The Role of Plant Roots in Preventing Soil Erosion

By
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Professor Grierson began her talk with a lively introduction to the properties of soil with special reference to the vast range of living creatures that inhabit soils. We rely on soil as the medium to grow most of our food, and in the future as World population increases we will need to get more food from the same amount of soil. But, the spread and intensification of agriculture have led to accelerated soil erosion rates.

It seems that at least a quarter and perhaps even a third of useful soil has already been lost to rivers and the sea through erosion promoted by modern agricultural methods, which rarely give annual crops enough time to develop deep root systems. This rate of soil loss will probably only increase as climate change forces ecological change and as locally adapted soil-binding plants give way to less effective replacements.

Surprisingly, we know very little about how plant roots actually interact with soil and hold it together. Hence, the motivation for Professor Grierson's research work that involves genetic modifications to *Arabidopsis* (a type of cress) to produce a variety of root configurations from the same species as well as the measurement of the forces required to pull up a plant. She and her team have developed new assays to measure: the attachment of roots to sterile gel media, plant resistance to uprooting from compost or soil and methods of protecting soils from water erosion during simulated flooding events. As a proof of concept, Claire Grierson’s team have used their new assays to demonstrate hitherto undetected roles for root hairs in anchoring roots and preventing soil erosion.

Clearly this research is still at an early stage, and currently seems to raise as many questions as it answers as, for instance, the role of mycorrhizal fungi that often grow around and into plant roots. Other strategies (such as mixed cropping, or the use of perennial crops) may have much to contribute. It is, however, certain that we do not have any sure-fire solutions ready to implement. There is little doubt that this fascinating lecture persuaded the audience that we need them urgently.