Review* 10, 33–39. DOI: 10.7203/metode.10.12546.
- [4] Belay, T. (2021). Impact of Climate Change on Food Availability – A Review. *International Journal of Food Science and Agriculture*, 5(3), 465–470. DOI: 10.26855/ijfsa.2021.09.01.
- [5] Beltrán Andreu, C. & Manera Erbina, C. (2015). La vía menorquina de crecimiento: el fin de un modelo económico, 1960–2010. *Revista de Historia Industrial*, 59, 179–205.
- [6] Beddington, J., Asaduzzaman, M., Clark, M., Fernández, A., Guillou, M., Jahn, M., Erda, L., Mamo, T., Van Bo, N., Nobre, C., Scholes, R., Sharma, R. & Wakhungu, J. (2012). *Achieving food security in the face of climate change: Final report from the Commission on Sustainable Agriculture and Climate Change*. Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security. <https://hdl.handle.net/10568/35589>.
- [7] Binimelis Sebastián, J., Ginard Bujosa, A. & Ordinas Garau, A. (2004). El procés de mecanització agrària a les Illes Balears durant l'autarquia (1946–1969). *Estudis d'història agrària*, 17, 147–167.
- [8] Bisson, J. (2007). *La tierra y el hombre en Menorca*. Maó: Institut Menorquí d'Estudis.
- [9] Calatayud, S. (1999). Difusión agronómica y protagonismo de las elites en los orígenes de la agricultura contemporánea: Valencia, 1840–60, *Historia Agraria*, 17, 99–127.
- [10] Cardona Andújar, J. (2006). Formación Profesional Agraria. Actividades del INEM-PPO en Castilla-La Mancha (Período 1968–1982). *Alcalibe: Revista Centro Asociado a la UNED Ciudad de la Cerámica*, (6), 171–200.
- [11] Cardona Pons, E., Casas Bosomba, G. & Moll Taltavull, C. (2017). Menorca la reserva de biosfera al teu abast. Maó: Consell Insular de Menorca, Agència Menorca Reserva de Biosfera.
- [12] Carson, K. I. (2017). Agricultural training and the labor productivity challenge. *International Journal of Agricultural Management*, 6, 131–133. DOI: 10.5836/ijam/2017-06-131.
- [13] Cartaña, J. (2000). Las estaciones agronómicas y las granjas experimentales como factor de innovación en la agricultura española contemporánea (1875–1920), *Scripta Nova*, 69(4), not paged.

- [14] Casanovas Camp, M. Á. (2016). *História de Menorca*. Palma: Editorial Moll.
- [15] Casanovas Camps, M. Á. (2005). Menorca. Un bosquejo histórico. *Narria: Estudios de artes y costumbres populares*, 109–112, 2–12.
- [16] Casanovas Camps, M. Á. (2003). La Transformació d'una Economia Insular. El Cas De Menorca: 1600–1920. *Butlletí De La Societat Catalana d'Estudis Històrics*, 12, 145–160.
- [17] El Bilal, H., Bassole, I. H. N., Dambo, L. & Berjan, S. (2020). Climate change and food security. *Agriculture and Forestry*, 66(3), 197–210. DOI: 10.17707/AgricultForest.66.3.16.
- [18] Elliott, R. & Timulak, L. (2005). Descriptive and interpretive approaches to qualitative research. In Miles, J. & Gilbert, P., eds., *A Handbook of Research Methods for Clinical and Health Psychology* (pp. 147–160). Oxford Academic. DOI: 10.1093/med:psych/9780198527565.003.0011.
- [19] Esnouf, M. (2011). *Valorización de los productos de origen y desarrollo territorial en la isla de Menorca* [Master's Thesis]. Montpellier: SupAgro.
- [20] Fernández Clemente, E. (1990). La enseñanza de la agricultura en la España del siglo XIX. *Agricultura y sociedad*, 56, 116–148.
- [21] Firdaus, R. R., Senevi Gunaratne, M., Rahmat, S. R. & Kamsi, N. S. (2019). Does climate change only affect food availability? What else matters? *Cogent Food & Agriculture*, 5(1), 1707607. DOI: 10.1080/23311932.2019.1707607.
- [22] Font, F., Madeo R., Grijalvo, M., Xavier Abad, X. & Teixidor, E. (2020). *Sa Granja International Rural Lab Menorca*. Maó: Consell Insular de Menorca.
- [23] Cascone, G., Scuderi, A., Guarnaccia, P. & Timpanaro, G. (2024). Promoting innovations in agriculture: Living labs in the development of rural areas. *Journal of Cleaner Production*, 443, 141247. DOI: 10.1016/j.jclepro.2024.141247.
- [24] Gómez Benito, C. & Luque Pulgar, E. (2007). Modernización agraria, modernización administrativa y franquismo. El modelo educativo y administrativo del Servicio de Extensión Agraria (1955–1986). *Áreas. Revista Internacional de Ciencias Sociales*, 26, 131–149.
- [25] Gómez Martín, M. & Copena Rodríguez, D. (2023). De auxiliares amables a campesinas conscientes. Origen y trayectoria de la primera Granja-Escuela femenina en España. *Ayer. Revista De Historia Contemporánea*, 131(3), 193–217. DOI: 10.55509/ayer/1276.
- [26] Guevara Viera, R. V., Nápoles Gutiérrez, N., Curbelo Rodríguez, L. M., Guevara Viera, G. E. & Soto Senra, S. A. (2013). Eficiencia de la capacitación agrícola como componente del sistema de extensión agraria. *Revista de Producción Animal*, 25(1), unpagued.
- [27] Groizard Cardosa, J. L., Bru Martínez, L. L., Oliver Rullán, F. & Santana Gallego, M. (2016). *Los costes de la insularidad de las Islas Baleares: evaluación de políticas actuales y propuestas de futuro*. Palma: Universitat de les Illes Balears.
- [28] Hernández Andreu, J. (2005). Cien años de economía de Menorca (17/11/05). *Revista de Menorca*, 89, 73–85.
- [29] Jansà Clar, A., Jansà Clar, X., Llopart Díaz, C., Mercadal Pons, B., Obrador Tudurí, A., Rosell Sanuy, J., Trilla Arrufat, J. & Vidal Miquel, T. (1981). *Enciclopèdia de Menorca*. Vol. 1 Geografia Física. Maó: Obra Cultural de Menorca.
- [30] Lacambra Gambau, V. M. (2001). Desarrollo rural en los espacios rurales europeos. Elementos de desigualdad territorial. *Revista catalana de Sociologia*, 11, 253–276.
- [31] Lamo, A. (1996). La formación agraria en Menorca. *Vida Rural*, 28, 26–28.
- [32] Lovell, H., Hann, V. & Watson, P. (2018). Rural laboratories and experiment at the fringes: A case study of a smart grid on Bruny Island, Australia. *Energy Research & Social Science*, 36, 146–155. DOI: 10.1016/j.erss.2017.09.031.

- [33] Lozano, B., Palomo, G., Megias, L. & Monllor, N. (2020). Guía metodológica para la creación de un espacio test agrario. Valencia: IATED.
- [34] Madeo, N., Abad, X., Font, F., Grijalvo, M., Febrer, R., Calero, J. & Teixidor, E. (2021). *Estratègia Agrària de Menorca. Pla d'accions per la sostenibilitat de l'agricultura menorquina*. Maó: Consell Insular de Menorca.
- [35] Martín, F. E. (2016). Formación en 2050. Hacia el agricultor especialista. *Agricultura: Revista agropecuaria y ganadera*, 1000, 990–996.
- [36] McPhee, C., Bancarz, M., Mambrini-Doudet, M., Chrétien, F., Huyghe, C. & Gracia-Garza, J. (2021). The defining characteristics of agroecosystem living labs. *Sustainability*, 13(4), 1718. DOI: 10.3390/su13041718.
- [37] Méndez Vidal, A. X. (2008). *De la vinya a la ramaderia. El canvi en el model agrari menorquí (1708–2006)* [Doctoral dissertation]. Palma: Universitat de les Illes Balears.
- [38] Merino, R. (2005). Apuntes de historia de la Formación Profesional reglada en España. Algunas reflexiones para la situación actual. *Témpora. Revista de historia y sociología de la educación*, 8, 211–236.
- [39] Mesquida, T. (2019). Els aliments de les Illes. *Directa*, (481), 4–11.
- [40] Mir, A. (1921). Menorca en la segunda década del siglo XX. *Agricultura. Revista de Menorca*, 20, 10–12.
- [41] Nekhay, O. & Salazar, M. (2021). El sector Agrario. In *Economía Española. Homenaje a Joan Sardà*, (pp. 161–190). Sevilla: Ediciones Alfar.
- [42] Oller, R. A. & Benito, R. M. (2020). El futuro del sector agrícola español: claves para construir un sector sostenible económica, social y medioambientalmente. *Indice: Revista de Estadística y Sociedad*, 77, 25–28.
- [43] Palacios, R., Gil, C., Jongsma, D. & López-Davalillo, J. (2020). *Necesidades Formativas de la Juventud Rural*. Madrid: Ministerio de Agricultura, Pesca y Alimentación.
- [44] Piqueras Haba, J. (2009). Las estaciones enológicas en España. *Territorios del Vino*, 4/5, 8–39. <http://www.territoriosdelvino.fhuce.edu.uy/images/datos/revistatv04y05.pdf>.
- [45] Ramos Truchero, G. & Izquierdo Ramírez, B. (2019). La formación profesional agraria en España: un reto para la agricultura familiar. In *Agricultura familiar y derecho a la alimentación: reflexiones desde España, América Latina y el Caribe* (pp. 121–129). Ediciones de la Universidad de Oviedo.
- [46] Seguí Puntas, C. (2001). Ses Amitges (Societat Rural Menorquina). *Revista de Menorca*, 85(1), 105–139.
- [47] Schaffers, H., Cordoba, M. G., Hongisto, P., Kallai, T., Merz, C. & van Rensburg, J. (2007). Exploring business models for open innovation in rural living labs. In *2007 IEEE International Technology Management Conference*. Piscataway, NJ: IEEE.
- [48] Soini, K., Anderson, C. C., Polderman, A., Teresa, C., Sisay, D., Kumar, P., Manocchi, M., Mickovski, S., Panga, D., Pilla, F., Preuschmann, S., Sahani, J. & Tuomenvirta, H. (2023). Context matters: Co-creating nature-based solutions in rural living labs. *Land use policy*, 133, 106839. DOI: 10.1016/j.landusepol.2023.106839.
- [49] Sudrià, C. (2017). Miquel A. CASASNOVAS, Història Econòmica de Menorca. La transformació d'una economia insular (1300–2000). Palma, Editorial Moll, 2006, 492 pp. [a review]. *Revista De Historia Industrial – Industrial History Review*, 16(35), 193–198. DOI: 10.1344/rhi.v16i35.19835.
- [50] Sumane, S., Kunda, I., Knickel, K., Strauss, A., Tisenkopfs, T., Rios, I. des I., Rivera, M., Chebach, T. & Ashkenazy, A. (2018). Local and farmers' knowledge matters! How integrating informal and formal knowledge enhances sustainable and resilient agriculture. *Journal of Rural Studies*, 59, 232–241. DOI: 10.1016/j.jrurstud.2017.01.020.

- [51] Tolón Becerra, A. & Lastra Bravo, X. (2007). Evolución del Desarrollo Rural en Europa y en España. Las Áreas rurales de metodología LEADER. *M+A. Revista Electrónica de Medioambiente* 4, 35–62.
- [52] Tous de Sousa, C., Roca Torrent, A., Victory Pons, R., Tripogney, N. & Massebeuf, M. (2016). *Guide des bonnes pratiques énergétiques dans les exploitations de vaches laitières*. University of Girona.
- [53] Turrado Fernández, J. A. (2017). *Claves para incorporarse con éxito a la agricultura: El manual del joven agricultor y ganadero*. ASAJA de León.
- [54] Vilcu, R., Van den Bossche, L., Altman, N., Ziegler, V., Salle, E. & Zomer, B. (2023). *Empowering rural areas in multi-level governance processes* [EU SHERPA Project deliverable]. DOI: 10.5281/zenodo.8383411.
- [55] Zavratnik, V., Superina, A. & Stojmenova Duh, E. (2019). Living Labs for rural areas: Contextualization of Living Lab frameworks, concepts and practices. *Sustainability*, 11(14), 3797. DOI: 10.3390/su11143797.

Other sources

- [56] Agència Menorca Reserva de Biosfera. <http://biosferamenorca.org/portal.aspx>. Accessed February 2, 2024.
- [57] Agència Menorca Reserva de Biosfera (2019). *Pla d'Acció de la Reserva de Biosfera de Menorca*. Consell Insular de Menorca. 102 p.
- [58] Baret, D. (March 16, 2018). Sa Granja, la escuela que forma a futuros payeses. *Última Hora*. <https://www.ultimahora.es/noticias/economico/2018/03/16/986941/granja-escuela-forma-futuros-payeses.html>.
- [59] Bustamante, J., Allés, A. & Espadas, M. (2007). *Centro de Capacitación y Experiencias Agrarias de Mahón (Menorca)*. INFORMACIÓN TÉCNICA. <http://sagranja.cime.es/>, DL: ME 325 / 2007.
- [60] Bustamante, J. (2022). *Sa Granja, 1922–2022 a partir de la recopilació feta per Joan Bustamante Pascual (enginyer agrònom)*. Unpublished.
- [61] Comunidad Autónoma de las Illes Balears (2023). Ley 3/2023, de 17 de febrero, de Menorca reserva de biosfera. BOE-A-2023-13670.
- [62] Consell Insular de Menorca (2019). Estratègia Alimentària de Menorca. 16 p. DL: ME.78-2019. <https://www.menorcabiosfera.org/documents/documents/3405doc2.pdf>.
- [63] Consell Insular de Menorca (2020). *Estrategia Menorca 2030 hoja de ruta para descarbonizar el sistema energético de la isla*. Coord. Estaun Clarisó, I., Consell Insular de Menorca, 218 p.
- [64] Food and Agriculture Organization of the United Nations (1996). Rome Declaration on World Food Security and World Food Summit Plan of Action: World Food Summit, 13–17 November 1996, Rome, Italy. ISBN/ISSN. 9251039399.
- [65] Instituto Balear de Estadística (IBESTAT) (2023). INDICADOR DE PRESIÓN HUMANA (IPH). SEPTIEMBRE 2023 (AVANCE). <https://ibestat.caib.es/ibestat/inici>.
- [66] Instituto Nacional de Estadística (INE) (2023). Población residente por fecha, sexo y grupo de edad (Menorca). <https://www.ine.es/jaxiT3/Datos.htm?t=59662>.
- [67] Milan Urban Food Policy Pact (15 October 2015). <https://www.milanurbanfoodpolicypact.org/wp-content/uploads/2020/12/Milan-Urban-Food-Policy-Pact-EN.pdf>.
- [68] Ministerio de Agricultura (1955). ORDEN de 12 de junio de 1968 por la que se adscribe la Estación Experimental Agrícola de Menorca (Mahón) a la Dirección General de Capacitación Agraria. BOE-A-1968-713.

- [69] Ministerio de Agricultura (1955). ORDEN de 30 de septiembre de 1955 por la que se encomienda a la Dirección General de Coordinación, Crédito y Capacitación Agraria el Servicio de Extensión Agrícola. BOE 273. <https://www.boe.es/gazeta/dias/1955/09/30/pdfs/BOE-1955-273.pdf>.
- [70] Ministerio de Educación, Formación Profesional y Deportes (n.d.). *Agraria*. TodoFP. <https://www.educacionyfp.gob.es/mc/secciones-todofp/titulos-fp/por-familias/loe/agraria.html>.
- [71] Ministerio de Educación y Formación Profesional y Deportes, Gabinete Técnicos de la Secretaría General de Formación Profesional (2023). *Repertorio Nacional de Certificados Profesionales*. SECRETARÍA GENERAL TÉCNICA Subdirección General de Atención al Ciudadano, Documentación y Publicaciones, 972 p. NIPO 847-22-166-9.
- [72] Ministerio de Transportes, Movilidad y Agenda Urbana (2023). *Resolución definitiva de la línea 2 de la convocatoria de ayudas para la rehabilitación de edificios de titularidad pública en el marco del Plan de Recuperación, Transformación y Resiliencia*. https://cdn.mitma.gob.es/portal-web-drupal/sede_electronica/PIRED/primer_resolucion_definitiva_pirep_local_linea_2.pdf.xsig.pdf.
- [73] Morán, I. (2022). El Caserío o cómo unas porciones de queso han condicionado la historia láctea de Menorca. *La Vanguardia*.
- [74] Redacción (May 12, 2022). Acuerdo para incluir un nuevo certificado de profesionalidad de agroecología en la reunión de seguimiento entre la Consejería de Educación y Formación Profesional y el Consell Insular de Menorca. *Periódico de Balears*.
- [75] Sa granja. <http://sagranja.cime.es/>.
- [76] Seguí Parpal, A. (2022). *Centenari de SA GRANJA. Celebració de sant Isidre*. Maó 28 de maig de 2022. Unpublished. <http://sagranja.cime.es/WebEditor/Pagines/File/SA%20GRANJA%201922-2022%20document.pdf>.
- [77] Tous de Sousa, C., Roca Torrent, A., Victory Pons, R., Tripogney, N. & Masseur, M. (2016) *Stratégie pour la Promotion de l'Efficiencia Énergétique dans les Exploitations Bovines Laitières de l'Euroregion*.
- [78] UNESCO (2023). Prehistoric Sites of Talayotic Menorca.
- [79] UNESCO (2016). *Lima Action Plan for UNESCO's Man and the Biosphere (MAB) Programme and its World Network of Biosphere Reserves (2016–2025)*. United Nations Educational, Scientific and Cultural Organization, Paris, France.
- [80] UNESCO, A. (2017). *New Roadmap for the Man and the Biosphere (MAB) Programme and its World Network of Biosphere Reserves*. United Nations Educational, Scientific and Cultural Organization, Paris, France.