Trees and Management Tools for Agroforestry

4th DigitAF webinar

Webinar agenda

- Introduction
  - DigitAF project, tool catalogue and webinars (Marie Gosme, 10’)
  - general principles on tree species choice and management in AF systems (Bert Reubens, 10’)
- Digital tools for decision support for to tree species choice
  - DENTRO (Bert Reubens, 5’)
  - AgroforesTreeAdvice (Marie Gosme, 15’)
- Tree species choice in a changing climate (Bert Reubens, 10’)
- Tree management and related tools for farmers and advisors (Marilyne Laurans, 20’)
- Questions and answers (all, 20’)

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DigitAF's aims and approach

DIGItal Tools to help AgroForestry meet climate, biodiversity and farming sustainability goals: from field to cloud

Target groups

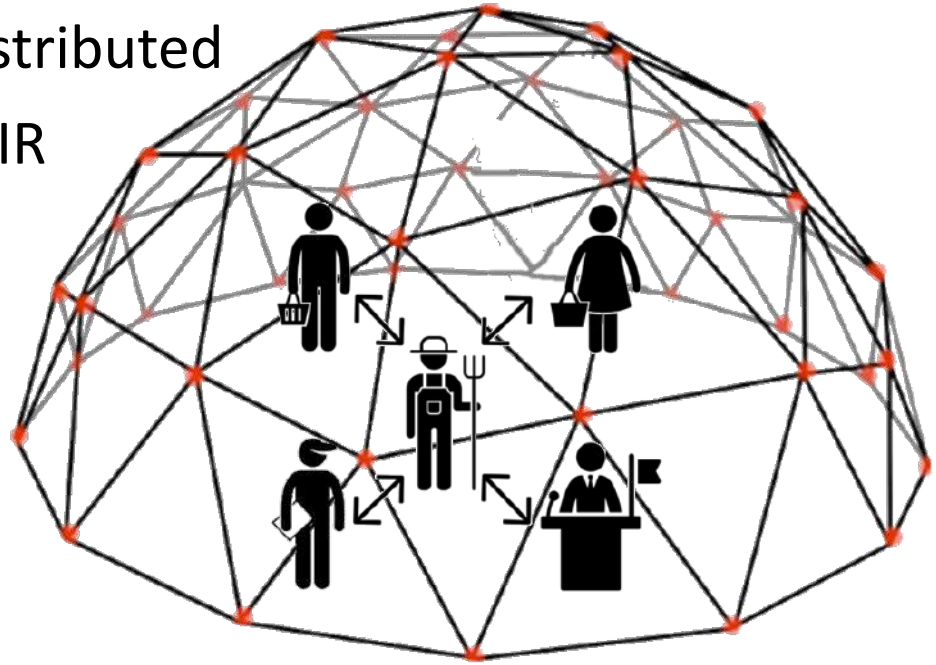
- 3 target groups:

DIGITAF Target groups	01 Policy-makers, at regional, national and European levels	02 Practitioners (e.g. farmers, landowners, foresters)	03 Beneficiaries of AF products and services
Why this group of actors?	Set the scene for a high quality implementation of AF	Implement AF	Valorize AF products and services: use and benefit from them
What are their needs?	• Insights on barriers to adopt AF and guidelines to facilitate uptake, • Comparison of policies between countries and targeting areas where policies will have the highest impact	• Increase farm economic performance, • Improve farm sustainability	• Evaluate AF impacts in terms of services, • Secure provisioning, • Better understand AF benefits

=> WP1 => WP2 => WP3

Approach

- User-centered
- Open-source
- Distributed
- FAIR



=> WP4

DigitAF's Living Labs

LL	Practitioners	Policy actors	Other beneficiaries	
			Value chain	Other stakeholders
CZ	27 (22 farmers, 5 advisors)	7	2	5 NGO
FI	7 (6 farmers, 1 advisor)	2	1	6 (4 teachers 2 researchers)
DE	4	3	2	2 (1 env. NGO, 1 education)
IT	10 (4 farmers, 6 advisors)		2	
NL	8 (6 farmers, 2 advisors)	6	2	
UK	4	3	2	

Priorization of work

Initial survey of stakeholder's needs

- 92 respondents in 6 Living Labs (CZ, FI, DE, IT, NL, UK)
- Identification of needs and knowledge (or lack thereof) about tools
- Paper published in Agroforestry Systems:

https://dx.doi.org/10.1007/s10457-024-01047-x

Agroforest Syst
https://doi.org/10.1007/s10457-024-01047-x

Exploring agroforestry limiting factors and digitalization perspectives: insights from a european multi-actor appraisal

Margherita Tranchina · Paul Burgess · Fabrizio Giuseppe Cella · Laura Cumplido-Marin · Marie Gosme · Michael den Herder · Sonja Kay · Gerry Lawson · Bohdan Lojka · João Palma · Paul Pardon · Linda Reissig · Bert Reubens · Evert Prins · Jari Vandendriessche · Alberto Mantino

Received: 26 March 2024 / Accepted: 24 July 2024

Abstract Despite its potential for fostering farm sustainability, the adoption of agroforestry faces context-dependent challenges, among which the (perceived) shortage of decision-supporting tools and barriers hindering the assessment of economic, environmental, and social benefits. The process of digitalization offers significant opportunities to enhance sustainability, but it remains crucial to foster a human-centric, fair, and sustainable approach. In the context of the DigitAF Horizon Europe project, we present the results of a multi-stakeholder questionnaire aimed at understanding the perceptions of stakeholders regarding agroforestry and digitalization, as well as the needs of these stakeholders for a successful implementation of this agricultural practice. In the questionnaire, there was a specific focus on the need for and the conditions for the use of digital tools and models, such as generalized digital tools,

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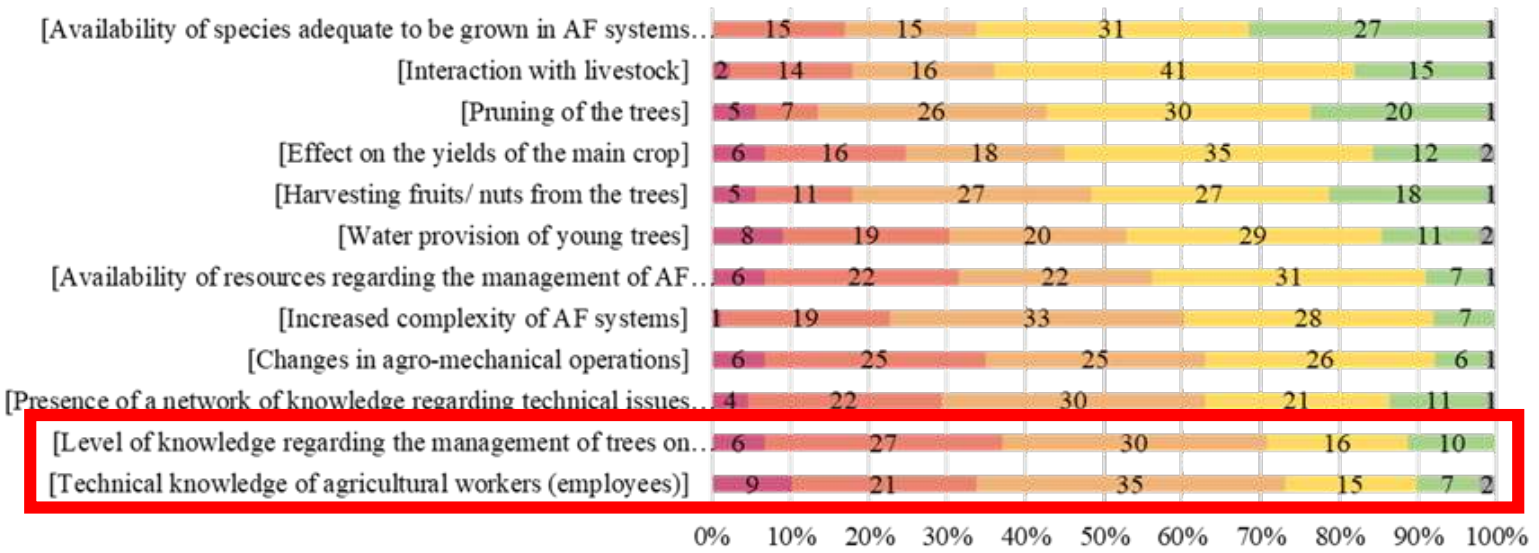
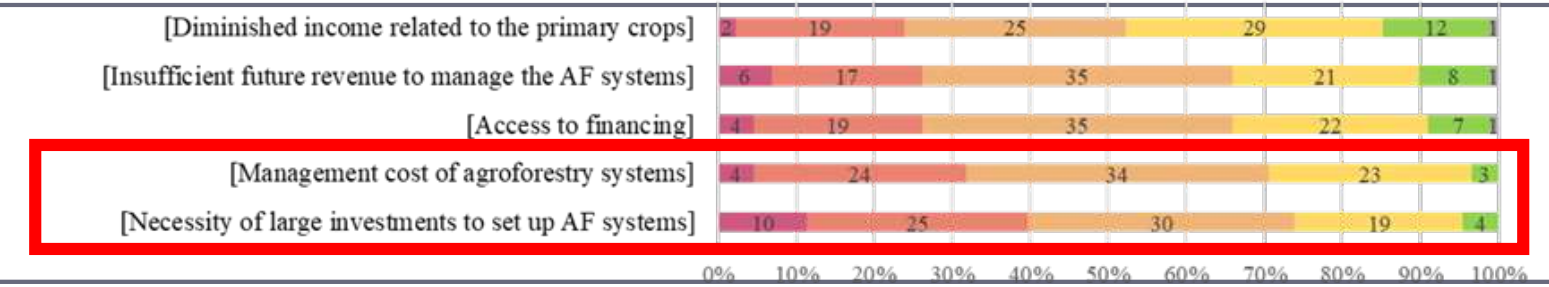
Stakeholder Survey

Obstacles

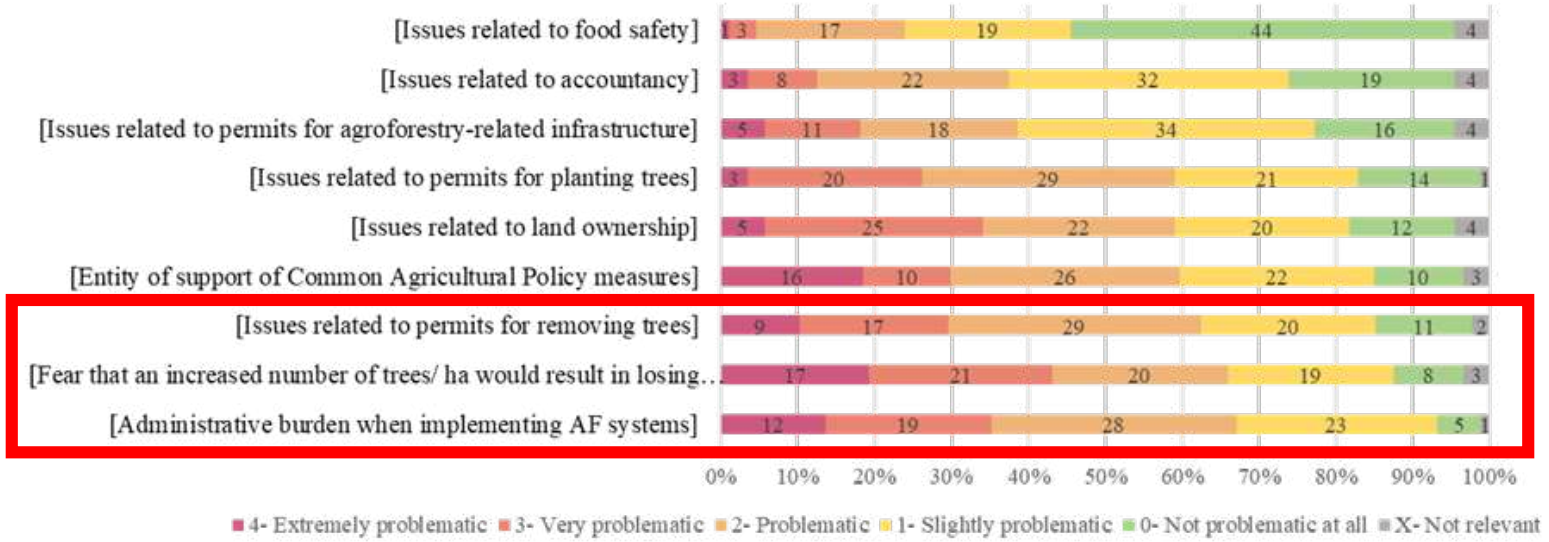
Technical Obstacles



Economic Obstacles



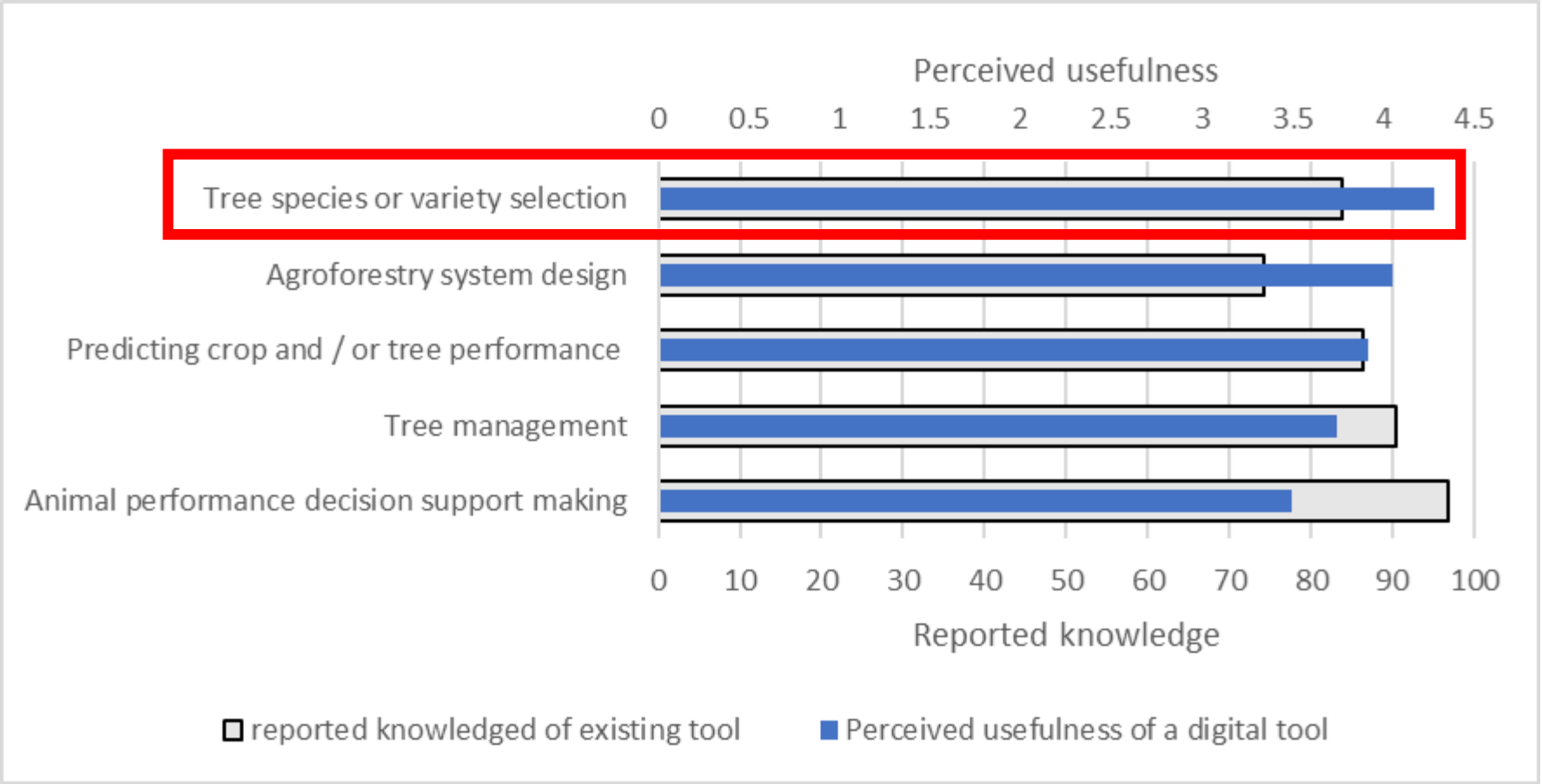
Administrative Obstacles



Survey in 6 Living labs about the needs of stakeholders and their use of digital tools

Stakeholder Survey

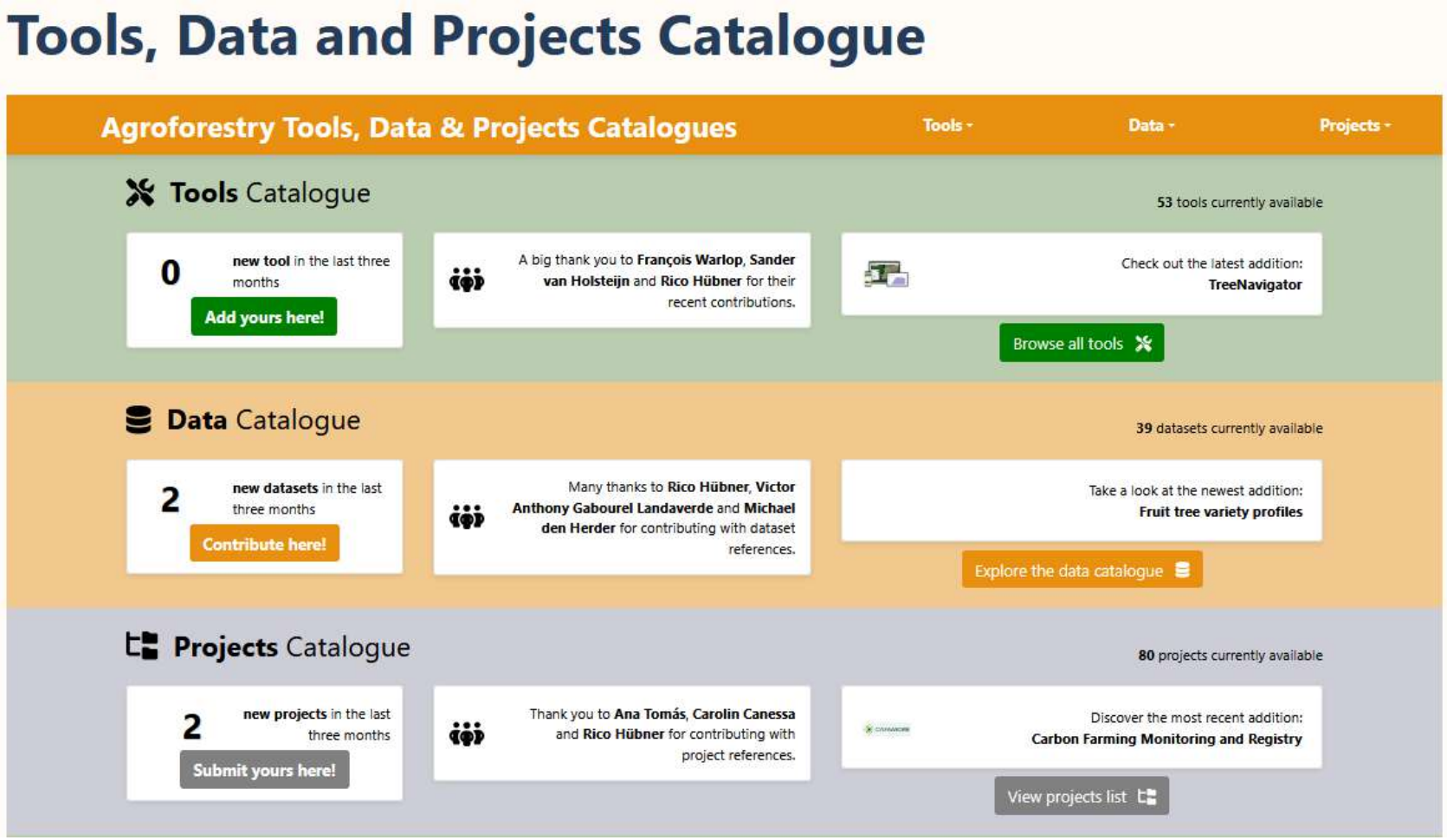
Perceived usefulness for tools <-> reported knowledge about existing tools



Tools, datasets and projects catalogues

https://digitaf.eu/tools-data-and-projects-catalogue/

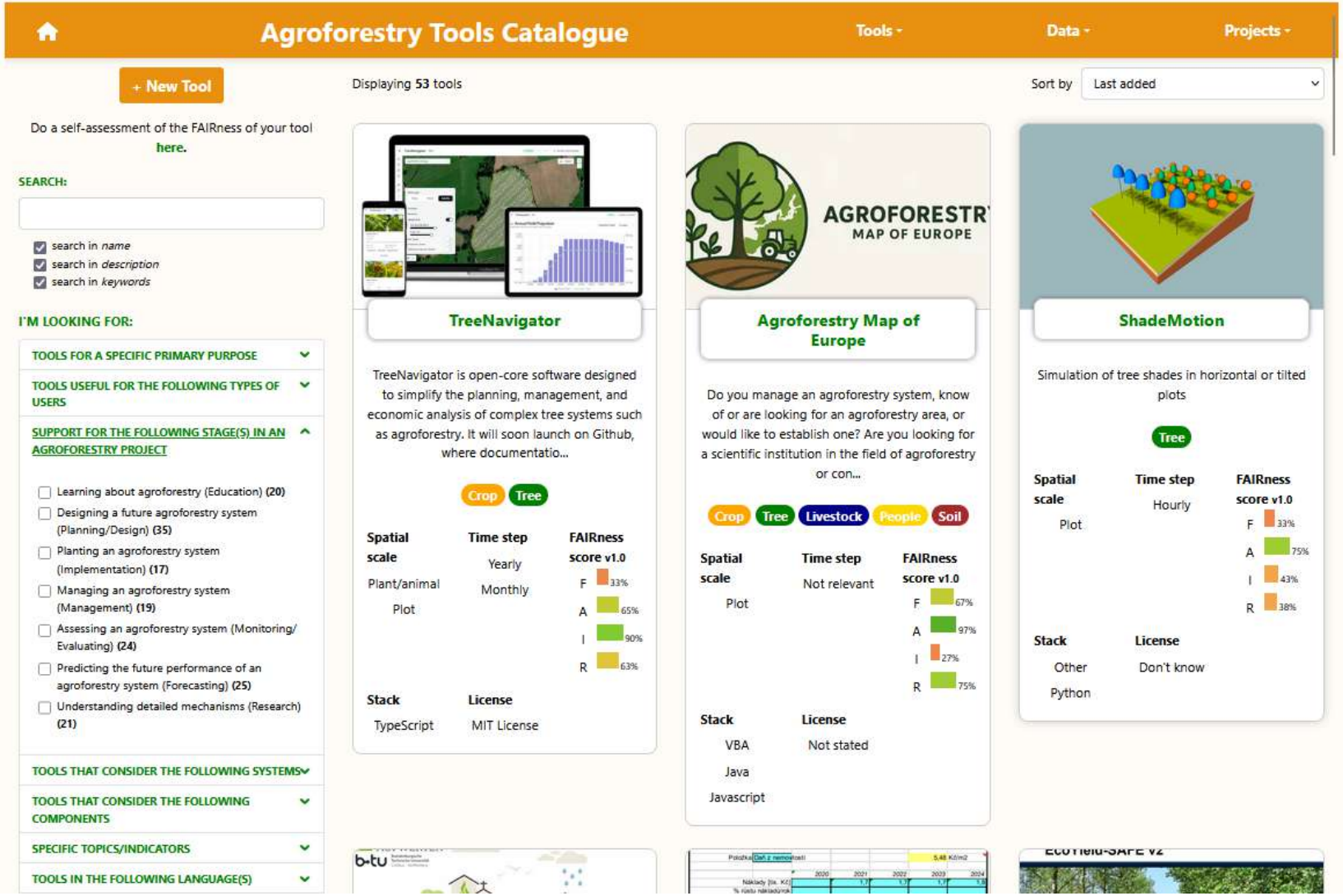
- 53 Digital tools
- 39 datasets
- 80 projects



Tool catalogue

https://digitaf.eu/tools-data-and-projects-catalogue/

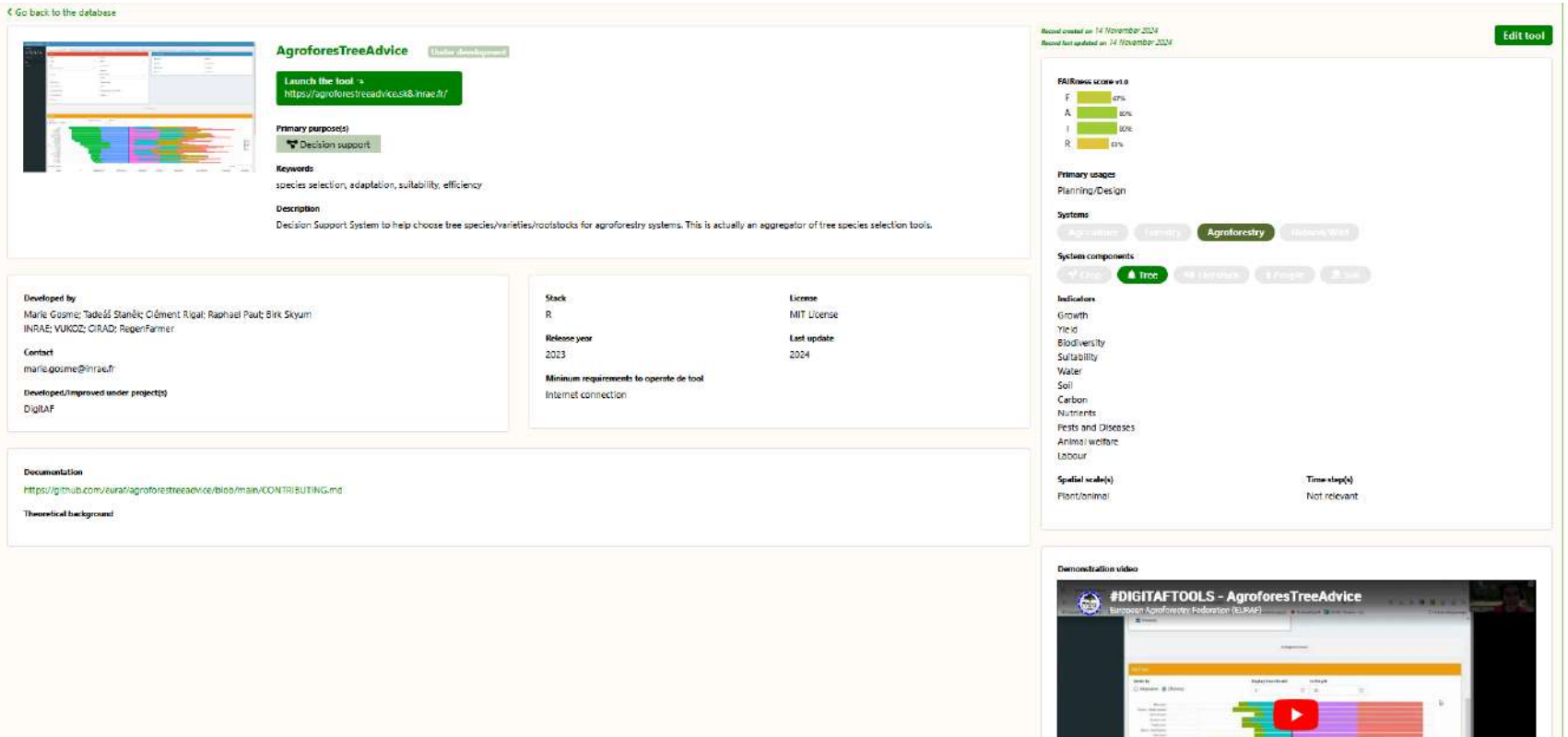
- Filtering by
  - primary purpose
  - type of user
  - step in agroforestry journey
  - type of AF system
  - components taken into account
  - topics/indicators…
- FAIRness assessment



Tool Factsheet

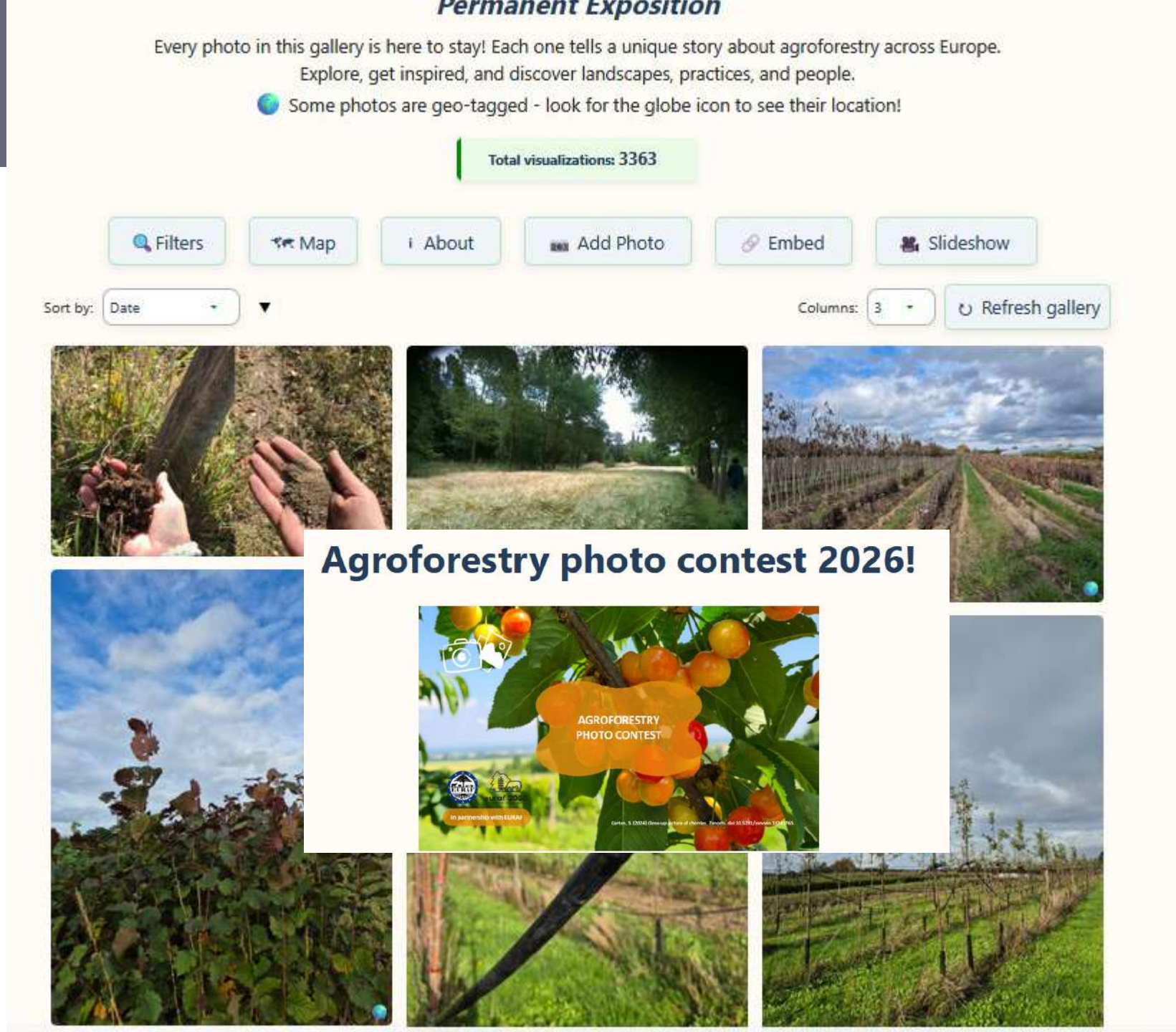
Each tool has its factsheet with:

- link to tool and link to manual
- details on what's included
- embedded tool demo or tutorial video



https://digitaf.eu/agroforestry-gallery/

- more than 440 open-source (CC-BY) agroforestry pictures
- upload your own pictures before May 15th, and participate to the agroforestry photo contest (https://digitaf.eu/agroforestry-photo-contest-2026/)



DigitAF webinars available in replay on DigitAF website

Carbon farming; financial analysis; biodiversity and soil health; tree species selection and management

- https://digitaf.eu/news/

[Webinar] Tools on Carbon farming (REPLAY)

November 27, 2025

Discover practical digital tools to plan, measure, and scale carbon farming in agroforestry. On Tuesday 25th November 2025, we held...

READ MORE

[Webinar] Financial Tools for Agroforestry (REPLAY)

January 29, 2026

Discover practical digital tools for financial management in agroforestry. On Thursday 22nd January 2026, we held our webinar on Fincancial...

READ MORE

[Webinar] Biodiversity and Soil Health (REPLAY)

March 3, 2026

Discover practical digital tools ⚙ for biodiversity and soil health in agroforestry On Thursday 26th February 2026, we held our...

READ MORE

[Webinar] Trees and Management

March 6, 2026

Discover practical digital tools ⚙ for tree selection and management in agroforestry 🌳🚜📅 Tuesday 31st March 2026🕚 11:00 – 12:30...

READ MORE

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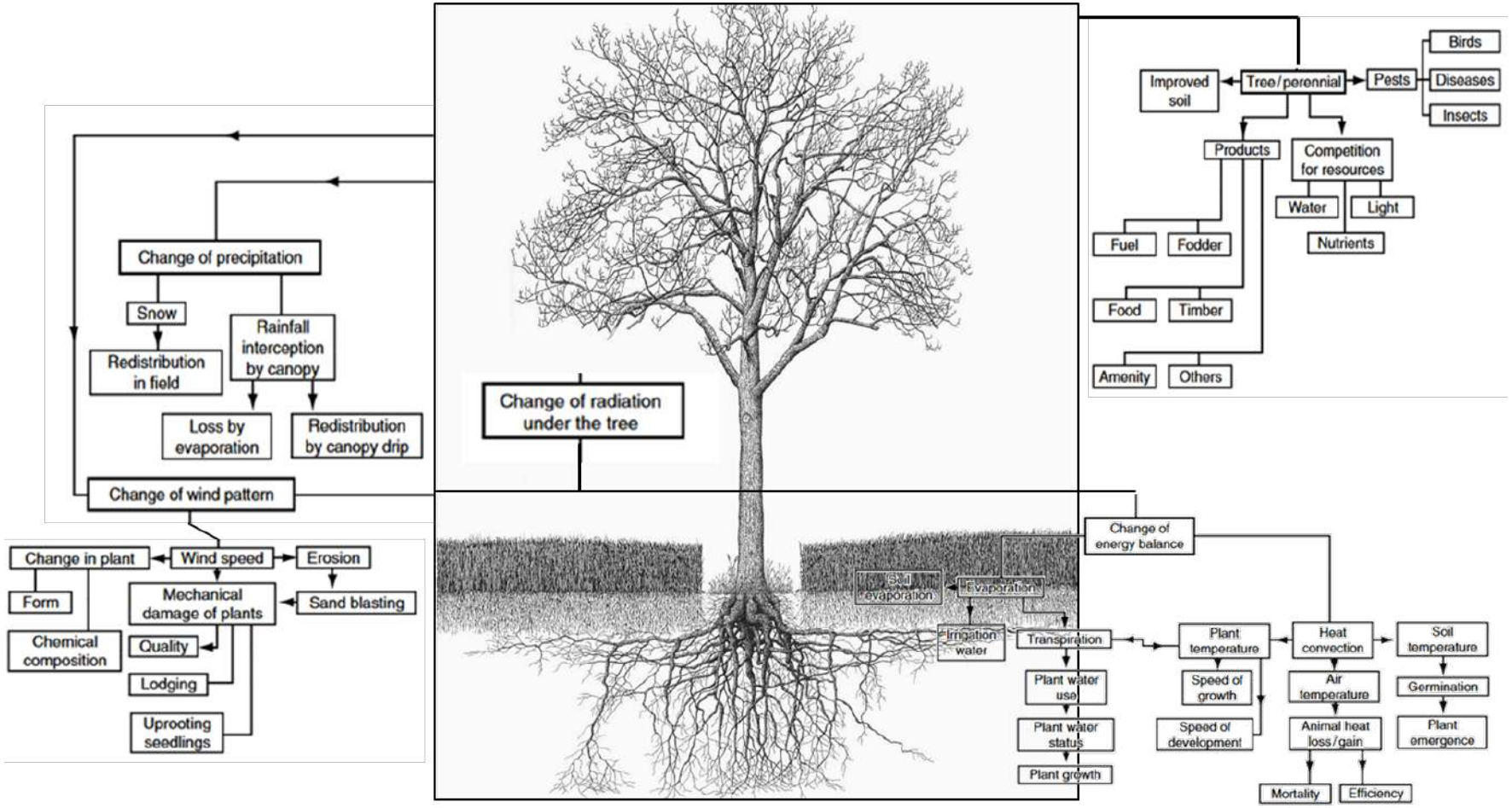
Tree species choice & management in agroforestry systems: general principles

Bert Reubens

DigitAF Webinar 31/3/2026

Introducing trees = introducing new dynamics



Dupraz & Liagre 2008

What choices to make for a succesful project?

Outcome: Healthier trees, lower management burden, and more sustainable, productive agroforestry systems.



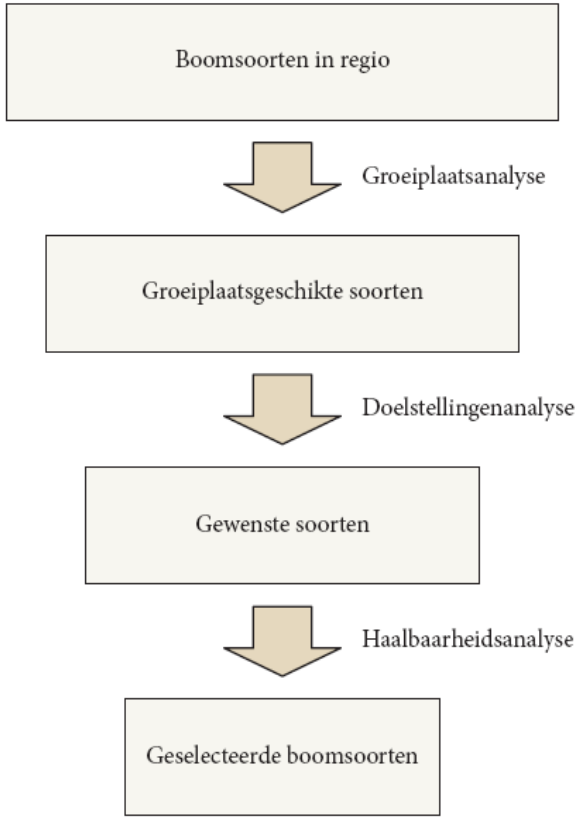


Getting started

- Developing a plan step by step
- Take your time!
- **Space and time + relationship to other crops. Every situation is different.**
- **Choice of tree species (and beyond: variety, rootstock, type of planting material, etc.)**
- **Number of trees and plot layout (machinery? cultivation? plot shape?)**
- **Management, pruning and protection of the trees**
- Management of the strip beneath the trees
- Cultivation measures on the plot (tillage, fertilisation, etc.)
- Legislation and regulations, subsidy conditions.
- …

Key principles for tree species choice

- Ecological compatibility
- Functional role in the system
- Complementarity with other components (crop, livestock, …)
- Economic value & productivity
- Management requirements
- Biodiversity and ecosystem services
- Social and cultural acceptibility
- Feasibility



De Vos *et al*. (2010)

Ecological compatibility

- **Climate suitability**

  Match species to temperature extremes, frost risk, rainfall patterns, and microclimates to ensure survival and steady growth.

- **Soil compatibility**

  Align species with local texture, pH, nutrients, salinity, and ground water levels/fluctuation so trees establish quickly and need fewer inputs.

- **Water and root interactions**

  Choose drought-tolerant or moisture-demanding species appropriately, and pair complementary root depths to reduce crop competition.

- **Native and non-native choices**

  Favor natives for resilience, but taking into accounts CC dynamics;
  Use non-natives only when non-invasive and ecologically compatible.

- **Diversify and experiment**

  Future conditions uncertain; spread risk; add some experimental species

Functional role in the system

- **Shade provision**
  Broad, dense canopies. Fast growing species.

- **Wind breaks**
  Dense, vertical structures. Fast growing species.

- **Nitrogen fixation**
  E.g. alder, black locust, ...

- **Nutrient pumping**
  Deep rooting species.

- **Wildlife habitat**
  Shelter, connectivity, flowering and fruiting trees, …

Complementarity with other components

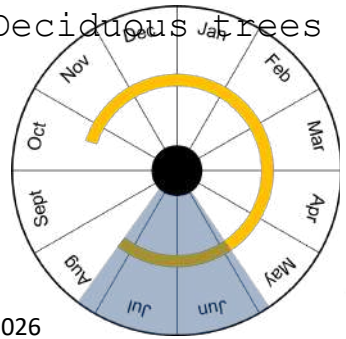
- **Light and shade**
  Match canopy traits (dimension, density) to crop light needs.

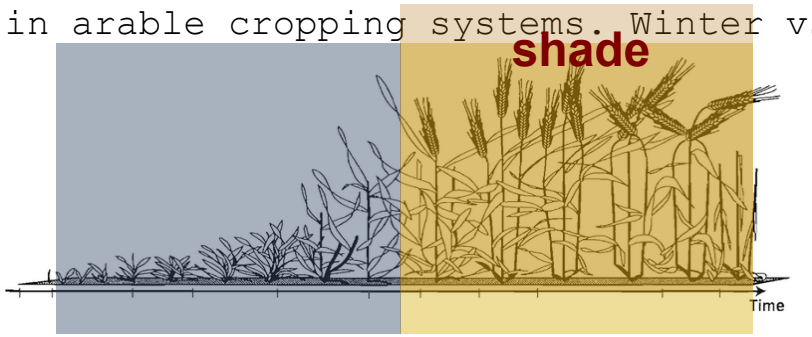
- **Root interactions**
  Prefer deep-rooted trees to reduce water and nutrient competition and favor optimal use of resources

- **Allelopathy risks**
  Avoid combinations that suppress crop growth (inhibitory compounds e.g. juglon)

- **Silvopastoral balance**
  Provide fodder and shelter while protecting young trees from browsing or rubbing

- **Phenology and seasonality**
  Deciduous trees in arable cropping systems. Winter vs





Economic value and productivity

- **Revenue timing**

  Long-term returns (timber) vs annual cash flow (fruit, nuts, berries)

- **Cost savings**

  Fodder trees, nutrient pumps, nitrogen fixation, …

- **Market fit**

  Local demand? Processing access? Product price variability?

- **Manageability**

  P est cont labo

Management requirements

- **Align species with management capacity**
  Pruning intensity, growth rate, …

- **Ensure machinery and harvest moment compatibility**
  Row spacing, root suckering, branch brittleness, …

Biodiversity & ecosystem services

- **Agroforestry ecosystem services**

  Pollination, natural pest control, carbon storage, soil regeneration, water regulation, climate resilience across seasons, …

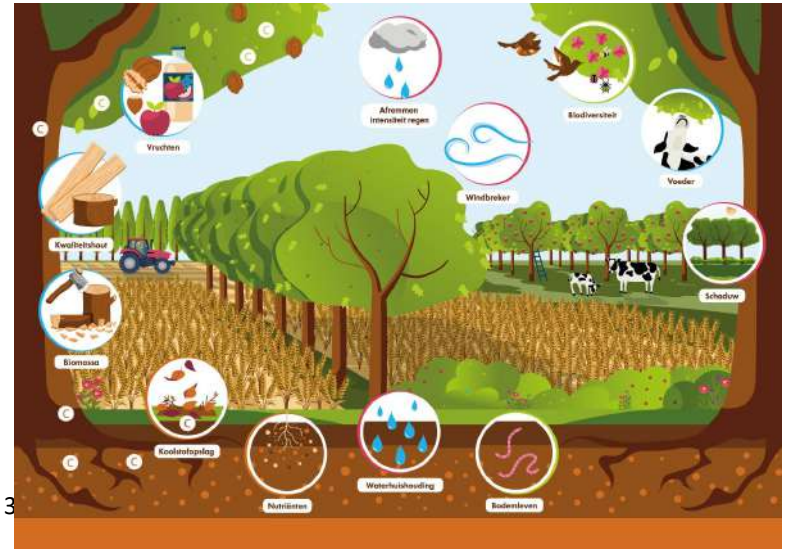
- **Diversity amplifies services**

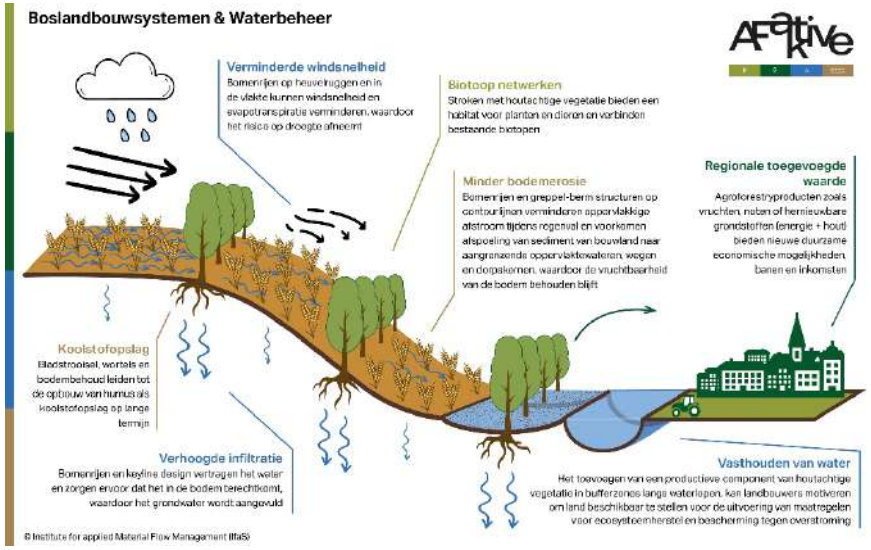
  Structural and functional diversity.

  Intentionally combine complementary species. Use space and time in all dimensions.

- **Functional traits drive outcomes**

  Flowering, fruiting trees for pollinators. Varied canopy layers for habitat. Deep roots for soil structure and carbon sequestration. Etc.





Feasibility

- **Availability**

  Specific species, variety, rootstock, planting stock, …

- **Pests and diseases**

  Prioritize pest and disease resistance; avoid high-risk species (e.g. ash-dieback)

- **Costs of installation and management**

  Planting stock, cultivars, protection needs, …

System design and spatial planning

- **Orientation**

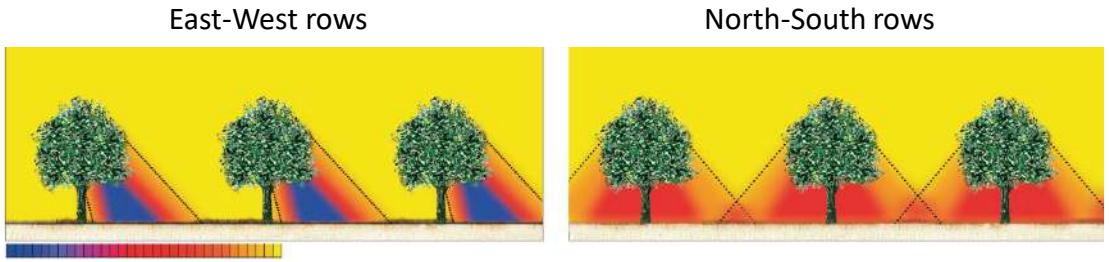
  N-S vs E-W; slope; dominant wind direction; plot shape; …

- **Spacing and access**

  Row spacing and width must fit machinery width and maintenance needs. Intra-row spacing reflexts canopy spread, roots, …

- **Density and light**

  Complementarity with other components



(INRA, C. Dupraz)

System design and spatial planning

- **Temporal dynamics**
  Plan for staged thinning, pruning and evolving crop rotation.

- **Multi-strata systems**
  Combining upper and lower canopies can boost productivity, ESS and diversity

- **Regulatory constrains**
  Account for subsidy rules, environmental compliance

(Liagre & Girardin, 2013)

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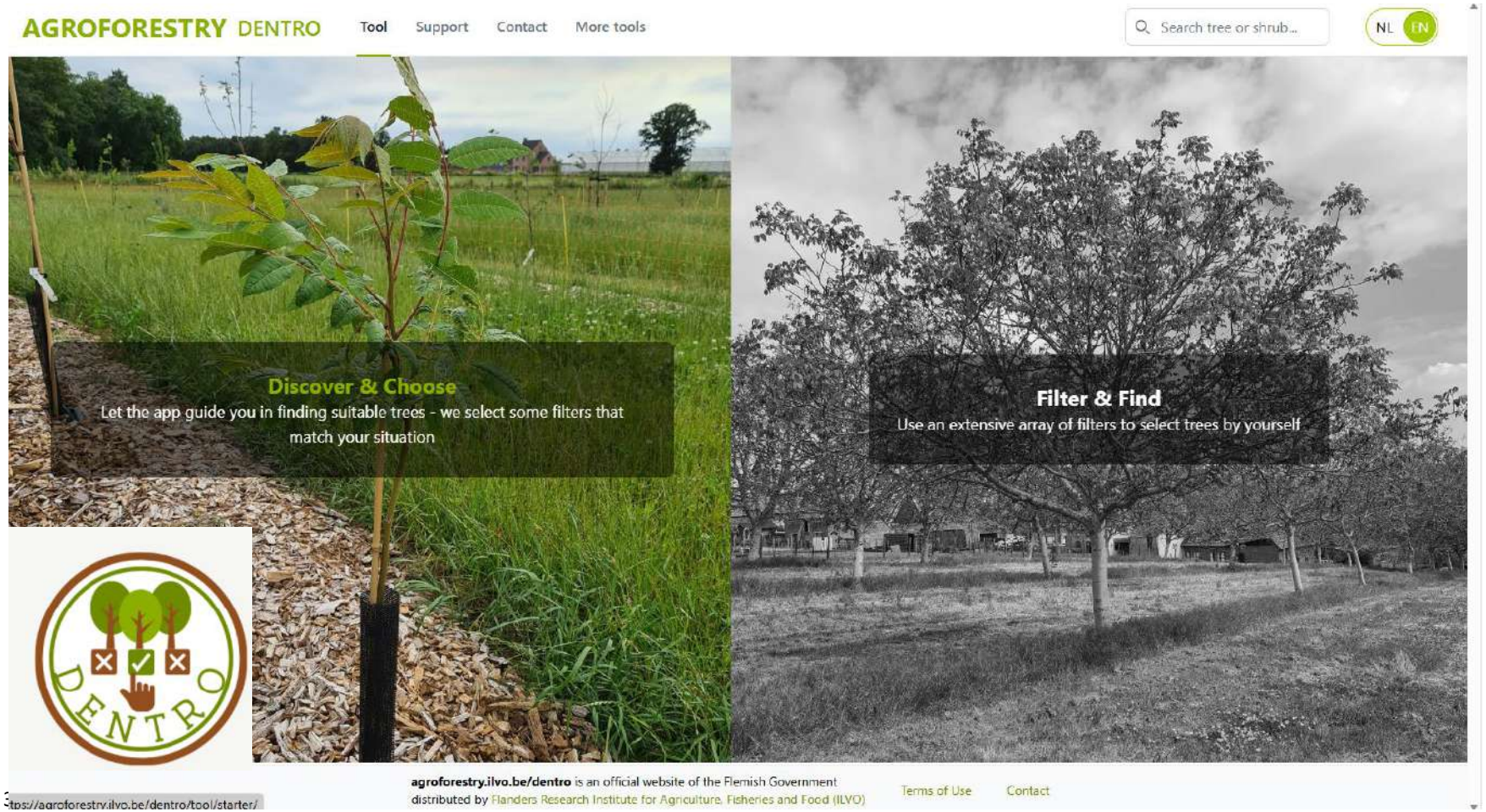
Decision support tools for tree species selection

DigitAF Webinar 31/3/2026

Dentro (part of the Agroforestry Planner)



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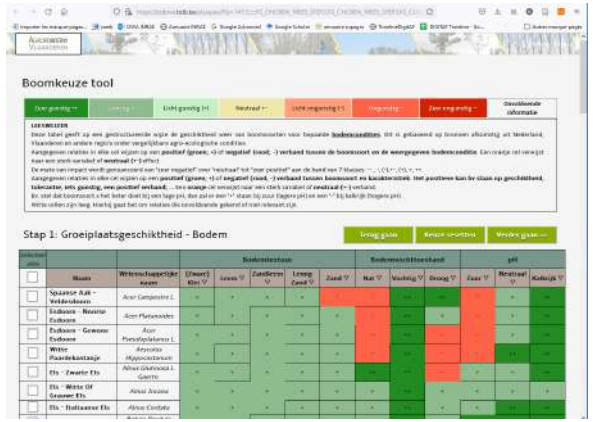
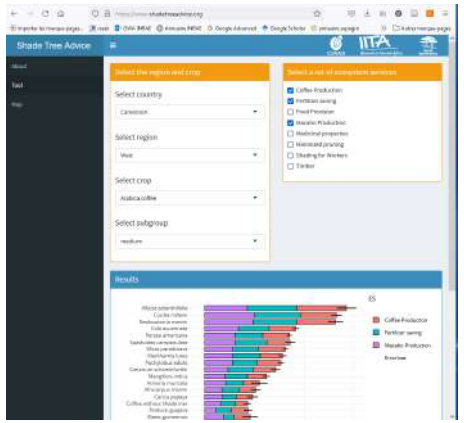
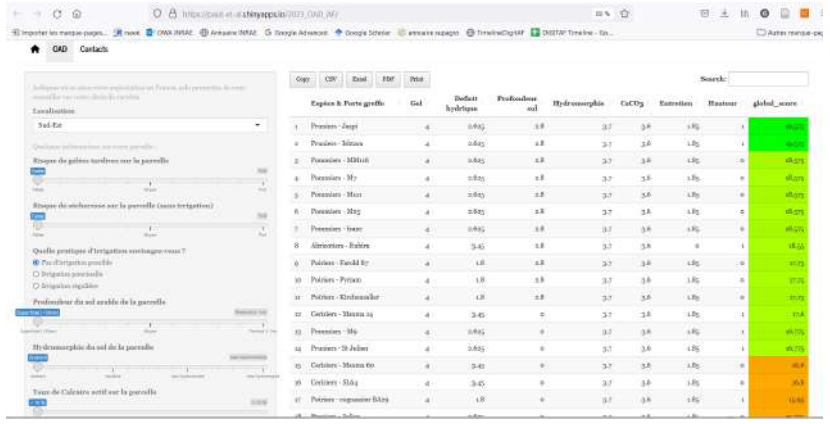
A diversity of DSS to help choose tree species



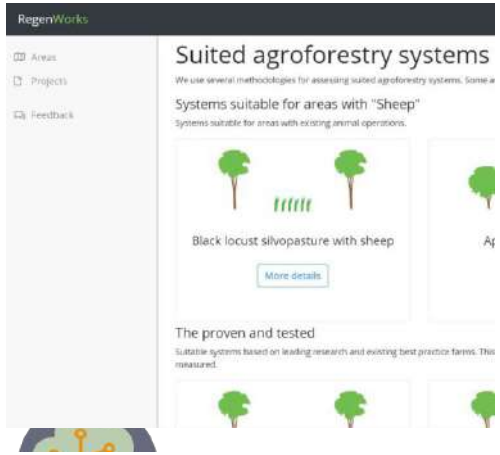
DENTRO (ILVO, Belgium



ShadeTreeAdvice (CIRAD, France)



Deciduous (GRAB, France)



SCSM (RegenFarmer, NL)

Seznam Drevin ALS (CZU, Czechia)

… and more !

Why work together?

Working group (larger than DigitAF consortium) to…

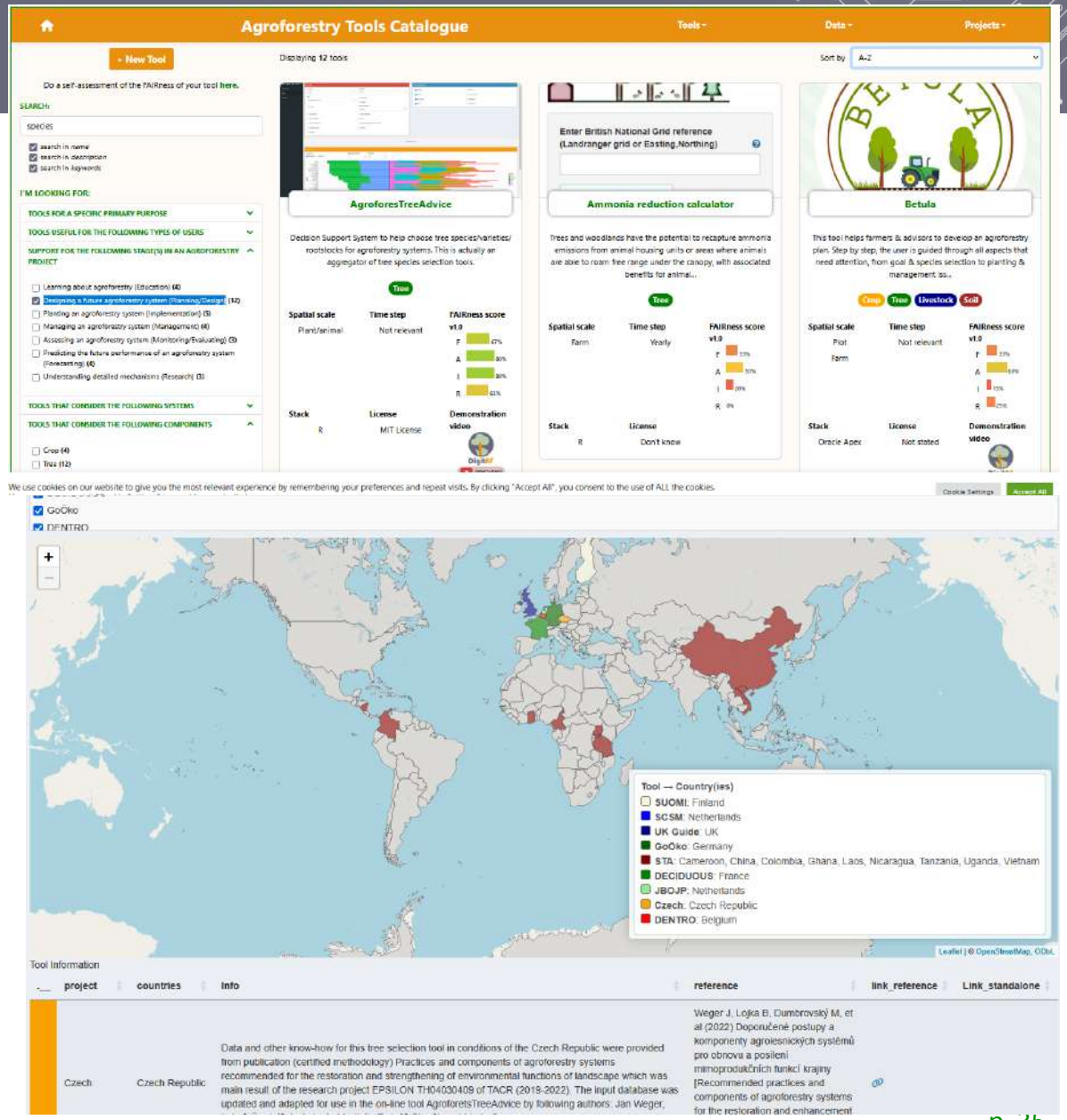
- Gather all tools in one place to help users compare them and select the most adapted to their needs
- Allow users to query all tools from a common (multilanguage) interface
- Combine the underlying data to enrich the choices/provide more knowledge
- Generate new knowledge?

Work in progress…

Gathering all tools in one place to help users compare them and select the most adapted to their needs

- Through DigitAF's Tools Catalogue
  - https://digitaf.eu/tools-database/
  - filter by objective "Designing a future agroforestry system (Planning/Design)" and type "species" in the search box

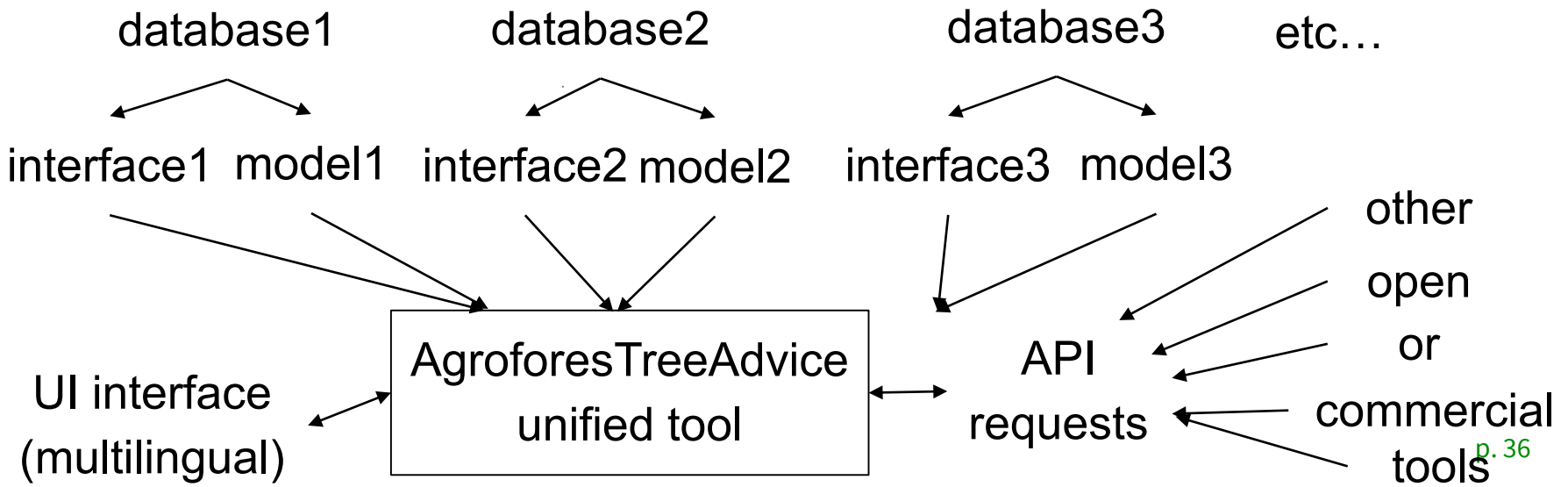
- Through a dedicated page on AgroforesTreeAdvice
  - beta version https://gosme.shinyapps.io/agroforestreeadvice



Allowing users to query all tools from a common interface

Building AgroforesTreeAdvice unified tool

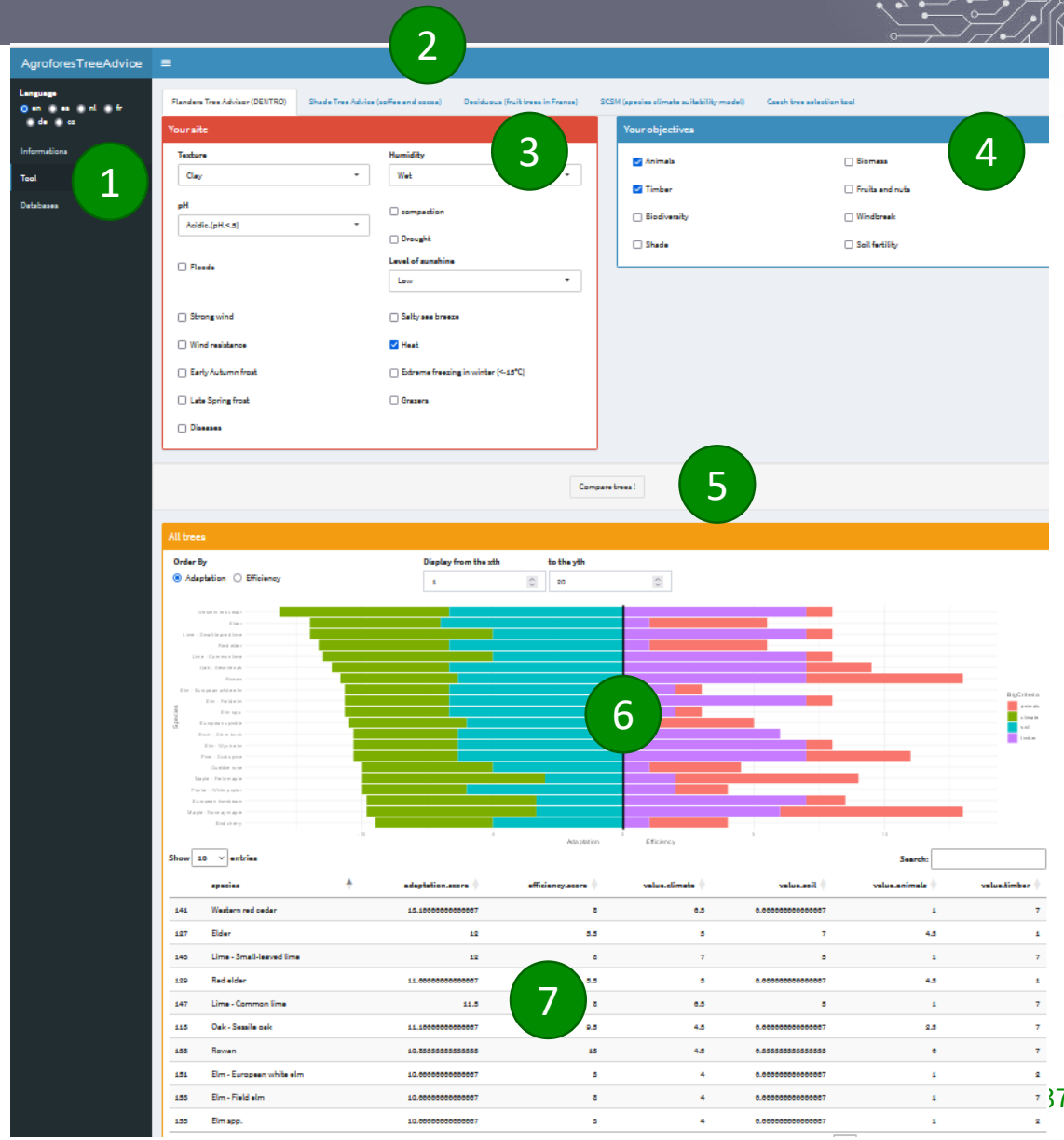
- Each tool is broken down into
  - 1 database (tree characteristics)
  - 1 interface specifying the titles/choices for each user input
  - 1 model (algorithm to compute each species' score based on user inputs and the tool's database)
- The common interface standardises inputs/outputs
- It can be queried via
  - A GUI (shiny)
  - API requests



Allowing users to query all tools from a common interface

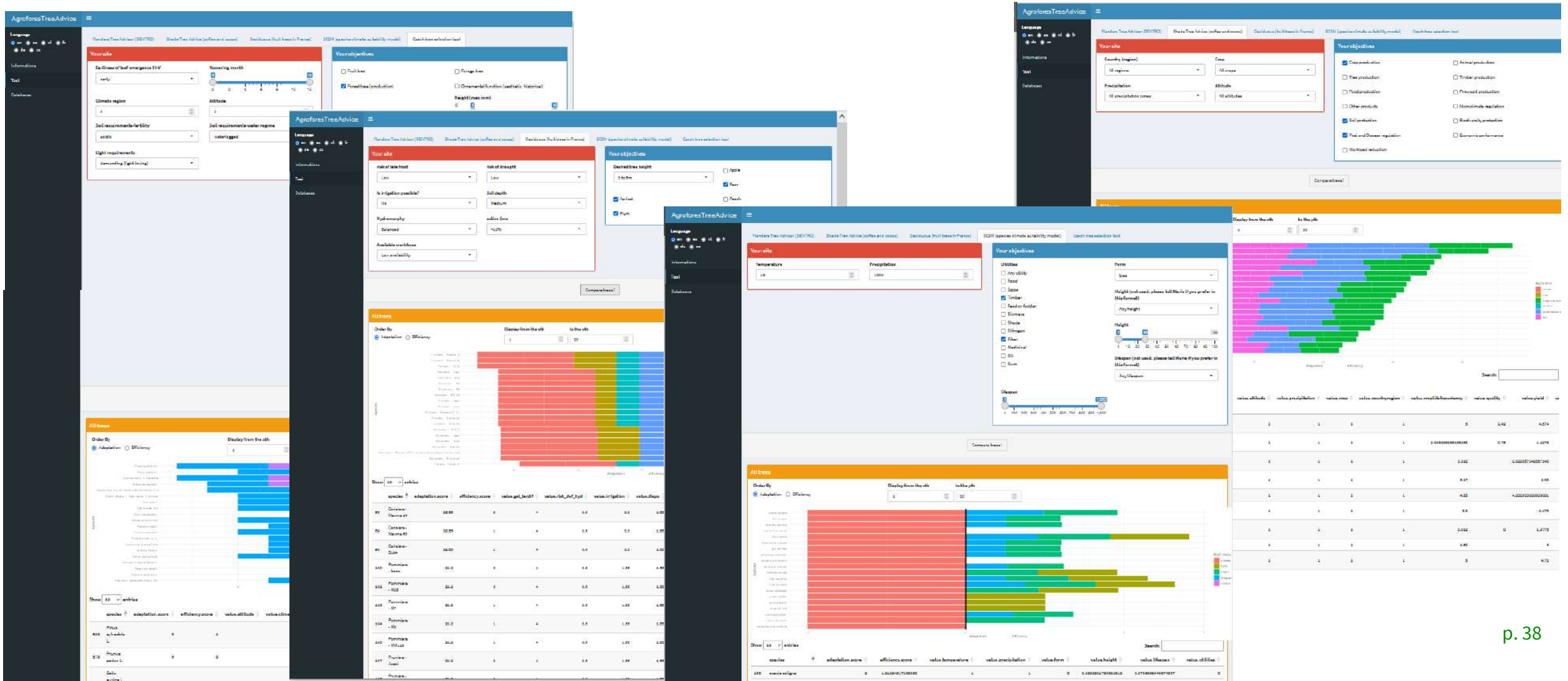
The Shiny GUI

1. Select the desired language (en, nl, fr, de,cz)
2. Select the tool you want to use
3. Describe your site
4. Describe your objectives
5. Click on « Compare trees »
6. Visualize the ranking of trees according to their adaptation to your site conditions or to their efficiency at producing the desired objectives
7. Get the details of the scores in each subcategory



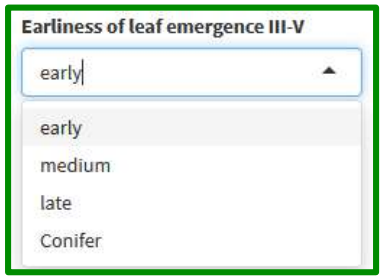
Allowing users to query all tools from a common interface

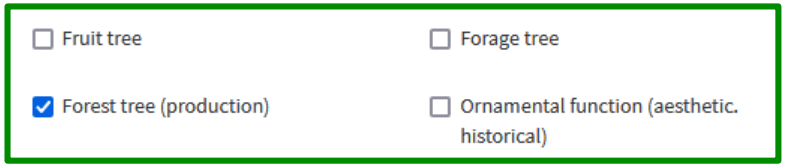
Each tools keeps its own specificities but all are presented with the same look and feel

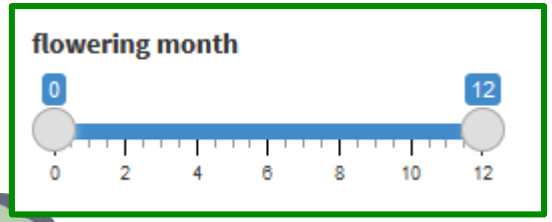


Allowing users to query all tools from a common interface

Each tool can keeps its own scoring algorithm or, if the relationship score = f(user inputs, database) is simple, it's possible to use a standard scoring algorithm: the sum of the individual scores of individual user inputs







User input	Corresponding column in tree database	Score
1 item in a drop-down list	n logical columns (1 for each item) 1 column containing 1 item	1 if the tree has this characteristic, 0 otherwise
1 or several items in a set of checboxes	n logical columns (1 for each item) 1 column containing 1 or more items	# (selected items ∩ characteristics of the tree) /#selected items
1 numerical value	1 column containing a unique value	1-abs(user value -tree value)/(max(tree values)-min(tree values))
	1 column containing a range of values (x-y)	1 if the user value is within the range, 0 otherwise
A range of values	1 column containing a unique value	1 if the user range contains the tree value, 0 otherwise

Allowing users to query all tools from a common interface

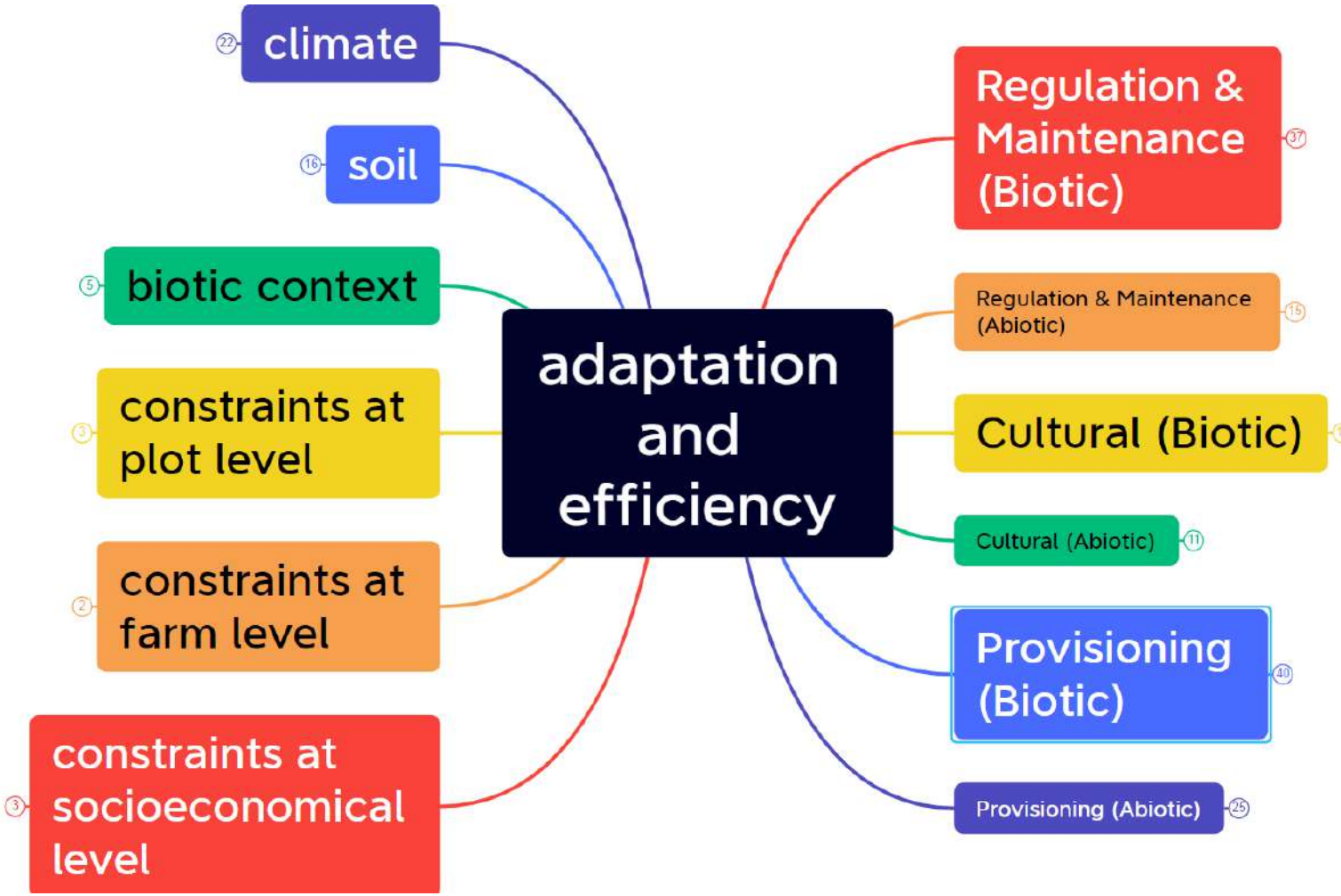
URL query (work in progress)

- It’s already possible to pass parameters through the URL
  - Example: https://agroforestreeadvice.sk8.inrae.fr/?model=Czech&soil_water=soil_water_waterlogged&habitus=bush
- HTTP POST request underway
- Objective: allow coupling with other software/apps
  - E.g. RegenWorks, FarmTree etc…

Combining the underlying data to enrich the choices/provide more knowledge

Aligning the diversity of criteria from a diversity of tools

- 2 types of tree characteristics:
  - Adaptation to local conditions (response traits)
  - Efficiency at providing ecosystem services (effect traits)
- Hierarchy of criteria
  - To accommodate more or less detailed tools
- Trees also in a hierarchy: genera>species>variety



Combining the underlying data to enrich the choices/provide more knowledge

combined content (criteria)

criteria		Tool								
type	category	Czech	DECIDUOUS	GoÖko	DENTRO	JBOJP	SCSM	STA	FTSDB	Total
Adaptation	constraints at socioeconomical level	1	0	0	1	0	0	1	0	3
	constraints at farm level	0	1	0	0	3	1	3	0	8
	constraints at plot level	4	3	3	2	2	1	6	3	24
	biotic context	0	0	3	2	0	0	0	0	5
	soil	2	3	5	4	5	0	0	5	24
	climate	4	2	7	10	0	2	2	2	29
Efficiency	Provisioning (Biotic)	13	1	4	5	3	7	23	5	61
	Provisioning (Abiotic)	0	0	0	0	0	0	0	0	0
	Regulation & Maintenance (Biotic)	1	0	4	10	1	2	69	2	89
	Regulation & Maintenance (Abiotic)	0	0	0	0	0	0	0	0	0
	Cultural (Biotic)	3	0	7	0	0	1	0	0	11
	Cultural (Abiotic)	0	0	0	0	0	0	0	0	0

Combining the underlying data to enrich the choices/provide more knowledge

combined content (species)

Tool	Number of species/varieties
Czech	58
DECIDUOUS	6
GoÖko	71
DENTRO	69
JBOJP	74
SCSM	441
STA	188
FTSDB	38

Generating new knowledge?

Let's be optimistic!

- Hopefully we'll be able to infer missing information in one database from information in other databases
- Or at least identify knowledge gaps
  - E.g. not many tools include effects of tree species on biodiversity

Perspectives

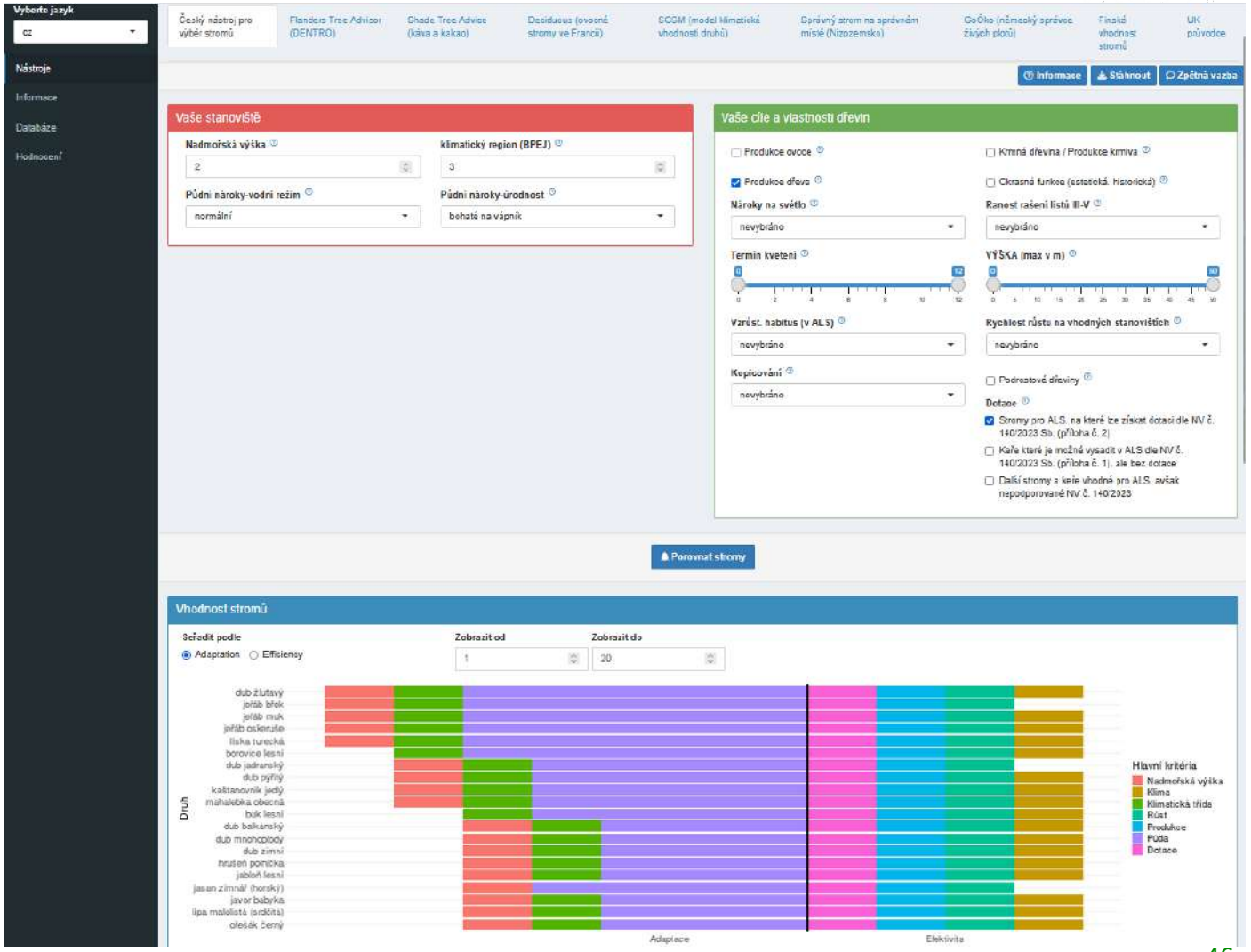
- you can test the prototype, send bug reports and contribute to data and/or code
  - The tool: https://agroforestreeadvice.sk8.inrae.fr/
  - The github repository for bug reports and contributing to code: https://github.com/euraf/agroforestreeadvice
  - Or by email : marie.gosme@inrae.fr
- Adding new databases
  - UK tree guide (done)
  - Swiss tree database (under verification: https://gosme.shinyapps.io/agroforestreeadvice/
  - French timber tree soil/climate adaptation
  - etc…

Exploitation

The « Czech branch »

- Forked from the gitHub
- Improvement of the interface (info bubles)

- https://stanek.shinyapps.io/agroforestreeadvice_vukoz



To know more…

- Publication
  - Gosme et al. 2025 “AgroforesTreeAdvice: A Decision Support Tool Combining Heterogeneous Knowledge Resources for Tree Species Selection in Agroforestry Systems.” Agroforestry Systems. https://doi.org/10.1007/s10457-025-01208-6
- Czech tool at EURAF 2026
  - Weger et al 2026 Development of “Czech branch” of an online AgroforestryTreeAdvice decision-support tool for tree species selection in agroforestry systems
- Demo/hands-on tests at EURAF 2026
  - Workshop “Hands-on demonstrations of agroforestry tools for system design, financial costs and benefits evaluation, biodiversity impact, carbon storage and other environmental assessments”

Webinar agenda

- Introduction
  - DigitAF project, tool catalogue and webinars (10’)
  - general principles on tree species choice and management in AF systems (10’)
- Digital tools for decision support for to tree species choice
  - DENTRO (5’)
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- **Tree species choice in a changing climate (10’)**
- Tree management and related tools for farmers and advisors (20’)
- Questions and answers (20’)

Tree species choice in a changing climate

Bert Reubens – Sander Van Daele

DigitAF Webinar 31/3/2026

Context and key insights

- Tree species selection requires more and more a climate-resilient, site-specific and future proof approach
- Increasing weather extremes – heatwaves, prolonged droughts, intense rainfall, long wet periods, … already affect tree performance
- Most vulnerable areas = urban areas and agricultural landscapes where soil compaction and lack of buffering are present
- But also: huge concerns about native forest species
- Challenging: same place, range of extremes

Climatic stress and tree performance

- Weather extremes = more extreme fluctuations in groundwater levels
- Permanently wet soils: shallow root systems
- However: long periods of waterlogging => root mortality due to oxygen deficiency
- Drought events: groundwater level below shallow root zone => rapid decline
- Species thriving under stable wet conditions (willow, poplar, black alder, …) => cannot cope with newly emerging dry phases

Need for dual tolerance

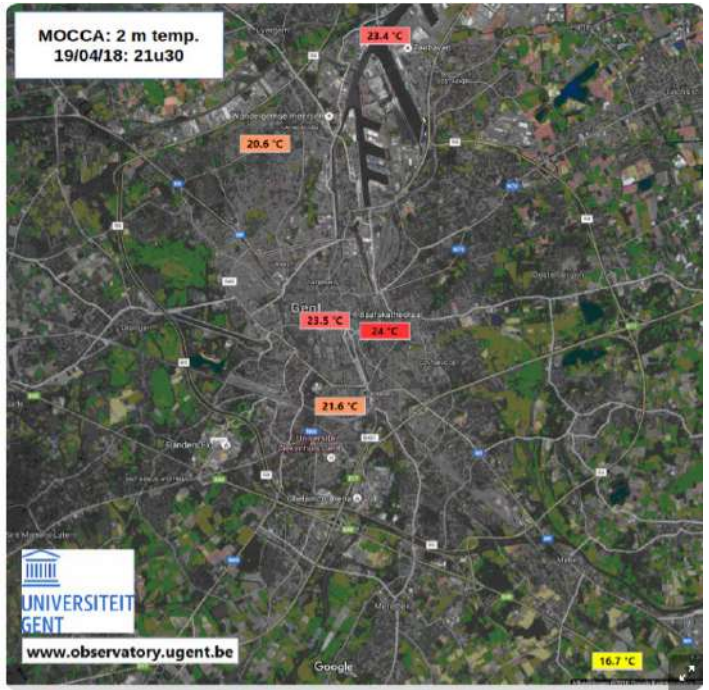
- Dual tolerance: wet winters and dry summers?
- Tree species now need to tolerate both waterlogging and prolonged drought
- Soil texture amplifies this:
  - Sandy soils (low water-holding capacity) exacerbate drought stress
  - Loamy and clay soils buffer moisture more effectively

Location matters

- Forests: favorable microclimate, high soil porosity and good infiltration => helps trees cope better
- Urban areas: soil sealing, heat accumulation, limited rooting space => pose sever stress
- Agricultural fields: vulnerable due to open exposure, occasional soil compaction, …

⇒agroforestry vulnerable,

but part of the solution



Towards climate-resilient tree species selection?

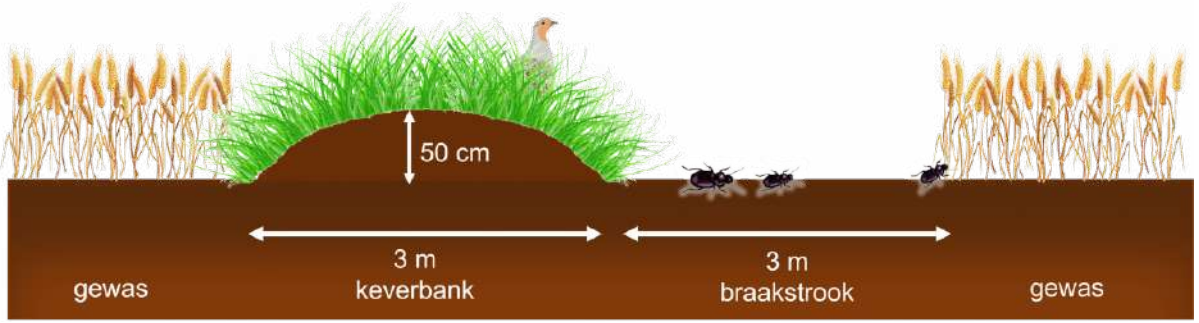
Agroforestry planning should incorporate:

- **Species adapted to fluctuating groundwater tables**
  - Yes: e.g. *Populus x canescens, Quercus robur, Crataegus monogyna, Carpinus betulus*, *Corylus avelana, …*
  - No: *Alnus glutinosa, Salix spp., Betula pubescens, …*
- **Species for very wet soils**
  - Almost up to the surface level: *Alnus glutinosa, Betula pubescens, Sambucus nigra, Salix spp., Sorbus aucuparia, Populus tremula, Rhamnus frangula, …*
  - Not lower than 30-40 cm: *Quercus robur, Quercus petraea, Populus x canscens, Corylus avelana, Carpinus betulus, Viburnum opulus, Fraxinus excelsior, …*
- **Species with demonstrated drought and heat tolerance**
  - *Acer campester, Acer platanoides, Carpinus betulus, Castanea sativa, Malus sylvestris, …*

Towards climate-resilient tree species selection?

Other key principles

- Genotypes or provenances with demonstrated drought and/or waterlogging tolerance
- Diverse mixtures spread risk
- Site analysis (soil type, compaction status, historic water regimes) to better match species to field conditions
- Site remediation: alleviate compacted layers, mulching, applying organic material, …
- Adaptive measures (e.g. beetle bank)



Assisted migration & ‘flexible’ definition of native species?

- Climate change = faster than potential natural dispersal of trees
- Recolonisation following the last ice age is not yet complete
- Therefore: actively introducing genetic material from native species (from different regions of origin), as well as other species from Southern and Eastern Europe might be needed?
- More flexible definition and policy regarding native species?

Sorbus to the rescue?

Interreg
France - Wallonie - Vlaanderen
Micro-projet | Microproject
Sorbus to the rescue

- An example of assisted migration for Flanders: *Sorbus torminalis* and *Sorbus domestica* (as an alternative for *Sorbus aucuparia*)
- Non-invasive, not far away, very promising climate characteristics, high economic value (timber)

Practical recommendations

- Relevant sources of information
  - https://www.fichierecologique.be/#!/
  - https://climessences.fr/
  - https://www.ecopedia.be/klimaat-en-natuurbeheer/welke-boomsoorten-herkomsten-voor-een-klimaatonzekere

- Arboreta and open-air experiments as valuable indicators

Facteur et stade	Sensibilité	Commentaire
Gelée tardive		
Juvénile	PS	
Adulte	PS	
Gelée précoce		
Juvénile	PS	
Adulte	PS	
Sécheresse		
Juvénile	PS	
Adulte	PS	Moins sensible que l'érable plane et l'érable sycomore
Canicule		
Juvénile	PS	
Adulte	PS	
Neige et givre		
Juvénile	PS	
Adulte	PS	
Vent		
Juvénile	PS	Enracinement très puissant
Adulte	PS	

PS : peu sensible | S : sensible | TS : très sensible

Tolerance of Acer campestre for climate parameters

Thank you! Questions?

Contact

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www.agroforestryvlaanderen.be
www.digitaf.eu

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Overview of resources and challenges in managing trees in agroforestry

Marilyne Laurans, Cécile Antin, Yves Caraglio

DigitAF Webinar 31/03/2026

C. Antin

Context

DigitAf WP2, Task 2.2, Subtask 2.2.2 : Tree performance, selection and optimisation.

⇒ Cécile Antin's post-doctoral fellowship focuses on **tree management and performances**

Methodology

- ❖ Inventory of existing tools, models and resources
- ❖ Analysis of responses to living labs survey *
- ❖ A survey of french AF stakeholders

Results

- ❖ Diversity of stakeholders
- ❖ Expectations from trees : why do farmers plant trees ?
- ❖ Perceptions of tree performances
- ❖ Tools and resources
- ❖ Needs and challenges

** Tranchina, M., et al (2024). "Exploring agroforestry limiting factors and digitalization perspectives: insights from a european multi-actor appraisal." Agroforestry Systems **98**(7): 2499-2515.*

Survey characteristics

European level
DigitAF network

	Czech R.	Finland	Germany	Italy	Netherlands	UK
Answers	20	3	12 (10 LL)	12	14	8
- Farmers	11	2	6	3	5	2
- Advisors		-		5	3	-

French national level

Structure	Type	Geographical scope
AGROOF (2 interviewees)	Research / Training / Advice	Gard / Hérault / France
Afac-Agroforesteries	Network structuring	France
Arbres et Paysages 32	Advice / Training	Gers
Arbres, Haies, Paysages d'Aveyron	Advice / Training	Aveyron
Chambre d'agriculture - Ariège	Advice / Training	Ariège
Chambre d'Agriculture - Nord Pas de Calais	Advice / Training	Hauts de France
Chambre d'agriculture - Pays de la Loire	Advice / Training	Pays de la Loire / France
CNPF	Training	France
Envol vert	Advice / Training	Tarn
INRAE, DYNAFOR	Research	France
Silva Domestica	Advice	Normandie

Diversity of stakeholders

- Depending on the management stage, the type of AF system and the objectives of trees :

	Farmers	Local advisory structures	Local authorities	Cuma*	SCIC** for wood-energy	Service providers	Individuals
Design, species selection							
Tree management plan							
Planting							
After-planting tree monitoring (~ 3 years)							
Mulching, watering, weeding…							
Within plot tree pruning							
Hedge maintenance							

light green : occasional involvement

dark green : strong involvement

Expectations : why do farmers plant trees ?

- Farmers have a good knowledge of the various services potentially provided by trees
- Ecosystem services were more often cited that economic production
- Timber production appears to be a very minor objective for recent plantations : the production of high-quality timber is technically challenging in open-spaced AF conditions

=> For some, timber production shoud be reserved to forests; other option : within-plot hedgerows

Perceptions of tree management practices and performances

- Highly unsatisfactory : to the point of jeopardizing ecosystem services and timber production
- Concerns all types of AF* but after the planting stage and for different reasons :
  - For biodiversity (hedgerows) : maintenance practices inadapted
  - Timber production : lack of tree management in the first years

  **exception for fruit trees*
- No long-term monitoring data or data are aggregated at the national level => difficult to assess and quantify the actual performances of trees regarding initial objectives

Tools and resources currently available for tree management

- Inventory based on grey and white literature

- Results :
  - ~30 digital tools and models
  - ~50 other resources : guides, technical sheets and training material

- Numerous tools for the design and for carbon stock estimations
- Few decision-support tools for tree management
- Lack of accessibility and complexity of technical sheets and databases produced by research projects

Main barriers in tree management

- The creation of new digital decision-making tools is not seen as a major lever for improving tree management.
- **Lack of knowledge** about trees among the various stakeholders
- Shortage of **available labour**, whether due to farmers' **lack of time** or a shortage of service providers capable of carrying out this work.
- **Perception of trees :** a nuisance to minimize or a symbol that speaks for himself (no management required)
- Others reasons : **regulatory** matters, **low value of tree products**, overlook or lack of resources allocated to intra-plot AF compared to hedgerows.

Some key challenges

- Integrate **teaching (theory and practices) on trees and management tools** into initial and continuing agricultural and agronomic training programmes.
- Adopt **participatory research approaches :** interviewees would like stronger links with research e.g. on trees' response to management practices and to climate change, on tree root development in agroforestry systems..
- Set up a **long-term monitoring program of AF trees and practices =>** better evaluation and understanding of the ecological and economical performances of AF systems

Mean while :

- Extend **the duration of support** after planting.
- Deepen the analysis of the **drivers of tree management** practices => post-doctoral position of Juliette Picard (2026-2027), funded by Occitanie region (Défi clé O3T)

Thank you for your attention !

This project has received funding from the European Union's Horizon Europe research and innovation programme.

Grant agreement: 101059794

Co-funded by the European Union

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