



## *Loss Of Aboveground Biodiversity*

### **Plant-soil interactions**

Aboveground biodiversity refers to all the organisms that live above the soil. The starting point of all terrestrial food webs, both above- and belowground, are primary producers, mostly plants and algae. Through photosynthesis, these organisms transform inorganic compounds of carbon dioxide (CO<sub>2</sub>) from the atmosphere and water (H<sub>2</sub>O), together with mineral nutrients from the soil, into organic compounds in the form of their own plant tissues. All heterotrophic organisms depend on these primary producers to obtain their energy and nutrients. The question remains, however, how above- and belowground biodiversity are related and whether loss of aboveground biodiversity also implies loss of belowground biodiversity.

When looking at the plants in woods, grasslands or parks, it becomes clear that aboveground plant species are different in their shape, colour and smell. Similarly, albeit less well known, plant species also differ belowground in the morphology and chemistry of their roots. As a result, the composition of soil organisms also differs between plant species such that a higher diversity in soil biota is positively correlated to a higher diversity in plants. It is important to note that some plant species are much more diverse than others, meaning that losing certain plant species from an ecosystem can have much greater impacts on belowground biodiversity than you would expect from the change in plant species number.

Given the vast diversity of soil organisms and, in comparison, the lesser number of plant species, it has been argued that many of the species that live in the soil most likely behave as generalists rather than as specialists with regard to the food they consume. Biodiversity studies do provide some support for this idea given that with increased plant species richness the increase in species richness of soil organisms is especially notable at the lower end of the plant-species-richness gradient.

### **Drivers of loss**

Throughout the past centuries, and especially since the industrial revolution and the production of mineral fertilisers, human impacts on biodiversity have been tremendous and are projected to keep increasing in the coming decades. The main cause of declines in biodiversity is land-use change. Conversion of natural land into agricultural systems in which very few plant species, even very few plant genotypes, are being grown leads to lower soil biodiversity. Awareness of the potential negative effect of this process on ecosystem functions, such as natural pest control, has led to the implementation of alternative cropping systems in which plant diversity is increased through the creation of species- rich field borders, diversified rotations and intercropping.

### **Specialists vs. generalists**

The differences between the various species of soil organisms in their response to the decline of aboveground diversity can be explained by the level of dependence on a very narrow or broad range of aboveground species. Specialist species have a narrow range of species on which they can prey, while generalists have a broad range and can easily switch food sources depending on what is available. High levels of specialism are most notable in organisms that coevolved with each other, meaning that they are adapted to specific characteristics.

*Soil Lovers say: Keeping Your Biodiversity Of Plants Is Extremely Important For Soil Life And Resilience*