Geophysical Research Abstracts
Vol. 14, EGU2012-12477, 2012
EGU General Assembly 2012

Assessment of Carbon Sequestration in German Alley Cropping Systems

P. B. Tsonkova, A. Quinkenstein, C. Böhm, and D. Freese

Chair of Soil Protection and Recultivation, Brandenburg University of Technology, Cottbus, Germany (penka.tsonkova@tu-cottbus.de)

Alley cropping systems (ACS) are agroforestry practices in which perennial trees or shrubs are grown in wide rows and arable crops are cultivated in the alleys between the tree rows. Recently, ACS which integrate stripes of short rotation coppices into conventional agricultural sites have gained interest in Germany. These systems can be used for simultaneous production of crops and woody biomass which enables farmers to diversify the provision of market goods. Adding trees into the agricultural landscape creates additional benefits for the farmer and society also known as ecosystem services. An ecosystem service provided by land use systems is carbon sequestration. The literature indicates that ACS are able to store more carbon compared to agriculture and their implementation may lead to greater benefits for the environment and society. Moreover, carbon sequestration in ACS could be included in carbon trading schemes and farmers rewarded additionally for the provision of this ecosystem service. However, methods are required which are easy to use and provide reliable information regarding change in carbon sequestration with change of the land use practice. In this context, our aim was to develop a methodology to assess carbon sequestration benefit provided by ACS in Germany. Therefore, the change of carbon in both soil and biomass had to be considered. To predict the change in soil carbon our methodology combined the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and the soil organic carbon balance recommended by the Association of German Agricultural Investigation and Research Centers (VDLUFA). To reflect the change in biomass carbon average annual yields were adopted. The results showed that ACS established on agricultural sites can increase the carbon stored because in the new soil-plant system carbon content is higher compared to agriculture. ACS have been recommended as suitable land use systems for marginal sites, such as post-mining areas. In such areas soil carbon usually increases at a faster initial rate compared to agricultural land which means that these areas could provide high level of carbon sequestration service in the short term. The approach will be broadened to include assessment of other ecosystem services provided by ACS in Germany which would increase the possibility to adequately compensate farmers for the supply of environmental benefits.

Keywords: agroforestry, biomass production, carbon sequestration, ecosystem services, marginal sites