Traditional forest management reduces fungal diversity

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This is Nerea Abrego-Antia, researcher in the UPV/EHU's Mycology Team. Credit: UPV/EHU

There is a shortage of dead wood in forests because fallen branches and trees tend to be cleared away. This wood, if available, ought to be decomposing, as it is the habitat of many living beings like lignicolous fungi. These fungi are capable of decomposing dead wood and turning it into organic and inorganic matter. So clearing away the dead wood from the forests is ecologically harmful for the fungi. Nerea Abrego-Antia and Isabel Salcedo-Larralde, biologists in the Department of Plant Biology and Ecology of the UPV/EHU-University of the Basque Country, have recently quantified this effect on fungi populations that live off dead wood in various beech groves in Navarre. The main conclusion of the study is that forestry and classical forest management are harming the community of saproxylic fungi. What is more, the researchers have discovered that in the forests being exploited various fungi species are disappearing and in some cases even whole families are affected.

The conclusion of the research is crystal clear: the clearing away of remains of dead wood is harming the populations of lignicolous or saproxylic fungi. Nevertheless, Isabel Salcedo, director of the research, has qualified this: "You see everything very clearly, but you don't accept it that easily. The pre-hypothesis could be that as the basic matter is lost, the environment will be directly affected. But the aim of our work is to prove it. In forestry only recently did they start to notice this phenomenon, while in Europe it began to be proven scientifically about ten years ago." The work of the UPV/EHU researchers has focussed on the traditional exploitation of various beech groves, and the result has been published in the specialised journal *Forest Ecology and Management*. "It is a journal of great quality," pointed out Salcedo. "In the field of mycology, the journals that publish the description of species and systematics papers tend to have little impact; yet this one devotes attention to the ecological approach and has a more universal influence. The works that analyse the ecological aspect have a greater impact, and as far as we are concerned, it is usually quite difficult to get them published. But in this piece of work we paid great attention to the statistical and ecological aspect, which has enabled us to get the paper published in such an important journal."

The analysis was carried out on samples from sixteen zones, of which eight are exploited and the other eight are not. After the samples had been gathered, they were classified in accordance with a standard criterion that is used by mycologists in this field so that the research can be repeated. "The first main variable to do the classifications was the size of the wood remains in the debris. They are classified according to three sizes, from the largest to the smallest," explained Salcedo. "Normally, the smallest debris in this classification is not analysed. Yet many fungi have to be identified under the microscope, although there are known species that are very large, like the tinder fungus Fomes fomentarius. But it is more difficult to gather

samples of the rest and identify them, and it takes longer."

After the classification of the wood in terms of size, the next criterion is the level of decomposition. For each size three levels of decomposition were established: the recently fallen, the ones that have begun to decompose and the ones that are fully decomposed. "A more precise classification could have been made, but we found that the levels of decomposition fitted well into the three groups." The debris analysed was classified into nine groups.

After classifying the debris, the fungal species existing in each were identified, in other words, the community of fungi existing in each twig. As far as possible, the "quantity" of each species is also established, even though this is no easy task. As Salcedo pointed out, this last parameter is difficult to apply.

The other European studies have concentrated on large-sized woody debris, which is why importance has been attached to the volume of dead wood in the forests when it comes to preserving them. However, according to the research by Salcedo and Abrego, the factor that exerts the most influence on the diversity of saproxylic fungi is the diversity of the woody debris, not the volume of wood, in other words, that the nine groups classified should appear the maximum possible number of times. "This conclusion is a result very much to be taken into consideration in forest management," stressed Salcedo.

At the same time the influence exerted by forest fragmentation on the presence of fungi is also being analysed. Based on this research, the growth of the edge or intervening matrix which happens as a result of forest fragmentation also has a negative effect on their diversity. The main conclusion of the study is that forestry and classical forest management are harming the community of saproxylic fungi, at least in the zones studied. The work of these UPV/EHU biologists specifies the levels of this damage. The group's development

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