
The Role of Roots in Soil Health

How Roots Contribute to a Healthy Ecosystem

Roots are fundamental to soil health and its functionality. They contribute to soil structure by creating channels and pores as they grow, providing more access for water to infiltrate and microbes to thrive. Their efficiency in absorbing nutrients have a direct impact on crop yields and quality, with effective root systems being able to access deeper soil levels to improve plant function even further. When looking at the effect of roots in soil health the main factors are root mass, soil aggregates, root exudates and soil organic carbon (SOC).

Soil Aggregates

Soil aggregates are clusters of soil particles that are bound together by organic matter, microbial activity, and root exudates. When these aggregates form around the root from root exudates and microbial activity, it gives the root a brown color and is referred to as a rhizo-sheath. This can be observed by searching for high biological activity at the roots.

Root Mass

Root mass plays an important role in soil health, feeding and housing the microbial community and increasing carbon in the soil. It has been found that smaller roots provide a greater surface area for rhizo-deposition (root exudates and carbon), while root density affects both the input of carbon and soil aggregate stability. Researchers found that grassland and pasture management systems nearly doubled the root mass when compared to row cropping.

When looking at management practices, vast improvements to soil health can be found by increasing root mass and especially fine root mass.

Root Exudates

Root exudates are important for soil organic carbon formation and for the shaping and regulating of the microbial community. Plants can deposit different types of exudates into the soil to perform various functions, such as feeding microbes, disease suppression and sequestering carbon. Furthermore, the relationship between root exudates and microbes create cascading effects upon nutrient cycling and the breaking down of organic matter.

Through management practices such as the application of bio inoculants, we can enhance the microbial community, creating more diversity and better soil health.

Soil Organic Carbon

Soil organic carbon is created by microbial activity, such as fungi decomposing organic matter or dead/decomposing roots. Researchers have found that as much as 10-60% of the total net fixed carbon produced by the plant is released as rhizo-deposited carbon into the soil via the roots.

Conclusion

It is clear that roots play a pivotal role in soil health. When you consider plant root systems and their symbiotic relationship with the soil microbial community, you can enact management practices that can further enhance root function and ultimately the performance and yield of your crops.

Thank you for reading!