



**HAL**  
open science

## Rooftop farming on urban waste provide many ecosystem services

Baptiste Grard, Claire Chenu, Nastaran Manouchehri, Sabine Houot, Nathalie Frascaria, Christine Aubry

### ► To cite this version:

Baptiste Grard, Claire Chenu, Nastaran Manouchehri, Sabine Houot, Nathalie Frascaria, et al.. Rooftop farming on urban waste provide many ecosystem services. EGU General Assembly, EGU, Apr 2018, Vienna, Austria. hal-04372018

**HAL Id: hal-04372018**

**<https://hal.inrae.fr/hal-04372018>**

Submitted on 4 Jan 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



## **Rooftop farming on urban waste provide many ecosystem services**

Baptiste Grard (1,3), Claire Chenu (1), Nastaran Manouchehri (2), Sabine Houot (1), Nathalie Frascaria (3), and Christine Aubry (4)

(1) AgroParisTech, INRA, Université Paris Saclay, UMR Ecosys, Grignon, France (claire.chenu@inra.fr), (2) AgroParisTech, INRA, Université, Paris Saclay, UMR Genial, Paris, France, (3) AgroParisTech, CNRS, Université Paris Sud, Université Paris Saclay, UMR LSE, Orsay, France, (4) INRA, AgroParisTech, Université Paris Saclay, UMR Sadapt, Paris, France

Urban farming, especially on rooftops, is a popular and growing topic in both the media and the scientific literature, providing a genuine opportunity to meet some of the challenges linked to urban development worldwide. However, relatively little attention has been paid to date to the growing medium of green roofs, i.e. Technosols. A better understanding of the influence of Technosols and the link 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. Urban organic waste was used, and results were compared with those obtained using a commercial potting soil, based on yield and trace metal concentrations, substrate characterization, and the amount of leaching. An assessment of the ecosystem services expected from the Technosols was undertaken in terms of the output of food (food production and quality), regulation of water runoff (quantity and quality), and the recycling of organic waste. Indicators of these ecosystem services (e.g., yield, annual loss of mass of mineral nitrogen) were identified, measured and compared with reference cases (asphalt roof, green roof, and cropland). Measured yields were almost equivalent to those obtained from horticultural sources in the same area, and the Technosols also 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, and demonstrates their multifunctional character, as well as allowing the identification of trade-offs. An ecosystem services approach is proposed for the design of soil-based green infrastructure of this kind, and more generally for the design of sustainable urban agriculture.

**Keywords:** urban farming, ecosystem services, Technosol, urban waste, green roof, urban garden, productive rooftop, green infrastructure.