Increasing the biodiversity of extensive green roofs using native plants is not so easy : exploring the plant community responses to substrate depth and insolation

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Introduction

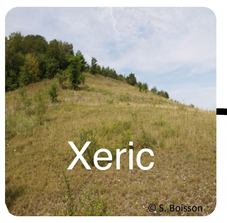
Dry grasslands are habitats with a high distinctive biodiversity. The abiotic conditions of green roofs are as stressful as those of dry grasslands. Green roofs could support grassland plant communities that could have distinct survival responses depending on green roofs microconditions.

Objective

To test the installation success of native plant communities on two substrate depths and three insolations in order to confirm the opportunity to create analogous habitats on green roofs system.

Methods

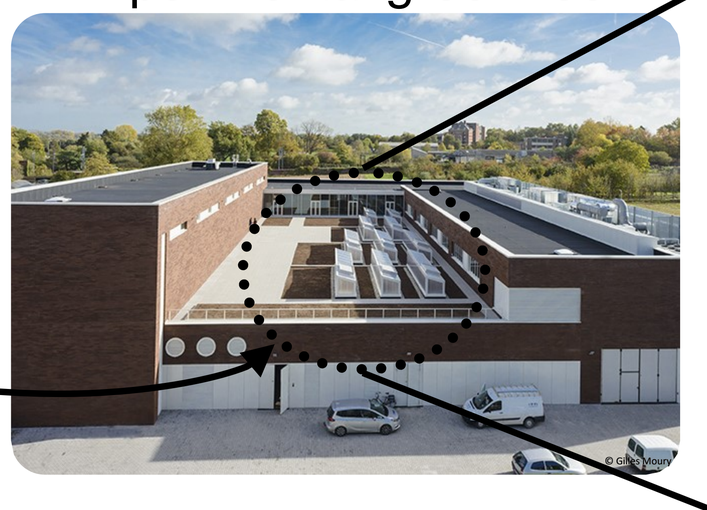
Dry grasslands



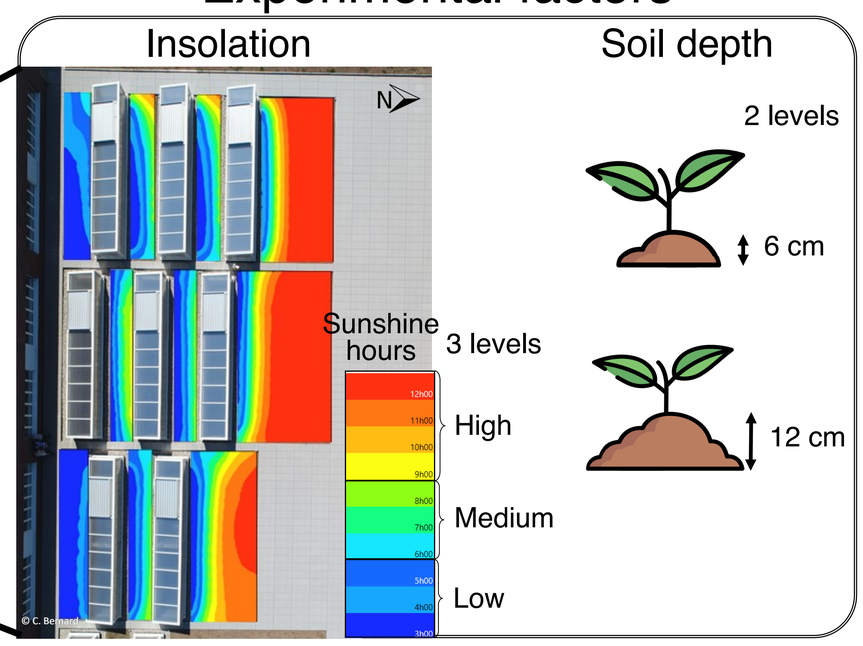
29 species

Seeded in October 2017
110 seeds/m² per species

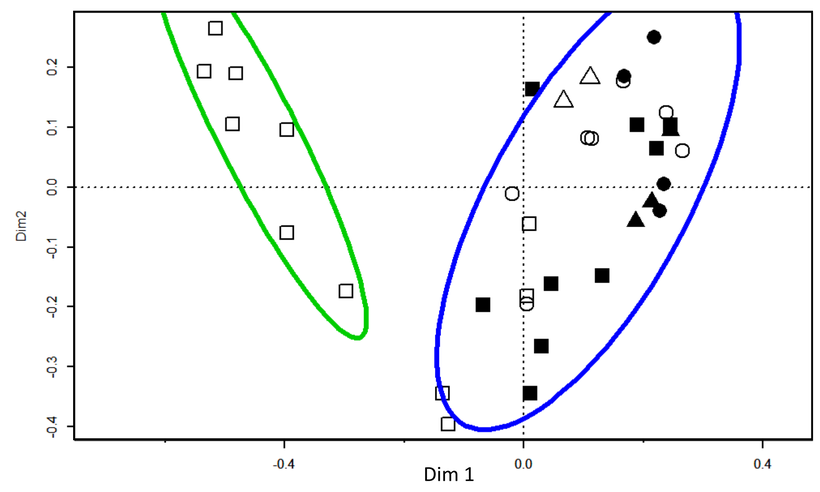
Experimental green roof



Experimental factors



Results



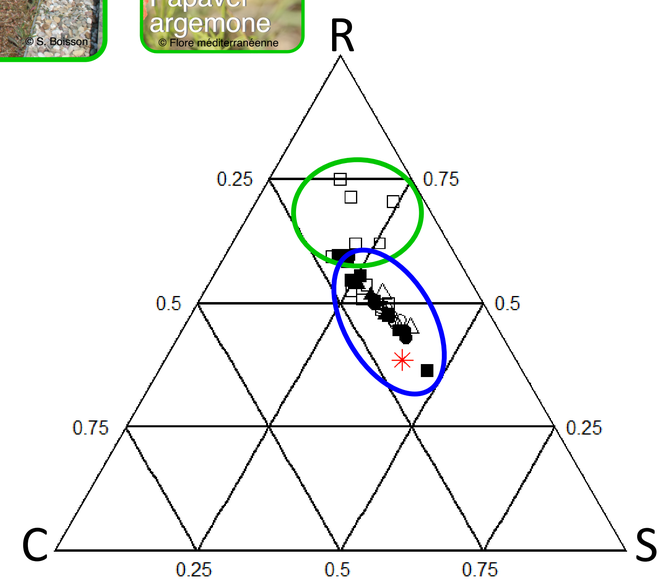
Principal Coordinate Analysis (PCoA) of the floristic composition of plant communities in June 2019 (1 point = 1 m² plot)

Legend

Soil Depth

Insolation	6 cm	12 cm
H	□	■
M	△	▲
L	○	●

✳ Seeded community



Average CSR strategy of plant cover in June 2019 (1point = 1m² plot)

- Depth and insolation create **2 different plant communities**.
- Specific abundance, richness and community cover were lower in plots with **higher insolation** and **6 cm substrate depth** defined as the most stressful conditions.

- The CSR triangle is used to represent the **competitive** (C), **stress-tolerant** (S) or **ruderal** (R) status of a species or a community.
- When the **insolation increased** and the **substrate depth decreased**, the plant community tended to be more **ruderal** (R).

Take home message

The heterogeneity of microconditions of a green roof and thus its structure have promoted the installation of distinct plant communities. In the case of the most stressful conditions, the integration of ruderal species makes it possible to quickly have the installation of a cover that could be beneficial to the installation of other species.

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