EcoAF on CAPSIS, simulates the economics effects of your choices when building and managing an agroforestry field!

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EcoAF on CAPSIS, simulates the economic effects of your choices when building and managing an agroforestry field !

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Wishes of people in agroforestry field:

Agroforestry advisors, farmers: a tool to draw future agroforestry parcels easily and an economical simulator to help choose between several plantation strategies ; Researchers (for popularization): to show the effect of specific choices ; Students: a playful economical simulator. The scope is on all the parcels a farm, but some people would like to take in account the landscape (possible but limited).

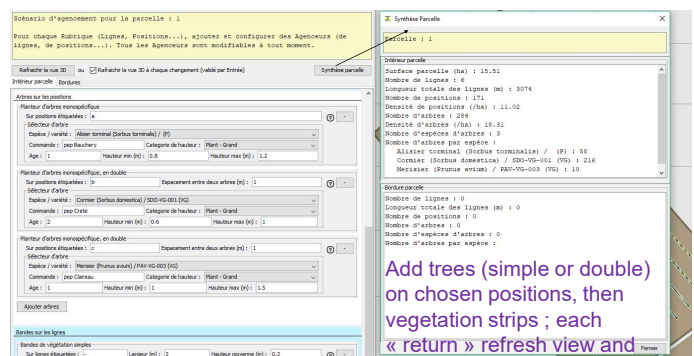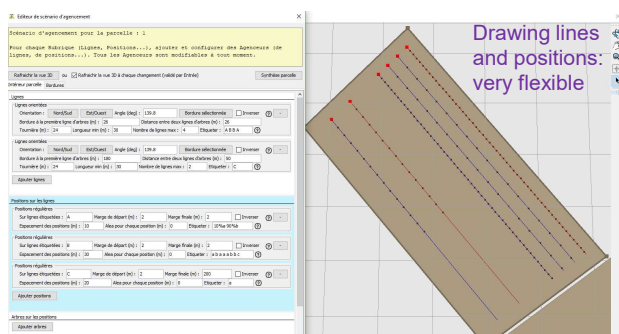## The CAPSIS simulation platform and participatory research

CAPSIS, a common core with more than 80 specific modules, developed since 20 years for forests, is already used for agroforests (*HiSafe* module), and includes models totally (*Economics* module) or partially useful for our purpose (light models). Developers (INRA java writers) and modelers (explainers of wishes and writers of math models for production) are together for discussing and writing during the co-development sessions, which help built robust and finely suited tools. Modellers include some end-users, which imply a sharper vision of wishes and problems. Other end-users are included during modellers-users test-and-critic sessions. We focused first on timber trees, but new experts enter the team when new aspects need models: including fruit trees, shrubs, grazing, crop rotations… To improve the growth models of freely growing forestry trees, we rely on forestry and agroforestry test plots (ONF, CNPF, IRSTEA, INRA, AFAC (includes almost all French agroforestry groups), AGROOF, GRAB, agronomy colleges,…), and develop a participatory tool for farmers and agroforestry advisors via the INRA platform E-phytia.

Design of each parcel: draw hedges and/or agroforestry lines

Imports of parcel groups are based on the shape file format: .shp files farmers can export from the European TELEPAC system, but whatever .shp files are suitable, i. e., an export from the public French farm parcel collector (http://professionnels.ign.fr/rpg). The interface help choosing the place of border hedges, inside lines, positions of trees, species, strip bands. Tree lines are straight now but complex lines and unevenly placed trees are for later. The integration of soil databases, drawing of pedologic zones and exclusion zones are for later.

Drawing lines and positions: very flexible

Add trees (simple or double) on chosen positions, then vegetation strips ; each « return » refresh view and estimates

2D and 3D visualization of future potential growth, exports

The parameters of species (production model, shape, color) are included in .csv imported tables, so that modellers can modify parameters easily. The first EcoAF version, released for first tests in April 2019, includes a rough growth model for species, to allow a visualization of trees, as growth models for timber species are under construction, and production models for fruit trees, fuel species, shrubs, grass,… are for the future. The quality of production models will be very variable, depending on available data, but we prefer to include most species so that all could be drawn, and limits will be clearly exposed. Aleas will depend on the quality of plants, their handling, the pedoclimatic adequacy of the species, occasional (birds, machines,…) or large-scale accidents,... Economics (impact on time included) about trees will first rely on the *Economics* CAPSIS module, and will be refined later. Economics of shaded inter-crops and impacts on bred animals are for later. Standard CAPSIS graphs are available, but adaptation to specific needs will be done. A soon available export will be a ready-to-use file to prepare the command of plants.
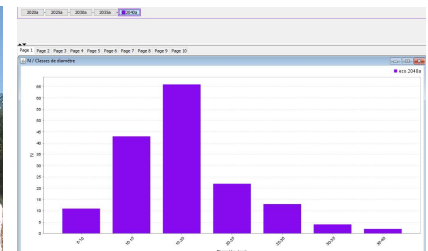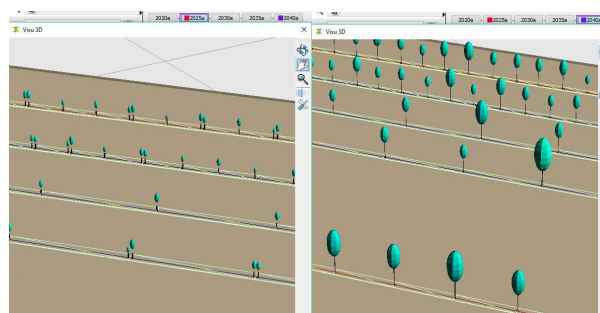
Example of possible graphs

3D: Evolution of trees after 5 years (some positions with doubled trees), then after 20 years (thinning of the weakest on each position occured)
The only included alea now is a death rate of 10% at year 2.

Available freely, do you want to test it? Ask for the installer and a suitable Skype session ! ;)

French and English designed. http://www.inra.fr/capsis
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