Deciphering the active strawberry microbiome associated with roots and rhizosphere soil

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Abstract
Plants recruit diverse microbial communities from the soil. Plant-microbiome interactions confer multiple beneficial impacts on crop plants. Understanding of such interactions in strawberry production systems is still obscure. Using a strawberry crop model, we conducted a 3-year field experiment at Castle Hayne, North Carolina to test the hypothesis that carbon sources (molasses, mustard meal, and mixtures) when used in anaerobic soil disinfestation (ASD) procedures can improve soil health and impact microbial communities. Our results demonstrate that ASD, particularly with the mixture of molasses and mustard meal significantly produced higher marketable yield, and reduced soil-borne pathogens. Microbiome data analysis showed increased relative abundance and structure of both bacterial and fungal communities and influenced the α-diversity and β-diversity compared with the non-treated control. We discovered shifts in the assembly of beneficial microbiome members such as *Arthrobacter, Bacillus*, *Paraburkholderia*, *Bradyrhizobium* and *Trichoderma harzianum*. Collectively, this study adds to our understanding of the eminent roles of beneficial microbiomes and uncovering mechanisms that can lead to potential biologically based solutions for disease resilience in strawberry, and enhanced productivity, consistent with a sustainable agriculture.