Arbuscular mycorrhiza fungi (AMF) are a group of soil fungi that colonize plant roots and enhance their ability to take up important minerals from the soil. In return, the fungi receive sugars from the plant. Within this mutually beneficial system “which is called a symbiotic relationship” AMF are extremely important for plant health and growth, especially under adverse conditions of water, nutrients and disease.

Scientists believe that a diverse AMF community, made up of many different fungal species, is more likely to result in successful symbiotic relationships between plant and fungi. Diverse AMF communities are also thought to be more resilient to changes in environmental conditions over space and time. AMF diversity can be affected by several factors, including soil disturbance, nutrient contents of the soil, the presence of bacteria and other fungi, and changes in weed populations. While conventional tillage disturbs the soil by turning the top layer over prior to planting, in no-till fields the seeds are planted directly into the ground without first removing weeds or leftover plant matter from previous seasons.

What is this research about?
Arbuscular mycorrhiza fungi (AMF) are a group of soil fungi that colonize plant roots and enhance their ability to take up important minerals from the soil. In return, the fungi receive sugars from the plant. Within this mutually beneficial system “which is called a symbiotic relationship” AMF are extremely important for plant health and growth, especially under adverse conditions of water, nutrients and disease.

What did the researchers do?
Following harvest, soil samples were taken randomly from wheat fields in southern Portugal, one of which had undergone conventional tillage (the disturbed field), and one of which had not been tilled in the past 9 years (the undisturbed field). After isolating the DNA from these samples, a computer software program identified all the different AMF species found in each field. Next, the researchers created a “family tree” for the AMF species found, which showed how closely the species were related to one another.

What you need to know:
The number of different species of arbuscular mycorrhiza fungi (AMF) was lower in disturbed soils (conventionally tilled fields), with no-till wheat fields showing greater AMF diversity. A diverse AMF community may enhance plant health, especially for crops grown in nutrient-poor soils.
What did the researchers find?

Overall, AMF diversity was greater in the undisturbed (no-till) field compared to that of the conventionally tilled field. In addition to decreased diversity, tilling impacted the structure and makeup of the AMF community (in other words, the relative frequency of the different AMFs). This research also confirmed that using soil samples is an effective way to analyze AMF diversity.

How can you use this research?

Farmers can use this research to better understand how soil-disturbing practices, such as tilling fields, can impact the diversity and resilience of symbiotic soil fungi communities. Agricultural scientists can further this research by examining the effects of various tillage and crop rotation systems on the diversity and resilience of AMF communities.

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