Forest floor carbon stocks in mixed forests in Spain

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Background

- Forest floor carbon stocks have been studied using a modelling approach for Peninsular Spain and the Balearic Islands (López-Senespleda et al., 2021). Results were implemented in a web viewer.
- Despite the huge dataset used, mixed forests could be underrepresented, as the sampling design was mainly focused on monospecific stands.

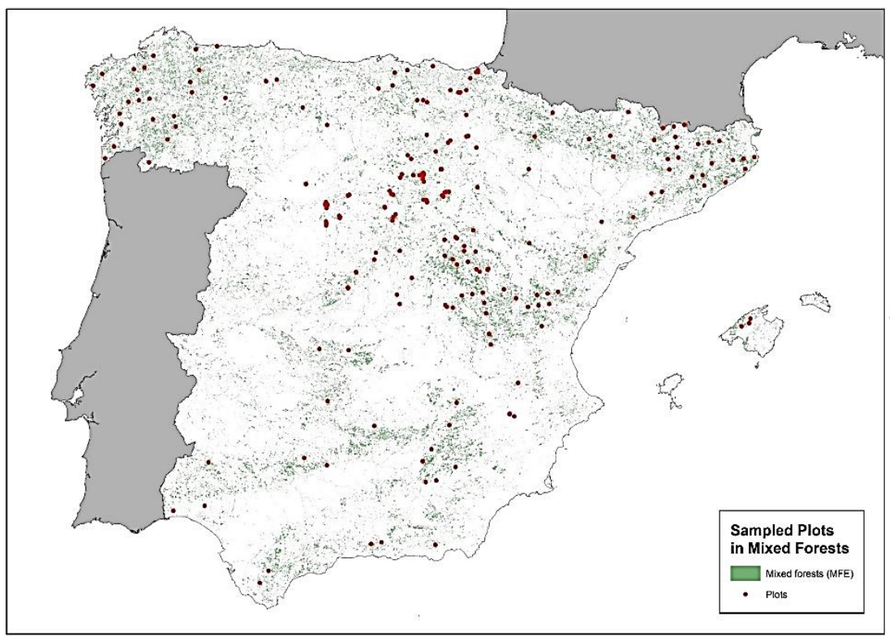

Figure 1. Sampling plots in mixed forests in Peninsular Spain and Balearic Islands

How does it work?

- ICIFOR forest floor carbon stock dataset was complemented with other existing datasets in Spain through a literature review.
- To improve and complete the existing dataset, an ad-hoc survey was designed and carried out to cover the main forest formations in Spain.
- The resulting sampling intensity was less than 1 plot per 15000 ha of wooded area (Figure 1).
- Forest floor C stocks were determined by collecting all plant material from the forest floor in a known area (Fig. 2). In the lab, the material was dried (65ºC) and C content was analyzed.

Figure 2. Forest floor sampling in mixed forests

Results

- Forest floor C stocks found in mixed forests (trimmed $mean_{10\%}$= 7.8 Mg C ha^{-1}) were not statistically different from coniferous monocultures (*p-value*>0.051; $tmean_{10\%}$= 9.7 Mg C ha^{-1}), although significant differences were found compared to broadleaved forests (*p-value*<0.001; $tmean_{10\%}$= 4.6 Mg C ha^{-1}).
- Within *mixed forests*, mixture type (conifer species mixture, broadleaf species mixture, and conifer and broadleaf mixture) is a factor controlling forest floor C stock (Fig. 3).
  - When the forest is composed by a conifer mixture, the observed mean value was 7.8 Mg C ha^{-1} (trimmed $mean_{10\%}$). For the mixture of hardwood species, the observed mean value was 5.0 Mg C ha^{-1} and for mixture of conifer and hardwood species, the mean forest floor carbon stock was 8.7 Mg C ha^{-1}.
  - In a robust comparison, differences were found between hardwood species mixture and mixture of conifer/hardwood species (*p-value*=$7.08 \cdot 10^{-5}$), and between conifer mixture and hardwood species mixture (*p-value*=0.01).

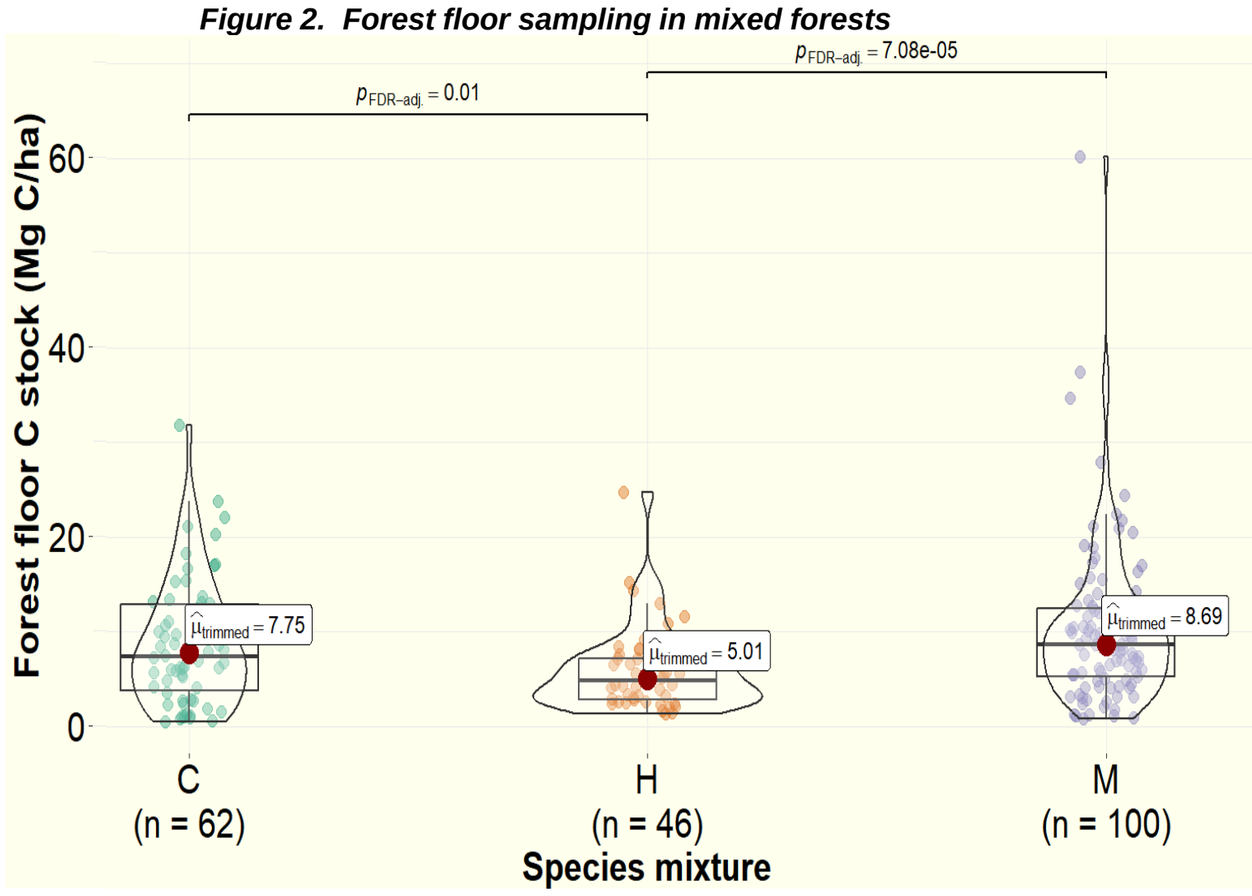

Figure 3. Forest floor C stock in mixed forests by mixture species type

Conclusions

- ❑ Mixed forests had higher values of forest floor C stocks than broadleaf monocultures, but did not differ from coniferous monocultures.
- ❑ The species composition of the mixture was found to be key to understanding the C stocks in the forest floor in mixed forests.
  - Immobilization processes may be more important than decomposition in the forest floor for those mixtures containing conifer species, where higher amounts of C are stored in the forest floor.

Scientific symposium

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