

## ➤ LIVE laboratory

It is composed of 80 researchers in various domains. This plurality allows a complete work without any grey areas about many questions.

Biggest part of their works is to analyze relations between humans and nature and more generally to study deal with urban ecosystems.

### Background:

Evol'ville team characterized 41 herbaceous spaces defined by two landscape gradients, artificialization and management gradients. The artificialization gradient defines the landscape around sites cover by buildings versus vegetation. The management gradient shows the site mowing frequency.

They studied the impact of these gradients on different traits (leaf specific surface area, reproduction height and flower size) of various plants in the field. Their results showed a variability within the two gradients. The next step is to determine if the traits variability observed are due to plasticity of plants or real genetic modifications. In order to study that, they harvested seeds from plants studied in the field for further *ex situ* experiment.



*Daucus carota*<sup>10</sup>  
(Apiaceae)



*Trifolium pratense*<sup>9</sup>  
(Fabaceae)



*Lotus corniculatus*<sup>6</sup>  
(Fabaceae)



*Medicago lupulina*<sup>11</sup>  
(Fabaceae)



*Galium album*<sup>12</sup>  
(Rubiaceae)



*Plantago lanceolata*<sup>7</sup>  
(Plantaginaceae)



*Dactylis glomerata*<sup>8</sup>  
(Poaceae)

### What is a trait?

Morphological or physiological characteristics that impact plant fitness:

- **Growth** (ex: Specific Leaf Area<sup>1</sup>)
- **Survival** (ex: Seed shape<sup>3</sup>)
- **Reproduction** (ex: Number of seeds<sup>5</sup>)

### Which traits will be modified?

Will these modifications be integrated in the genome?

How artificialization and management gradients will impact these traits?

### Genetic or plastic changes?

## ➤ Scientific approach

### Material and method

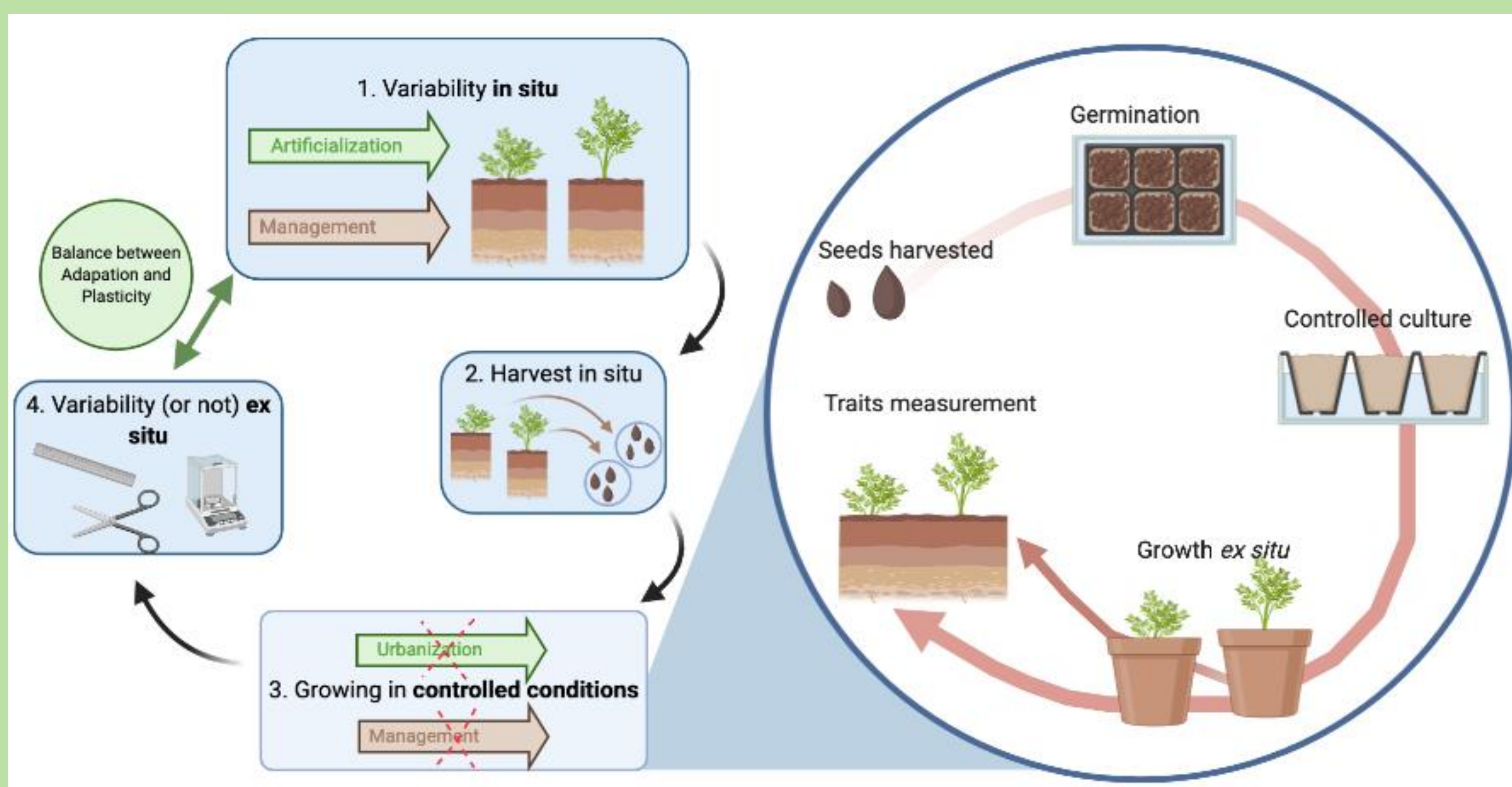


Figure: Experimentation Summary drawing

Created with BioRender.com

### Do some seeds need special treatments to germinate?

- To answer this question, we are going to do **germination tests**. It will provide us a **germination rate** for each species which will allow us to determine how much seeds we will have to sow for our experiments. Some species may have a too small germination rate. Indeed, **Fabaceae seeds** are plants which might need **abrasion** to germinate. Knowing that three of our plants are **Fabaceae**, we may have to scratch them to help their germination.
- Germination tests are scheduled already in **January**.

## ➤ Introduction

Plants are under constant environmental pressure and must adapt to survive. Evol'ville is a project on potential adaptations of plants to survive in urbanized ecosystems.

We study how green management and artificialization can influence plant adaptation by growing seeds harvested in different gradients in the same conditions and measuring functional traits, in order to answer:

## ➤ Discussion

Modifications are not maintained → plasticity



Modifications are maintained → adaptation

- Urban environments drive genetic or plastic modifications in plant species<sup>4</sup>.

### Several points still in question:

- Abundance of seeds harvested will be limiting to study some gradients.
- Avoid interspecific crossing to assure a descendance reflecting only one gradient.
- Experimentation time limits → developmental stages between species are different.
- Urban environments are very heterogeneous<sup>2</sup> within same gradient.
  - ↳ can differently influence phenotypic and genetic changes within the same gradient.

## ➤ Conclusion

- **Traits modification along artificialization and management gradient reflects plasticity or adaptation mechanisms according to their maintenance in controlled conditions.**

## ➤ Perspectives

- How plant communities will change in urban environments?
- Predict the modification of flora in cities in response to urban project.

## ➤ Bibliography

- (1) Bouchet, D. C., Cheptou, P. O., & Munoz, F. (2017). Mowing influences community-level variation in resource-use strategies and flowering phenology along an ecological succession on Mediterranean road slopes. *Applied vegetation science*, 20(3), 376-387.
- (2) Gorton, A. J., Moeller, D. A., & Tiffin, P. (2018). Little plant, big city: a test of adaptation to urban environments in common ragweed (*Ambrosia artemisiifolia*). *Proceedings of the Royal Society B: Biological Sciences*, 285(1881), 20180968.
- (3) Thompson, K. A., Renaudin, M., & Johnson, M. T. (2016). Urbanization drives the evolution of parallel clines in plant populations. *Proceedings of the Royal Society B: Biological Sciences*, 283(1845), 20162180.
- (4) Winchell, K. M., Reynolds, R. G., Prado-Irwin, S. R., Puente-Rolón, A. R., & Revell, L. J. (2016). Phenotypic shifts in urban areas in the tropical lizard *Anolis cristellus*. *Evolution*, 70(5), 1009-1022.
- (5) Yakub, M., & Tiffin, P. (2017). Living in the city: urban environments shape the evolution of a native annual plant. *Global change biology*, 23(5), 2082-2089.

## ➤ Photographic sources

- (6) Altigérien. (19 juin 2013). *Lotus corniculatus* L. [1753]. Tela-Botanica. <https://api.tela-botanica.org/img:0001869470.jpg>
- (7) Christine Blehaut. (25 août 2010). *Plantago lanceolata* L. [1753]. Tela-Botanica. <https://api.tela-botanica.org/img:0002252320.jpg>
- (8) gregoire@... (26 mai 2011). *Dactylis glomerata* L. [1753]. Tela-Botanica. <https://api.tela-botanica.org/img:0000332500.jpg>
- (9) Guy Lecq. (8 avril 2017). *Trifolium pratense* L. [1753]. Tela-Botanica. <https://api.tela-botanica.org/img:0012424490.jpg>
- (10) Sylvain Piry (2 juillet 2017). *Daucus carota* L. [1753]. Tela-Botanica. <https://api.tela-botanica.org/img:0019936940.jpg>
- (11) Vincent Jouhet. (20 juin 2012). *Medicago lupulina* L. [1753]. Tela-Botanica. <https://api.tela-botanica.org/img:0000803130.jpg>
- (12) Yoan Martin. (13 mai 2015). *Galium album* Mill. [1768]. Tela-Botanica. <https://api.tela-botanica.org/img:0003148330.jpg>

Contact us! 

GASNIER L.: lucas.gasnier@etu.unistra.fr

KUNTZ M.: margot.kuntz2@etu.unistra.fr

MEYER M.: martin.meyer4@etu.unistra.fr

TALMOT V.: victor.talmot@etu.unistra.fr