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Baptiste Grard, N. Frascaria Lacoste, Claire Chenu

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Rooftop gardens and ecosystem services: beyond food production

Grard B.J.-P.*^{1,2}, Castell J.-F.¹, Houot S.¹, Michel J.-C.⁴, Cambier P.¹, Bel N.⁵, Madre F.⁵, Aubry C.⁶, Frascaria-Lacoste N.², Chenu C.¹

- (1) UMR ECOSYS, INRA-AgroParisTech, France
 - (2) UMR ESE, AgroParisTech – University Paris-Sud, CNRS France.
 - (3) UP EPHOR, Agrocampus Ouest, France
 - (4) TOPAGER, France
 - (5) UMR SAD-APT, INRA, France
- * Corresponding author. E-mail: baptiste.grard@agroparistech.fr

Urban area has become the living place of more than half of the world population since 2011. The loss of urban and peri-urban green space has led to many environmental issues (water runoff due to increasing sealed surface, air and water pollution, food security, lack of space, waste treatment etc.). As many authors showed it, these challenges may partially be solved through the development and improvement of green infrastructures or urban ecosystems (green roof and walls, artificial ponds, parks, gardens etc.). Indeed, these are a great opportunity to improve urban resiliency via ecosystem services.

During the last decade urban farming has grown in urban areas taking many forms such as gardens (in vacant land, public space, etc.), rooftop farming in open air or greenhouse etc. An innovative prospect is to create rooftop gardens on organic city wastes, thereby enhancing the urban metabolism. However, little attention has been paid to the ecosystem services provided by rooftop farming. Increasing knowledge is required to design sustainable rooftop farms and give tools to urban planners in order to implement such green infrastructures.

An experimental pilot project called T4P (Parisian Productive rooftopP, Pilot Project) took place on the rooftop of the technical University AgroParisTech since 2012. Four different treatments based on the use of three contrasted urban organic wastes and their layering were compared to a commercial potting soil through yield measurements, substrates characterization, leaching characterization and pollutants quantification.

The aim of this presentation is to analyze and discuss a first assessment of ecosystem services provided by a productive rooftop based on urban waste. We quantify services such as regulation service (i.e water runoff quantity and quality, recycling of organic wastes, regulation of climate via carbon storage) as well as provisioning services (food production and quality). And compare them with different situations such as bare rooftop or nonproductive green roof. Our analysis shows the multifunctional character of technosols made from organic wastes located on urban rooftops and the ecosystem services approach appears as a fertile one to evaluate and devise constructed technosols as a component of green infrastructures.

Key words: urban farming, ecosystem services, technosol, urban waste, green roof, green infrastructure