

本期目录 | 下期目录 | 过刊浏览 | 高级检索  
页] [关闭]

[打印本

同位素示踪 · 资源环境 · 动植物生理

保护性耕作对小麦-土壤系统综合效应研究

张水清<sup>1</sup>, 黄绍敏<sup>1</sup>, 聂胜委<sup>1</sup>, 郭斗斗<sup>1</sup>, 程秀洲<sup>2</sup>

1. 河南省农业科学院植物营养与资源环境研究所, 国家潮土土壤肥力与肥料效益长期监测站, 河南 郑州 450002;

2. 河南省潢川县农业技术推广中心, 河南 信阳 465150

摘要:

采用长期定位试验与短期田间试验相结合的方法,通过室内化验分析和数理统计,研究了河南省不同土壤类型区保护性耕作对土壤理化性质、土壤微生物生物量碳氮及小麦(*Triticum aestivum* L.)籽粒产量和产量构成因素的影响。结果表明,与传统耕作相比,保护性耕作显著提高土壤有机质、碱解氮、有效磷及交换性钾含量,分别提高24.8%、14.3%、7.8%和24.8%;而对小麦增产效果并不显著。4种不同保护性耕作方式下,免耕、浅耕相比旋耕、深耕,提高小麦穗数15.0%~32.2%,提高穗粒数2.6%~12.6%,但4种处理间小麦千粒重及籽粒产量效果无显著差异;免耕、浅耕较旋耕、深耕可以一定程度上提高苗期和灌浆期土壤含水率、以及土壤碱解氮和有效磷,并显著提高小麦不同生育时期的土壤微生物生物量碳氮。免耕与浅耕是较为适宜河南省小麦生产及土壤可持续利用的保护性耕作方式。

关键词: 保护性耕作 小麦产量 土壤有机质 碱解氮 有效磷 交换性钾 微生物生物量碳氮

## COMPREHENSIVE EFFECTS OF CONSERVATION TILLAGE ON WHEAT-SOIL SYSTEM

ZHANG Shui-qing<sup>1</sup>, HUANG Shao-min<sup>1</sup>, NIE Sheng-wei<sup>1</sup>, GUO Dou-dou<sup>1</sup>, CHENG Xiu-zhou<sup>2</sup>

1. Institute of Plant Nutrition and Environmental Resources Science, Henan Academy of Agricultural Sciences, National Long-term Monitoring Station of Fluvo-Aquic Soil Fertility and Fertilizer Effects, Zhengzhou, Henan 450002;

2. Agricultural Technique and Popularization Center in Huangchuan, Xinyang, Henan 465150

Abstract:

Combination of long-term (18 years at Zhengzhou) and short-term (2 years at Yanling) field experiment, chemical analysis and data statistics were employed to study comprehensive effects of conservation tillage on wheat-soil system. The results showed that compared with traditional tillage, conservation tillage significantly increased soil organic matter, alkali-hydrolyzable nitrogen, available phosphorus and exchangeable potassium. However, there was no significant difference in wheat (*Triticum aestivum* L.) grain yield between the two tillage patterns. The spike number and grain number per spike of wheat in no tillage (NT) and shallow tillage (ST) treatments were more than those in rotary tillage (RT) and deep tillage (DT) treatments, while there was no significant difference in 1000-grains weight and grain yield of wheat among the four tillage patterns. In treatments of NT and ST, soil water content, alkali-hydrolyzable nitrogen, available phosphorus, were enhanced, especially for soil microbial biomass C and N. Therefore, in Henan province NT and ST is the better conservation tillage pattern for wheat production and soil continuous use.

Keywords: conservation tillage grain yield of wheat soil organic matter alkali-hydrolyzable nitrogen available phosphorus exchangeable potassium microbial biomass C and N

收稿日期 2011-08-15 修回日期 2011-12-12 网络版发布日期

DOI:

基金项目:

扩展功能

本文信息

Supporting info

PDF(1309KB)

[HTML全文]

参考文献[PDF]

参考文献

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

引用本文

Email Alert

文章反馈

浏览反馈信息

本文关键词相关文章

保护性耕作

小麦产量

土壤有机质

碱解氮

有效磷

交换性钾

微生物生物量碳氮

本文作者相关文章

张水清

黄绍敏

聂胜委

郭斗斗

程秀洲

PubMed

Article by ZHANG Shui-qing

Article by HUANG Shao-min

Article by NIE Sheng-wei

Article by GUO Dou-dou

Article by CHENG Xiu-zhou

通讯作者:

作者简介:

作者Email:

#### 参考文献:

- [1] Humberto B C, Lai R. No-tillage and soil-profile carbon sequestration: An on-farm assessment[J]. Science Society of America Journal, 2008, 72:693-701
- [2] Huggins D R, Reganold J P. No-Till: the Quiet Revolution[J]. Scientific American, 2008, 299: 70-77
- [3] Metay A, Oliver R, Scopel E, Douzet J M, Moreira J A A, Maraux F, Brigitte J, Feller C. N<sub>2</sub>O and CH<sub>4</sub> emissions from soils under conventional and no-till management practices in Goiania ( Cerrados, Brazil)[J]. Geoderma, 2007, 141: 78-88
- [4] Rockstrom J, Kaumbutho P, Mwalley J, Nzabi A W, Temesgen M, Mawenya L Barron J, Mutua J, Damgaard-Larsen S. Conservation farming strategies in East and Southern Africa: Yields and rain water productivity from on-farm action research[J]. Soil&Tillage Research, 2009, 103: 23-32
- [5] Rolf D, Theodor F, Amir K, Li Hongwen. Current status of adoption of no-till farming in the world and some of its main benefits [J]. International Journal of Agricultural and Biological Engineering, 2010,3(1): 1-25
- [6] Tobert H A, Kenneth N P, John e M. Tillage system, fertilizer nitrogen rate, and timing effect on corn yields in the Texas blackland prairie[J]. Agronomy Journal, 2001, 93: 1119-1124
- [7] Tristram O W, Wilfred M P. Soil organic carbon sequestration rates by tillage and crop rotation: a global data analysis[J]. Soil Science Society of America Journal, 2002, 66:1930-1946
- [8] Mahdi A K, Mark A L. Effect of strip tillage on corn nitrogen uptake and residual soil nitrate accumulation compared with no-tillage and chisel plow[J]. Agronomy Journal, 2004, 96: 1164-1171
- [9] Ardell D H, Brian J W, Alfred L B. Tillage and nitrogen fertilization influence grain and soil nitrogen in an annual cropping system[J]. Agronomy Journal, 2001, 93:836-841
- [10] Hongwen Li, Huanwen Gao, Hongdan Wu, Wenying Li, Xiaoyan Wang, Jin He. Effects of 15 years of conservation tillage on soil structure and productivity of wheat cultivation in northern China[J]. Australian Journal of Soil Research,2007, 45: 344-350
- [11] 郭贤仕,杨如萍,马一凡,郭天文,张绪成. 保护性耕作对坡耕地土壤水分特性和水土流失的影响[J]. 水土保持通报,2010,30(4): 1-5
- [12] 张 磊,王玉峰,陈雪丽,马春梅,龚振平. 保护性耕作条件下土壤物理性状的研究[J]. 东北农业大学学报,2010, 41(9): 50-54
- [13] 高旺盛. 论保护性耕作技术的基本原理与发展趋势[J]. 中国农业科学,2007, 40(12): 2702-2708
- [14] 李向东,郭天财,高旺盛,胡廷积. 河南传统农业作物起源与耕作制度演变[J]. 中国农学通报,2006, 22(8): 574-579
- [15] 李向东,陈源泉,隋 鹏,高旺盛,马月存. 中国南方集约多熟稻田保护性耕作制度[J]. 生态学杂志,2007, 26(10): 1653-1656
- [16] 张海林,高旺盛,陈 阜,朱文珊. 保护性耕作研究现状、发展趋势及对策[J]. 中国农业大学学报,2005,10(1): 16-20
- [17] 孙悦超,麻硕士,陈 智,赵永来,苏 洁. 保护性耕作农田抗风蚀效应多因素回归分析[J]. 农业工程学报,2010,26(10): 151-155
- [18] 徐世宏,梁天锋,曾华忠,江立庚,丁成泉,张 玉. 不同耕作方式下水分管理对水稻氮素吸收利用的影响[J]. 核农学报,2009,23(6): 1065-1069
- [19] 李素娟,李 琳,陈 阜,张海林. 保护性耕作对华北平原冬小麦水分利用的影响[J]. 华北农学报,2007,22(S2): 115-120
- [20] 刘 爽,张兴义. 保护性耕作下黑土水热动态研究[J]. 干旱地区农业研究,2010,28(6): 15-22
- [21] 贾洪雷,马成林,李慧珍,陈忠亮. 基于美国保护性耕作分析的东北黑土区耕地保护[J]. 农业机械学报,2010, 41(10): 28-34
- [22] 李洪勋,吴伯志. 不同耕作措施对微环境变化的影响[J]. 核农学报,2005, 19( 4 ) : 269-273
- [23] 吕怡忠,廉晓娟,赵 红,刘武仁. 保护性耕作模式对黑土有机碳含量和密度的影响[J]. 农业工程学报,2010,26(11): 163-169

- [24] 胡宁, 娄翼来, 张晓珂, 梁文举, 梁雷. 保护性耕作对土壤交换性盐基组成的影响[J]. 应用生态学报, 2010, 21(6): 1492-1496
- [25] 康轩, 黄景, 吕巨智, 银秋玲, 梁和, 雷振甜, 李仍云. 保护性耕作对土壤养分及有机碳库的影响[J]. 生态环境学报, 2009, 18(6): 2339-2343
- [26] 姚珍, 黄国勤, 张兆飞, 彭剑锋, 吴孙娟, 章秀福, 高旺盛. 稻田保护性耕作研究—II. 不同耕作方式对水稻产量及生理生态的影响[J]. 江西农业大学学报, 2007, 29(1): 182-186
- [27] 李向东, 陈尚洪, 陈源泉, 高旺盛, 马月存, 马丽. 四川盆地稻田多熟高效保护性耕作模式的生态系统服务价值评估[J]. 生态学报, 2006, 26(11): 3782-3788
- [28] 李梦雅, 王伯仁, 徐明岗, 李桂花, 孙楠, 张文菊. 长期施肥对红壤有机碳矿化及微生物活性的影响