



Physical modelling of the sustainable C-accumulating lawn ecosystems in Moscow

Andrei Stepanov and Ivan Vasenev

Russian Timiryazev State Agrarian University, Moscow, Russia, composer@list.ru

Introduction. The urban ecosystems are usually considered as one of most unstable ones, unable to withstand the negative anthropogenic impacts on their principal components, including soil cover in case of man-changed lawn ecosystems. Soil environmental functions control the lawn environmental quality and transfer of principal chemical elements and compounds between the atmosphere, vegetation and soil cover in case of urban ecosystems. Physical modelling of the man-changed local lawn ecosystems with different versions of the constructed topsoil is useful tool to design and develop the sustainable C-accumulating lawn ecosystems in conditions of the biggest in Europe Moscow megalopolis with high level of anthropogenic impacts and originally low pools of Corg in topsoil of the zonally dominated in the background forest landscapes Albeluvisols.

Objects and Methods. Principal objects of the lawn topsoil physical modelling have been developed in the Ecological Experimental Station of the Russian Timiryazev State Agrarian University with typical for the northern part of Moscow megalopolis urban landscape conditions. The experimental lawn topsoil versions have been constructed from the different combinations of the prepared peat and sand mixture with the basic artificial topsoil horizon of 10 cm, in different percentage of the principal components with limited application of nitrogen fertilizers for grass production process support and topsoil Corg conservation. The topsoil Corg pools are monitored by soil traditional analysis methods plus soil CO₂ and CH₄ fluxes measurement by expositional chambers with LI-COR and stationary gas chromatograph. Fertilizing efficiency – by agrochemical analysis plus soil N₂O and NO₃- fluxes measurement.

Future results application. Transfer of the already verified monitoring protocol from the previous container experiment to the micro-field one with plot areas comparative to the real lawns and with additional versions of the nitrogen fertilizing will give us possibilities to develop experimentally based recommendations for sustainable lawn soil design taking into attention soil environmental functions including CO₂ emission regulation one that are very actual in conditions of Moscow megalopolis active development and before challenges of the global climate changes especially accelerated in the Eurasian boreal zone.