图书基本信息

书名：<<土地利用变化与施肥管理方式对黑土碳库的影响>>

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前言

Human activity（fossil fuel combustion and land-use change）consumed large amounts of energy resources leading to C02 and other greenhouse gases emitted into atmosphere， which escalated and changed natural processes resulting in greenhouse effect and global warming， and it is estimated that atmospheric has increased from a pre.industrial concentration of about ppm to about 380 ppm.The global carbon cycle is defined as the processes of carbon flow and ex-change through the biosphere， atmosphere， hydrosphere， and geosphere being one of the most complex， interesting and important global element cycles.The cycle is usually thought of as four major pools of carbon interconnected by pathways ofexchange.These pools include the atmosphere， the terrestrial biosphere， the oceans and the sediments fincluding fossil fuels）.Soil carbon pool is the largest carbon reservoir in the terrestrial biosphere， and its carbon storage is twice that of the atmosphere and three times that of the vegetation including forest， grassland and arable land.Soil carbon p001 can be either sink or source depending on the carbon input and output through soil-plan tatmosphere interface.Thus， globally， not only scientists and government leaders， but common people are concerned about to what extent global soils can sequester the increasing atmospheric.

内容概要

On the basis of the long-term position experiments established in the National Field Research Station of Agroecosystem in Hailun, and Key Laboratory of Black Soil Ecology of Chinese Academy of Sciences, this research aims to examine the impact of land-use change and long-term fertilization on soil carbon stocks, the physically protected SOC, and carbon emissions from black soil as well as carbon budget through the ecosystems and soil-plant-atmosphere interface. The stability mechanism of black soil carbon pool was defined, and carbon sequestration capacity of black soil was also evaluated.

书籍目录

9.12 Summary 9.13 References

章节摘录

Soil carbon flux comprises three biological processes：soil microbial respiration． plant root respiration and soil fauna respiration， and a non-biological process：the oxidation and decomposition of matters containing carbon（Raich and Tufek cioglu，2000）． In general， soil fauna respiration and C02 emission as a result of non-biological process can be negligible due to the very small amount detected． Inaddition， C02 emissions from soil can be divided into plant root respiration， mi． crobial decomposition of plant derived organic carbon． and microbial decomposi． tion of native soil organic matter,iemicrobial autotrophic respiration；in gen-eral， the combination of root respiration and microbial decomposition of plantderived organic matter is defined as rhizosphere respiration（Kuzyakov and Cheng， 2001；Cheng and Kuzyakov， 2005；Yang and Cai， 2005）． The substrates for rhizosphere respiration come from carbon recently fixed through photosynthesis， whereas SOM decomposition is primarily a function of soil heterotrophic activi-ties using soil carbon． This two processes act simultaneously and are also linkedthrough rhizosphere interactions， which may exert a stimulative（priming effect）or a suppressive influence on SOM decomposition（Cheng， 1999a， 1999b；Chengand Kuzyakov,——005）． Roots of higher plants， as a key functional component of belowground systemsand one of the main soil forming agents， interact with virtually all soil compo-nents． The processes largely controlled or directly affected by roots and often OC-curring in the vicinity of the root surface are commonly referred to rhizosphere processes． These processes may include root production through growth and death（root turn over）， rhizodeposition， root respiration and rhizosphere micro-bial respiration as a result of microbial utilization of rhizodeposits． Rhizosphere processes play a critical role in the global carbon cycle．