Soil Microbial Biomass Carbon and Nitrogen in Tomato Field associated with Cover Crops and Irrigation Rates. (S03-wang141419-Poster)

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Abstract:

To understand how mineralization of soil organic matter is influenced by cover crops and water regimes, soil microbial biomass was investigated in a vegetable field after three leguminous and one non-leguminous cover crop had been grown and incorporated into the soil. They were sunn hemp (Crotalaria juncea), cowpea (Vigna unguiculata), velvet bean (Mucuna deeringiana) and sorghum sudangrass (Sorghum bicolor * S. bicolor var. Sudanese) vs. a fallow (control) associated with 4 irrigation rates (initiated when the water tension reached 5, 10, 20 or 30 kPa). The results showed that all 4 cover crops significantly increased microbial biomass C and N. Compared to the control (fallow), sorghum sudangrass, cowpea, sunn hemp and velvet bean increased microbial biomass C by 68.9%, 89.8%, 116.8% and 137.7%, and microbial N by 58.3%, 100.0%, 297.3% and 261.3%, respectively. One legume cover crop, cowpea, had no greater effect on soil microbial C and N, statistically, than the non-legume cover crop, sorghum sudangrass. The tropical legumes, velvet bean and sunn hemp, increased the microbial biomass C markedly. However, the various irrigation rates did not cause significant changes in either microbial N or microbial C. Furthermore, soil microbial activity was highly related to the N concentration and/or C:N ratio in the cover crops and the soil. Yields of tomato fruit correlated well with the level of soil microbial N and the soil C:N ratio. These results suggest that cover crops improve soil microbiological activity through the decomposition of organic C. Legumes are more effective than non-legumes, because legumes contain larger quantities of N and better C:N ratios than non-legumes. Enhanced levels of soil microbial activity improved soil fertility by increasing the plant available N, and by accelerating the mineralization of organic C and the recycling of nutrients.

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