



A tool for finalising and evaluating agroforestry systems


User guide



About this document

Summary

This guide has been designed to assist project leaders in using DEXiAF. It provides concise details on the steps to follow to get started. This guide does not explain how the DEXiAF tool was developed or how to use it in practice.

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Keywords

Agroforestry – design – sustainability – performance

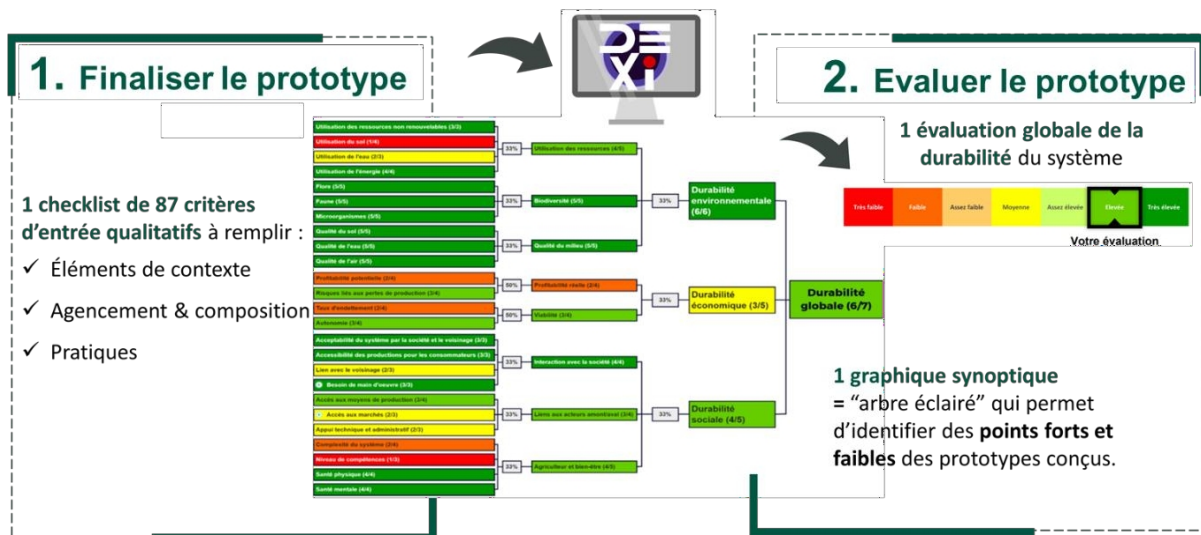
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Foreword

DEXiAF is a **tool for assessing the sustainability** of agroforestry systems **prior to planting**. Based on the characteristics of a system under design, it provides farmers with an assessment solution based on the three pillars of sustainability and an analysis of the project's strengths and weaknesses prior to planting. Easy to use and time-efficient, DEXiAF is a tool with significant educational potential. Co-developed by INRAE, GRAB and UniLasalle, it is freely available.

DEXiAF, a tool for finalising and evaluating agroforestry systems



Why use DEXiAF?

- Assess the sustainability of a **prototyped SAF**
- Validate a **list of elements** to be considered by users in the design phase of agroforestry systems
- Broaden the project leader's objectives by integrating the challenges of a **holistic approach** during the design phase
- Identify **avenues for improving** agroforestry system prototypes by providing a dashboard to identify the **strengths and weaknesses** of prototyped systems
- Develop a **discussion** and workshop **facilitation tool** for advisors and producers.

DEXiAF is not intended to:

- Replace advisors
- Determine operational strategy
- Solve problems

I. Install DEXiAF

Before you begin: update Java

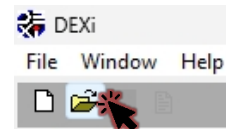
The DEXiAF tool is based on DEXi technology developed by Marko Bohanec, which enables the calculation and evaluation of the sustainability/performance of agroforestry systems.

Install the DEXi software:

https://kt.ijs.si/MarkoBohanec/DEXi/setup/DEXi505en_setup.exe

Download the template DEXiAF and open it with the software DEXi:
from

<https://means.inrae.fr/rubriques-verticales/outils-emc/dexiaf>



Presentation of DEXiAF with the DEXi software – tabs of interest

There are four tabs under DEXi:

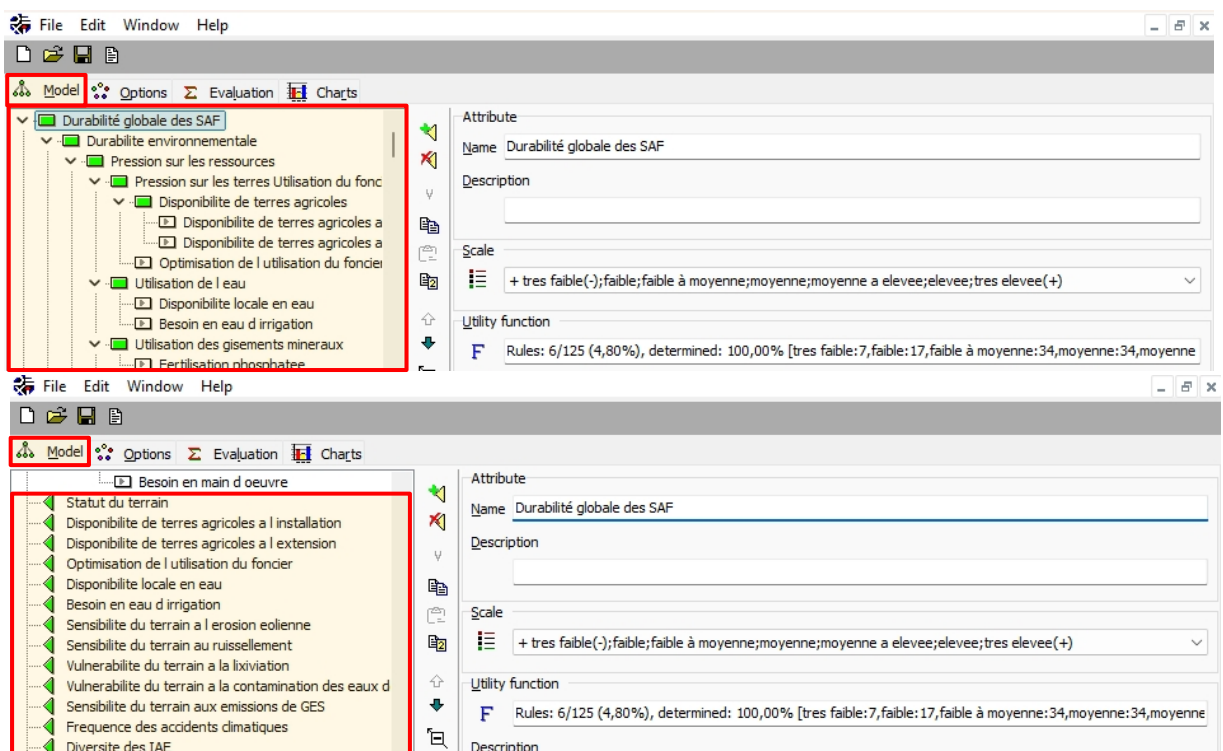
 Model	 Options	 Evaluation	 Charts
Complete DEXiAF tree structure.	Data entry tab / data entry	Evaluation results tab	Graphical representation of evaluation results

Tree structure of the DEXiAF template

 Model	 Options	 Evaluation	 Charts
---	---	--	--

This tab displays the DEXiAF tree structure with all input and aggregate criteria. **No input or modification is required.** On the left is the DEXiAF model represented as a tree structure (screenshot 1). Scrolling down this window will display the list of input criteria in the order in which they were entered (screenshot 2).

 This tab does not require any input or modification.



II. Use DEXiAF

This tab allows you to describe your prototyped SAF(s) and their context(s).

On the left are the input criteria to be entered, and the columns on the right correspond to the SAFs entered. Three systems are integrated into the model and are accompanied by a detailed document to explain the practices and serve as examples.

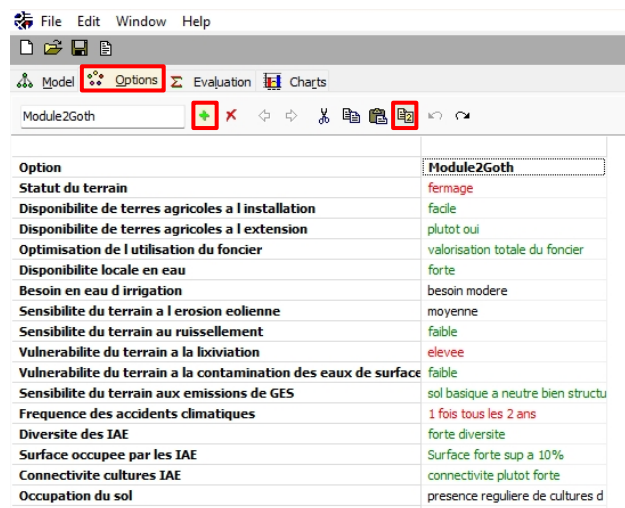


1. Describe and characterise the SAF

- Click on "Module2Goth" (or another SAF you have entered) and click on " " to duplicate.
- OR Click on " + " to add a new blank project.

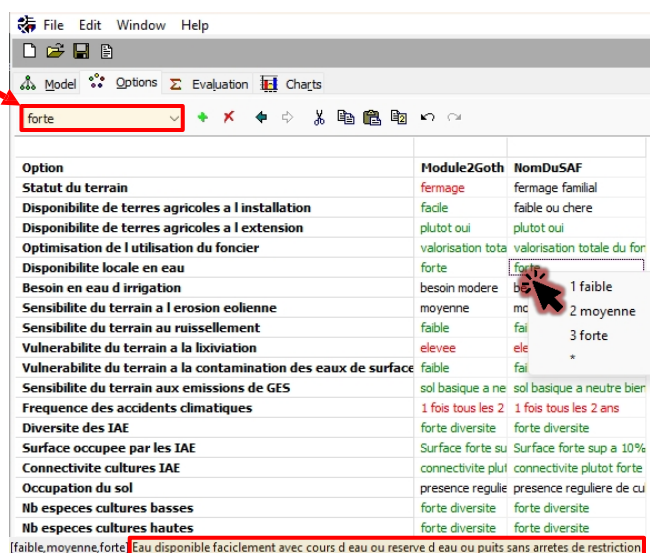
NB¹: We recommend duplicating to make filling in easier. This can reduce the number of entries if the information is the same.

NB²: It is also possible to delete and/or move columns using the following buttons:

Option	Module2Goth
Statut du terrain	fermage
Disponibilite de terres agricoles a l installation	facile
Disponibilite de terres agricoles a l extension	plutot oui
Optimisation de l utilisation du foncier	valorisation totale du foncier
Disponibilite locale en eau	forte
Besoin en eau d irrigation	besoin modere
Sensibilite du terrain a l erosion eolienne	moyenne
Sensibilite du terrain au ruissellement	faible
Vulnerabilite du terrain a la lixiviation	elevee
Vulnerabilite du terrain a la contamination des eaux de surface	faible
Sensibilite du terrain aux emissions de GES	sol basique a neutre bien structu
Frequence des accidents climatiques	1 fois tous les 2 ans
Diversite des IAE	forte diversite
Surface occupee par les IAE	Surface forte sup a 10%
Connectivite cultures IAE	connectivite plutot forte
Occupation du sol	presence reguliere de cultures d

- Rename the new column with the name of your SAF in this box.
- Fill in the criteria by right-clicking and selecting the class.
- The definition of the criterion appears when you hover over it. It is also displayed at the bottom of the screen.



Option	Module2Goth	NomDuSAF
Statut du terrain	fermage	fermage familial
Disponibilite de terres agricoles a l installation	facile	faible ou chere
Disponibilite de terres agricoles a l extension	plutot oui	plutot oui
Optimisation de l utilisation du foncier	valorisation tota	valorisation totale du for
Disponibilite locale en eau	forte	forte
Besoin en eau d irrigation	besoin modere	1 faible
Sensibilite du terrain a l erosion eolienne	moyenne	2 moyenne
Sensibilite du terrain au ruissellement	faible	3 forte
Vulnerabilite du terrain a la lixiviation	elevee	*
Vulnerabilite du terrain a la contamination des eaux de surface	faible	faible
Sensibilite du terrain aux emissions de GES	sol basique a ne	sol basique a neutre bien
Frequence des accidents climatiques	1 fois tous les 2	1 fois tous les 2 ans
Diversite des IAE	forte diversite	forte diversite
Surface occupee par les IAE	Surface forte su	Surface forte sup a 10%
Connectivite cultures IAE	connectivite plu	connectivite plutot forte
Occupation du sol	presence regulie	presence reguliere de cu
Nb especes cultures basses	forte diversite	forte diversite
Nb especes cultures hautes	forte diversite	forte diversite

NB: If you do not know how to fill in one or more criteria, choose "*".

⚠ Entering "*" does not allow for a complete evaluation for all criteria and will cause problems when displaying the results.



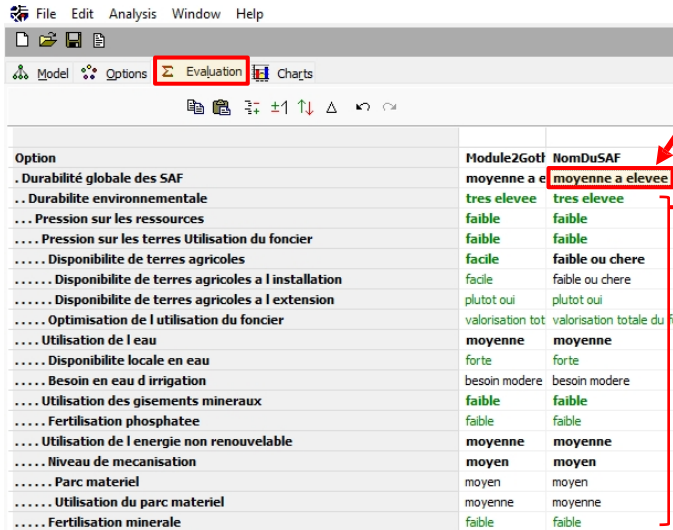
Entering the information for the 87 criteria takes approximately 30 minutes.

2. Assess sustainability based on input criteria



a. Calculate and aggregate data

This tab allows you to obtain an assessment of your prototype SAF(s). On the left are all the criteria of the DEXiAF model, and on the right is the assessment obtained for each SAF entered.



Option	Module2Goth	NomDuSAF
Durabilité globale des SAF	moyenne a	moyenne a elevee
.. Durabilite environnementale	tres elevee	tres elevee
... Pression sur les ressources	faible	faible
.... Pression sur les terres Utilisation du foncier	faible	faible
..... Disponibilite de terres agricoles	facile	faible ou chere
..... Disponibilite de terres agricoles a l installation	facile	faible ou chere
..... Disponibilite de terres agricoles a l extension	plutot oui	plutot oui
..... Optimisation de l utilisation du foncier	valorisation tot	valorisation totale du f
.... Utilisation de l eau	moyenne	moyenne
.... Disponibilite locale en eau	forte	forte
.... Besoin en eau d irrigation	besoin modere	besoin modere
.... Utilisation des gisements minéraux	faible	faible
.... Fertilisation phosphatee	faible	faible
.... Utilisation de l energie non renouvelable	moyenne	moyenne
.... Niveau de mecanisation	moyen	moyen
..... Parc materiel	moyen	moyen
..... Utilisation du parc materiel	moyenne	moyenne
..... Fertilisation minerale	faible	faible

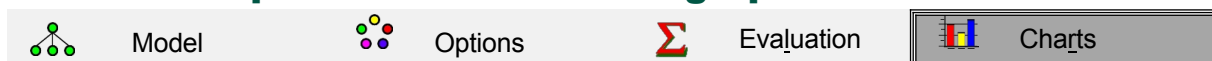
The overall sustainability score for the SAF is displayed.

A score is assigned to each criterion in the tree.

Low sustaina ble	Moderately sustainable	Sustaina ble
------------------------	---------------------------	-----------------

NB: The dots on the left indicate the depth of the aggregate criterion in the tree.

b. Represent the results in graphs



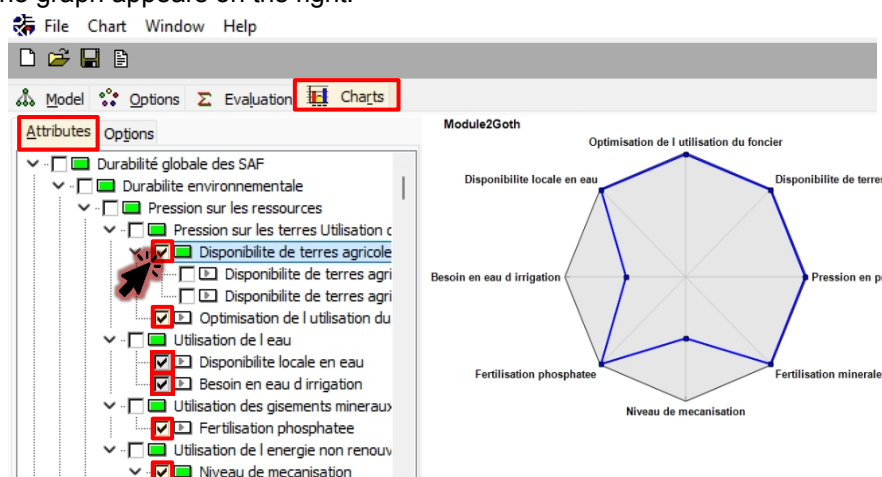
This tab allows you to obtain a graphical representation of the evaluation of your SAF(s). On the left is the tree structure with all the criteria, which you can select. The graphs are displayed on the right.

Display 1 chart for 1 SAF

- Tick the box for the criteria you want to display on the graph.

⚠ Only compare criteria of the same depth, as shown in the screenshot.

- The graph appears on the right.

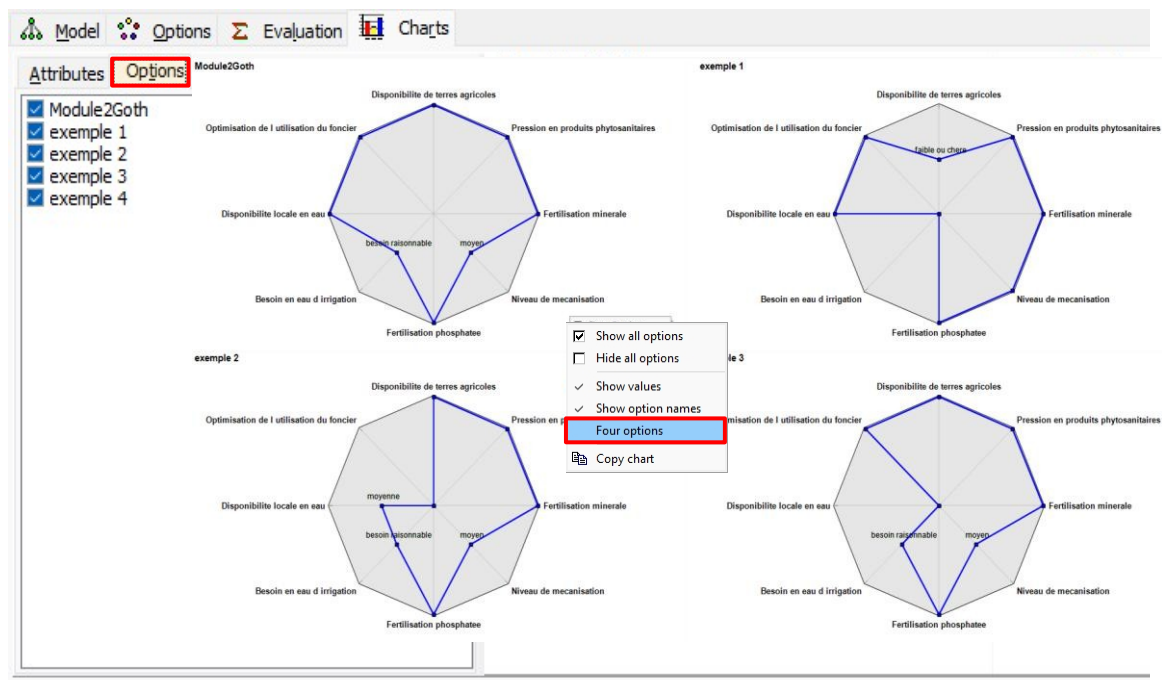


NB: Radars should not be used to compare SAFs with each other, but rather to observe changes in the same prototype.


Display multiple graphs

- Click on the "options" sub-tab.
- Tick the SAFs for which you want to view the graphs.
- Right-click in the space on the right (where the graphs appear).
- Click on "Four options" to display multiple graphs.

NB: Only a maximum of 4 graphs can be displayed simultaneously.



Other actions available by right-clicking are:

<input checked="" type="checkbox"/> Show all options	→	Select all SAFs Deselect all SAFs
<input type="checkbox"/> Hide all options	→	Indicate the score obtained for the relevant criterion on the radar
<input checked="" type="checkbox"/> Show values	→	Indicate the name of the relevant SAF
<input checked="" type="checkbox"/> Show option names	→	Display a dial view to show the results of several SAFs Copy the graph to
<input checked="" type="checkbox"/> Four options	→	the clipboard
 Copy chart	→	

III. View the results using DEXiVisu

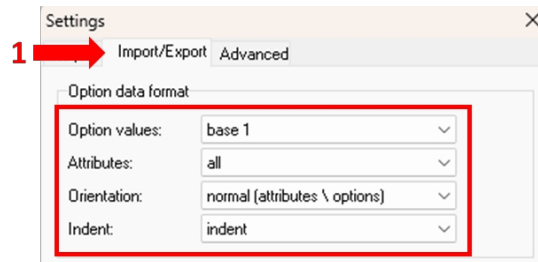
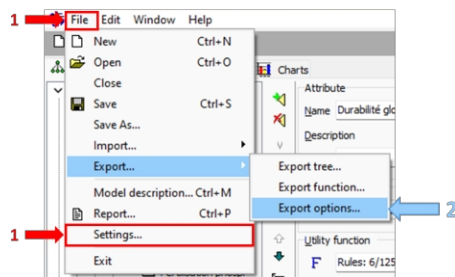


DEXiVisu is an Excel file containing a macro that allows you to view your SAF assessment in a summary table format. The procedure consists of four steps:



0. Check the import/export settings in DEXi

- In (File -> Settings -> Import/Export)
- Set the parameters (see screenshot below)



1. Export the data from your prototypes from DEXi

- Select: File - Export - Export options (see above)
- Name your file "SAFName_options"
- Choose the "Tab-Delimited" type

NB: This step allows you to export the evaluation of the prototyped SAF(s) from DEXiAF to Visu. The tables can then be generated from this.



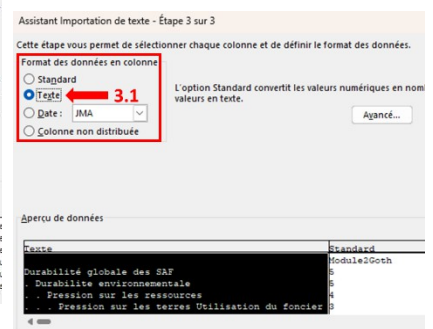
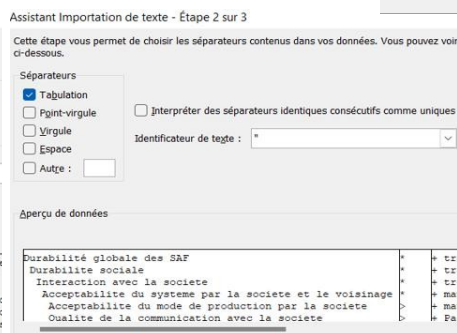
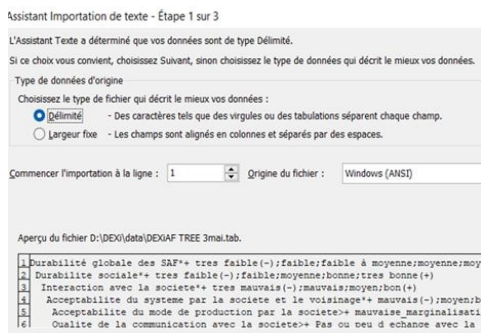
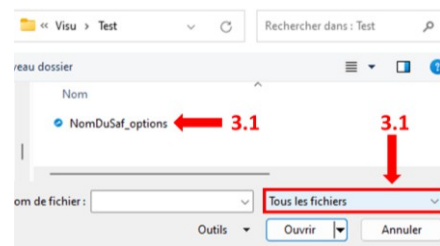
2. Import the data into DEXiVisu.xls

2.1 Open the file

- In Excel: File -> Open
- Select the file "SAF_options_name"

NB: Display "all files" to see the file

- Open the file and check the settings (see screenshots)



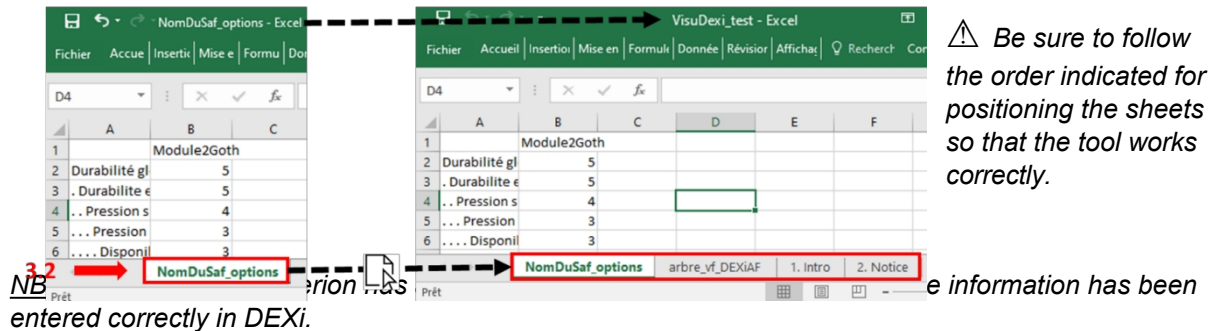
NB: This step will open a new Excel tab with a list of x columns. Column A contains the DEXiAF tree. Columns B to x correspond to the prototypes evaluated on DEXiAF, with the sustainability score obtained for each criterion.

2.2 Move the data to DEXiVisu

- Open the Excel Visu tab and the new Excel tab "NomDuSaf_options" side by side

In the new Excel tab "NomDuSaf_options":

- Click on the "NomDuSaf_options" sheet (located at the bottom of the screen)
- Drag it into the Excel Visu tab
- Position it first (far left)



NB: Be sure to follow the order indicated for positioning the sheets so that the tool works correctly.

NB: The information has been entered correctly in DEXi.

2.3 Save the data

- Save the file under a different name at this point, so that you can keep the original file and return to it if necessary.

NB: In Office 2007/2010, keep the .xslm format (which allows macros).



3. Display the results in a summary table in DEXiVisu.xls

3.1 Run the DEXiVisu macro

- Press the "Display results table" button.

Afficher le tableau de résultats

⚠ Macros must be enabled. If they are not, close the file and reopen it, enabling macros when prompted.

3.2 Set table display settings

- A dialogue box appears.
- Specify the number of levels of the tree structure to be displayed in the summary table (e.g. 4 levels for an overview).
- An Excel sheet is created for each prototyped SAF, showing the DEXiAF tree with colour coding (see screenshot below).

Elagage / Pruning

Rang maximum souhaité / Maximum rank wanted

OK

Annuler

NB1: Not displaying the entire tree simplifies the representation.

NB2: To get an idea of the number of levels to display:

1= s only overall sustainability

4= s compact view (recommended first)

7xml-ph-0000@deepl.internals the entire tree - full view (for a more detailed analysis of the changes to be made) If the number entered is greater than the total number of levels, the entire tree is displayed.

	Rang maximum					
Rang	2	3	4	5	6	7
Non renseigné						
1	(1/2)	(1/3)	(1/4)	(1/5)	(1/6)	(1/7)
2	(2/2)	(2/3)	(2/4)	(2/5)	(2/6)	(2/7)
3		(3/3)	(3/4)	(3/5)	(3/6)	(3/7)
4			(4/4)	(4/5)	(4/6)	(4/7)
5				(5/5)	(5/6)	(5/7)
6					(6/6)	(6/7)
7						(7/7)

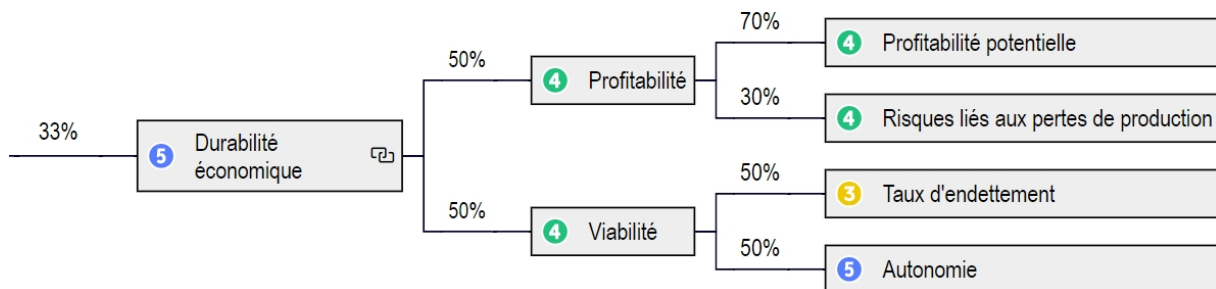
⚠ Please note that if you restart the macro after changing the number of rows, the leaves will be overwritten by the new tables.

IV. Rethink the SAF by using the results of the DEXiAF assessment

Aiming for triple performance

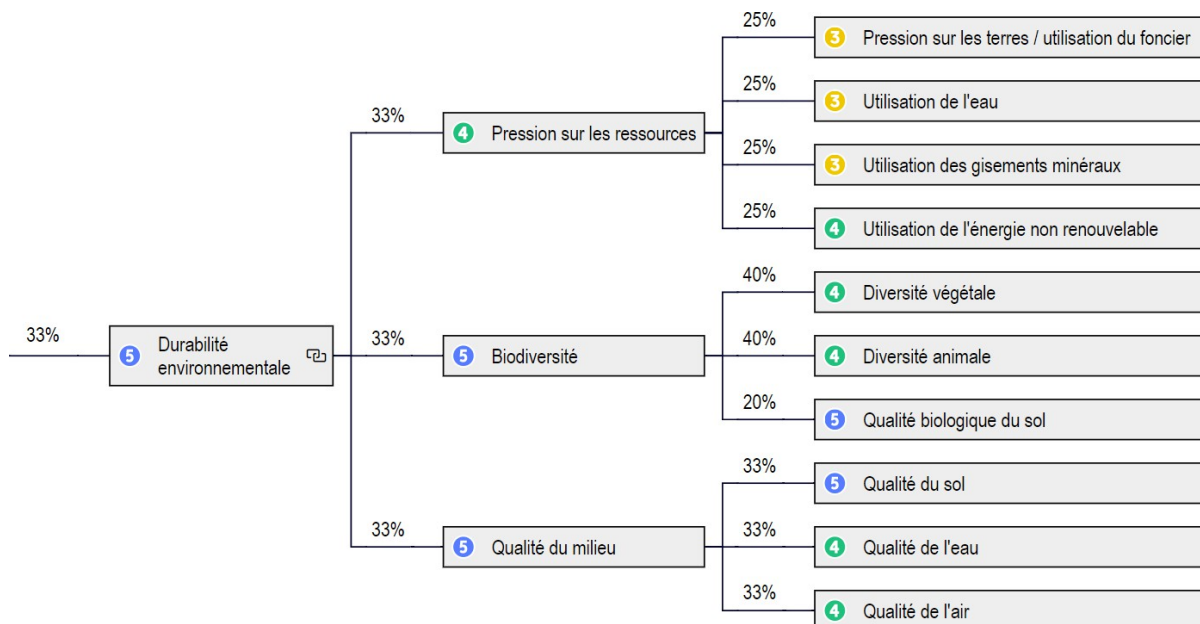
After evaluating the SAF with DEXiAF, it is important to ensure that all dimensions of sustainability have been taken into account in the design of the SAF.

Economic dimension



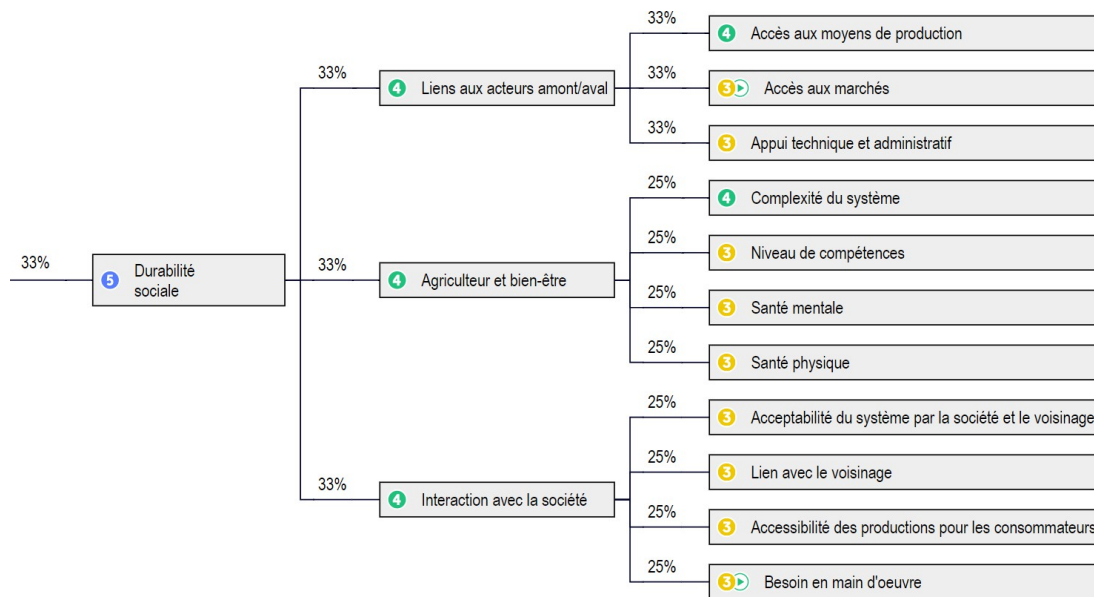
The tool encourages the design of a system that integrates the concepts of immediate profitability and long-term viability, incorporating a qualitative assessment of its autonomy and debt ratio. It should be noted that this qualitative assessment does not replace existing economic assessment tools, which can be used once the agroforestry system has been stabilised.

Environmental dimension



The tool supports the design of more sustainable agroforestry systems that respond to the challenges of agroecological transition. It encourages consideration of the impact of design choices (design, species, production methods and cultural practices) on resources, biodiversity and the quality of the environment (air, water and soil).

Social dimension






DEXiAF encourages consideration of links with upstream and downstream actors and society in general, particularly by incorporating the concept of accessibility of production, but it also encourages consideration of the physical and mental well-being of farmers.

Analyse the strengths and weaknesses of your SAF

Based on the results obtained from the DEXiAF assessment, it is possible to analyse the overall weaknesses of the SAF and identify areas for improvement.

The DEXiAF tree structure is made up of three types of criteria:

-  Contextual elements: related to agricultural operations, non-modifiable.
-  Design elements: related to the multi-year strategy
-  Practice elements: related to the annual strategy

Based on the summary tables produced by DEXiVisu:

- Identify the weak points of the SAF, corresponding to criteria that received a **very low**, **low** or **medium** score (between 1 and 2);
- Determine whether these are context elements (non-modifiable) or design or practice elements;
- Consider possible improvements to the criteria concerned.

NB: Reading the document containing the definitions of the entry criteria provides ideas on the changes to be implemented in the SAF in order to obtain a higher score and thus improve the sustainability of the system.

Liens aux acteurs amont aval (4/4)	Accès aux moyens de production (3/3)	Accès aux intrants (2/3)	Context
		Accès aux matériels (3/3)	
	Appui technique et administratif (3/3)	Accès à la main d'oeuvre (2/3)	
		Accès aux marchés (2/3)	
Agriculteurs et bien-être (2/4)	Complexité du système (1/4)	Accès à un appui administratif (3/3)	Practices
		Accès aux connaissances techniques (3/3)	
		Diversité des tâches (1/3)	
		Niveau technique requis (1/3)	
	Niveau de compétence (3/3)	Charge de travail (2/4)	Context
		Niveau de compétence initiale (2/3)	
	Santé mentale (2/3)	Appui technique et administratif (3/3)	Practices
		Accès à un appui administratif (3/3)	
		Accès aux connaissances techniques (3/3)	
		Motivation (3/3)	
	Qualité de vie (1/3)	Equilibre vie pro vie perso (2/3)	Context
		Isolément humain (1/3)	
	Stress et incertitude (3/3)	Aversion aux risques (3/3)	Practices
		Statut du terrain (2/3)	