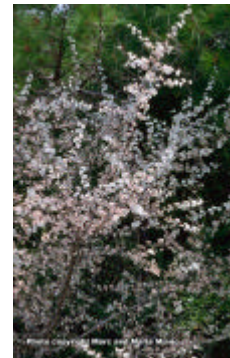
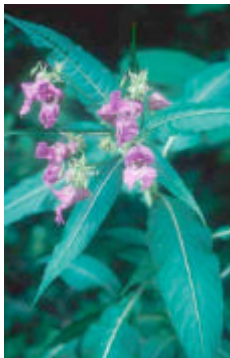


# INPLANBEL

Invasive Plants in Belgium :

Patterns, Processes and Monitoring



## CONTEXT

- **INVASIVE SPECIES** : 2 criteria
  1. Alien (exotic): taxon introduced outside its natural distribution
  2. Reproduces and increases its range in its new environment
- **SECOND LARGEST CAUSE OF BIODIVERSITY LOST**  
(competition, predation, habitat modification,...)
- **INTERNATIONAL PRIORITY** :  
CBD, IGBP\_GCTE, Diversitas, E.U. 5th and 6th Framework Programme
- **NO CLEAR SCIENTIFIC STRATEGY IN BELGIUM:**  
Lack of scientific basis for monitoring and management

## OBJECTIVES

- Multifunctional and multi-level analysis of exotic plant invasion in Belgium
- Specifically :
  - Provide a **structured list of exotic** and their succes of invasion
  - Detailed analysis of interactions between **species dispersal traits and landscape** characteristics
  - Identification of universally valid principles of biological invasions : **species and communities traits**
  - Analysis of the **consequences of plant invasion** on ecosystems
- Basic framework for threat evaluation, policies development, management strategy and further research programs

## PARTNERS

- Laboratoire d'Écologie – Faculté universitaire des Sciences agronomiques de Gembloux (FUSAGx) (G. Mahy) - coordinator
- Belgian National Botanic Garden (L. Vanhecke)
- Laboratoire de Génétique et Ecologie végétales – Université Libre de Bruxelles (ULB) (P. Meerts)
- Research Group Plant and Vegetation Ecology – University of Antwerp (UIA) (I. Nijs)

## METHODS : Biological models

- All exotics for basic information
- 3 set of target species for detailed analysis
  - Set I : Invaders or potential invaders of natural or semi natural habitats of interest for biodiversity
  - Set II : Species from man made communities (tropical C4 grasses in maize fields)
  - Set III : Exotics that failed to become invasive or with different level of success

# Methods : Biological models

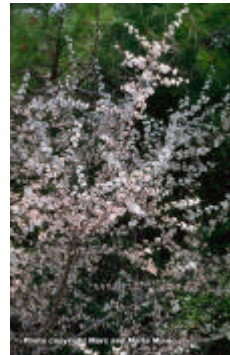
*Impatiens glandulifera*



*Polemonium cearuleum*



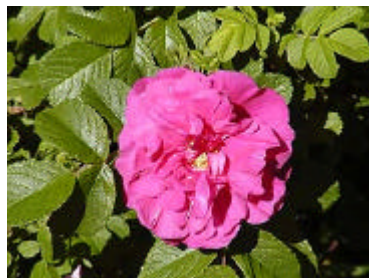
*Prunus serotina*



*Heracleum mantegazzianum*



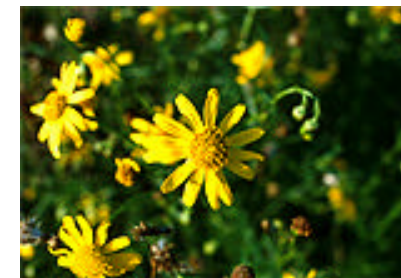
*Fallopia japonica*



*Rosa rugosa*



*Solidago gigantea*

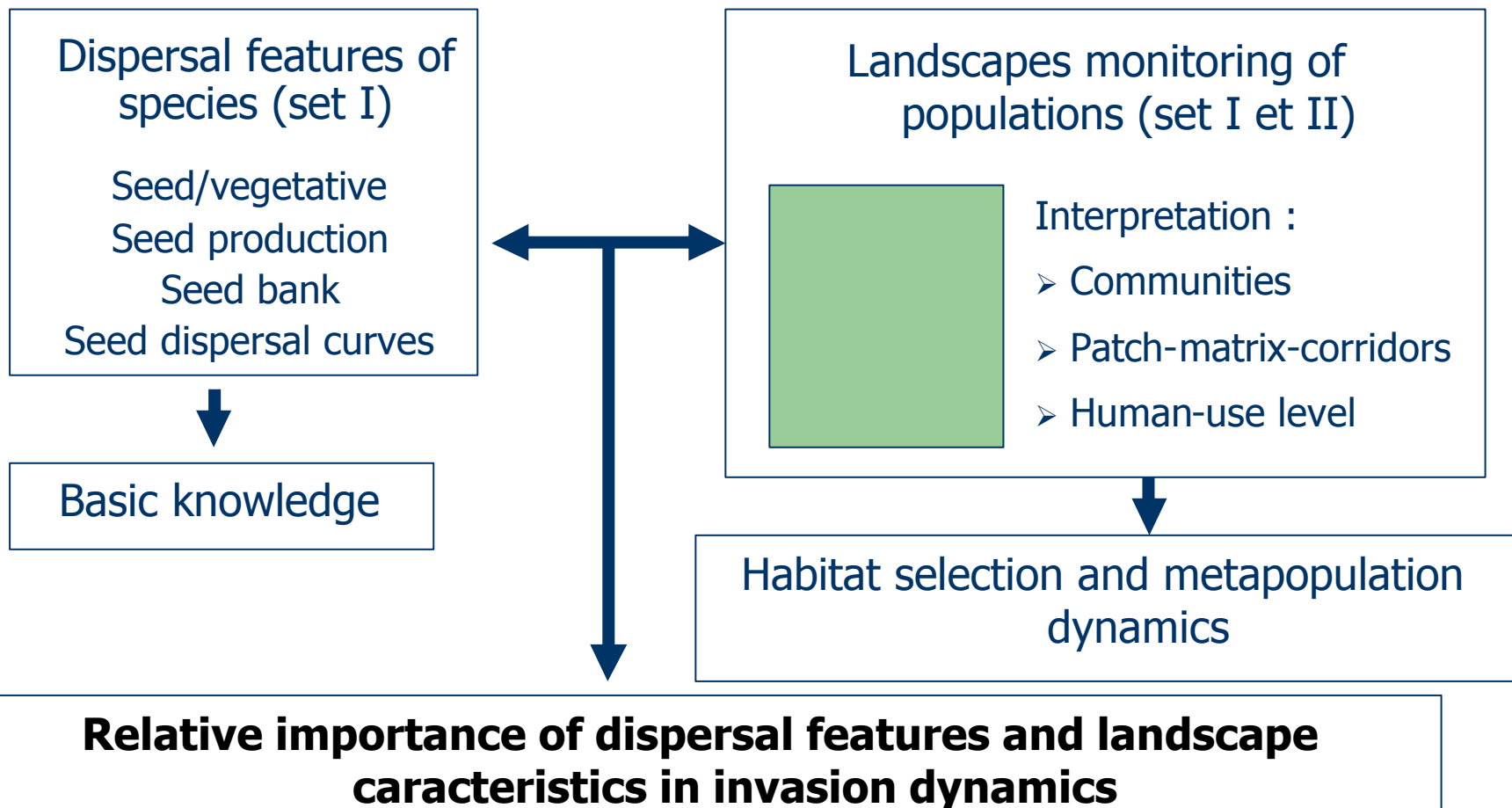


*Senecio inaequidens*

## WP I : List and invasion succes

- Compilation of a list of exotics species present or historically found in Belgium
  - Compilation of data from herbarium/litterature
- For set 1 and set 3 : estimation of invasive success as expansion rate (area increase/time units)
  - Compilation of data from herbarium/litterature
- For all curent exotic species : evaluation of invasive risk
  - Compilation of data from adjacent or ecologically similar regions : litterature and case study

## WP 2 : Dispersal/landscape





## WP 3 : Trait analysis

Traits of species with different  
invasive success ( $\leq$ WP1)

Traits of representative invaded  
ecosystems ( $\leq$  WP2)

### Ecophysiological traits

Relative growth rate, photosynthetic  
rate, light compensation point, dark  
respiration rate

[P,K,Mg,Ca, micronutiments]<sub>leaf</sub>

+ Reproductive features ( $\leq$ WP2)

### Ecophysiological traits

Soil cover

Active radiation, red: far red ratio –  
humidity

Soil characteristics and soil elements  
concentrations ( $\leq$ WP4)

**Multiple regression of invasive success simultaneously on one invader  
trait and one invaded system trait for all combinaisons**  
Significant traits of species – ecosystems AND interactions

## WP 4 : Impact on ecosystems

**Selection of invaded and non-invaded patches within homogeneous sites**

**Comparisons of ecosystem traits**

Variance analysis :

- systematic differences in traits between invaded and non invaded patches across sites
- differences among species in the effect on soils

Multiple regresion (path analysis)

- relative importance of site conditions and species traits for determining ecosystems changes (<= WP3)

**Net primary production and above ground nutrient stock**

Dried standing phytomass, mineral nutrient composition.

**Topsoil chemicals properties**

PH, C total, C/N ratio,  
Cation exchange capacity,  
extractable P and cations,  
nitrogen mineralisation

## Expected results and valorisation

- 
- List of exotics species with classification in risk class
  - Key traits of species correlated to invasion
  - Key traits of ecosystems correlated to invasibility
  - Habitat preference for target species
  - Historical and current dynamics of invasion for target species
  - Landscape compartments prone to invasion in relation to human land use
  - Evaluation of level of impact on ecosystem for target species
- Early detection of problematic species
  - Early detection of sensible ecosystems
  - Developing strategy for monitoring
  - Guidelines for Land-use planing
  - Feasibility of site restoration

## Valorisation and user committee

- Network for monitoring invasive species
  - In nature reserve (warning system) : RNOB, Ardenne & Gaume, Natuurpunt
  - At larger scale : AEF, FloWer
- Increasing awareness of policy makers (land-use and environment)
  - Aminimal, DGRNE, CRNFB, IBGE
- Increasing awareness of belgian scientific community :
  - Biodiversity platform and National Focal point