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# Will higher temperatures favor exotic plant species in urban wastelands? An experimental study on soil seed banks from cities in Central France.

Sabine Greulich<sup>\*†1,2</sup>, Maëva Hirsch<sup>3</sup>, Marion Brun<sup>3</sup>, and Francesca Di Pietro<sup>3</sup>

<sup>1</sup>Cités, Territoires, Environnement et Sociétés (CITERES) – CNRS : UMR7324, Université François Rabelais - Tours – 33 allée Ferdinand de Lesseps BP 60449 37204 Tours cedex 3, France

<sup>2</sup>ZAL – LTSER Zone Atelier Loire – France

<sup>3</sup>Cités, Territoires, Environnement et Sociétés – Université de Tours, Centre National de la Recherche Scientifique : UMR7324 – France

## Résumé

Ecosystems with high anthropogenic disturbances are known to be particularly sensitive to the establishment of ruderal and exotic species. It has been suggested that they are a stepping stone in the spread of exotic and invasive species into more dense plant communities from undisturbed sites.

Urban wastelands are potentially sites with ruderal characteristics that host a rather thermophileous vegetation, since mean temperatures in cities have been found to be up to 2 °C above those of the surrounding area (Sukopp & Wurzel 2003). They have also been found to comprise a high amount of exotic and invasive species (Muratet et al. 2007). It can be hypothesized that exotic and invasive species, especially those of Mediterranean or (sub)tropical origin, will become more dominant with the increasing temperatures predicted by climate change scenarios.

The present study aims to quantify the amount of exotic and invasive species in wastelands from two middle-sized urban areas centered around the cities of Tours and Blois in Central France (respectively 167 km<sup>2</sup> with 250000 inhabitants and 114 km<sup>2</sup> with 65000 inhabitants). It also aims to test the impact of temperature rises on the expression of the wastelands soil seed banks.

The presence of exotic and invasive species in the standing vegetation was evaluated in a total of 179 wastelands with a minimum size of 400 m<sup>2</sup>, dominated by herbaceous to shrubby vegetation. Soil seed banks were sampled from 15 wastelands presenting three degrees of invasion. Soils were then experimentally submitted to two climate simulations during six months: (i) a simulation of present climate, (ii) a simulation of future climate in the city of Tours by 2085. Seedlings appearing in the two treatments were counted and identified.

The results of the study confirm only partially the tested hypothesis. Exotic and invasive plant species were less present in the standing vegetation than in other studies of urban wastelands. The presence of exotic and invasive species in seed banks was very variable, and

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\*Intervenant

†Auteur correspondant: [sabine.greulich@univ-tours.fr](mailto:sabine.greulich@univ-tours.fr)

this variability tended to increase with increasing presence of exotics in the standing vegetation. Composition of seedling communities tended to differ according to climate treatment, but no common trajectories from present to future communities could be established.

This study suggest that climate scenarios only are not sufficient to predict future vegetation dynamics in urban wastelands, but other parameters such site history, soil type, connectivity, composition of present communities need to be taken into account.

Sukopp, S. & Wurzel, A. 2003. The Effects of Climate Change on the Vegetation of Central European Cities. *Urban Habitats*, 1(1), ISSN 1541-7115. <http://www.urbanhabitats.org>  
Muratet, A., Machon, N., Jiguet, F., Moret, J. & Porcher, E. 2007. The Role of Urban Structures in the Distribution of Wasteland Flora in the Greater Paris Area, France. *Ecosystems* 10, 661 -671

**Mots-Clés:** plant communities, climate change, invasive species, simulation vegetation dynamics