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Characterization of Globally Important Agricultural Heritage Systems (GIAHS) in Europe

Marta Arnés García [1,*], José Luis Yagüe [2], Víctor Luis de Nicolás [3] and José M. Díaz-Puente [2]

1 Department for Agricultural, Food and Forestry Systems, Università degli Studi di Firenze, 50145 Firenze, Italy
2 Departamento de Ingeniería Agroforestal, Universidad Politécnica de Madrid, 28040 Madrid, Spain; joseluis.yague@upm.es (J.L.Y.); jm.diazpuente@upm.es (J.M.D.-P.)
3 Vicerrectorado de Investigación e Internacionalización, Universidad Pontificia Comillas, 28049 Madrid, Spain; vdenicolas@comillas.edu
* Correspondence: marta.arnesg@gmail.com; Tel.: +34-670-590-212

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Abstract: The recognition and safeguarding of agricultural heritage in Europe are new concepts that are gaining attention due to the contribution they make to sustainability. Of the 57 Globally Important Agricultural Heritage Systems (GIAHS) that exist in the world today, only six have been designated in Europe. Through a qualitative analysis of the proposal documents submitted by these six European GIAHS to the Food and Agriculture Organization of the United Nations (FAO) during the designation process, this study provides a comparative characterization of these sites supported by expert assessment. During the first phase, 24 specific sub-criteria were observed based on the five main criteria that a site has to meet in order to demonstrate its global relevance as an agricultural heritage of humanity. The relevance of the resulting sub-criteria was then assessed by a Delphi panel of experts and the validated ones were applied in an assessment of the six European sites. The European GIAHS sites are characterized by the high value of their cultural landscapes' evolution, modeled by traditional and adaptive agriculture knowledge and practices that are promoted and maintained thanks to organized and committed social organizations. The results of structuring of sub-criteria can facilitate the application of other possible European GIAHS sites.

Keywords: agroecosystems; cultural landscapes; traditional agriculture; heritage; biodiversity

1. Introduction

1.1. Agricultural Heritage and Globalization

The rise of globalization has brought numerous changes to contemporary society, especially in recent decades. It is the most relevant phenomenon of the last century in terms of the development of human societies. As core cogs in the globalization machine, food and livelihood systems are changing dramatically, as are the use of natural resources, the environment, and societies. The expansion of the food trade has connected local markets around the world and also political agendas in agricultural and environmental matters. Since the 1970s, policies have focused on investment in inputs for modern agriculture, research in technological innovation, and agrarian reforms [1].

That agricultural paradigm focused on agricultural intensification has detracted from traditional agroecosystems so much so that the latter are under a threat of disappearing. A growing international concern advocates the recognition and safeguarding of these agroecosystems as a world heritage site that contains, in its ancient interlinkages between humans and the environment, the keys to sustainable development as acclaimed by the recent 2030 Agenda. For this reason, in 2002 the Food and Agriculture

Organization of the United Nations (FAO) launched an initiative to identify and safeguard Globally Important Agricultural Heritage Systems (GIAHS), defined as "remarkable land use systems and landscapes which are rich in globally significant biological diversity evolving from the co- adaptation of a community with its environment and its needs and aspirations for sustainable development". Worldwide, GIAHS recognition advocates demonstrating the relevance of these systems as examples in which agriculture and livelihoods, biodiversity, social organizations, cultural landscapes, and innovation work together to create sustainable human activities that have survived and that co-adapt with the environment through time.

The recognition of agriculture as a heritage of humanity that needs to be safeguarded is a relatively new concept. The UNESCO's World Heritage Convention of 1972 previously exclusively referred to the natural heritage and the cultural heritage as remains of cultures [2]. Gradually it has included new aspects. The inclusion of "cultural landscape" in the 1992 World Heritage Convention, opened the door to acknowledging active agriculture as a heritage of humanity, as it has been widely recognized that "the environmental goods, the cultural landscapes and cultural heritage of agriculture are created and maintained through active agricultural production" [3].

Agricultural heritage was implicit until the 18th century, understood as the relationship between nature and man in the conformation and improvement of agroecosystems thanks to the knowledge passed down from generation to generation through trial and error [4]. The changes brought about by the new agricultural paradigm of the Green Revolution, involved the transfer of trial and error to laboratories with the consequent multiplication of test possibilities in a single generation [5,6]. The goal of the Green Revolution was to increase agricultural productivity per capita by focusing on crop yield in order to resolve the problem of feeding a growing world population while focusing on the danger of famine in "underdeveloped" countries [7,8]. Indeed, as Borlaug et al. [9] and others [10,11] reflect, crops with these high yield varieties brought about marked production growth. However, the Green Revolution made the mistake of perceiving agroecosystems as systems in which variables could be tightly controlled, as in the experiments carried out in laboratories, rather than recognizing that they are complex specific systems shaped by the traditional knowledge of hundreds of generations that have been embedded in such agroecosystems. This approach involved a new type of agriculture that discarded traditional agriculture, which had become discredited. This is reflected in the words of the 1970 Nobel Peace Prize winner Norman Borlaug and his collaborators:

> "Such spectacular increases in yield destroy, in one stroke, the built-in conservatism or resistance to change that has been passed on from father to son for many generations in a system of traditional agriculture". [9]

Ramalingam [12] reflects pointedly on this when referring to the transformation of the rice paddies of Bali and the cooperative Subak Institutions in the context of development aid. The "Massive Guidance" development project, embedded in the intensive agriculture stream promoted by the Green Revolution, was approved by the Asian Development Bank (ADB) with the objective of generating more productive agricultural systems. The Massive Guidance project promoted cultivating rice as often as possible taking for granted the intricate irrigation system developed by the Subak, which was based on farmers' cooperation and was refined over centuries in order to adapt to the mountainous regions in Bali. The result was a dramatic drop in rice yields. Upstream rice fields became infested with pests, and water shortages plagued the rice fields downstream. Afterwards, researchers demonstrated the high relevance the Subak had on sustainable management of rice paddies. It received the recognition of World Heritage in 2012 [13].

The emergence of this type of agriculture in the complex dynamics of agroecosystems around the world has resulted in the deterioration and even destruction of its social and ecosystem functions. This calls into question the viability of this model as a solution to global problems [14–18]. The green revolution model and its subsequent evolution towards industrial agriculture dominated the twentieth century. The awareness has been gradual, but the second decade of the 21st century is witnessing the

decantation of a new paradigm for agricultural development. A paradigm that must cover the objective of feeding the growing population of the world, under considerations of global sustainability [19,20], including climate change challenges, and the landscape and resilience of the territories. In these last aspects, agriculture acts from a double point of view—as a driver of global environmental change and also as the activity most affected by it [21–25].

When conceptualizing a new paradigm, key-ideas are presented, such as the debate around "sustainable intensification of agriculture" [26]. The FAO has already adopted this idea under the motto "Save-and-Grow" [27]. Another key-idea: Diversified agroecological systems [28], links the concepts of diversification—maintain multiple and changing over time sources of production—and agroecology—"the science of applying ecological concepts and principles to the design and management of sustainable food systems" [29]. Moreover, we can find the idea of "sustainable food systems" that integrate "food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised" [30] and must be "protective and respectful of biodiversity and ecosystems, and culturally acceptable, (. . .) while optimizing natural and human resources" [31].

In this regard, agroecosystems work as nested dynamic structures, just like organisms in which a rich number of internal components are organized to capture, store, and mobilize energy in a perfect and coordinated way [32]. This is what we mean when referring to the resilience and sustainability that agroecosystems reach thanks to their complexity [33]. Such complexity implies a state of homeostasis due to the efficient cooperation and reciprocity of a huge number of components in space and time. The Agricultural Heritage Systems recognition is aligned with this new paradigm, and it is promoted with the objective of facing a very different challenge that the conventional heritage had faced so far, that of "conserving living, evolving systems of human communities in an intricate relationship with their territory" [34]. This would be carried out through dynamic conservation, which involves the local social organization in the creation of an action plan that reflects the strategies, policies, and activities that ensure the preservation of the GIAHS.

Current studies conducted in GIAHS sites in Asia—especially China, Japan, and Korea—provide strong evidence of the relevance of these traditional agricultural systems in maintaining the local social structure [35], reducing rural migration while providing incomes for the local population [36], maintaining the landscape [37], and environmental sustainability [38]. The recognition of these sites is just a first step that claims to reveal the knowledge that lies in the GIAHS in terms of resilience and sustainability. Efforts on research, acknowledgment, dissemination, and conservation [35,39,40] of these systems in the Asian continent are consolidated compared to other places in the world, such as Europe.

1.2. New Concern for Agriculture Heritage in Europe

Agricultural heritage in Europe dates back to 7000 years ago, and so the Mediterranean landscape is the mark of the passage of different societies whose agricultural and other socio-economic activities have modeled it [41–43]. Among them, special mention must be given to the Arabs' and Romans' footprint, thanks to the development of infrastructures and agricultural technology that modeled the environment and was adapted in such a smart way that for hundreds of years they remain as key elements of the Mediterranean agriculture [44].

At the end of the Second World War, the EU launched the Common Agricultural Policy (CAP) which, mainly during its first decades, strongly supported the agriculture intensification [45] to the detriment of the less productive traditional farmlands. Until the 80s, that was the first of three major periods identified in the evolution of the CAP [46]. During the post-productivist period—until the 2008 crisis—productive orientation was combined with rural development measures and growing weight of the associated environmental aspects. We are currently in a new CAP period, defined as neo-productivist [47,48], which is fully aligned with the idea of a paradigm shift under the sustainable intensification that we mentioned in the previous section. Wilson and Burton [49] define it as a

return to agriculture as the main focus of attention rather than rural development. This is a key point since it implies that the agricultural concept has prevailed within the renewed paradigm. Furthermore, reflections over CAP put agriculture—including livestock and forestry obviously—as the central element to cope with climate change and global challenges [46,50], as is also said in the previous section.

It must also be taken into account that in the case of the EU, there is a strong link between the productive aspects of agriculture and those associated with society, culture and landscape. We can find this approach in the definition of the socio-ecological production model in the formulation of the Europe2020 strategy [51]. We can also find it by opening the definition of the scope of the work document—carried out in collaboration with the Directorate General for Agriculture and Rural Development—to face the global and environmental challenges of agriculture and the European rural environment [50]. This document includes the value of European agricultural heritage in the configuration of the rural environment and landscape. It is also an important aspect of every place to live and work as well as to generate economic activity.

However, the traditional structure of rural landscapes has been deeply altered in Europe where low-production agriculture has been abandoned in favor of intensive agriculture, with the consequent loss of traditional knowledge, biodiversity and cultural landscape [52,53]. Nowadays, we still can find traditional agricultural systems in Europe that have survived through changes in development by innovating and adapting and providing high-quality products. The difficulties of these products to face the current highly competitive market are being favored by increasing interest among consumers in Europe for regional quality products produced in a traditional and sustainable way [54].

The importance of studying, maintaining, and promoting that cultural heritage has been put on the European agenda. The European Landscape Convention was a first step toward the preservation of agriculture that began to disappear in favor of intensive agriculture—especially with the measures initiated by the Common Agricultural Policy (CAP)—and that integrates valuable cultural heritage built up over thousands of years [52]. However, while the UNESCO World heritage list has been labeled as Euro-centrist by different facets [55], the FAO agricultural heritage system list is just beginning to reflect timid European participation. Only two years ago, Europe became part of the FAO Agricultural Heritage list, with six designated sites in the Mediterranean Basin and one in a state of approval. Asia, on the other hand, received its first designation in 2005, with 36 currently GlAHS designated and certificated. The late entry of Europe into this list is something that is beyond the limits of this study. Instead, it intends to provide more information about the significance of these sites in the world agricultural heritage as a whole.

This study principally seeks to analyze the main features and characteristics that are shared by, and differentiate, the European GIAHS sites already certified. Following this line, this study aims to dig into the main features of the agricultural heritage in Europe as an initial overview to comprehend the sustainability lying within these traditional systems, which have been maintained for hundreds even thousands of years. It is also felt that contributions can support other European sites in the submission of their proposals to the FAO.

1.3. GIAHS Recognition and Certification Process

The potential GIAHS are evaluated before receiving or not such recognition through a process that is explained in this section.

The designation and certification process of a GIAHS site is carried out by the FAO and is mainly based on the assessment of the proposals and the outcome of the expert visit to the proposed site. Firstly, the site of interest has to submit a proposal to the GIAHS Secretariat at the FAO, which will then check it before they send it to a group of experts known as the Scientific Advisory Group (SAG). The SAG group evaluates the proposal and makes a judgment on whether or not it meets the requirements. After the proposal review, a visit to the proposed site is carried out by expert(s) nominated by the SAG. Finally, the group of experts prepares an evaluation report based on the review of the GIAHS proposal

and the outcome of the expert visit to the proposed site. The six European sites that are the subject of this analysis went through this process before receiving recognition and certification as Agricultural Heritage Sites of Humanity.

The SAG is made up of seven scientists from different parts of the world, specialized in subjects that directly affect the GIAHS sites and their management. This group was created in 2016 in order to ensure scientific rigor, provide guidance to the GIAHS designation process, and develop new tools and orientation.

The proposal is a document in which the stakeholders of the site that wants to be recognized as GIAHS must describe in detail the characteristics and services of the agroecosystem to be recognized and designated as an agricultural heritage site of humanity. In order to facilitate understanding for potential applicant countries, and to combine the requirements that these spaces must meet, five criteria have been developed to represent the totality of the functionalities, goods, and services provided by the system (Table A1 in Appendix A).

2. Materials and Methods

With the aim of characterizing the GIAHS in Europe, this study has focused on the comparative analysis of the proposal documents and is supported by expert judgment. The study has been carried out in three phases: (I) Review of the GIAHS proposal documents and qualitative analysis of their content for the extraction of comparison sub-criteria, (II) Experts' assessment of the extracted sub-criteria through a Delphi panel, (III) and Characterization of the European GIAHS sites based on the sub-criteria validated by the experts.

2.1. Case Studies

Six sites in Europe have received GIAHS recognition from the FAO. All of them have been assessed in this article. Hereafter, they are listed from oldest to most current order: (i) The Agricultural System of Valle Salado de Añana (VSA), (ii) Málaga Raisin Production System in La Axarquía (MR), (iii) Barroso Agro-sylvo-pastoral System (BASP), (iv) Olive Groves of the Slopes between Assisi and Spoleto (OGAS), (v) Soave Traditional Vineyards (STV), (vi) and The Agricultural System Ancient Olive Trees Territorio Sénia (AOT).

The GIAHS program started in 2002 and the first proposal in Europe was launched in Spain in 2017. That year the Spanish systems VSA and MR became part of the program, and therefore, Europe entered the FAO Agricultural Heritage System list. Portugal and Italy joined the program in 2018 with BASP, OGAS and STV, and the AOT system in Spain joined in 2019.

2.1.1. The Agricultural System of Valle Salado de Añana

The Añana Valley is an area of about 1500 hectares in which the people from the local area developed a salt cultivation system that has lasted for 7000 years. This system is located on steep slopes and has geological features that are typical of an arid salt diapir, which does not provide large areas for growing crops.

The Salt Valley is located in the center of the Añana Valley, under the sea level at 580 m and above the saltwater springs that have made possible the creation of the salt cultivation system by gravity. The origin of these saltwater springs is a geological phenomenon called diapir, a gigantic bubble of salt, with a depth of 3.5 km, from the sea of Tethys. The bubble disappeared millions of years ago. This diapir is recharged by the flows of water. In this way, saline aquifers are formed thanks to the underground runoff of freshwater that dissolves the halite or rock salt (NaCl) inside the diaper, resulting in brine springs.

The halophyte biodiversity of this system is integrated into the production system where different ecosystems can be found because of the heterogeneity of salt aquifers, springs and wells. Therefore, the pasture lands and vegetation of the surroundings have been related to the salt system over time.

The collection of salt is done through a water irrigation system that comes from the Roman Empire. It consists of pumping the aquifers from the brines and transporting it through canals to the salt-pans where the salt extraction, based on natural evaporation thanks to the action of the sun, takes place. The salt extraction system is used to force evaporation by burning combustible materials. A second system was used for five thousand years, until it was replaced two thousand years ago with the system that is currently in use.

The system is focused on salt production. The necessary structure to maintain this complex and organized system has depended, and continues to depend heavily, on its supply activities with resources from the surrounding areas. These resources include: Timber for construction of the platforms, stones for the terrace walls and the surface of the evaporation floors, clay for wells and basins waterproofing, etc.

Currently, the Valle Salado de Añana Foundation promotes and preserves the system through tourism, cultural, commercial, productive and research activities. It is comprised of local and regional government stakeholders and representatives of salt makers. The Valle Salado de Añana System has been included in the List of Wetlands of International Importance of the Ramsar Convention since 2002, and in the Catalog of Unique and Outstanding Landscapes of the Historical Territory of Álava.

2.1.2. Málaga Raisin Production System in La Axarquía

In the mountainous region of La Axarquía—in an area of 28,039 hectares—the cultivation and production of the Muscatel raisin were developed. This cultivation is carried out in areas of high slope and difficult access and has transformed this mountainous landscape from the 18th and 19th centuries to the present with the use of manual and craft technologies.

The conditions surrounding this crop and the difficulties of intensification due to the orographic, lithological and the scattered factors of smallholding over the territory, have allowed it to remain almost intact in a sustainable way until today. Muscatel raisin cultivation is practically the only agricultural activity in the area, along with some low-income olive groves. The traditional variety used since the Muslim period, Muscatel of Alejandría, was recovered after the Phylloxera plague that swept grape crops across Europe. Currently, the variety consists of a graft from the Muscat of Alexandria onto Rupestris of lot rootstocks. Nowadays, 84% of the Muscatel of Alexandria variety is used for the production of raisins, and it represents 66% of the vine-growing area in Málaga.

The Malaga raisins have received a Protected Designation of Origin (PDO), whose specifications include most of the traditional farming techniques used in the area. These techniques are done mostly by hand with the help of hoes, peaks or scissors, from the planting system in tresbolillo, tilling, pruning, and weed control to those related to grapes harvesting and drying of raisins. Mules, due to their robustness and strength, are used for transporting the grapes from the slopes to the drying floors. The participation of the whole family during the raisins production (mainly during the harvesting/drying process) remains an essential factor. Without this, the raisins produced in Málaga would probably not exist because if labor costs increased, the final product would not be profitable. There is little profit margin when harvesting this crop.

The tradition surrounding Muscatel raisin cultivation is embedded in the festivities that are still celebrated in the region. Nowadays, most of them have lost their original purpose, but they continue to be held during key events, such as fairs, to avoid losing traditional activities (zambomba, verdiales, wheel, etc.). The social organizations such as the Association Muscatel and the Second level cooperative UCOPAXA (for example), form a multidisciplinary performance group that acts to promote agricultural activity, support the agriculture production process and the smallholders, and carry out cultural activities and tourism, among other things.

The studies of diversity in the landscape of La Axarquía reflect a high heterogeneity of patches made up of small valleys, deep streams, and hills where crops are grown along with the natural vegetation and drying floors for raisins. Farmhouses are widespread.

2.1.3. Barroso Agro-Silvo-Pastoral System

The Barroso region in the north-east of Portugal, about 112,740 hectares, contains a multifunctional agrarian system based mainly on the interconnection between extensive livestock farming, crop production, and forestry. During thousands of years, these activities have created a remarkable landscape in an isolated region characterized by mountain ranges that are separated by wide depressions and plateaus and crossed by many permanent and small watercourses. The area is now integrated into the Peneda Gerês National Park.

This system is characterized as a rural subsistence economy with a high degree of food self-sufficiency, poor utilization of inputs, and very few surpluses. System management is predominantly carried out by small farms in large areas of common land. The strength of the relations between the peasants within the community has been strongly influenced by their interdependency and necessity for cooperation in a very isolated area over a long period of time.

Their main activities are: Animal production (cattle, goat, pigs, and sheep), fodder and cereal production (marshes and cereals), vegetable production (potatoes), beekeeping production (honey), and processing of food products (smoked meats). Many products coming from the Barroso Agro-sylvo-pastoral have been recognized with certificates of quality: Two cattle breed meats have been certified with Protected Designation of Origin (PDO) and the Protected Geographic indication (PGI) has been given to the beef from the Barroso marshes and to sheep (Cordeiro do Barroso) and a goat breed (Cabrito do Barroso). Barroso honey, from the autochthonous Iberian honeybee, is a PDO and so is Batata de Trás-os Montes, the Barroso potato. Smoked meats, such as chouriça de carne and sangueira de salpicão, were also been recognized as PGI by the European Commission in 2017. These food products are hand-made and based on pork, bread, and other condiments, such as gourds (pumpkin).

The territory of Barroso is mostly occupied—approximately 95%—by forest, scrubland, and cropland, in descending order. Forest and scrubland represent approximately 80% of the land used within the territory. Most of the land is common land where grazing and livestock farming, the main activities of the Barroso agricultural system, are carried out.

Marshes pastures, arable fields, and garden vegetables for daily consumption can be found close to the villages. These land-use units within the mountain plots, conformed by scrublands and poorer pastures for free-grazing in the outskirts of the village, make a mosaic-like landscape with a spiral growth pattern and with the village located in the center.

2.1.4. Olive Groves of the Slopes between Assisi and Spoleto

Along the slopes of the Umbrian Valley that stretches from Assisi to Spoleto, an olive grove system that dates from the Roman Empire covers an area of 9213 hectares along six different municipalities. The olive-growing surface in this area is equal to about 4570 hectares. It has spread uphill since the interest in this crop resurfaced between the 16th and 17th centuries. It extends in various terrace systems as much as 500 and 600 m up the slope.

The olive trees, which are being cultivated in this region, belong to local traditional cultivars (Moraiolo, Frantoio, Leccino) that are grown in an open center bush shape. The olive oil that results from this production is obtained by pressing the olives like they were pressed centuries ago, generating extra virgin olive oil that has received the Protected Designation of Origin (in Italy DOP) labeling.

Lack of interest in the intensification of olive farming, with the consequent outdatedness of most of the structures, is mostly due to pedoclimatic limitations. In fact, the low temperatures in winter that limit vegetative activity and the productive potential of trees, together with the steepness of the slopes, have discouraged investments in modernizing the olive groves.

2.1.5. Soave Traditional Vineyards

The Soave traditional vineyards are a system of 12.000 hectares located in the Soave town hills of the Veneto Region. Most of the area is covered by vineyards (60%) while the rest is used for olive grove cultivation, orchards, chestnut groves, wood, and arable land.

The main economic resource of the area is agriculture, and, in particular, viticulture. Grape growing is based on two traditional varieties: Garganega and Trebbiano di Soave. It is mainly directed to producing Soave wine, certified with PDO, and a small production of the Recioto di Soave wine.

Production is carried out through almost 3000 small family farms, creating an economy that involves approximately 10,000 people. These smallholders are organized in social cooperatives, tat, together with the Soave Consorzio, play the main role in the competitiveness and survival of the system in global markets. Tourism is an increasing economy for the region and there are two wine routes that promote their wine products and the culture.

The sloped gradients of the vineyard hills are about 30–40%. The differences in gradient and soil textures have been two essential factors that model the system. A system that consists of small and very diverse plots contained by dry-stone walls and embankments. The contour plowing and the steep slopes do not allow high rates of mechanization, so most of the work is done by hand. In the slopes that are less pronounced, the pergolas are arranged in a ginder.

Most of the agricultural activities are done manually: Pruning, hoeing of the soil around the vines and landfilling of the manure, thinning of the sprouts and bunches, harvesting, etc. The vine training in Soave is mainly done through a traditional technique called the "Pergola Veronese". This is also done by hand.

The fragmentation, diversity, and heterogeneity of the landscape, together with the intactness of the vineyard in the hilly area, have been highly appreciated. In 2016, Soave's landscape was awarded the First Italian Rural Historical Heritage. The "Pergola Veronese" technique, terraces and other dry-stone walls, have been an essential element of modeling the landscape.

2.1.6. Ancient Olive Trees in Territorio del Sénia

The Mancomunidad Taula of Sénia, a territory of 207,000 hectares located in the north-east of Spain, contains about 4960 specimens of ancient olive trees, alive and in production. Outside this territory, there are few cases of territories that contain a concentration of ancient olive trees close to the concentration found in Taula of Sénia. These trees have at least 3.5 m of the perimeter at 1.3 m from the ground, and they can reach up to eight meters of the perimeter. Ninety-six percent of the specimens belong to the oldest variety of olive trees found in the territory: Farga. These ancient olive trees coexist with new olive groves.

There are many different types of land uses within the Sénia Territory. A large part of this territory (60%) is covered with conifers, leafy trees, scrub, and grassland. These are found especially in the inland mountain areas. Moreover, 36% of the territory is covered with crops and the other 4% are unproductive areas or water bodies. Regarding crops, the most important are rainfed crops as they represent 75%. The olive grove is the main growing crop, the 99% are rainfed crops, which represents nearly half of all cultivated soil. Rainfed fruit trees and irrigated citrus fruits are next in importance.

The varieties are totally adapted to climate conditions in the area. This is a Mediterranean climate, which is characterized by a long period of drought. Therefore, olive grove management techniques are traditionally rainfed, without irrigation needs. Fertilization of the fields is done using organic fertilizers from other activities of the primary sector of the territory (pig and poultry farms, sheep, and cattle sector).

Three main systems of land-use in the Territory Sénia are represented by the main sub-units of the landscape: An Inland area where conifers, leafy trees, and grass predominate, an intermediate area where rainfed olive groves and fruit trees predominate, and a coastal area with irrigated crops. The ancient olive trees and their management as crops have been modeling the landscape for thousands of years. Nowadays some of these crops are competing for space with the afforestation of conifers and shrubs due to their abandonment. In other cases, they are also associated with new olive groves and fruit trees. Other common elements of the landscape are the dry-stone buildings related to agriculture and livestock activities. These are dry-stone walls and dry-stone barracks.

2.2. Proposals Review and Elaboration of Sub-Criteria

A complete revision of the proposal documents of each of the six European sites already recognized as GIAHS has been done in order to understand the details and features that each site highlighted to warrant their recognition as an agricultural heritage system. The six documents follow a similar structure, based on the template given by the FAO in order to submit a proposal. The documents were reviewed in chronological order according to the dates the sites were certified, starting from the earliest.

In addition to the summary information that describes aspects of location, average, climate, and other general details, the core of the proposal is the description of the agricultural heritage system. This key part of the proposal is divided into three main chapters, namely: Significance of the Proposed GIAHS, Characteristics of the Proposed GIAHS Site, and Action Plan for the Proposed GIAHS Site.

Analyzing the second chapter of the proposal, "Characteristics of the Proposed GIAHS Site", detailed information on each site is presented in five sections according to the five criteria detailed in Table A1. The first chapter: "Significance of the Proposed GIAHS Site", is a summary of the features and characteristics of the system. It is closely linked to chapter 2, but seeks to frame the system in question in a more general sense, in terms of its relevance to global concerns such as sustainable development and biocultural diversity. Finally, the third chapter, the "Action Plan for the Proposed GIAHS site", outlines the policies, strategies, actions, and outcomes implemented or to be implemented by the stakeholders involved, with the aim of promoting the dynamic conservation of the system.

The guidelines and advice for the process of certification for the GIAHS dictate that "the proposed GIAHS site will be assessed based on the five criteria and an action plan" [56]. Despite these three main chapters, which are given in order to facilitate the structuring of information, the complete proposal is compiled of the five main criteria previously discussed. Therefore, in order to achieve the objective of this study, the five criteria have been the basis on which the comparative analysis has been structured as they are common to the six sites.

In the first phase, the main sections and sub-sections identified by each proposal within each of the five main criteria were extracted and the content of each one was summarized. Then, with the help of the MAXQDMA tool, the information from the titles of the sections and sub-sections of the six proposals, as well as their summary content, was compared and analyzed qualitatively using coding methods (Figure 1). The content, now coded and unified, was analyzed according to the number of references it received within the context of each criterion for the set of the six case studies. Subsequently, a relationship analysis of the codes was carried out, extracting intersections to references and relevant information not previously collected (Figure 2). An example of the procedure is shown below:

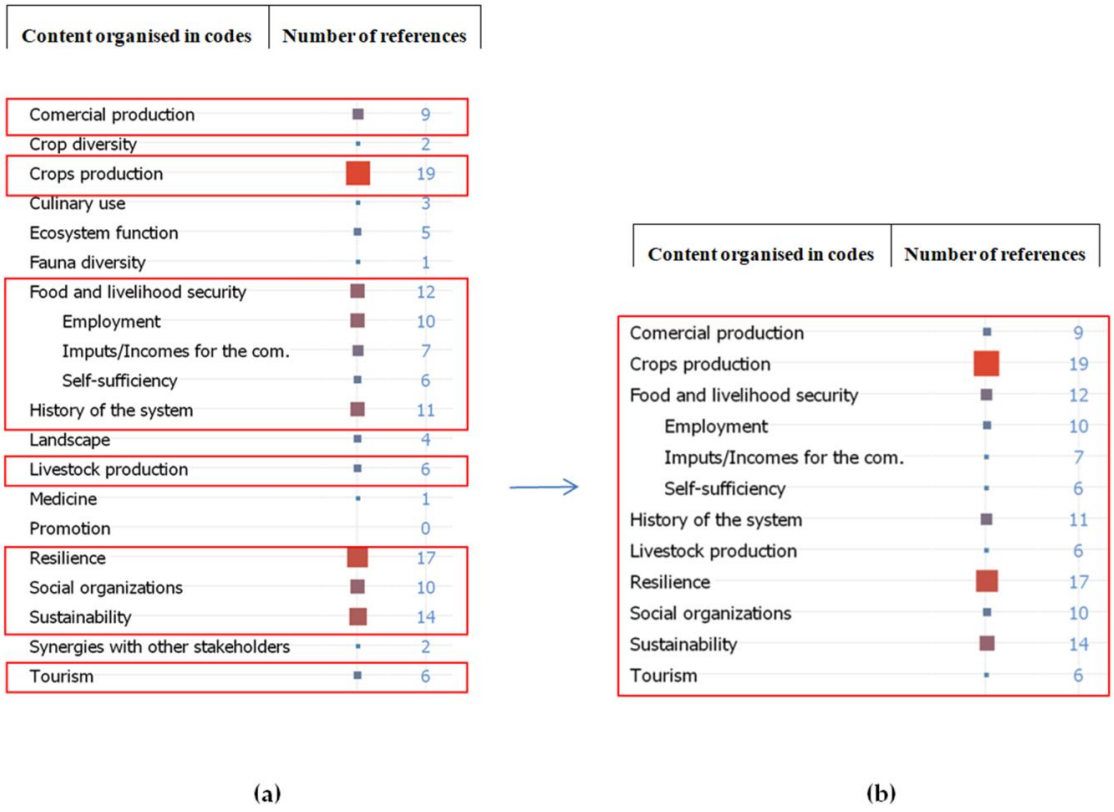

Figure 1. Coding results during the qualitative analysis of criterion 1: "Food and Livelihood Security", for the set of six case studies. (**a**) List of codes resulting from the qualitative analysis for the content of the criterion "Food and Livelihood Security", (**b**) and extraction of those with six or more references in the summarized content of the criterion. MAXQDMA graphical output retouched by own elaboration.

Figure 2. Sequence of the relationship between the codes with more references in criterion 1, where the smallest square represents one interrelation and the biggest square four interrelations. A: Commercial production, B: Crops production, C: Food and livelihood security, D: Employment, E: Inputs/Incomes for the community, F: Self-sufficiency, G: History of the system, H: Livestock production, I: Resilience, J: Social Organization, K: Sustainability, L: Tourism. MAXQDMA graphical output retouched by own elaboration.

This allowed, ultimately, combining or dividing the content into different sub-criteria within each main criterion detailed in the results section. When unifying the content organized by codes, priority was given to the organization by sections and subsections of the six documents so that the integrity of the proposals was maintained as far as possible. In order to describe each sub-criterion, the combination of the previous qualitative analysis was used, giving special attention to the interrelations and the segments referred to in them.

2.3. Delphi Panel

The analysis described in Section 2.2 allows the structuring of the content into a series of more specific sub-criteria of the GIAHS European sites that had been certified at the time of the study. In order to assess the suitability of the sub-criteria resulting from the aforementioned analysis, a Delphi panel was addressed with the participation of eight experts. This methodology supplies expert judgment to the lack of objective information [57,58] and facilitates to reach a consensus in the appropriateness of the sub-criteria to characterize the European GIAHS sites. This method avoids the negative effects of face-to-face discussions, although it cannot avoid the prejudice of the experts taking part in the panel [59].

The number of experts who have taken part in the panel is within the recommended optimum [60]. The experts are consultants and researchers who have a broad background and experience related to the GIAHS: sustainable agriculture, water and soil conservation, landscape, resilience, forestry, anthropology, public policies, etc. Expert's selection has been made with the goal of reaching a balance between experts from the continent where the case studies come from, and those specialized on GIAHS worldwide. All of them have participated or are currently participating in projects of recognition, dissemination or promotion of the GIAHS sites at the national or international level.

During the first round of the Delphi panel, the experts validated the relevance of the sub-criteria on a scale from very low relevance, to low relevance, average relevance, high relevance, and very high relevance [61]. In a second round, the Delphi panel achieved consensus in those sub-criteria where relevance was not agreed to in the first phase.

Expert responses consensus during the Delphi panel was scored using the consensus index (k). This index is defined by the interquartile range between the first quartile (q1) and the third (q3), so "k" = q1–q3. The value for these quartiles is determined from the percentiles that set a value below the response. In the case of q1. Therefore, its value would be the one that sets 25% of the answers below. In the case of q3, it would be the value that sets 75% of the answers below. In this way, the interquartile range will represent the dispersion of the responses with respect to the opinion of the group. A "k" less than 2 has been taken as a valid reference of the response. A "k" between 1 and 2 (variations between 10 and 20%) determines the answers with a high consensus value and a "k" less than 1 (variations less than 10%) determines responses with a very high consensus value.

2.4. Characterization

A survey was subsequently conducted and completed by a group of five experts from the SAG group on GIAHS and the GIAHS Secretariat of the FAO. These are the two bodies responsible for the assessment and designation of these sites. This survey was created in order to carry out a characterization of the six European sites using the sub-criteria specially elaborated for it and validated by the DELFI panel of experts. During the extraction and combination process, a definition was established that showed the state of maximum compliance with the sub-criteria by the GIAHS site (0 being the minimum value and 10 the maximum value). Analysis of variance (ANOVA) for every sub-criterion was conducted in order to analyze the differences existing among the case studies.

3. Results

3.1. Sub-Criteria Elaborated and Defined

Twenty-four sub-criteria have been drawn and defined (Table 1) from the five main criteria (Table A1). The suitability of these sub-criteria for the purpose of this study was from medium relevance to very high relevance for all sub-criteria except the sub-criterion "1.5. Tourism", for which the relevance was agreed to be low by the assessment of experts. Therefore, this sub-criterion has been the only one considered as not suitable for the characterization of the European GIAHS.

Table 1. Sub-criteria used for the comparative analysis of six European GIAHS, where the definition reflects the state of maximum compliance. Relevance: Suitability based on experts' judgment.

1. Food and Livelihood Security		**Relevance**	**k**
1.1. Socio-economic contribution of the system to the local community	Set of activities within the system, and the interrelations between them, that contribute both to the economy and society and that influence positively the food and livelihood security of the local community.	High	0
1.2. Production	The agricultural activities in the production process are effective and provide food and livelihood security.	High	1.5
1.3. Evolution of the system	The system proves to be a dynamic whole, able to maintain its working conditions from its time of origin until the present. The activities that have been carried out by the human being in co-adaptation with the environment have been relevant for their contribution to the community in terms of food security and livelihoods.	Average	0
1.4. Resilience and sustainability	The GIAHS is endowed with the necessary factors to recover from external threats, this being essential in the food and livelihood security of the local community. It can also ensure its maintenance over time without jeopardizing the food security and livelihoods of future generations. The local social organization has launched or is in the process of implementing strategies that favor the resilience and sustainability of the GIAHS site in these terms.	Average	0
1.5. Tourism aspects	Tourist activities affect the GIAHS in such a way that they support the system and maintain its conditions.	Low	0
2. Agro-biodiversity		**Relevance**	**k**
2.1. Biodiversity: Flora and fauna	The GIAHS site shows a relevant variety of animals, plants, and micro-organisms that are used directly or indirectly for food and agriculture, including crops, livestock, forestry, and fisheries.	High	0
2.2. Ecosystem function	The agro-ecosystem is embedded in a set of biological, geo-chemical and physical processes, carried out by a variety of system components that allow it to work in a functional and sustainable way.	High	0
2.3. Diversity on the main crop	The main crop of the system is constituted by significant varieties, diversity and genetic resources that ensure the resistance of the crop and its productive viability.	Average	0

Table 1. *Cont.*

2.4. General diversity of crops/livestock varieties.	There are significant crops and/or livestock varieties within the system, organized according to crop rotations, intercropping, crop-livestock systems, etc., which increase the resilience of the system and ensure productive viability.	Very high	1.5
2.5. Resilience and sustainability	The GIAHS is a diversified agroecological system with a greater capacity to recover from disturbances. It is equipped with the necessary strategies and components that allow it to maintain such capacity in the present day and in the future and the strength to defend against threats.	Very high	0
3. Local and Traditional Knowledge Systems		**Relevance**	**k**
3.1. Water and soil management	The GIAHS site is endowed with ingenious practices and systems of traditional knowledge that provide adequate water and soil management. In this way, it allows the agricultural system to function adequately and sustainably with respect to water and soil resources.	Very high	0
3.2. Agriculture and livestock techniques: (planting, pruning, harvesting, grazing, etc.)	There are intangible agricultural heritage techniques of invaluable traditional knowledge and adaptive technology that are practiced to ensure the sustainable management of crops, production, and the biodiversity of the agro-ecosystem.	Very high	0
3.3. Tools and infrastructures	Tools and infrastructures are a tangible heritage that has developed over time and through the evolutionary history of the site, adapting in an innovative way to the dynamic necessities of the system and its social organization.	Very high	2
3.4. Resilience and sustainability	The system has evolved in such a way that it maintains its qualities as a reservoir of invaluable traditional knowledge and practices. Furthermore, the system's resilience is due to adaptation of this knowledge to indigenous technology and management systems of natural resources, including biota, land, and water which have supported agricultural, forestry and/or fishery activities.	Very high	2
4. Cultures, Value Systems and Social Organizations		**Relevance**	**k**
4.1. Local organization within the system	The individuals, families, groups or local communities play a key role in the agricultural systems, organization, and dynamic conservation.	Very high	0
4.2. Social organizations supporting the system	They play a critical role in balancing environmental and socio-economic objectives, by engaging the social organization actors in policy processes critical to the functioning of the agricultural systems.	High	1.5
4.3. Festive events, rituals and beliefs	The festive events, rituals, and beliefs are part of cultural identity and a sense of belonging that are embedded in and belong to the GIAHS site.	Very High	0
4.4. Traditional culinary culture	The traditional culinary culture is part of cultural identity and a sense of belonging that are embedded in and belong to the GIAHS site.	High	2

Table 1. *Cont.*

4.5. Traditional medicine	The traditional medicine culture is part of cultural identity and a sense of belonging that are embedded in and belong to the GIAHS site.	Average	2
4.6. Promotion of the culture	The local social organizations have developed strategies, laws, and practices that lead to the recognition and promotion of the diverse cultural expressions of the territory.	Average	1.5
5. Landscapes and Seascapes Features		**Relevance**	**k**
5.1. Landscapes diversity	The GIAHS landscapes express an important degree of heterogeneity and structural variety.	High	0
5.2. Evolution of the landscapes	The GIAHS site presents landscapes or seascapes that have been developed over time through the interaction between humans and the environment and appear to have stabilized or to evolve very slowly. Their form, shape, and interlinkages are characterized by long historical persistence and a strong connection with the local socio-economic systems that produced them. Their stability, or slow evolution, is the evidence of integration of food production, the environment, and culture in a given area or region.	High	0
5.3. Infrastructure and settlements	The infrastructure and settlements are the foundational spatial format within the GIAHS that reflect the interconnection between the human and environmental sphere.	Very high	2
5.4. Analysis of the main planning and territorial protection tendencies	The local social organizations have developed strategies, laws, and practices that allow and ensure the maintenance of the territory potentialities and landscape quality.	High	0

The sub-criteria extracted for criterion 3 have all been validated as very relevant. The sub-criteria extracted for criterion 5 have also been very suitable.

3.2. Characterization

When analyzing the results, one must consider the fact that all GIAHS analyzed for this study had already received certified recognition from the FAO. Therefore, one would expect to see a high rating from the experts during the consultation process. This is confirmed in the results, as none of the values have been rated below 5.5 in any of the sub-criteria and for any of the systems, the majority has been rated above 7. In the figures presented hereafter, the mean, F, and significance resulting from the ANOVA are shown.

3.2.1. Criterion 1: Food and Livelihood Security

Regarding the ability of the agricultural system to contribute to the food and livelihood security of the community, four sub-criteria were defined and assessed for the six sites (Figure 3).

The contribution of production to food security and livelihoods has been remarkable in the Barroso Agro-sylvo-pastoral System, with the Añana Salt Valley being the least highlighted in this regard. The Malaga Raisin Production System has been second with the highest rating in terms of production, and subsequently the two Italian systems, which have received the same rating. This pattern matches the existence and number of products with PDO and PGI labels. The Barroso system contains three PDO and several PGI designations. The following four systems in productive relevance have received the PDO recognition of the main crop: Olive oil, wine, and raisins). Finally, the salt of Añana has not

received such certification. Therefore, we could expect a link between the observed pattern for the production sub-criterion and the products with PDO and PGI.

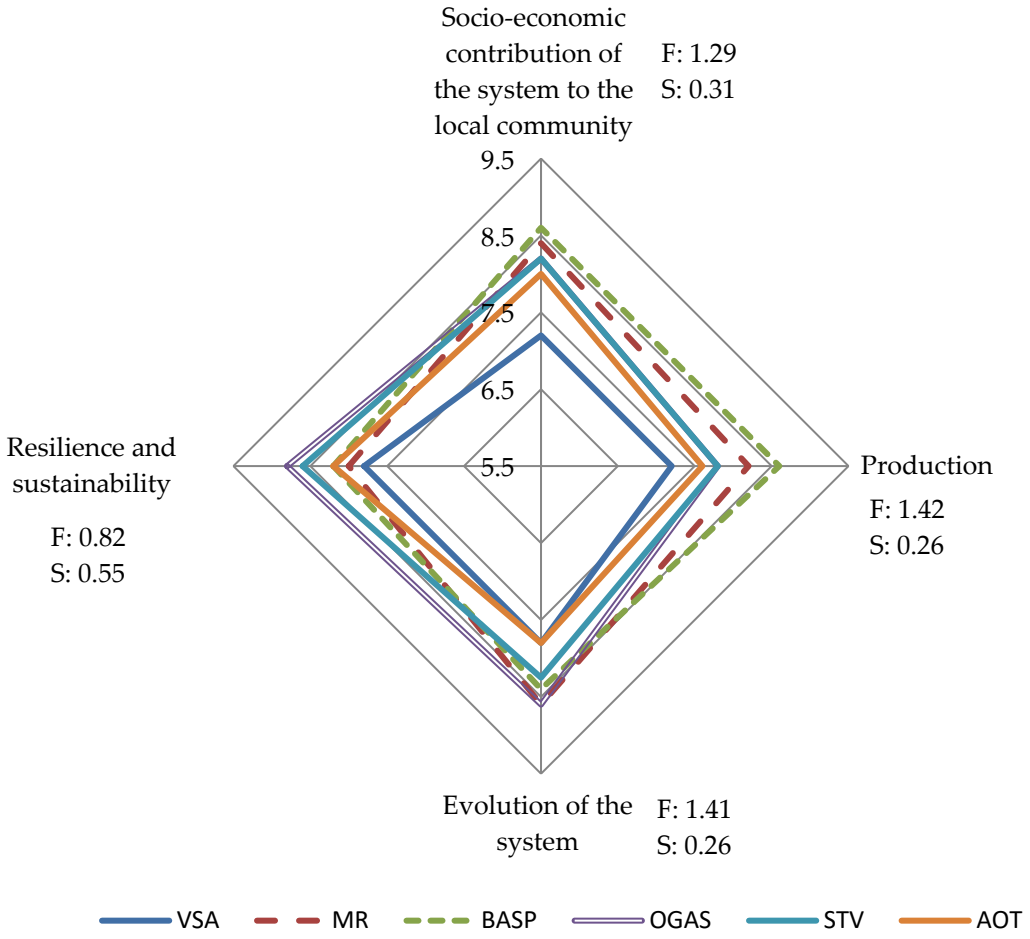

Figure 3. Characterization of the six sites for criterion 1. The values reflect the average of the expert's assessment in each sub-criterion.

The same pattern has been reflected in the sub-criterion: "socio-economic contribution of the system to the local community". These two sub-criteria are the only ones that are significantly important to reflect the contribution of the European GIAHS to the Food and Livelihood security of the local population.

3.2.2. Criterion 2: Agro-Biodiversity

Five sub-criteria have been formulated in order to analyze the capability of these sites to maintain significant biodiversity and genetic resources for food and agriculture.

Barroso Agro-sylvo-pastoral System is the European GIAHS with the most agro-biodiversity characteristics. Conversely, the Valle Salado de Añana has the least agro-biodiversity characteristics.

The other four GIAHS: Soave Traditional Vineyards, Málaga Raisin Production System in La Axarquía, Olive Groves of the Slopes between Assisi and Spoleto and the Agricultural System Ancient Olive Trees Sénia Territory, reflect very similar profiles in their characterization with respect to this criterion. They are systems with a main crop whose varieties and/or genetic resources ensure resilience and productive viability. The components of the agroecosystem reflect a relevant ecosystem function, demonstrating high resilience and sustainability. In contrast, all four GIAHS have received a lower assessment of the diversity of crops and/or livestock varieties and their organization within the system.

However, this sub-criterion was agreed by the Delphi panel to be of high relevance for expressing the agrobiodiversity of the system.

These four systems are mainly focused on the cultivation of olive groves and vineyards which are mainly monocultures that are barely mixed with a few other crops. The GIAHS of Portugal places livestock activity as the main one in the system. However, the proposal is specified as a multifunctional agricultural system as we can notice in the title "Barroso Agro-sylvo-pastoral System". The Salt Valley of Añana is entirely focused on salt production. The differences have been significantly different for three of the five sub-criteria (Figure 4).

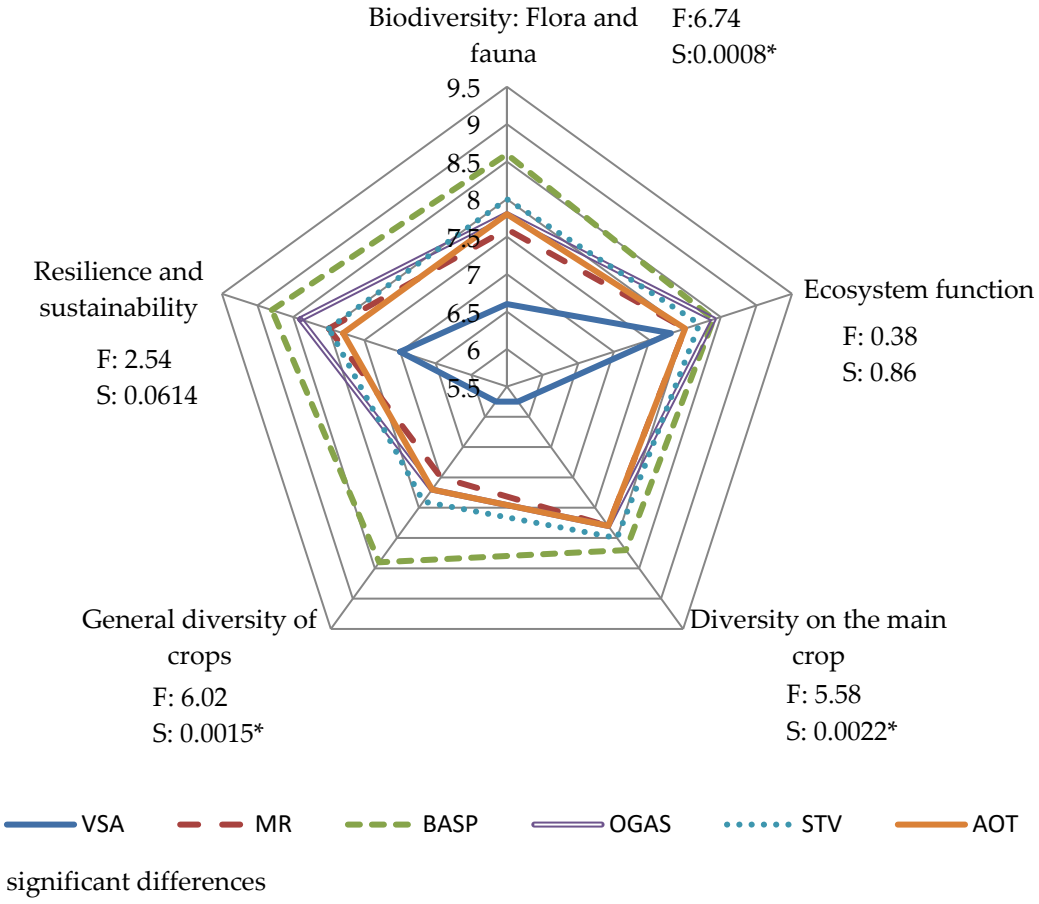

Figure 4. Characterization of the six sites for criterion 2. The values reflect the average of the expert's assessment in each sub-criterion.

Finally, the ecosystem function is the sub-criterion, where there is the most similarity between the six sites and the one that has received the highest rating as a whole.

3.2.3. Criterion 3: Local and Traditional Knowledge Systems

This has been one of the most valued criteria and with more similar profiles in the six sites (Figure 5). All have obtained very similar valuations, if not equal in the four sub-criteria, and are significantly very relevant to assess the local and traditional knowledge and practices embedded in the agroecosystem.

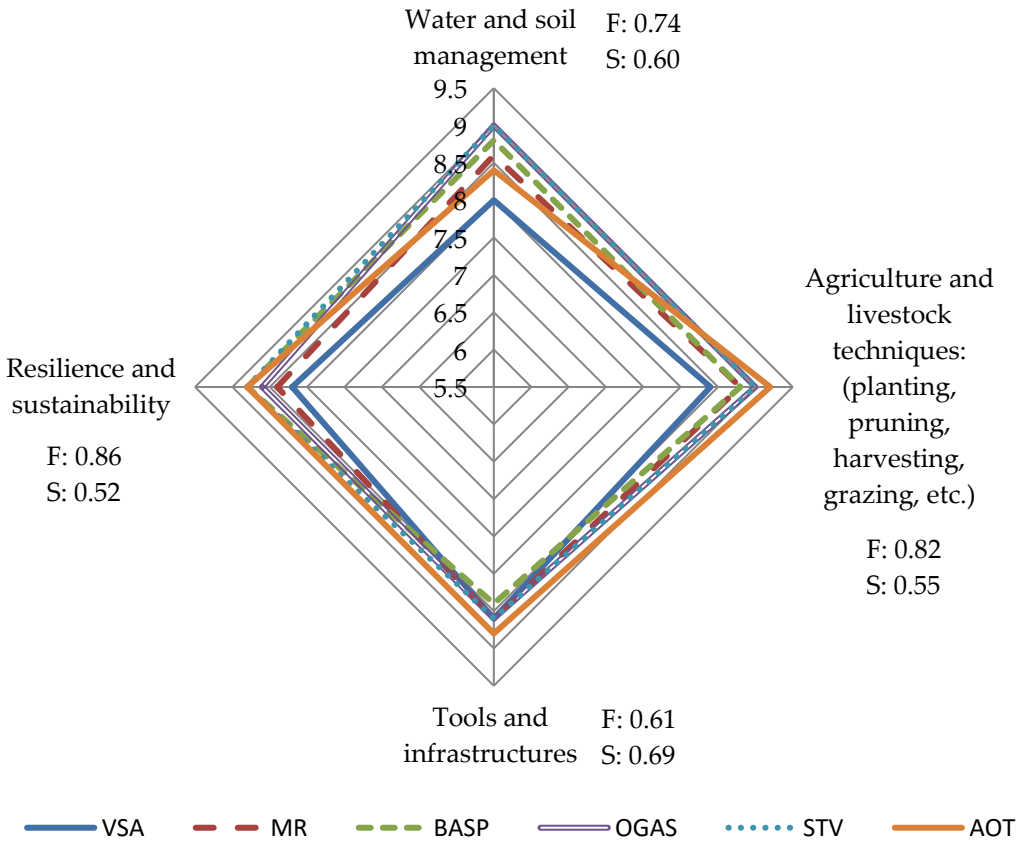

Figure 5. Characterization of the six sites for criterion 3. The values reflect the average of the expert's assessment in each sub-criterion.

The highest values as a whole went to the sub-criterion that refers to the use of traditional and adaptive agricultural techniques that are intangible heritage that ensure the sustainable management of crops, production, and biodiversity. Virtually close to this one are the tools and infrastructures as tangible heritage that have developed over time and have adapted to the necessities of the communities and obtained the same assessment as the resilience and sustainability sub-criterion. The sub-criterion "water and soil management" is the one that has shown the least similarities. The two Italian GIAHS have the highest ratings.

3.2.4. Criterion 4: Cultures, Value Systems, and Social Organizations.

The graphics observed for this criterion are similar, although there is a substantial difference between the sub-criteria (Figure 6). There are six defined sub-criteria.

The most valued sub-criteria have been those that refer directly to the role of society and its organization in the system. Regarding the role of individuals, groups, or families in interdependence with the system, the valuations have been diverse. The GIAHS of the region of Malaga (Spain) is the society with the greatest role to play on the agricultural system organization and dynamic conservation. This GIAHS is the one that has received the highest rating in the "Festive events, rituals and beliefs" and "promotion of the culture" sub-criteria. It has received the highest assessment along with the two Italian and Portuguese GIAHS, in the sub-criterion of "Social organizations supporting the system". This last sub-criterion has been the one that has received the highest evaluation as a whole and where more similarity can be observed among the six sites.

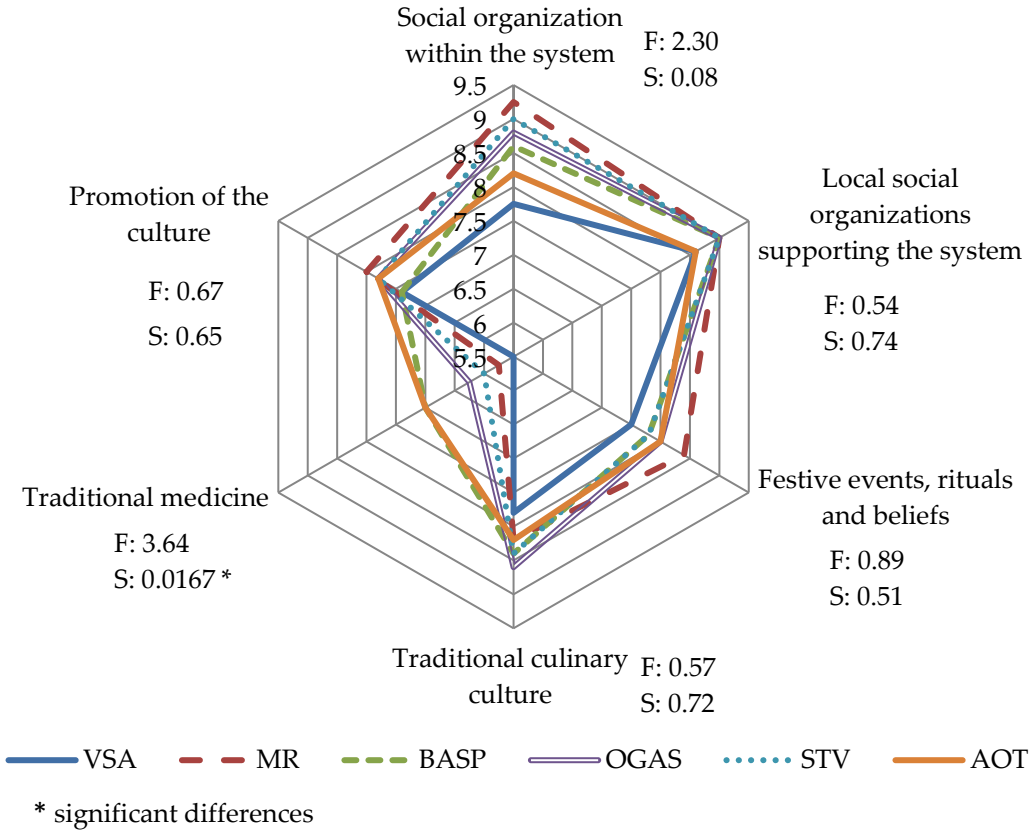

Figure 6. Characterization of the six sites for criterion 4. The values reflect the average of the experts' assessment in each sub-criterion.

Traditional medicine is significantly different among the six case studies and is the sub-criterion among the 24 that has received the lowest values. This sub-criterion and the one concerning "Promotion of the culture"—in which high ratings have not been observed either—were assessed during the Delphi panel to have medium relevance for the achievement of criterion 4.

3.2.5. Criterion 5: Landscapes and Seascapes Features.

Last but not least, four sub-criteria significantly important or very important have been defined for criterion 5. In this case, the resulting graphics are also similar (Figure 7), as was the case for criteria 3 (Figure 5) and 4 (Figure 6).

All sites received a very high rating on "Evolution of the landscape", reflecting that they all have landscapes that have been shaped by the strong interactions between humans and the environment. These interactions appear to have stabilized or to have evolved very slowly, as is evidenced by the integration of the local socio-economic system and the environment. This has been the sub-criterion that received the highest average rating of the 24 sub-criteria measured together for the six sites.

The Ancient Olive Trees Sénia Territory agricultural system has the lowest valuation for the sub-criteria "landscape diversity", "infrastructure and settlements" and "evolution of the landscape". The "analysis of the main planning and territorial protection tendencies" was the sub-criterion in which the lowest value was observed for the set of the six GIAHS. This shows that the local social organization has not stood out in the development of strategies, laws, and practices that allow and ensure the maintenance of landscape quality and potential.

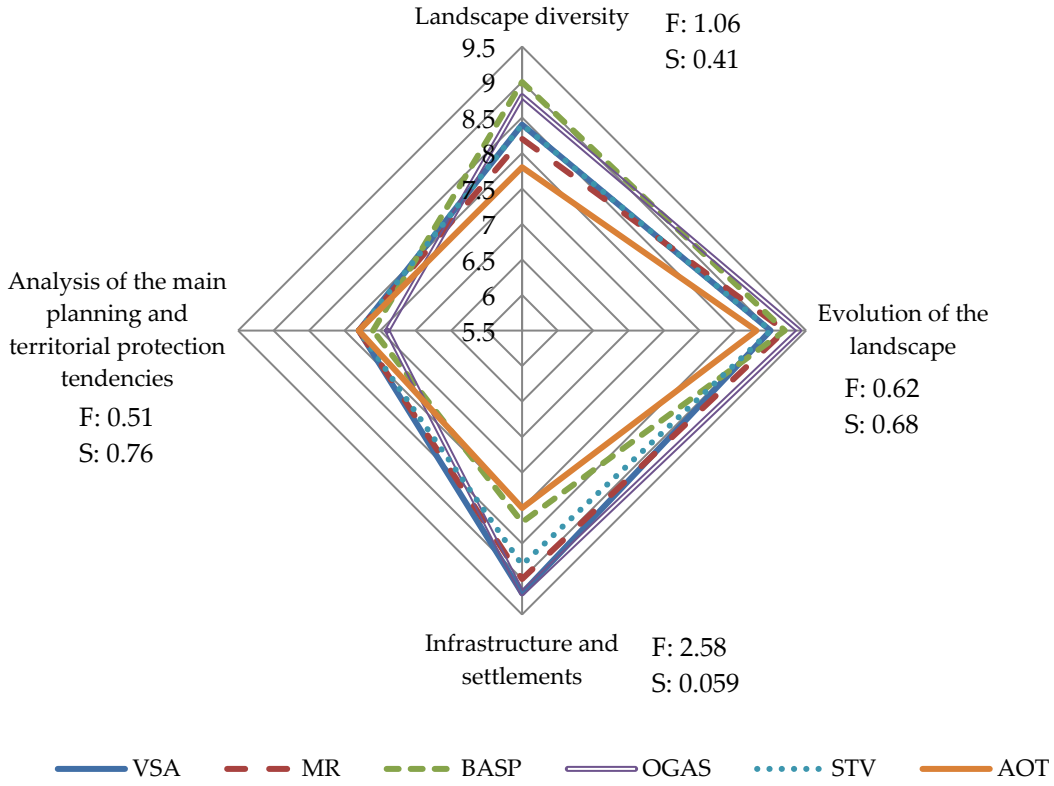

Figure 7. Characterization of the six sites for criterion 5. The values reflect the average of the experts' assessment in each sub-criterion.

4. Discussion and Conclusions

This study proposes a structure of 24 sub-criteria to compare and characterize the agricultural heritage in Europe. The lack of more specific indicators than the five main criteria that a GIAHS has to reach in order to receive the recognition, hinder the comparison of the GIAHS sites. Therefore, these 24 sub-criteria aimed to facilitate the characterization with a more solid and specific structure. In order to assess their suitability for the object of this study, they were subjected to experts' judgment. Only one sub-criterion, the one related to "Tourism: Tourist activities affect the GIAHS in such a way that they support the system and maintain its conditions", was declined in terms of relevance for the characterization.

This sub-criteria structure can be used by other sites that want to present their candidacy to the FAO. Its use can facilitate the management of the content and the detailed explanation of the fulfillment of the five main criteria, as long as it does not result in a rigidity that prevents reflecting on the authenticity and ingenuity characteristics of the GIAHS. The objective of this structuring in sub-criteria, however, has been to facilitate the visualization of the characteristics, similar and differentiating, of the European agricultural heritage currently recognized by the FAO.

The GIAHS European sites analyzed in this study have received the GIAHS designation and certification. They belong to three countries of the Mediterranean basin: Portugal, Spain, and Italy. Although not all are within the Mediterranean climate, they all receive some influence from it. All of them are located in places where climatic, orographic, and geological factors make agricultural intensification very difficult. They are systems developed in areas of very steep slopes, alternating valleys, and mountains that involve the isolation of human settlements and their activity, on poor or difficult soils for the development of crops, or climatic conditions with long periods of water scarcity. For hundreds of years—and in the cases of the Agricultural System of Valle Salado de Añana, the Barroso Agro-sylvo-pastoral system and the Agricultural System Olive Trees Ancient Territory Sénia

we are talking about thousands of years—they have developed agricultural production systems that have evolved and adapted to changes so that their functional characteristics have barely been altered over time.

Despite the low rates of agriculture employment observed in all sites—representing between 1% and 13% of the total employment in the region—the agricultural activities of these systems contribute very positively to the socio-economic activity of the local community. To understand this fact, we can draw attention to the results obtained in terms of effectiveness in the production process related to food and livelihood security. High values have been observed in this aspect, so it is expected that they are influencing local socio-economic activity. Despite the significant importance of these aspects in terms of food and livelihood security, more specific indicators would be necessary to comprehend why a low level of agriculture employment sustains economic activity from these sites.

It has been highlighted by the experts that most of the sub-criteria extracted for the "Food and Livelihood Security" assessment, were not relevant enough. However, it is also worthy to mention that the structure of sub-criteria came from a qualitative analysis of the documents presented and validated by the FAO, in which the declined sub-criterion "Tourism" was the result of the relevance given by the European GIAHS sites in their proposals.

In China, it has been demonstrated that tourism is playing an important role in GIAHS site incomes and conservation [62]. Tourism is a very useful mechanism in the preservation of heritage, without falling into the trap of converting its characteristics—such as culture and landscape—into mere assets for tourism [38,63]. This is especially relevant in the case of GIAHS, where heritage is active agriculture that cannot remain intact but must ensure its integration into current development flows without losing the integrity that the five main criteria reflect. However, although we cannot assume any relevance of tourism in European GIAHS socio-economic sustainability through this study, the relevance that the GIAHS sites have given to it in their proposals should be mentioned at least.

On the other hand, in terms of productivity, the systems with greater relevance in productive aspects contain products recognized by the European Union with PDO and PGI certification. These certifications were created with the aim of protecting traditional European products linked to their place of origin and traditional techniques that ensure that the products are highlighted by their quality. Finally, it is intended to increase the economic welfare of these regions whose agriculture cannot compete with modern agricultural enterprises [64]. European consumer trends, increasingly concerned with the quality of products, make possible the feasibility of these certifications and their availability in the market. The results observed through this study could reflect the positive influence of these products on the food and livelihood security of the European GIAHS.

In terms of biodiversity, the results have reflected marked differences between the GIAHS whose agricultural production is centered on olive groves and vineyards, and the others. These crops, inherited from the expansion of the Roman Empire through the Mediterranean, are mainly monocultures barely mixed with other crops. The values of biodiversity directly or indirectly used for food and agriculture, have not been high in general, but for the Portuguese GIAHS. In contrast, in this criterion, all have shown similar values in the ecosystem function, followed by the resilience and sustainability of the system in terms of biodiversity.

The European GIAHS have received high ratings in terms of local and traditional knowledge, local social organizations, and evolution of the landscape. This, together with the lower valuation in terms of agro-biodiversity, leads us to the concept of cultural biodiversity and bio-cultural refuge [65,66] to understand the sustainability of these systems. In general, the sites analyzed have shown not to be the example of high biodiversity systems and polyculture systems that have characterized other GIAHS in the world [33]. On the other hand, they recognize the relevance of social networks that strengthen, promote, and preserve traditional knowledge systems and practices, as well as the tools and infrastructure they use to make sustainable management of natural resources. In the case of the European GIAHS sites, it is cultural biodiversity that characterizes them and has made possible the creation of resilient and sustainable agroecosystems that are important examples of European cultural

landscapes [67]. Social organizations are the core of cultural biodiversity, and the GIAHS dynamic conservation depends on a multi-stakeholders' process that includes both the families and groups that depend on the system and the public organizations that support them [68].

This study has been carried out through the analysis of the documents of the proposal of the GIAHS in Europe. These reports are the available documents through which the potentiality of the GIAHS is assessed during the designation process. Therefore, the experts' performance on the study has been limited to a giving framework coming from the content presented on these documents and does not give the floor to express further opinions on the case studies. Interactions between the resulting sub-criteria analyzed have not been addressed in this study. Further studies in this regard could deepen the characterization presented in this manuscript. New GIAHS proposals are currently under study in Europe, and it will be interesting to check our findings about sub-criteria usefulness, in order to refine them.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. The FAO five main criteria for the assessment of potential GIAHS.

1. Food and Livelihood Security: The proposed agricultural system contributes to the food and/or livelihood security of local communities. This includes a wide variety of agricultural types such as self-sufficient and semi-subsistence agriculture where provisioning and exchanges take place among local communities, and thus, contribute to rural economy.
2. Agro-biodiversity: Agricultural biodiversity, is defined by the FAO as the variety of animals, plants and micro-organisms that are used directly or indirectly for food and agriculture, including crops, livestock, forestry and fisheries. The system should be endowed with globally significant biodiversity and genetic resources for food and agriculture (e.g., endemic, domesticated, rare, endangered species of crops and animals).
3. Local and Traditional Knowledge systems: The system should maintain local and invaluable traditional knowledge and practices, ingenious adaptive technology and management systems of natural resources, including biota, land and water which have supported agricultural, forestry and/or fishery activities.
4. Cultures, Value systems and Social Organizations: Cultural identity and sense of place are embedded in and belong to specific agricultural sites. Social organizations, value systems and cultural practices associated with resource management and food production may ensure conservation of and promote equity in the use and access to natural resources. Such social organizations and practices may take the form of customary laws and practices as well as ceremonial, religious and/or spiritual experiences.
5. Landscapes and Seascapes Features: GIAHS sites should represent landscapes or seascapes that have been developed over time through the interaction between humans and the environment, and appear to have stabilized or to have evolved very slowly. Their form, shape and interlinkages are characterized by long historical persistence and a strong connection with the local socio-economic systems that produced them. Their stability, or slow evolution, is the evidence of integration of food production, the environment and culture.

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