DEXiAF: a new ex-ante assessment tool for co-designing sustainable agroforestry systems

Aude Alaphilippe, François Warlop, Delphine Meziere, Aurélie Augis, Claire Vaskou, L. Castel, David Grandgirard

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Alaphilippe A.[1] (aude.alaphilippe@inra.fr), Warlop F.[2], Mezière D.[3], Augis A.[4], Vaskou C.[1], Castel L.[5], Grandgirard D.[4]

[1] UERI Gotheron, INRA, St-Marcel-Lès-Valence, France; [2] GRAB, Avignon, France; [3] UMR System, INRA, Montpellier, France; [4] Unilasalle Beauvais, Beauvais, France; [5] CA26, Chambre d'agriculture de la Drôme, Etoile-sur-Rhône, France

The design of optimal temperate agroforestry systems is a real challenge, particularly because of their multi-species and multi-production characteristics, but also because of the lack of references about these complex cropping systems.

Once agroforestry system prototypes have been designed, their global sustainability shall be assessed in order to identify the most promising system or the improvement possibilities before planting, while avoiding technical and economical failures. The tool (named DEXiAF) has been developed for such purpose. It is an expert knowledge-based tool to rank the sustainability of agroforestry prototypes (excluding livestock). It was developed with the DEXi software and is based on a decision tree subdivising the decisional problems of sustainability assessment into simpler units, referring to the three dimensions of sustainability.

DEXiAF can be used i) as a dashboard to determine strengths and weaknesses of the evaluated system; ii) to assist advisors and farmers in defining and optimizing the prototypes to be planted and iii) for training purpose allowing to discuss options.

The different steps of the tool development (structuration, aggregation, test), as well as the common framework defined to assess the sustainability of agroforestry systems will be presented. Two case studies (fruit-tree-vegetable system and arable crop-timber trees system) will illustrate the potential of this tool. A discussion on opportunities for improvement will be proposed.
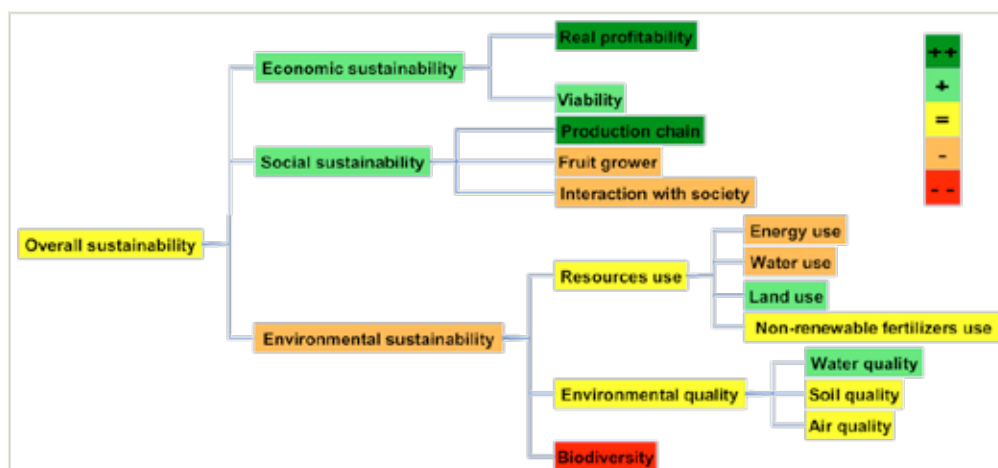
DEXiAF used as a dashboard: dark green colored criteria represents strenght, while red criteria weakness of the evaluated system.

Keywords: ex ante assessment, sustainability, agroforestry system, prototype, co-design.