

## Technical, administrative and economic challenges faced by European agroforestry pioneers: preliminary results from the DigitAF project

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### Introduction

Climate change is extremely urgent, and there is a need to shift towards more sustainable and resilient economies and food systems (IPCC 2023).

Agroforestry, the practice of deliberately integrating woody vegetation (trees or shrubs) with crop or animal systems (Burgess & Rosati, 2018), has been gaining attention as a sustainable land-use practice. Agroforestry is a promising climate mitigation practice: it is estimated that implementing agroforestry in the 10% of the area with the highest number of accumulated environmental pressures, could lead to a carbon sequestration of 2.1 to 63.9 million Mg C a<sup>-1</sup> (7.78 and 234.85 million Mg CO<sub>2</sub>eq a<sup>-1</sup>) (Kay et al. 2019).

### Objectives

Despite its proven potential, the adoption of agroforestry faces context-dependent challenges, including the lack of decision-making tools and barriers hindering the assessment of economic, environmental, and social benefits. The DigitAF Horizon Europe project (2022 to 2026) aims to co-develop digital tools tailored to address the unique needs and concerns of diverse stakeholders in the agroforestry landscape. By adopting an end-user-centered, multi-actor approach, the project aims to involve policy actors, practitioners (farmers, advisors etc.), and beneficiaries of AF goods and services in project activities. Thus six Living Labs (LL) in six European countries (IT, DE, NL, UK, FI, CZ) have been created. The work presented here focuses on the stakeholder perceptions on technical and administrative challenges

### Methodology

A multi-stakeholder survey was designed within the project to understand the perception, use, needs and wants of the various actors regarding agroforestry and digital tools, examining in depth past research and similar projects (Camilli et al. 2018; García de Jalón et al. 2018; Graves et al. 2017; Liagre F 2005; Rois-Díaz et al. 2018; Rolo et al. 2020; Tsonkova et al. 2018).

The initial distribution of the survey focused on participants of the DigitAF LLs and selected stakeholders Belgium, and achieved a total of 92 responses. In one section of the survey, respondents were asked to rank a series of technical, economic and administrative issues through a Likert scale.

### Results

The survey shows limited use of digital tools across all stakeholders. Members of the LL agreed upon a high demand for digital tools for the management of an agroforestry system. These include tools for system design, tree selection, crop, tree and animal performance and management of agroforestry systems. Also, tools on economic aspects of agroforestry systems and environmental aspects (biodiversity, carbon neutrality, soil health) are valued. They indicated that a tool related to agroforestry-related CAP matters could be of great relevance. From an environmental point of view, users would appreciate a tool or model aiding them in evaluating the carbon neutrality of agroforestry systems.

As seen in Figure 1. the survey participants see the main technical problems in implementation of agroforestry mainly in knowledge gap among practitioners about tree planting and management and necessity of substantial change of farming practices. The participants see the main economic obstacle in the large initial investment connected with establishment, but also high management cost in following years. The stakeholders also share the fear that and increased number of trees/ha would result in losing CAP support and further administrative burden when implementing agroforestry.

### **Discussion and Conclusion**

Despite the different contexts all the members of the Living Labs operate in, a large part of the needs and wants overlap. For example, the actors have a positive attitude towards the development of a (European) map of agroforestry practitioners and other actors. Also in most LL, the center of gravity of needs and wants are tools for agroforestry practitioners and advisors. There is a high demand for tools for the design and management of agroforestry systems, as well as decision support tools on the topic of financial aspects and tree and crop performance. The prediction as well as the monitoring of ecosystem services (with emphasis on carbon sequestration and biodiversity) is also an important topic for tool development. Furthermore, all LL made suggestions to increase user-friendliness by making tools available on mobile phones in the field, taking into account that tools must be accessed quick and easy, often without an internet connection.

This work provides great insight into the challenges faced by agroforestry stakeholders. but the initial sample may exhibit bias. Participants in this survey represent a highly educated subset of farmers who are exceptionally interested and knowledgeable about agroforestry. This bias is inherent to the nature of the survey, which was intentionally designed as a first attempt to gather insights from pioneers of agroforestry. Therefore, the outcomes of this survey should be interpreted accordingly. The next steps of the project are to analyze the survey results and, based on these results, to shorten and simplify the survey and distribute to a wider audience of stakeholders at European level.

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### **Keywords**

Adoption, Agroforestry, agroforestry practices, participatory research, adoption constraints, case study, collaborative research, agricultural policy