



## **Estimate of Carbon Sequestration under Cropland Management in China**

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**Abstract:** Long-time conventional tillage on a large scale and straw burning cause significant losses of soil organic matter (SOM); this makes cropland an emission source of greenhouse gas (GHG). However, in recent years, organic carbon in cropland has been increasing due to the spread of no-tillage techniques, and increasing the area where straw returning is practised, as well as extensively using cropland management tools such as fertilizing and irrigating. This can turn the cropland into an important sink of GHG. This paper analyzed the change of soil organic carbon (SOC) under different cropland management regimes, estimated carbon sequestration under cropland management in China. The results will be the base for a GHG inventory of Chinese croplands. **Method:** Through reviewing correlated references and constructing cropland management scenarios, the change of SOC under different cropland management regimes in long-term experiments were analyzed. In addition, according to farming system regions in China, the quantities of carbon sink under cropland management regimes were estimated and compared with the results of Tier2 approach of cropland remaining cropland in 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories. Finally, Meta-Analysis was used to estimate carbon sequestration under cropland management regimes in China. **Result:** The most successful management system for increasing SOC was using fertilizer and manure together, which could increase SOC 0.889 tChm-

2yr-1. Next came straw returning, using manure and no-tillage, respectively achieving 0.597 tChm-2yr-1 and 0.545 tChm-2yr-1 and 0.514 tChm-2yr-1. The effect of using fertilizer was not evident, only reaching 0.129 tChm-2yr-1. On the whole, these values were significantly larger than those of Tier2. Results also showed the change of SOC varied with different management systems and different areas. The increase of SOC in the Yellow-Huaihe-Haihe Rivers region, the upper and middle reaches of Yangtze River region and the southwest region was higher than that in the northeast region. There was even a decrease in SOC in Black Soil organic in the Northeast under fertilizer regimes. There was a negative relation between the annual growth rate of SOC and the original value under cropland management. So the balance of SOC and carbon sequestration potentials could be estimated under different management systems.

Conclusion The cropland management techniques of using fertilizer and manure together, straw returning, using manure and no-tillage could all increase SOC significantly. Carbon sequestrations of straw returning and using fertilizer and manure together were great.

**Key Words:** China; Cropland management; Soil carbon sink; IPCC Tier2; Meta-Analysis