Study on the Microbiology of Intercropping on the Prevention and Control of Faba Bean Fusarium Wilt

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Abstract:

Wheat and faba bean intercropping is one of the important intercropping systems in China, due to its improvement of production in field ecosystem and disease control. Faba bean fusarium wilt is one of the most common soil-borne diseases in faba bean. There are currently studies showing that beneficial microorganisms in the soil play a key role in controlling soil-borne diseases. Our aim is to investigate the influence of the microbiology of intercropping on the prevention and control of faba bean fusarium wilt. A field experiment was conducted that wheat intercropped with faba bean, respectively, in comparison with wheat and faba bean monocropping. Experiments have shown that in comparison with monocropping, intercropping significant increased wheat grain yield of 28.6% and promoted faba bean grain yield, but not significantly in monocropping and intercropping, with a LER of 1.15. Intercropping dropped disease incidence and disease index of faba bean fusarium wilt at late of drum grain stage. In the mature period, the pathogen to fungus ratio and the number of fusarium oxysporum and gene copy number were significantly lower than monocropped faba bean with respective drops of 47.7% and 35.54%. Intercropping bands number were more than monoculture. PCR-DGGE was applied to assess the microbial community structure. Intercropping improved the Shannon and McIntosh index, and reduced the Simpson index compared with monocropping. In comparison with monocropping, faba bean and wheat intercropping could alter the rhizosphere microbial community structure and reduce the number of the pathogenic bacteria, consequently, to effectively control the occurrence of faba bean fusaruim wilt disease and increase crop yield and reflect intercropping advantage.

Keywords: Intercropping, faba bean fusarium wilt, PCR-DGGE, microbiology