Study finds maize roots adapt to different tillage practices

March 15 2024, by Zhang Nannan

Credit: Pixabay/CC0 Public Domain

A study by the Chinese Academy of Sciences (CAS) has revealed how maize roots change their traits in response to different tillage practices, such as no tillage (NT) and conventional tillage (CT).

In the study published in *Frontiers in Plant Science*, researchers from the Institute of Applied Ecology of CAS measured the traits of lateral roots—the main parts of the root system that absorb water and nutrients—at two growth stages. They found that lateral roots showed significant plasticity, or the ability to adapt to different conditions, under NT and CT.

According to the researchers, NT, which leaves crop residues on the soil surface, is one of the solutions for soil conservation and food security. However, they also noted that long-term NT may cause soil structure stratification, which can hinder root development.

They found that the lateral root traits showed varying degrees of plasticity at different growth stages. Specifically, root length, diameter, and root length density, which measures how much root is present in a given volume of soil, showed remarkable flexibility, fluctuating within a range of -22% to 20%.

They also found that soil penetration resistance, which measures how hard it is for roots to penetrate the soil, was reduced at the jointing stage and increased at the flowering stage under NT, especially at a depth of 10 to 40 cm.

They concluded that the complementary effects of these resource acquisition strategies are important for maize to efficiently use nutrients and maintain soil health throughout the growing season. These findings underscore the need for tailored management practices that take into account root traits and their dynamic responses to different tillage systems.

More information: Liming Yin et al, Changes in the degree of lateral

root trait plasticity and trade-offs of maize under long-term no tillage, *Frontiers in Plant Science* (2024). DOI: 10.3389/fpls.2024.1345189

Provided by Chinese Academy of Sciences