

研究报告

# 保护性耕作对紫色水稻土团聚体组成和有机碳储量的影响

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**摘要** 通过长期定位试验, 研究了保护性耕作对四川盆地紫色水稻土耕层团聚体组成和有机碳储量的影响. 结果表明, 保护性耕作显著影响耕层团聚体组成及其有机碳含量. 油菜免耕、厢作免耕、绿肥免耕、垄作翻耕和厢作翻耕0~10 cm土壤大团聚体分别比对照(12%)增加23%、69%、9%、36%和28%, 而10~20 cm土壤大团聚体比对照低9%~38%. 冬水免耕、油菜免耕和绿肥免耕0~10 cm土壤大团聚体中有机碳含量分别比对照增加13%、31%和32%, 而10~20 cm土壤各处理有机碳含量低于对照28%~54%, 其土壤大团聚体和微团聚体中碳浓度差异低于0~10cm土壤. 各处理0~10 cm土壤总有机碳储量比对照增加8%~28%, 而10~20 cm土壤总有机碳储量低于对照4%~22%. 传统耕作转变为保护性耕作13年后0~10和10~20 cm土壤有机碳固定率分别为53和25 g·m<sup>-2</sup>·a<sup>-1</sup>, 传统耕作有机碳固定率分别为26和33 g·m<sup>-2</sup>·a<sup>-1</sup>. 保护性耕作有利于紫色水稻土表层大团聚体的形成和土壤总有机碳储量的提高.

**关键词** [免耕](#) [轮作](#) [秸秆覆盖](#) [团聚体组成](#) [碳储量](#) [稻田](#)

分类号

## Effects of conservational tillage on aggregate composition and organic carbon storage in purple paddy soil.

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### Abstract

A 13 years experiment was conducted to study the effects of conservational tillage on the aggregate composition and organic carbon storage in purple paddy soil of Sichuan Basin. The results showed that under no-tillage and ridge culture (rice-rape) (NR-RR), no-tillage and plain culture (rice-rape) (NP-RR), no-tillage and ridge culture (rice-green manure) (NR-RGM), tillage and ridge culture (rice-rape) (TR-RR), and tillage and plain culture (rice-rape) (TP-RR), the proportion of macroaggregates in 0-10 cm soil layer was 23%, 69%, 9%, 36%, and 28% higher than that under conventional tillage (CT) (12%), respectively, while in 10-20 cm soil layer, this proportion under conservational tillage was 9%-38% lower than that under CT. The organic carbon storages in the macroaggregates at the depth of 0-10 cm were 13%, 31% and 32% higher under no-tillage and ridge culture (rice-fallow) (NR-RF), NR-RR and NR-RGM than under CT, respectively, while that at the depth of 10-20 cm was 28%-54% lower. The differences in organic carbon storage between macro- and microaggregates were smaller in 10-20 cm layer than in 0-10 cm layer. Under conservational tillage, the organic carbon storage was 8%-28% higher in 0-10 cm layer but 4%-22% lower in 10-20 cm layer, compared with that under CT. After converted from CT to conservational tillage for 13 years, the mean organic carbon sequestration rate was 53 g·m<sup>-2</sup>·a<sup>-1</sup> and 25 g·m<sup>-2</sup>·a<sup>-1</sup> at the depths of 0-10 cm and 10-20 cm, while under CT, it was 26 g·m<sup>-2</sup>·a<sup>-1</sup> and 33 g·m<sup>-2</sup>·a<sup>-1</sup>, respectively. Conservational tillage was favorable to the formation of macroaggregates in surface soil layer and the enhancement of soil total organic carbon storage.

**Key words** [no-tillage](#) [rotation](#) [straw mulch](#) [aggregate composition](#) [carbon storage](#) [paddy soil](#)

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