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黄土丘陵区不同退耕还林地土壤有机碳库差异分析

Difference analysis of soil organic carbon pool in returning farmland to forest in loess hilly area

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英文关键词: [soil](#) [organic carbon](#) [forestry](#) [oxidizable labile organic carbon](#) [carbon management index](#)

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中文摘要:

为揭示不同人工还林地影响土壤碳库储量、质量的效应及差异特征,探讨了黄土丘陵区不同退耕还林地土壤有机碳及其组分质量分数、密度及碳库管理指数(CMI)的变化情况。结果表明:退耕12 a后,与坡耕地相比,不同还林地主要提高了0~40 cm土层总有机碳质量分数,增幅总体为沙棘>刺槐>山杏>杨树>撂荒,且在0~10 cm土层增幅最高(71.1%~156.9%),20~40 cm土层增幅最低(23.5%~68.9%)。这也使不同还林地0~100 cm土层总有机碳密度均显著增加。0~100 cm土层活性有机碳密度增幅为山杏、杨树(平均106.8%)>刺槐、沙棘(平均55.4%)>撂荒(9.9%),而非活性有机碳密度增幅则为沙棘(43.0%)>刺槐、山杏、杨树(平均22.1%)>撂荒(14.2%),这与不同还林地影响各土层活性与非活性有机碳质量分数和分布差异大有关。与坡耕地相比,山杏、沙棘及刺槐使0~20 cm土层CMI平均增加1.28倍,杨树和山杏则使20~100 cm土层CMI增加1.20~2.49倍。综上所述,退耕还林具备提升土壤碳库及其质量的潜力,且短期内总体以沙棘提升碳库效果较佳,山杏改良碳库质量较好。

英文摘要:

To determine the effects of different plantation on the quantity and quality of soil carbon pool, the fractions store and carbon management index (CMI) of soil organic carbon (SOC) in returning farmland in loess hilly region were investigated. After 12 years of returning farmland, the mass fraction of total organic carbon (TOC) of forest lands was increased mainly in 0-40 cm soil layer compared with the farmland, and the increasing rate presented a trend of Buckthorn>Robinia>Prunus armeniaca>Poplar>abandonment. The maximal growth of TOC was in the layer of 0-10 cm (71.1%-156.9%), and the minimal was in 20-40 cm (23.5%-68.9%). Thus, TOC in 0-100 cm soil layer improved significantly in each forest land. The labile organic carbon (LOC) density in 100 cm depth soil improved from 9.9% to 106.8% in the following order: abandonment, Robinia, Buckthorn, Prunus armeniaca and Poplar. Non-labile organic carbon (NLOC) was increased from 14.2% to 43.0% in the following order: abandonment, Robinia, Prunus armeniaca, Poplar and Buckthorn. The forest species exhibited different content and distribution of LOC and NLOC in each soil layer. Compared with the farmland, Prunus armeniaca, Buckthorn and Robinia improved CMI by 1.28 times in 0-20 cm soil, and Prunus armeniaca and Poplar improved CMI by 1.2-2.49 times in 20-100 cm soil. Consequently, returning farmland showed the potential of promoting soil carbon pool and quality. Buckthorn and Prunus armeniaca improved organic carbon content and the quality of carbon pool in soil respectively.

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