

Optimizing the Effects of Additional Straw Returning on Soil Organic Carbon Components: Insights from a Chinese Long-Term Conservation Field Study

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Abstract

Since the return to straw management in conservation fields, it remains unknown the optimum quantity needed for good soil health and plant production. This study aims at highlighting the lessons from a study conducted on an existing long term-term conservation tillage field within the Gansu Province of China. Two main tillage types, conventional tillage with straw returns (TS) and no tillage with straw returns (NTS) with four different additional straw return treatment levels of spring wheat and field pea as test crops. NTS fields showed more sensitivity to treatment effect. NTS fields had significantly higher grain yield. NTS fields had significantly higher SOC content than TS fields with SOC ranging from 5.56 – 20.77 g kg⁻¹. No straw addition (NSA 0x) and low straw addition (LSA 1x) levels recorded higher yields in wheat fields whiles for pea fields, it was LSA 1x and medium straw addition (MSA 2x). The observed trend in terms of increasing SOC content among the straw addition treatments was LSA 1x > NSA 0x > MSA 2x > high straw addition (HSA 3x). Highest accumulated SOC stocks was observed under LSA 1x while lowest SOC stocks was NSA 0x. The relative intensities of the C-H bonds were higher in LSA 1x and also, was more effective in increasing soil hydrophobicity. Straw addition to conservation fields has limit and lessons leant from this study can serve as guide to better understanding the complexities of our farming systems in our quest for sustainable agriculture production.

Key Words: