Geophysical Research Abstracts
Vol. 15, EGU2013-6105, 2013
EGU General Assembly 2013

Managing Bioenergy Production on Arable Field Margins for Multiple Ecosystem Services: Challenges and Opportunities

Andrea Ferrarini (1), Paolo Serra (1), Stefano Amaducci (1), Marco Trevisan (2), and Edoardo Puglisi (3)

(1) Institute of Agronomy, Genetics and Field Crops - Università Cattolica del Sacro Cuore, Piacenza, Italy (andrea.ferrarini@unicatt.it), (2) Institute of Agricultural and Environmental Chemistry - Università Cattolica del Sacro Cuore, Piacenza, Italy, (3) Institute of Microbiology - Università Cattolica del Sacro Cuore, Piacenza, Italy

Growing crops for bioenergy is increasingly viewed as conflicting with food production. However, energy use continues to rise and food production requires fuel inputs, which have increased with intensification. The debate should shift from “food or fuel” to the more challenging target: how the increasing demand for food and energy can be met in the future, particularly when water and land availability will be limited. As for food crops, also for bioenergy crops it is questioned whether it is preferable to manage cultivation to enhance ecosystem services ("land sharing" strategy) or to grow crops with lower ecosystem services but higher yield, thereby requiring less land to meet bioenergy demand ("land sparing" strategy). Energy crop production systems differ greatly in the supply of ecosystem services. The use of perennial biomass (e.g. Switchgrass, Mischantus, Giant reed) for energy production is considered a promising way to reduce net carbon emissions and mitigate climate change. In addition, regulating and supporting ecosystem services could be provided when specific management of bioenergy crops is implemented. The idea of HEDGE-BIOMASS* project is to convert the arable field margins to bioenergy crop production fostering a win-win strategy at landscape level. Main objective of the project is to improve land management to generate environmental benefits and increase farmer income. The various options available in literature for an improved field boundary management are presented. The positive/unknown/negative effects of growing perennial bioenergy crops on field margins will be discussed relatively to the following soil-related ecosystem services: (I) biodiversity conservation and enhancement, (II) soil nutrient cycling, (III) climate regulation (reduction of GHG emissions and soil carbon sequestration/stabilization, (IV) water regulation (filtering and buffering), (V) erosion regulation, (VI) pollination and pest regulation. From the analysis of available data, it emerges that production of biomass for bioenergy on field margins improves ecosystem services, depending upon the soil/agroecosystem health status of arable land displaced by the bioenergy crop. Considering that climate change is a dominant driver for agroecosystem health and perennial bionergy crops tend to stabilize soil C in arable land, it will be necessary to focus our attention to the improvement of climate regulation ecosystem service value in ecologically-degraded arable field margins. This management option seems to be the most sustainable strategy to enhance a win-win strategy: namely, sequestering carbon, producing biomasses for energetic purposes, improving the whole set of ecosystem services affected by soil organic matter, leaving, at the same time, more arable land for food and fiber crops.

* The HEDGE-BIOMASS project is funded by Italian Minister of Agriculture for the period 2013-2016 and is being followed by BIOMASS Research Center at Università Cattolica del Sacro Cuore (Piacenza, Italy).