

# Cover Cropping Increases Soil Fungal-Bacterial Community Diversity and Network Complexity in Apple Orchards on the Loess Plateau

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**Abstract:** **【 Objective 】** Soil microorganisms play a key role in soil fertility. Exploring the microbial community composition and diversity in response to cover crops is important for improving soil fertility in orchards. This study investigated how cover cropping can improve soil fertility by altering microbial community composition and the interrelations among soil microorganisms. **【 Method 】** Soil physicochemical indicators and microbial community composition were evaluated after a six-years application of cover cropping in an apple (*Malus pumila* cv. Fuji) orchard located on the Loess Plateau, China. Three treatments were applied: *Trifolium repens* treatment (TR), *Lolium perenne* treatment (LP), Clear tillage treatment (CT). **【 Result 】** (1) Soil physicochemical and biological properties between cover cropping and clear tillage treatment had changed significantly after long-term trial. Compared to CT treatment, TR and LP treatments significantly increased the levels of soil organic matter(SOM), microbial biomass carbon (MBC), and total nitrogen (TN) in orchard soil( $p < 0.05$ ). (2) The soil of the cover crop treatments had a more complex microbial co-occurrence network than that of the clear tillage treatment; in particular, the correlations among fungi were significantly increased. Changes in the fungal community were more related to microbial biomass nitrogen (MBN), TN, and carbon-nitrogen ratio (C: N). **【 Conclusion 】** This indicates that cover cropping not only increases the diversity of soil microorganisms but also increases the interrelations between microbial groups, thereby improving the soil fertility of apple orchards on the Loess Plateau.<sup>15</sup>

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