

保护性耕作和杂草管理对冬小麦农田土壤水分及有机碳的影响

韩惠芳, 宁堂原, 李增嘉**, 田慎重, 王瑜, 仲惟磊, 田欣欣

作物生物学国家重点实验室/山东省作物生物学重点实验室/山东农业大学农学院, 山东泰安 271018

Effects of conservation tillage and weed control on soil water and organic carbon contents in winter wheat field.

HAN Hui-fang, NING Tang-yuan, LI Zeng-jia, TIAN Shen-zhong, WANG Yu, ZHONG Wei-lei, TIAN Xin-xin

State Key Laboratory of Crop Biology, Shandong Key Laboratory of Crop Biology| College of Agronomy, Shandong Agricultural University, Tai'an 271018, Shandong, China

- 摘要
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摘要

在秸秆全量还田的试验田中(从2004年起),于2008—2009年及2009—2010年冬小麦生育期间,研究了不同耕作措施(旋耕、耙耕、免耕、深松和常规耕作)和杂草管理对冬小麦田土壤水分及有机碳的影响.结果表明:在未除草条件下,免耕、深松的杂草总密度显著提高;而在除草条件下,杂草密度显著下降.小麦从拔节期到灌浆期0~60 cm土层水分含量呈明显波动变化,田间保留一定量的杂草可增加不同耕作方式0~20 cm的土壤水分含量,表现出一定的土壤水分保持效应.保留杂草仅提高了拔节期0~20 cm土层的土壤有机碳含量;而在抽穗期和灌浆期,0~20、20~40和40~60 cm土层有机碳含量均低于去除杂草处理.去除杂草条件下,深松显著提高了冬小麦籽粒产量;保留杂草条件下,旋耕的籽粒产量最高,常规耕作产量最低.

关键词: 保护性耕作 杂草 冬小麦 有机碳 土壤水分

Abstract:

Taking a long term (since 2004) straw-returning winter wheat field as the object, an investigation was made in the wheat growth seasons of 2008-2009 and 2009-2010 to study the effects of different tillage methods (rotary tillage, harrow tillage, no-tillage, subsoil tillage, and conventional tillage) and weed management on the soil water and organic carbon contents. No matter retaining or removing weeds, the weed density under subsoil tillage and no-tillage was much higher than that under rotary tillage, harrow tillage, and conventional tillage. From the jointing to the milking stage of winter wheat, retaining definite amounts of weeds, no matter which tillage method was adopted, could significantly increase the 0-20 cm soil water content, suggesting the soil water conservation effect of retaining weeds. Retaining weeds only increased the soil organic carbon content in 0-20 cm layer at jointing stage. At heading and milking stages, the soil organic carbon contents in 0-20, 20-40, and 40-60 cm layers were lower under weed retaining than under weed removal. Under the conditions of weed removal, the grain yield under subsoil tillage increased significantly, compared with that under the other four tillage methods. Under the conditions of weed retaining, the grain yield was the highest under rotary tillage, and the lowest under conventional tillage.

Key words: conservation tillage weed winter wheat organic carbon soil water

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