Changes in the local nutrient cycle of softwood species caused by climate change

Del Arco Jose M.[1] , Blanco Raquel[2],Zaldívar Pilar[3], Martínez Carolina[4], Fernández Mercedes[5] Hernández Ángel[6]

[1] *University of Valladolid, Instituto de Gestión Forestal sostenible (Uva-INIA*
Address: Avenida de Madrid 44 34071 Palencia
Tlf:34979108361
Mail: chear@agro.uva.es

[2,3,4,5,6] *University of Valladolid Departament of Ciencias Agroforestales*
Address: Avenida de Madrid 44 34071 Palencia

Abstract:

Climate change is causing changes in plants to adapt to new environmental conditions. Trying to prove the existence of climate change with the extent of recent decades temperatures gives us no clear results. However, if we observe the changes produced in the physiological processes of plant species affected by altered weather conditions, we can state categorically that climate change is occurring.

One of the most influential processes in the local cycle of nutrients in Mediterranean ecosystems is the leaf abscission. (Escudero y Del Arco, 1987). This process determines the speed of the nutrient cycle as a function of duration of leaf abscision. But also regulates the cycle of nutrients lost locally because it affects specially upon the process of nutrient retranslocation which entails the withdrawal of nutrients from leaves before they fall off (Del Arco et al., 1991). As the leaf abscission process determines the loss of nutrients, it also influences the residence time of nutrients in leaf biomass (Escudero et al. 1992) and, therefore, the conservation of nutrients in Mediterranean ecosystems.

In this work, to show that there have been changes in these physiological processes as a result of climate change, we compared the values of the time and duration of leaf abscission process, retranslocación and residence time of nutrients in two conifer species (*Pinus halepensis* and *Pinus pinea*) taken by the research team three decades ago with those taken recently.

The final result shows that there has been, over the years, a change in the leaf abscission process reflected in a time of maximum advance of abscission and an extension of the duration of leaf abscission. These changes are caused by the premature arrival of summer water deficit due to higher temperatures and increased transpiration. This is negative for the intensity of retranslocación of nutrients (Del Arco et al., 1991). If recycling of nutrients is carried out with less intensity, there are more losses and impoverishment of ecosystems dominated by these two species.

However, the residence time of nutrients such as nitrogen and phosphorus is not affected because leaf longevity of both species is not significantly reduced.

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Jose Mª Del Arco Montero Instituto de Gestión Forestal sostenible (Uva-INIA) Univerty of Valladolid
Address: avenida de Madrid 44
34071 Palencia
Tlf: 979108361
Mail: chear@agro.uva.es

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