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1s6a A healthy soil as a basic enabling condition for the transition towards circular land management and land use

Rooftops farming on urban waste provide many ecosystem services

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Urban farming, especially on rooftops, is a popular and growing topic in both the media and scientific literature. It is a great opportunity to meet some of the challenges linked to urban development worldwide. However, little attention has been paid to date to the growing medium of green roofs, i.e., Technosols. A better understanding of the influence of Technosol choice and its links with ecosystem services is required in order to maximize the environmental benefits of urban rooftop farming. Between March 2013 and March 2015, a pilot project called T4P (Parisian Productive rooftop, Pilot Experiment) was conducted on the rooftop of AgroParisTech University. Two different units using urban organic wastes were compared to a commercial potting soil based on yield and vegetables trace metal concentration measurements, substrates characterization and leaching quantification. We then performed an assessment of the ecosystem services expected from the Technosols in terms of the provisioning of food (food production and quality), regulation of water runoff (quantity and quality of runoff), and recycling of organic wastes. We identified indicators of these ecosystem services (e.g., yield, annual mass loss of mineral nitrogen) and compared their measured values to reference situations (asphalt roof, green roof, and cropland). Measured yields were almost equivalent to that in horticulture in the same area and the Technosols retained 73.9 – 83.9% of the incoming water (rainfall or irrigation). This is the first quantitative analysis of ecosystem services delivered by urban garden rooftops developed on organic wastes. It demonstrates their multifunctional character and allows to identify trade-offs. We propose that the ecosystem services approach should be used for the design of such soil-based green infrastructures and more generally for the design of sustainable urban agriculture.

Keywords: