Assessment of leaf litter decomposition in a pine and beech mixed forest: case study in northern Spain

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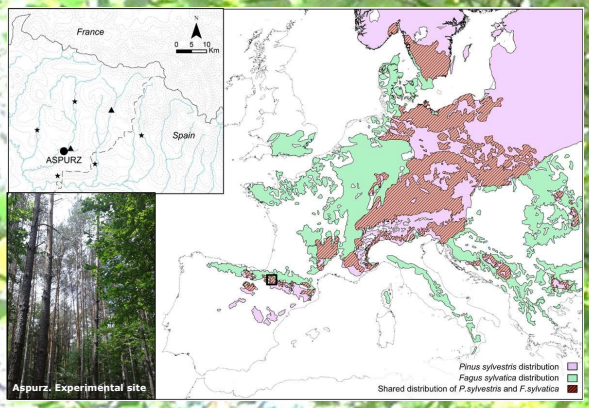
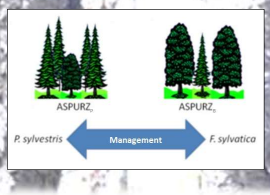
INTRODUCTION: *Mixed Forests & Leaf litter decomposition*

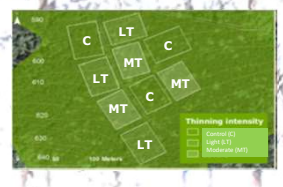
- *The promotion of **mixed forests** represents an adaptation strategy in **forest management** to cope with climate change. The mixing of tree species with complementary ecological traits may modify forest functioning regarding productivity, stability, or resilience against disturbances.*
- ***Litter decomposition** is an important process for global carbon and nutrient cycles in terrestrial ecosystems, also affecting the functionality and sustainability of forests. Decomposition of **mixed leaf litters** has become an active research area and it is important to understand the factors controlling **decomposition rates** and **nutrient cycles** in mixed stands.*

MATERIALS AND METHODS: *Experimental design*

- *A litter decomposition experiment was carried out in a **Scots pine and European beech mixed forest** in the south-western Pyrenees (Aspurz, province of Navarre, **Spain**).*
- *The effects of different factors were studied on **mass loss** and **chemical composition** in such decomposing litter over a period of **three years**:*
  - ***Thinning intensities:** **0%** (Control), **20%** (Light Thinning) and **40%** (Moderate Thinning) removal of basal area*
  - ***Leaf litter types:** pine needles, beech leaves or a mixture of both*
  - ***Tree canopy:** pure pine or mixed pine and beech*

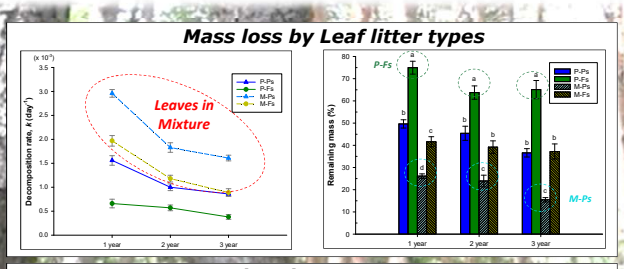


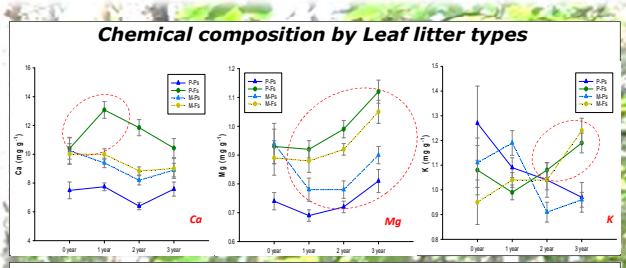


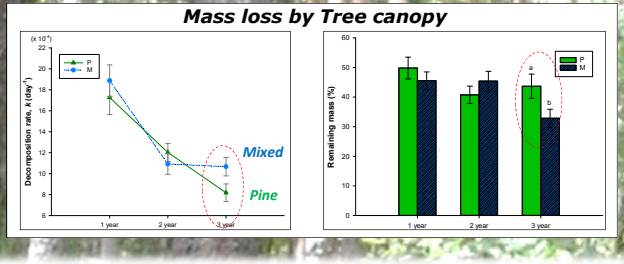


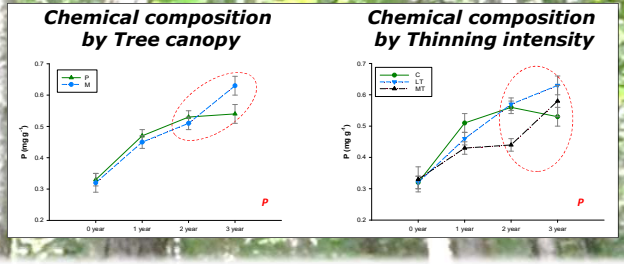
RESULTS: *Mass loss & Chemical composition*

- *A higher **decomposition rate** was observed in litter from the pine needles and beech leaves mixture, as well as under mixed tree canopy. Regarding thinning treatments, significant differences on decomposition rates disappeared at the end of the study period.*
- *Time influenced the nutrient concentration after the leaf litter incubation, with significant differences in the **chemical composition** between the different types of leaf litter. Higher **Ca** and **Mg** concentrations were found in beech litter types than in pine ones. It was observed an increase of certain nutrients throughout the decomposition process, due to immobilization by microorganisms (e.g. **Mg** in all leaf litter types, **K** only in beech leaves, **P** in thinned plots and under mixed canopy).*









CONCLUSIONS:

- *These results suggest the existence of **positive synergies** between both pine and beech litter types and that mixed stands favour decomposition. The combined effect of these **mixed-stands factors** on decomposition rates is greater than the influence of thinning.*
- *Evaluating the overall response in mixed leaf litters and the contribution of single species is necessary for understanding the litter decomposition and nutrient processes in mixed forest ecosystems.*

ACKNOWLEDGMENTS:
David Candel-Pérez is funded through a Juan de la Cierva research contract (ref. IJCI-2017-31638), provided by the Spanish Ministry of Science, Innovation and Universities.