

Fungal and Bacterial Communities in Transitional Organic Field Crop Systems

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One precept of organic agriculture is that organic practices increase soil biological diversity. However, there is little information on the effects of organic cultivation management on soil microbial community composition or on the rate at which any change may occur. To address these questions, an on-going multi-disciplinary project is being conducted to understand short and long-term ecological changes in agricultural land that is transitioned from conventional to organic production. The conventional system is a traditional Midwest corn - soybeans rotation managed according to conventional best management practices. The organic system is a rotation that includes corn, soybeans, hay and oats. All phases of the rotations are present each year in a randomized split-block design with six replicates. Soil samples (0 to 15 cm depth) from six organic transitional and six conventional treatments were collected in the fall, 3 years after the organic management was initiated. To assess changes in microbial community structure, gDNA was extracted and T-RFLP analysis was performed with fluorescently labeled primers targeting both 16S bacterial (11F and 907R) and fungal rDNA (ITS1-F and ITS4). Results showed that the combined T-RFLP profiles exhibited high similarity between the different treatments (Figures 1 and 2).

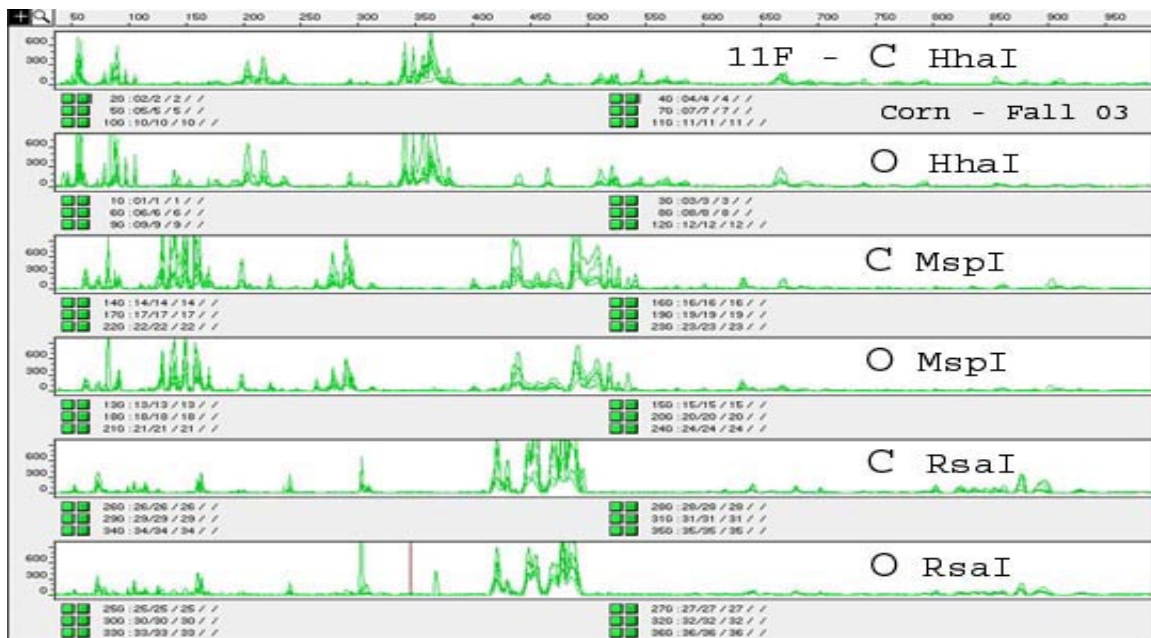


Figure 1. Corn T-RFLP profiles (combined replicates): comparison between Organic (O) and Conventional (C) treatments for each restriction digestion.



Figure 2. Soybean T-RFLP profiles (combined replicates): comparison between Organic (O) and Conventional (C) treatments for each restriction digestion.

Pearson-UPGMA clustering analysis showed that the six combined T-RFLP profiles for each treatment were more than 85% similar for bacteria and over 75% for fungi, which indicates that no clustering of treatments was observed. These results suggested that the gross microbial community composition over a 3-year transition from conventional to organic management did not change significantly.

Publications Resulting From This Work

Rigot, J. F., D. Stinner, F. C. Michel, Jr., 2005. Analysis of the impact of a 3-year Transition from Conventional to Organic Agricultural Rotation on Soil Bacterial and Fungal Community Structure by T-RFLP Analysis for rRNA genes (in process).