

保护性耕作对旱作农田耕层土壤肥力及酶活性的影响

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Effects of conservation tillage on soil nutrients and enzyme activities in rainfed area

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摘要 通过田间定位试验,研究了不同耕作方式对黄土高原西部旱农区耕层土壤肥力和酶活性的影响。结果表明,秸秆还田可以显著提高0—5和5—10 cm土层有机质、全氮、全磷、全钾、铵态氮、速效磷、速效钾和3种水解酶活性;10—30 cm土层仅提高了有机质、全钾和速效钾含量,对其余各养分含量和水解酶活性并无明显影响。免耕降低了0—5、5—10和10—30 cm土层硝态氮含量,但对过氧化氢酶活性有明显促进作用。相关分析表明,土壤有机质、养分和碱性磷酸酶、蔗糖酶活性之间呈极显著相关关系。进一步应用主成分分析表明,土壤有机质、养分和水解酶活性共同反映着黄土高原雨养农区土壤肥力水平的高低。

关键词: 耕 秸秆还田 旱作农田 土壤养分 土壤酶活性 耕 秸秆还田 旱作农田 土壤养分 土壤酶活性

Abstract:

Based on the field experiments conducted in Dingxi of the western Loess Plateau, effects of the conventional tillage and five conservation agricultural patterns, namely conventional tillage, conventional tillage with stubble incorporating, no tillage with no stubble, no tillage with stubble retention, conventional tillage with plastic mulching and no tillage with plastic mulching on soil nutrients and enzyme activities in a rainfed farming system were studied. The results show that contents of soil organic matter, total N, total P, total K, $\text{NH}_4^+\text{-N}$, available P and K, soil urease, alkaline phosphates and invertase activities at the 0–5 and 5–10 cm layers are increased in the two stubble retention systems. Moreover, in the two stubble retention systems, soil organic matter, total K and available K are improved greatly at the 10–30 cm depth of soil. Soil catalase activity is improved at the 0–30cm depth of soil in the three no-tillage systems, while $\text{NO}_3^-\text{-N}$ content is decreased. There are significant correlations between soil organic matter, contents of the nutrients, alkaline phosphatase and invertase activities. Principal component analysis indicates that soil organic matter, nutrients and hydrolases could be used to evaluate soil fertility in rainfed areas of Loess Plateau.

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