



Understanding on Soil Inorganic Carbon Transformation in North China

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Soil total carbon balance in long-term fertilization field experiments in North China Plain. Four long-term fertilization experiments (20-30 years) were investigated on SOC in 40 cm, calcium carbonate and active carbonate (AC) in 180 or 100 cm soil profile, $\delta^{13}\text{C}$ values of SOC and $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values of carbonate in soil profile, particle distribution of SOC and SIC in main soil layers, and ratios of pedogenic carbonate (PC) in SIC and C3-SOC in SOC. The most important conclusion is that fertilization of more than 20 years can produce detectable impact on pool size, profile distribution, ratio of active component and PC of SIC, which make it clear that SIC pool must be considered in the proper evaluation of the response of soil carbon balance to human activities in arid and semi-arid region.

Land use impact on soil total carbon pool in Inner Mongolia. With the data of the second survey of soils in Inner Mongolia and the 58 soil profile data from Wu-lan-cha-bu-meng and Xi-lin-hao-te, combining with the ^{13}C and ^{18}O techniques, SIC density and stock in Inner Mongolia is estimated. The main conclusion is that soils in inner Mongolia have the same level of SOC and SIC, with the density in 100cm pedons of $8.97 \text{ kg}\cdot\text{m}^{-2}$ and $8.61 \text{ kg}\cdot\text{m}^{-2}$, respectively. Meanwhile, the significantly positive relationship between SOC and SIC in A layer indicates co-sequestration of SOC and SIC exist.

Evaluation of the methods for measuring CA enzyme activity in soil. In laboratory, method in literature to measure CA activity in soil sample was repeated, and found it was not valid indeed. The failure could not attribute to the disturbance of common ions like NO_3^- , SO_4^{2-} , Ca^{2+} , and Mg^{2+} . The adsorption of CA to soil material was testified as the main reason for that failure. A series of extractants were tested but no one can extract the adsorbed CA and be used in measuring CA activity in soil sample.

Carbonate transformation in field with straw returned and biochar added. In 2009, a field experiment concerning soil carbonate transformation under straw return and biochar addition was carried out. It is designed as a long-term field experiment. In the experiment, Ca^{2+} and Mg^{2+} in soil solution of different depth and time, in situ soil pH, soil CO_2 concentration, and microbial activity will be measured. The main propose of the experiment is to explore the relationship between the transformation of SOC and SIC. Meanwhile, it is one of important field experiment for biochar effects on crop production, soil processes, and environmental impact.

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