

论文

黄土高原水蚀风蚀交错区施肥对黑麦草农田土壤水溶性有机碳、氮的影响

沈玉芳^{1,2}, 陶武辉^{1,3}, 李世清¹

- 1. 西北农林科技大学 黄土高原土壤侵蚀与旱地农业国家重点实验室, 陕西 杨凌 712100;
- 2. 中国科学院、水利部 水土保持研究所, 陕西 杨凌 712100;
- 3. 西北农林科技大学 资源环境学院, 陕西 杨凌 712100

摘要:

为阐明施肥通过增加植物同化能力, 是否可影响土壤可溶性有机碳(DOC)、氮(DON)为目的, 采用田间试验, 研究了施肥对黄土高原水蚀风蚀交错区黑麦草生长农田DOC及DON含量及累积量的影响。结果表明, 不论施氮或施磷, 均能提高黑麦草冠层和根系生物量, 且施氮水平与黑麦草冠层和根系生物量之间均呈极显著正相关关系。施磷对土壤DOC含量影响相对较小; 土壤DOC含量随施氮水平增加呈现减少趋势, 0~20 cm土层土壤DOC含量下降幅度最高达25.9%; 施氮后不同土层土壤DON含量及累积量增加, 0~100 cm土层DON累积量与施氮量呈显著正相关关系; 单施磷时0~60 cm土层土壤DON含量较不施肥对照减少, 但差异不显著。以上结果表明, 在黄土高原水蚀风蚀交错区, 高量无机氮肥投入可增加该区植物产量及土壤DON, 但不利于土壤DOC累积, 说明氮肥投入对改善该地区土壤供氮能力有积极意义。

关键词: 土壤 可溶性有机碳 可溶性有机氮 施肥 黑麦草

Effects of Fertilization on Dissolved Organic Carbon and Nitrogen in the Ryegrass Farmland Soil in Wind-Water Erosion Crisscross Region on the Loess Plateau

SHEN Yu-fang^{1,2}, TAO Wu-hui^{1,3}, LI Shi-qing¹

- 1. State Key Laboratory of Soil Erosion and Dryland Farming on the Loess Plateau, Northwest A & F University, Yangling 712100, China;
- 2. Institute of Soil and Water Conservation, CAS and Ministry of Water Resources, Yangling 712100, China;
- 3. College of Resources and Environmental Sciences, Northwest A & F University, Yangling 712100, China

Abstract:

Many results showed fertilization enhanced plant assimilation. But it's not clear that whether these assimilation products will have effect on soil dissolved organic carbon (DOC) and dissolved organic nitrogen (DON) or not. And whether that will make changes to soil quality, especially in arid and semiarid regions, such as the Loess Plateau in China. Therefore, a field trial was carried out with ryegrass as indicative crop in wind-water erosion crisscross region on the Loess Plateau, to study the effect of fertilization on the contents and accumulations of DOC and DON in farm soil. The results showed that both the application of nitrogen fertilizer and phosphorus fertilizer increased the above-ground and root biomass of ryegrass. And the relative relation is very significant between them. There was no obvious effect on the content of DOC when only phosphorus was applied to soil. The content of DOC decreased with the application of nitrogen fertilizer. And the largest decrease amplitude, 25.9%, was found in 0-20 cm by PN4 treatment in 2008. There was no significant decrease in the content of DON in the soil where only phosphorus applied. But the content of DON increased in its degree in different soil layers with the application of nitrogen fertilizer. There was an obviously positive correction between accumulation of DON and N fertilizer. And both the correction coefficients of 2007 and 2008 was 0.99 ($n=5$). The result indicated that the chemical nitrogen application was in favor of the biomass and DON in the region, but was against DOC. It suggested higher chemical nitrogen application was of beneficial to the increase of soil nitrogen supply capacity in wind-water erosion crisscross region on the Loess Plateau.

Keywords: soil DOC DON fertilization ryegrass

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