

Green barriers of cypresses could reduce fire initiation risk

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Study area in eastern Spain, showing the plot of Cypress that survived the forest fire of Andilla in 2012. Ravine of the Herbasana, Jerica (Spain). Credit: G. Della Rocca et al

Every year fires burn thousands of hectares, destroy entire ecosystems and put the lives of people and animals at risk. Understanding the dynamics of fire would allow a solution to be found for the high number of incidents. Spanish and Italian researchers have studied the

flammability of vegetation and shown that cypresses, capable of tolerating severe droughts and high temperatures, could be an effective barrier against fire initiation due to their low degree of ignition.

The Sierra de Gata [fire](#) (Cáceres, Spain) has been one of the most high-profile of the summer, burning more than 7,000 hectares, but it has not been the only one. Although during the 2001-2010 period the number of fires has been showing a downward trend, in 2015 alone more than 8,885 fires have razed 68,500 hectares in Spain, according to data from the Ministry of Agriculture, Food and the Environment (MAGRAMA) on 30 August 2015.

In general fires are usually a natural phenomenon of many ecosystems, and fire is a land management tool, provided it is kept under control. However, climate change and current land use causes increasingly more severe fire regimes. The flames not only destroy wild habitats, but also endanger the lives of nearby populations and cause long-term damage.

One of the measures used to help to better control fires is the use of green barriers. The CypFire project, financed by the European Union, studies the possibility that planting selected varieties of cypresses reduces the risk of fire initiation in a feasible, ecological and economical way.

"We had already observed that Spain and Turkey commonly used these cypress barriers as an effective tool in preventing fires from spreading, given that they are less affected than other species of trees in forest fires," as told to SINC by the authors of the study published in the *Journal of Environmental Management*.

Experiments in the laboratory

These scientists, from several Spanish and Italian institutions -National

Institute for Agricultural and Food Research and Technology (INIA), University Institute for Sustainable Forest Management (UVA-INIA), the IMELSA department of Monumental Trees and the Institute for the Sustainable Protection of Plants (IPSP-CNR)- took samples from the cypress plantation on CypFire's experimental plot in Jérica (Castellón, Spain) and carried out various experiments on this type of tree to understand how it reacts to fire. The team focused specifically on the nature of the vegetation's flammability, or in other words, the ease and speed at which it burns as well as the energy needed.

The researchers considered four phenomena: ignitability (capability of a material being ignited), sustainability (property of a fuel to continue burning), combustibility (speed at which a fuel burns), and consumability (amount of fuel that burns).

The aim of the study was to determine and analyse these four components in the laboratory, using live and dead fine fuel of the common cypress *Cupressus sempervirens* var. *horizontalis* involved in the process of initiating and spreading surface fire, ignition of tree canopies and subsequent spreading as an active or passive crown fire.

Low ignitability of cypresses

The particle-level results obtained in the laboratory reveal that "the samples of the cypress trees studied have a low degree of ignitability (long ignition times), high combustibility, high sustainability and low consumability, compared to other typically Mediterranean species," stresses Carmen Hernando, one of the authors and researchers at INIA, to SINC.

The work demonstrates that live and dead fine fuels of the cypresses studied are resistant to ignition due to their high ash content, and because their leaves are capable of keeping their water content high during the

summer. "But once they burn their combustion is very energetic," adds Hernando.

The scientists propose the possibility of exploiting some of the morphological, functional and ecological features of the common cypress variety studied to construct a barrier system as a "promising" tool to reduce the risk of fire initiation in Mediterranean areas.

Yet the expert considers that the research should be tested on a larger scale (full tree, stand and landscape) to verify whether this species can generate low-flammability fuel structures in fires of low to medium intensity.

"These same laboratory results are not observed in the cypresses used generally as ornamental plants growing in dense hedges (given that this encourages the accumulation of dead fuel and notably increases their flammability), as has been seen in wildland-urban interfaces by fire-fighters," concludes the scientist.

More information: "Possible land management uses of common cypress to reduce wildfire initiation risk: a laboratory study." *Journal of Environmental Management* 159: 68-77 [DOI: 10.1016/j.jenvman.2015.05.020](https://doi.org/10.1016/j.jenvman.2015.05.020)

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