FOREST4EU

ITHub 4 – Non-Wood Forest Products

FOREST4EU partner: Cesefor
OG: PINEA
OG's country: Spain
Type of Innovation: Service

Pinea ClimaDAT: a tool for pine harvest prediction

Introduction

One of the main objectives of the OG Pinea has been to establish a system for predicting pine cone harvests. The estimation of harvests on a real scale in Castilla y León is still done visually carried out by environmental agents. There is an increasing disparity between what is estimated and what is harvested. For this reason, as opposed to direct measurement, the aim is to develop a predictive model that allows a reliable estimate of harvests.

Approach and main results

Pinea ClimaDAT is an application for simulating pine cone harvests at the forest scale several months (or even years) in advance, which is a fundamental tool for predicting harvests, and facilitates the management and organization of forest management. This app has been developed in two phases: In the first phase, during 2017, the application was developed by research centers, private enterprise and local administration in areas where this activity has economical relevance. The purpose of Pinea ClimaDAT in this first version was to calculate - both for historical series and for the current year - the annual pine cone production and biomass stocks for *Pinus pinea* public utility forests. It was developed for a specific province of the Spanish territory in which there was an extensive database for the development of the model underlying the application. In addition, it allowed simulations to be carried out on user-defined climate data or on climate scenario projections. In a second phase, during the years 2022 and 2023, within the framework of the PINEA OG, an improvement of the application has been carried out, which can be summarized as follows: (i) The geographical validity of the App has been extended to two more provenance regions. (ii) Pine cone harvest data available until 2021 are included. (iii) The App is made compatible with public GIS data. (iv) The natural units used by the tool to relocate the study area are redefined. (v) The effect of *Leptoglossus occidentalis* on pine cones production is incorporated. (vi) The use of new climatic variables is evaluated. The simulations of this tool are performed by applying different pine cone production models, including the model of Calama et al. 2016. These models use data from available forest management inventories. In the case of the usability of the application referring to how to carry out a simulation with user-defined data, the following are requested: A) Location data B) Forestry characterization (surface area, number of trees for stone pine and the rest of the species) C) Select the season for which the simulation is to be carried out. With these three simple steps you can simulate pine cone production in tn and

kg/ha. It also allows you to compare production with previous seasons. This application is available for free on the project's website

Lessons learned

Building predictive models requires a significant amount of quality data to produce accurate and reliable results; the quality of the record has a bearing on the quality of the model. Maintaining continuity in data collection can become complicated in periods of crisis with budget constraints. The data recorded are from a limited number of experimental plots, although the prediction system has been able to extrapolate to neighbouring areas within the same source area, it has not been able to reach other more distant territories. The arrival of *Leptoglossus occidentalis* in Europe had a disruptive impact on the historical data series that previously reflected the strong influence of climate on pine cone production, in addition to the difficulty of detecting the presence of the insect - due to its elusive nature and the lack of an effective monitoring system - and being able to predict the effect of its population on production in a given area. The forthcoming arrival of new exotic pests or diseases (such as the alert that already exists in France or Italy for *Toumeyella parvicornis*) may change the dynamics of ecosystems in an unpredictable way and alter the data series used to feed the prediction models, so that all the calculations and formulas used will have to be readjusted once again.

Further information

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