BUILDING MICROBIAL DIVERSITY IN SEMI-ARID COTTON PRODUCTION SYSTEMS FOR SOIL HEALTH - WHAT IS ACHIEVABLE!

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Abstract

For agroecosystems, soil microbes perform essential ecosystems services, that includes decomposition of organic matter, storage of soil carbon, nitrogen cycling, and the enhancement of plant growth through symbiotic relationships. These ecological processes are substantially influenced in agroecosystems by crop type, the climate, and yearly field management. Collectively, the soil microbes' function as the soil's microbiome in the same capacity that the gut microbes of all animals, help to promote the overall health of the organisms. For agricultural systems, "poor soil health" ultimately leads to increased economic costs to compensate for the lack of ecosystem services performed by the soil microbes. Research contacted in dry-land and irrigated cotton systems within the semi-arid climate of Lubbock TX has found that no-till and stubble managed systems greatly increase soil health and promotes greater capacity of the soil microbes to carry out important ecosystem services. While the benefits are not seen each year, soil microbial dynamics are either higher or are more stable from year to year for both dryland and irrigated cotton productions systems that use no-till and stubble management then occurs for conventional cotton production. No-till system have a higher level of fungal activity including the maintence of beneficial symbiotic and saprophytic fungi that aid to reduce disease development. With the addition of stubble, the Daily Temperature Range (DTR) of the soil at the surface and at 15 cm depth is reduced resulting in a greater microbial benefit. The reduction in temperature stress on the soil microbiomes through a reduction in DTR is one immediate response to having stubble on a field.