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Conservation tillage and soil biodiversity in the black soil region of northeast China: results from a long-term tillage trial

Shixiu Zhang, Liang Chang, Xuewen Chen, Yan Zhang, Xueming Yang, Shuxia Jia, and Aizhen Liang
Chinese Academy of Sciences, Northeast Institute of Geography and Agroecology, China (zhangshixiu@iga.ac.cn)

Conservation tillage has become the core technology to conquer the degradation of black soil, the 'giant panda in arable land'. Since soil is a home to a variety of organisms, it is very important to regard soil as a living system to evaluate the impact of conservation tillage on the health of black soil. Therefore, based on the long-term conservation tillage trial established by the Key Laboratory of Mollisols Agroecology of the Chinese Academy of Sciences, the responses of soil biodiversity and its function to conservation tillage were comprehensively elucidated in this study. Compared with conventional tillage, conservation tillage strongly improved the species richness (1-8%), density (25-57%), and biomass (30-50%) of the entire soil assemblages, including microorganisms, nematodes, collembolans, mites and earthworms, as well as the connectance of soil food web (14-32%). Furthermore, conservation tillage promotes the performance of soil biotic function in soil structure formation, soil carbon sequestration and nitrogen efficient utilization and crop yield stability. These results suggest that conservation tillage can effectively utilize the functional potential of soil organisms, which is of great significance to supporting the healthy and sustainable development of agriculture in the black soil region of northeast China.