

Work-package group 2: High natural and cultural value agroforestry

Specific group: *Montado* in Portugal

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1. Context

The AGFORWARD research project (January 2014-December 2017), funded by the European Commission, is promoting agroforestry practices in Europe that will advance sustainable rural development. The project has four objectives:

- 1) to understand the context and extent of agroforestry in Europe,
- 2) to identify, develop and field-test innovations (through participatory research) to improve the benefits and viability of agroforestry systems in Europe,
- 3) to evaluate innovative agroforestry designs and practices at a field-, farm- and landscape scale, and
- 4) to promote the wider adoption of appropriate agroforestry systems in Europe through policy development and dissemination.

This report describes one of about 40 initial stakeholder workshops to address objective 2. Further details of the project can be found on the AGFORWARD website: www.agforward.eu

2. Description of system

In Portugal, the main agroforestry system is a traditional system called *Montado*. It is characterized by low density trees combined with agriculture or pastoral activities. The main tree species encountered in the *Montado* are cork oak (*Quercus suber* L) and/or holm oak (*Quercus rotundifolia* L). Mixed stands with a combination of these species are also common. Agriculture, typically for cereal production, was a common practice since the thirteenth century even in areas recognized for their low productivity. The incentives given by kings and politicians for this activity were based on the necessity of dealing with the increased population of this region at that time (Fonseca 2008). In the 20th century, during the 80's, cereal production decreased and pastoral activities became dominant. Animal species include sheep, goats, pigs and cows, and the traditional breeds vary between regions and several are region specific (Figure 1).



Fig 1. Image of a *montado* with multispecies (cattle and pigs) grazing, near Évora. (Photo by João Palma, available @ <https://www.flickr.com/agforward>)

Cork oak based *Montado* areas are included in the Portuguese National Forest Inventory (NFI) as part of the cork oak and holm oak forest area, which occupies 736,775 ha and 331,179 ha respectively (AFN, 2010) (see Figure 2a). The lack of information regarding the understory management of these areas in the NFI hampers the differentiation of both systems regardless of their differences: one is managed typically for forest production (cork in cork oak systems) and the other for agrosilvopastoral production (cork, sweet acorns, animal and/or crop production). The majority of the *Montado* area is in the south-east, although some areas also exist in the north of the country (Figure 2b).

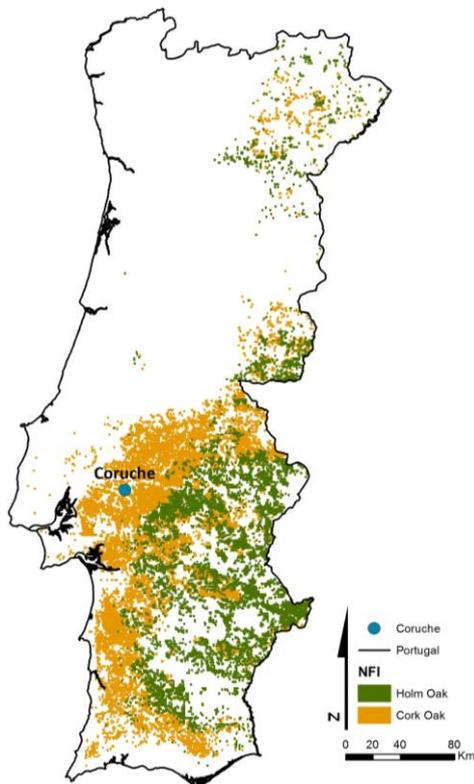


Fig 2a. Distribution of main *montado* species (*cork oak and holm oak*) in Portugal from the National Forest Inventory (2010)

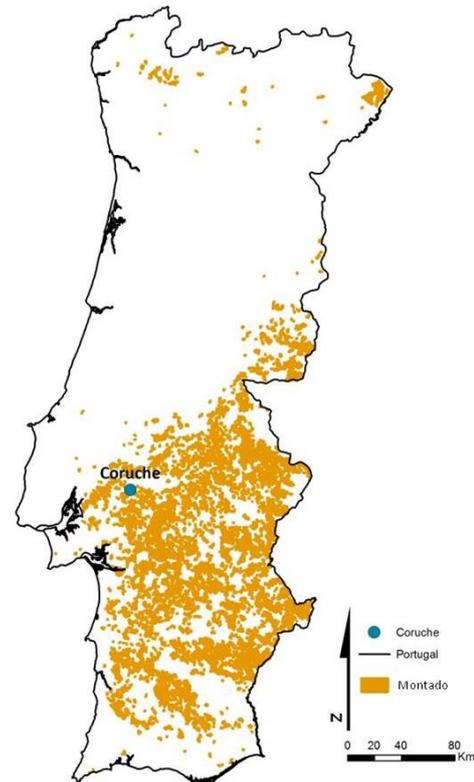


Fig 2b. Distribution of *montado* area in Portugal from CORINE land cover dataset (class 244 – agroforestry); .

Note: blue dot shows the location of the meeting.

The main product resulting from the tree management in these systems is either sweet acorns (from holm oak) or cork (from cork oak), extracted at a minimum nine year interval defined by the national legislation. Wood from dead trees and prunings are also removed, mainly for domestic usage, as well as tree fruits and foliage for human and animal consumption respectively. Economic return is dependent on cork price and market fluctuations, reinforcing the importance of the multifunctional management of these areas, which may even include diverse activities such as hunting, mushroom and medicinal plant collection, carried out not only by farmers and landowners but also by local communities.

3. Participants

Invitations were sent to 34 institutions including public administration departments and institutes (8), farms and forest associations (13), public farms (2) and private owners (11). Two types of invitations were sent out for participants to attend the Sharesop:

- Institutional: where members of the ISA team were not acquainted with people from the organisation, the invitation was sent to general contacts or to those individuals subsequently named by the organisation
- Personal: a member of ISA team was acquainted with someone from the organisation and personally addressed the invitation to that contact.

The meeting was attended by 22 stakeholders and 17 stayed for the open discussion: seven were technicians (five related to forest and agriculture associations, one technician from a local council and one representative of the national rural network), eight forest or/and farm managers and two representatives of the academic sector (and also farm managers) (Table 1). The ISA team comprised five members: two presenters/speakers, two assistants and a photographer.

Table 1. Attendees at the open discussion:

Entity/property	Sector
Herdade da Chaminé	Private owner
Quinta da Cholda	Private owner
	Private owner
	Private owner
Companhia das Lezírias	Public farm manager
Herdade do Rio Frio	Private owner/academic
	Private owner/academic
	Private owner
Herdade Vale Mouro	Private owner
Herdade dos Clérigos	Private owner
ICNF	Public institution
Coruche Council	Public institution
Coruche Council	Public institution
RRN	Public institution
Coruche Council	Public institution
ACHAR	Farm/forest association
FORESTIS	Farm/forest association
APFC	Farm/forest association
UNAC	Farm/forest association
CAP	Farm/forest association
ANSUB	Farm/forest association
APFC	Farm/forest association

The vast majority of participants (94%) were between the ages of 35-65 years: eight (47%) were between 35-50 years and eight (47%) between 50 and 65 years. One person was younger than 35 years. Gender characterization showed a mix: 6 (35%) women and 11 (65%) men. From the 17 attendants, twelve (70%) were property managers, ten of these already managing *montado* areas. Most of them combined the management of these systems with others: *Pinus pinea* for pine nut production, *Eucalyptus globulus* plantations for pulpwood production, livestock breeding for meat production, cereals production in irrigated land.

4. Programme for 'Shareshoping'

The meeting was hosted by the City Council of Coruche (Fig 2) and held at the Observatório do Sobreiro e da Cortiça (Cork and cork oak Observatory – Fig 3).



Fig 3. Image of cork and cork oak Observatory in Coruche (Portugal).

The programme of the Shareshop is provided below:

9.00	Reception and registration participants
9.30	1st Part: Welcome and explanation of agroforestry AGFORWARD project and reasons and objectives of the Shareshop - Joana Paulo (ISA) Agroforestry/AGFORWARD/EURAF – Joao Palma (ISA)
10.15	Film presentation: 'Agroforestry : perspectives and challenges' (17 min) ¹ .
10.35	Attendant's presentation: activity, type of property, AF systems included and expectations from the Shareshop.
11.10	Coffee break
11.20	2nd Part: open discussion session Identification of problems, challenges and good practices in agroforestry systems Potentialities and limitations of the new agroforestry systems.
12.50	Closing: questionnaire and acknowledgments
13.00	Lunch

The meeting started at 9.00 am with the registration of participants and a brief reception, hosted by Joana A. Paulo (ISA), to welcome participants. Joana provided a brief presentation, outlining the programme of the day and the objectives of the Shareshop.

João Palma (ISA) followed with the presentation² '1st Shareshop of the AGFORWARD Project – Agroforestry that will advance rural development (in Portuguese)', which focused on the 'agroforestry' concept and European projects already completed and under development (Figure 4).



Fig 4. Project presentation.

This presentation embraced not only high natural and cultural value systems (WP2) already known from the participants, but also other agroforestry systems included in WP3, WP4 and WP5. This offered a wider view of the agroforestry concept, bringing to the attention of participants the level of agroforestry innovations to be revealed within the AGFORWARD project.

¹ Available @ <http://agforward.eu/index.php/pt/247.html>

² Available @ <http://prezi.com/8pttfzrt-r5w/1o-shareshop-projecto-agforward/>

The organisers then presented the 17 minute film: ‘Agroflorestas: oportunidades e desafios’ with Portuguese subtitles; the film was directed by F. Liagre and N. Girardin³. Participants were then asked to introduce themselves to others present to facilitate greater engagement in the discussions. Discussions that followed focused on participants’ experience with agroforestry systems and their expectations for the workshop.

During the coffee break that followed, participants had the opportunity to see a poster session where several posters were displayed. Posters presented research carried out by the ISA team on the subjects of: *Montado* management, cork growth and production, modelling, management tools, agroforestry, carbon storage, amongst others.

After a coffee break the open discussion session was carried out (Figure 5), focusing on:

- a) the identification of problems, challenges and good practices in agroforestry.
- b) discussion on the potential and limitations of the new agroforestry systems



Fig 5. Open discussion.

The content and conclusions of the open discussion are presented in section 5 of this document.

After the open discussion ended, questionnaires were distributed to the participants. Participants were then offered a lunch in a local restaurant, where the discussion of agroforestry systems / innovations continued until 4 p.m.

5. Open discussion

The open discussion offered an opportunity to have an informal discussion, capturing a range of issues including advantages, problems and challenges for the implementation of agroforestry in Portugal.

The initial comments suggested that the different biophysical conditions that exist between the French conditions (seen in the AGROOF video) and Portugal may create barriers to the successful take-up or implementation of AF systems:

³ Available @ http://www.dailymotion.com/video/x20l6re_agrofloresta-oportunidades-e-desafios-legenda-em-portugues_tech

“The systems are very interesting! However what we see in France is very different from Portugal. The trees were added where the soils were fertile. On the contrary our forests are installed in very poor soils and this might difficult the implementation of agroforestry systems like those shown. And also we have water scarcity”...

A frequent comment made was the lack of knowledge of agroforestry systems, largely associated with production and economic return. Many participants commented on their doubts about the economic viability of the project and this tended to reduce interest in the implementation of agroforestry systems:

“We are living from our land management and my decisions will be looking for improvements. But I need to know how to manage it!”... “if we plant trees we need to wait for 30 years to have a return, nowadays we can’t wait so much”... “we need to know more about the payback otherwise it is not easy to take the risk”.

Regarding the *Montado* system three main concerns were highlighted:

- The importance of local knowledge. Specifically this relates to knowledge about soil conditions and root system development that is considered essential for good management. This is particularly important since cork oak roots can be damaged by machinery and some studies have demonstrated that roots do not recover. While participants recognised the benefits of such practice, the option of using machinery for root pruning in early tree development stages, forcing roots to go beneath crop rooting zones, was also discussed as a viable alternative, though it was recognised that such practice is not always possible in shallow soils.
- The importance of defining measures to increase productivity and the recovery of the soils. Some refer to the problems of tree regeneration due to animal presence, but others refer to the importance of the system multi-functionality and the benefits of grasslands (natural or sown) for both trees and animals, and soil organic matter composition.
- The importance of carrying out research on the effect of several management practices for the improvement of the quality of the cork such as: cork debarking rotation, fertilization or debarking intensity. One participant referred to an objective of achieving a value of around 60% of the cork being suitable for cork stopper production and hence eligible for high prices.

Emerging from the discussion were concerns about the economic crisis and future economic constraints that may impede the take up of agroforestry systems. One participant stated:

“I found the wind energy turbines very interesting and beautiful... But since I knew that we could be paying 106€/MW instead of 44€/MW, I started to hate the wind turbines... But, who is he going to pay and how much for a system which is not economically interesting compared to other alternatives (ex. Eucalyptus, pure forest, pure agriculture)?, specially under budgeting constraints like we are living today...”

These concerns illustrate the need to quantify the willingness of tax payers to pay, for the ecosystem services that agroforestry could deliver.

There were a number of barriers to agroforestry practice suggested including the bureaucratic system around public funding, the complexity related to legal aspects, and the separation of the forestry and agriculture sector in terms of management, legislation and financial support. The general impression is that the administration seems unable to support, manage or maintain the subsidies and policies, and this is hampering the effectiveness and success of the implementation of financial support for farmers. Note that in Portugal the financial support to implement agroforestry is present in the Rural Development Plan since 2007, but there has been very little uptake (up to 2013):

“We have governments without money and I don’t believe in their consistency to support the policies for the next 30-40 years. In short-medium term, people will be more interested in having money to go to supermarket than paying to sequester carbon or increase air quality”

6. Suggested innovations

Several recommendations were put forward for the successful implementation and innovation of agroforestry systems. These are grouped under AGFORWARD work packages 2-5 and presented in the table below:

Table 2. Five innovations and how these relate to the four farmer-network work-packages (WP) in the AGFORWARD project. WP2: high nature and cultural value systems; WP3: high value tree systems; WP4: silvoarable systems; WP5: silvopasture systems

Potential innovation	WP2	WP3	WP4	WP5
Use of agricultural land in marginal areas or areas not reached by irrigation systems. These plantations could improve the efficiency in irrigation as they act as a wind barrier or reduce horizontal water flow.			X	
Use of eucalyptus in agroforestry systems.			X	X
Use of <i>Gleditsia triacanthos</i> L. for livestock feeding. <i>G. triacanthos</i> L. seems to grow well in Mediterranean areas, fixes nitrogen, has spines to protect itself from herbivory and produces around 3-6 tons/ha of beans per year. It could also be associated to cork oaks. Several studies have already been carried out and experimental sites were mentioned.			X	X
The importance of these agroforestry systems for fire risk reduction. This aspect was raised by a participant related to forest management in the North of the country, and created an opportunity to organize a second Shreshop event in that region (see section 0 on next steps).	X			
Plantation of fruit trees for noble wood production (e.g. Apricots, <i>Prunus armeniaca</i> L.)		X		

7. Questionnaire results: ranking aspects of agroforestry systems

The participants were asked to complete a brief questionnaire which sought to highlight the key positive and negative aspects of agroforestry systems. The questionnaire asked to rank the importance of the positive and negative aspects of agroforestry, from 1 to 10, 1 being the highest rank and 10 being the lowest. 17 participants completed the questionnaire.

To help the interpretation of results, scores were given to the answers as it is shown in Table 3. Twenty-five points were given to the item ranked first and one point to the item ranked tenth. For each item, the points were added and the total points indicated the overall assessment in terms of positive and negative aspects of agroforestry: Table 4 (positive) and Table 5 (negative).

Table 3. Scoring points for each the rank

Rank	1	2	3	4	5	6	7	8	9	10
Points	25	18	15	12	10	8	6	4	2	1

The data suggest that positive aspects are mostly related to environmental benefits, income and product diversification (Table 4).

Table 4. The top 10 **POSITIVE** aspects of agroforestry systems.

Rank	Effects	Aspect	Final score
1	Socio-economic	Income diversity	207
2	Production	Diversity of products	200
3	Environment	Biodiversity and wildlife habitat	182
4	Environment	Soil conservation	172
5	Environment	Change in fire risk	155
6	Socio-economic	Profit	114
7	Environment	Carbon sequestration	109
8	Management	Tree regeneration/survival	99
9	Management	Management costs	96
10	Production	Timber/wood/fruit/nut quality	95

Negative aspects included the administrative burden, the complexity of work and the lack of knowledge about future productions/results if these systems are implemented (Table 5).

Table 5. The top 10 **NEGATIVE** aspects of agroforestry systems.

Rank	Effects	Aspect	Final score
1	Socio-economic	Regulation	149
2	Management	Complexity of work	115
3	Management	Tree regeneration/survival	114
4	Production	Disease and weed control	79
5	Production	Losses by predation	60
6	Management	Inspection of animals	59
7	Management	Management costs	52
8	Production	Timber/wood/fruit/nut quality	51
9	Production	Crop or pasture quality/food safety	50
10	Socio-economic	Market risk	47

8. Questionnaire results: qualitative written responses

Ten respondents gave a written answer to the question: “What constraints and challenges could be addressed by changes to an existing agroforestry system or establishing a new agroforestry system?” The comments broadly matched those given orally during the open discussion. The main concerns are related to the lack of knowledge in terms of production (due to the poor soils) and economic viability of the agroforestry systems (Table 6).

Table 6. Constraints and challenges identified by respondents

Answers and comments
<ul style="list-style-type: none"> • Loss of subsidies. • First, define the objectives. Second find solutions for the optimization of the objectives. Third, how to manage the systems when there are change in crop/forest markets. • Economic or legislative constraints. • Cost of implementation or modification of the system. • Soil mobilization when implementing the AF systems. • Shallow soils not able to support some of the tree species (walnut trees or poplar). • Resistance to integration. • Low productivity. Problems with natural regeneration. • Legislation. Lack of administrative support. • Resistance to innovation by land owners. Lack of investment capacity. • Lack of knowledge about the agroforestry systems potentialities. • Lack of information about how to do it. Resistance to changes. • Economic viability of the property.

On the question related to the potential solutions and research themes, twelve answers were obtained (Table 7).

Table 7. Potential research themes or innovation identified by respondents

Answers and comments
<ul style="list-style-type: none"> • Innovative [tree] species able to resist to livestock • Take advantage of economic healthy farms to develop innovative solutions (Pilot farms) • Improve agroforestry knowledge and communication. What is an agroforestry system? Advantages and disadvantages of each system and each possible crop/livestock • In Montados with poor soils, would an agroforestry system improve the production? What would be the economic benefits per hectare? What crop cultures could be implemented with the Montado without decreasing its productivity? • Use of other species offering benefits in a short term such as <i>Eucalyptus</i> sp. • Innovation sites with <i>Eucalyptus</i> sp. and <i>Pinus pinea</i>. • Integrate the management of animal production and forest systems. • Pests and diseases. An adequate silvo-environmental solution. • Economic viability and its distribution along the time. • Technology transfer. Implementation of agroforestry systems able to offer solutions to ...? • Production costs associated to production models for several agroforestry systems. • Implementation of 6/7 experimental sites with high rate of success.

9. Next steps

Of the 17 participants that completed the form, 13 indicated that they would be interested in supporting research related to the implementation of new agroforestry systems and new demonstration sites.

All the participants asked to receive the project newsletter. Another non official Shareshop was suggested for Northern Portugal. This area presents different agricultural and forest systems from those present in Central and Southern Portugal. The participants from that region expressed interest in the agroforestry concept and were willing to share information about the AGFORWARD project to farmers of that region. The Shareshop will occur in October/November 2014. Individual meetings were also planned with stakeholders.



Fig 6. Group photograph outside the Observatory after the Shareshop.

10. Acknowledgements

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