

Université Libre de Bruxelles  
Laboratory of Plant Genetics and Ecology

Impact of invasive plants on soil properties,  
nutrient fluxes and primary productivity

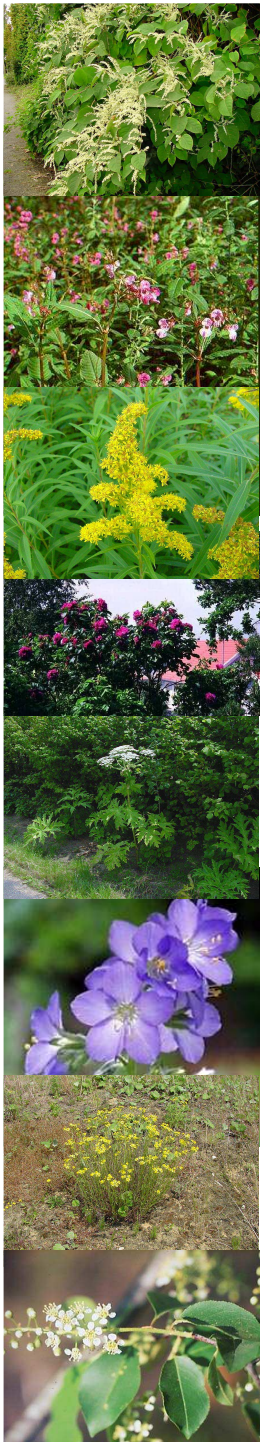


*Invasive plants in Belgium:  
Patterns, processes and monitoring*



SOS Invasions !  
9<sup>th</sup> March 2006



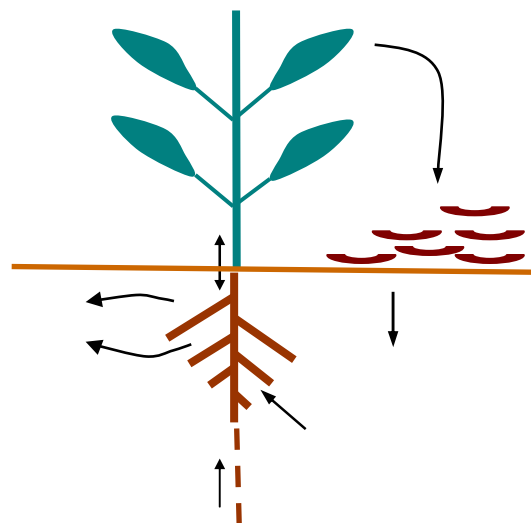


Uninvaded

Invaded



What does happen in ecosystems when a single exotic species replaces multispecific vegetation ?



Soil Properties

Net Primary productivity

Nutrient fluxes



# Methodology

9 species and 5 sites / species



*Fallopia japonica*



*Heracleum mantegazzianum*



*Solidago gigantea*



*Senecio inaequidens*



*Impatiens glandulifera*



*Impatiens parviflora*



*Prunus serotina*



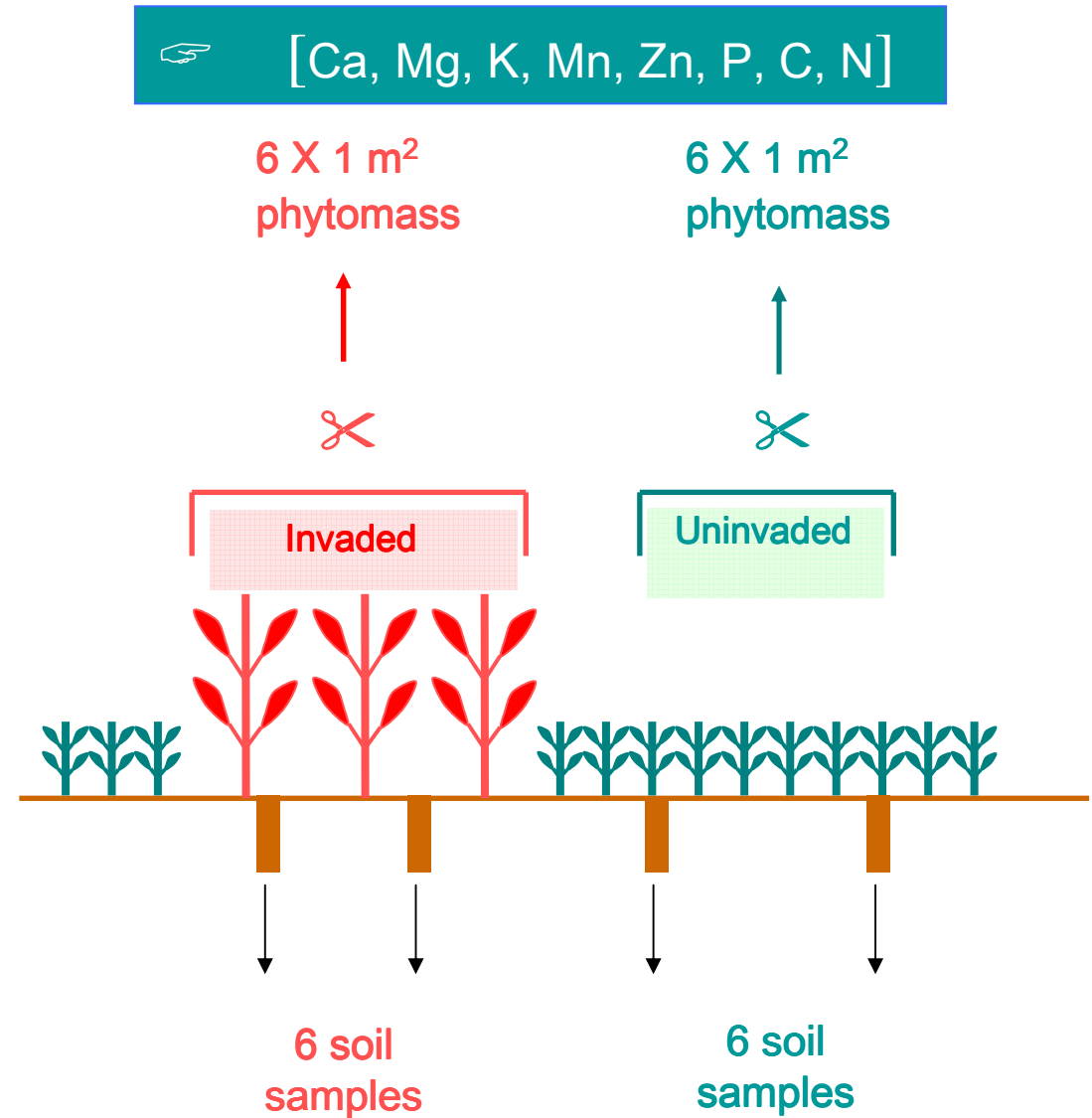
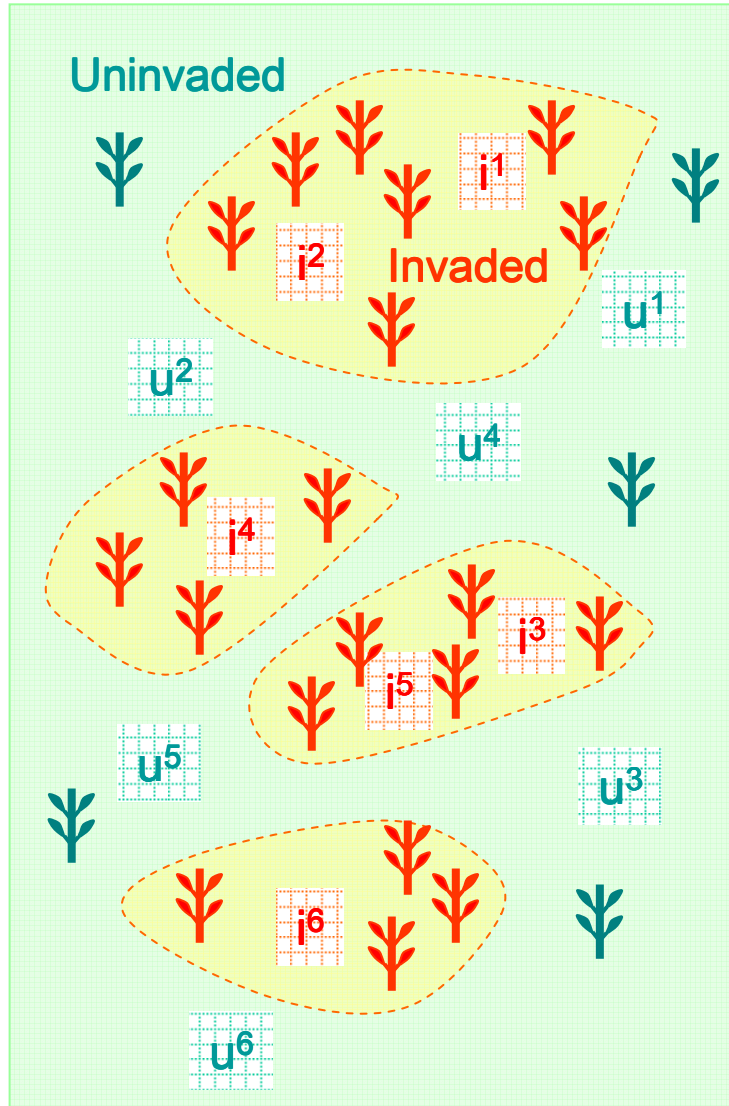
*Rosa rugosa*



*Polemonium caeruleum*

# Methodology

## Comparisons between invaded and uninvaded control plots

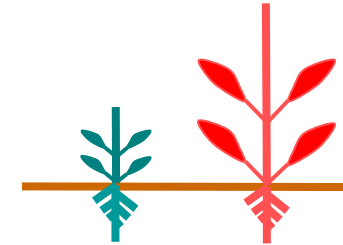


Soil pH, exchangeable cations, P, C, N...

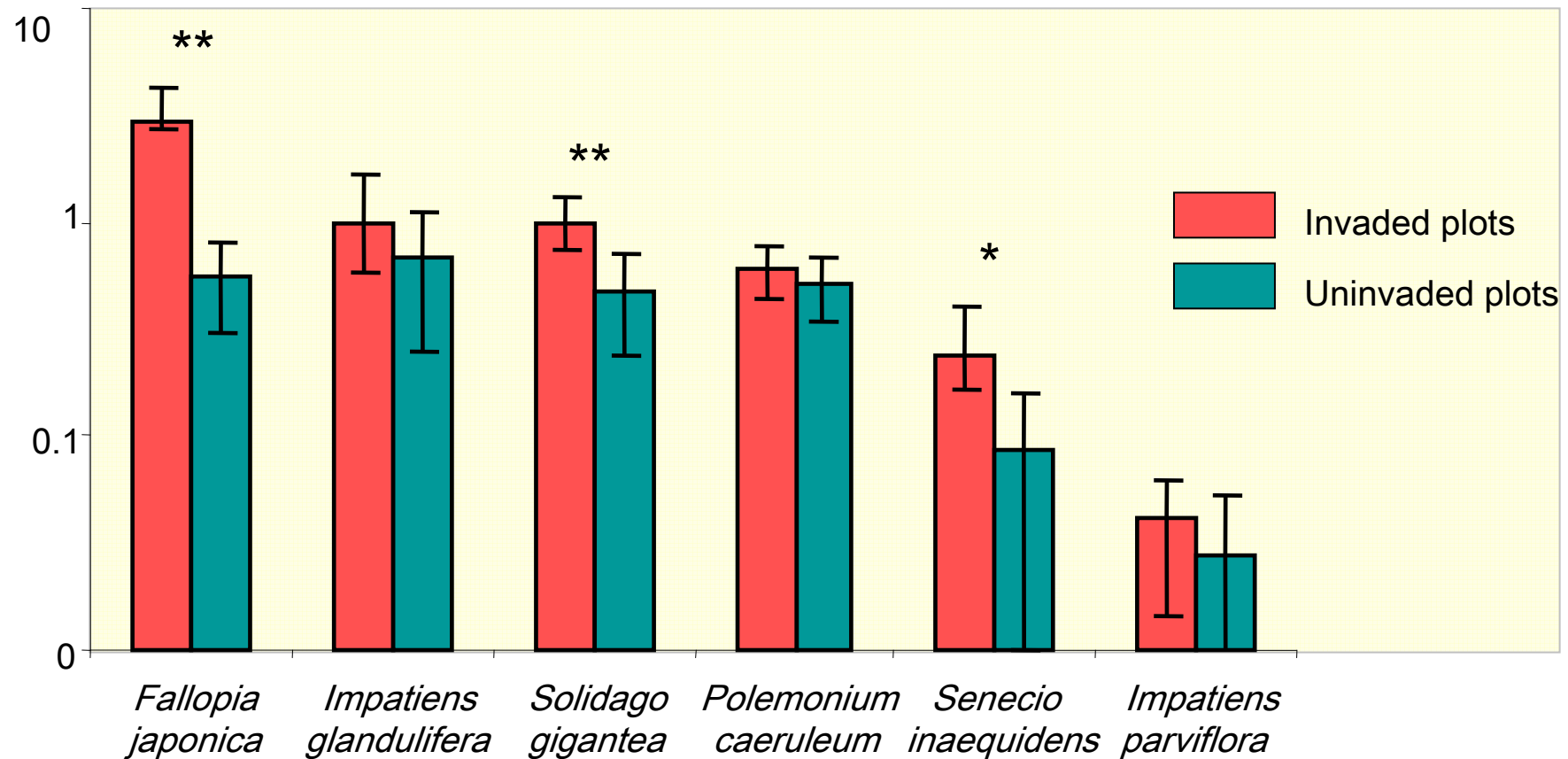
# Results

## Aboveground phytomass

Increased phytomass in invaded plots



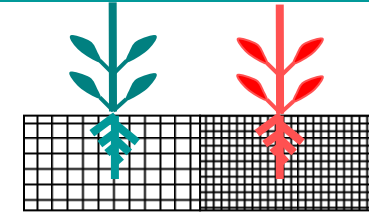
All sites pooled  
log (phytomass kg m<sup>-2</sup>)



# Results

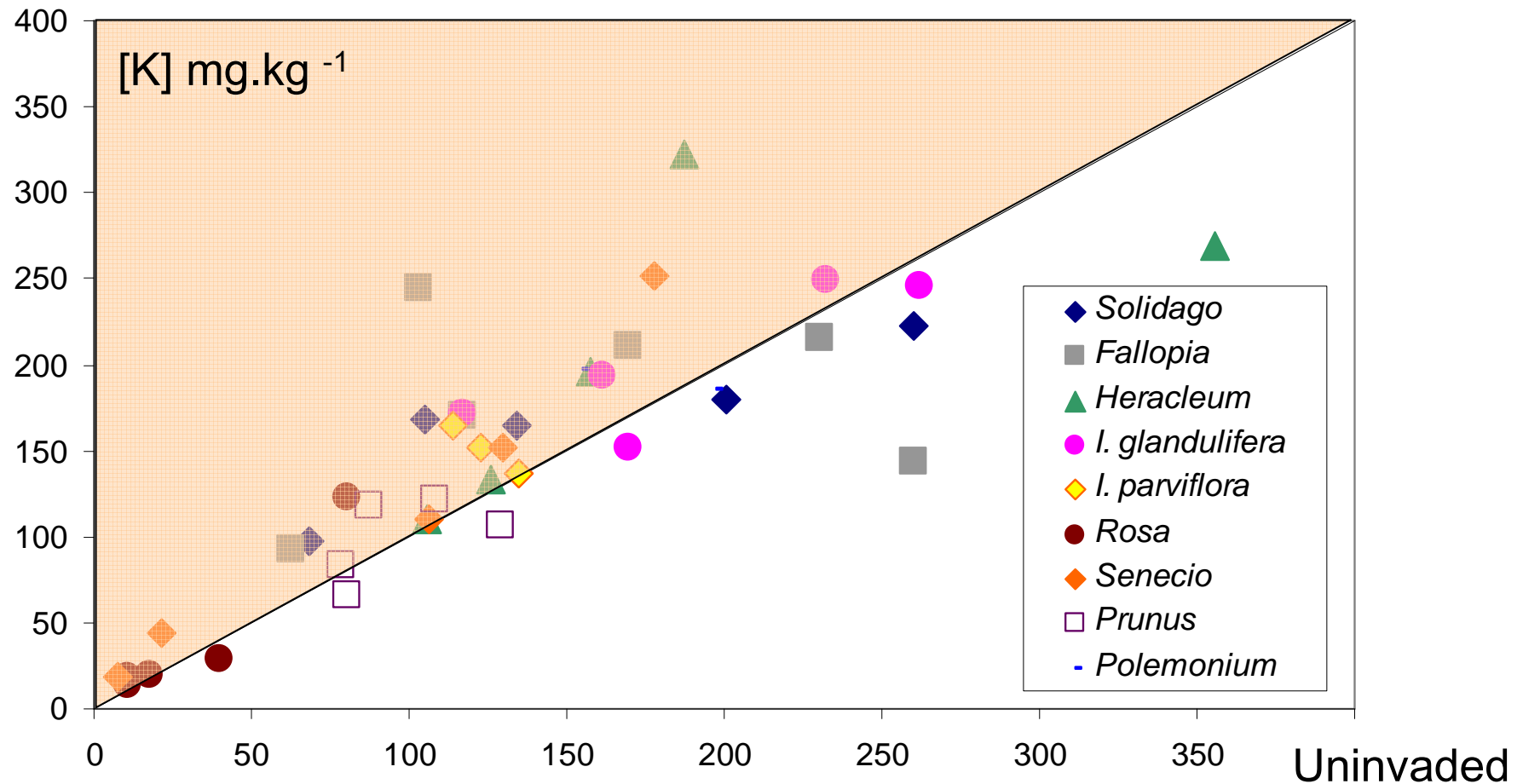
## Soil nutrient availability

Frequent increases of nutrient concentrations under exotics



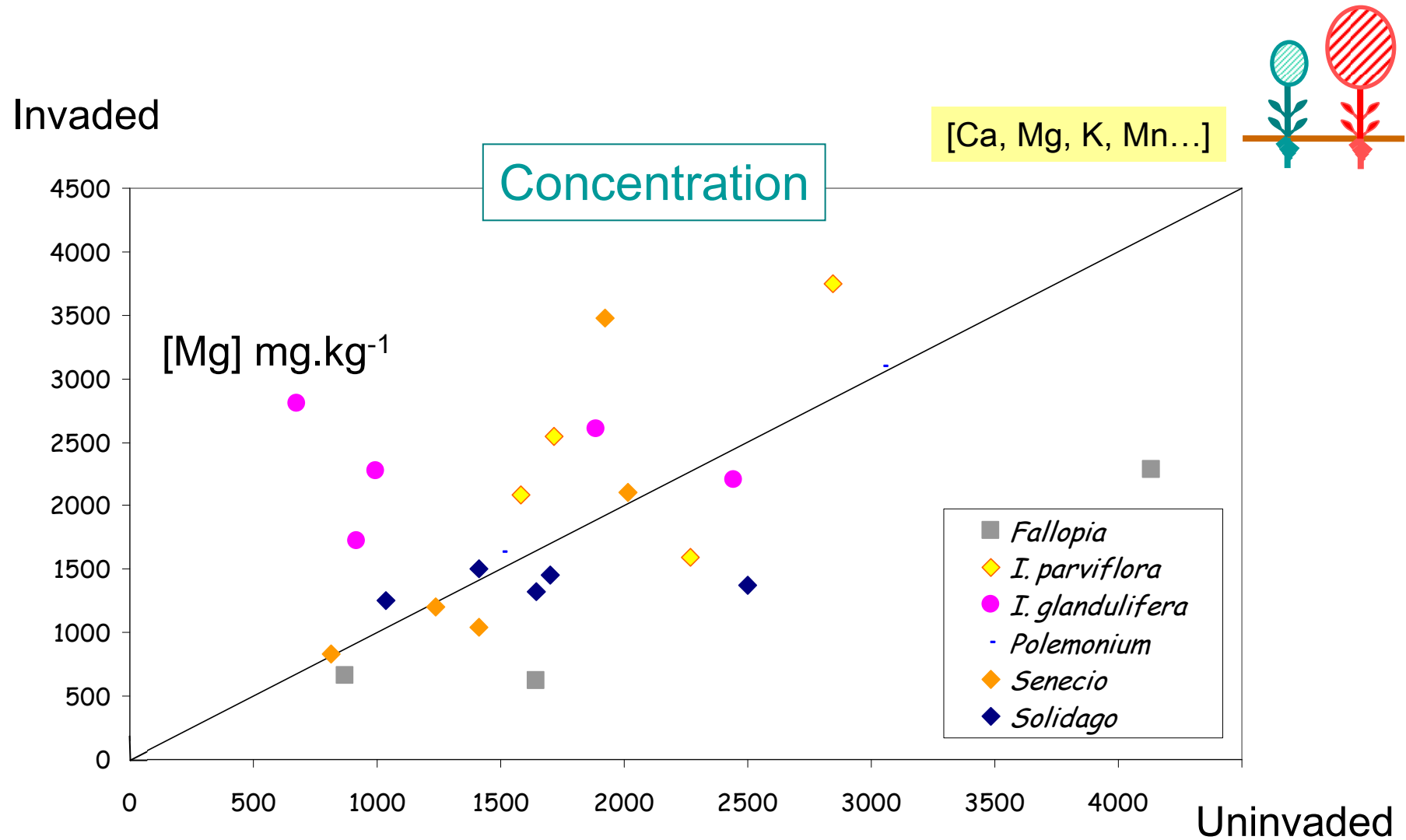
[Ca, Mg, K, Mn...]

Invaded



# Results

## Nutrients concentrations and stocks in standing phytomass

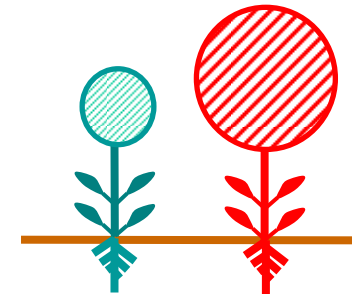


# Results

## Nutrients concentrations and stocks in standing phytomass

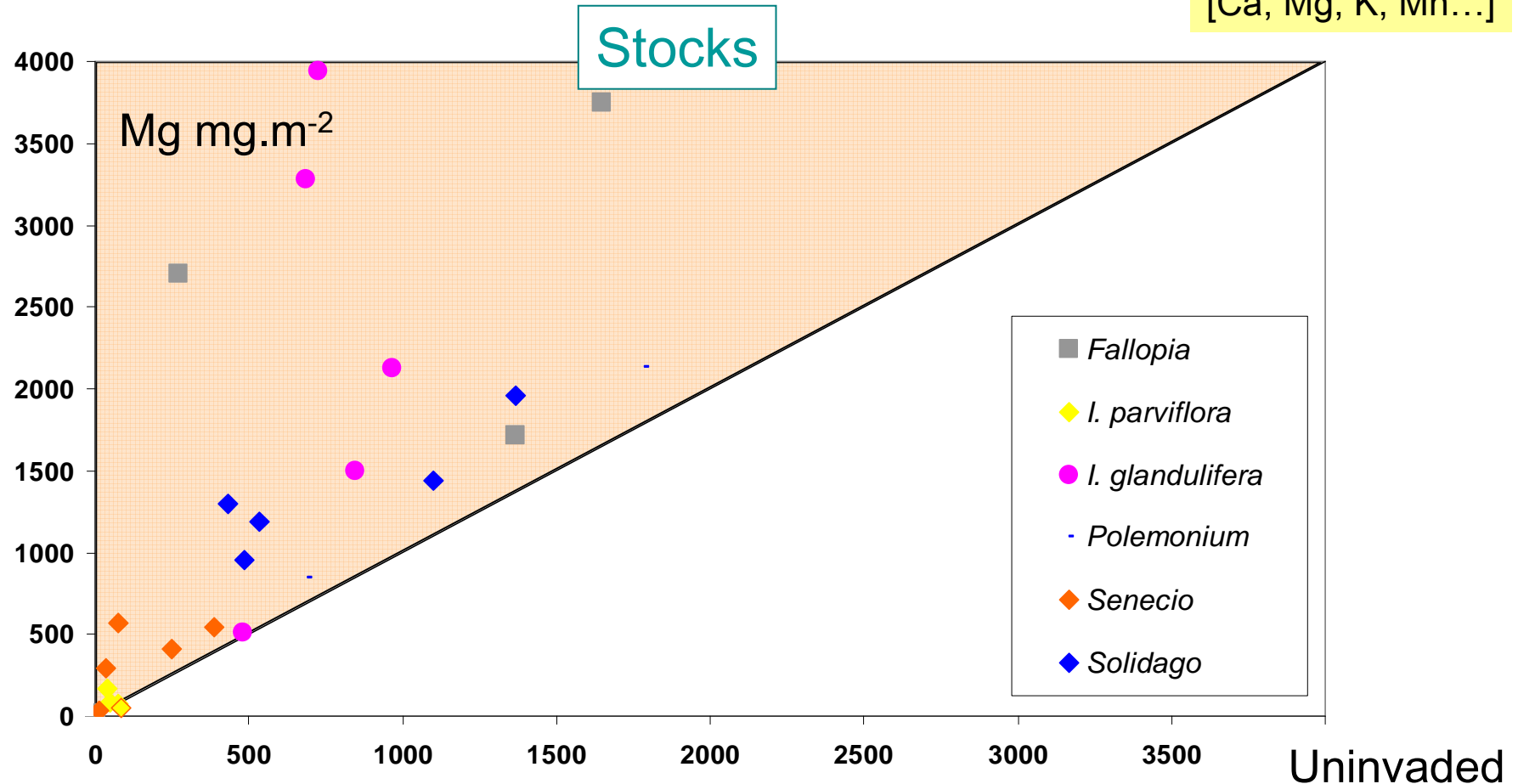
Stocks = concentrations X phytomass

Higher nutrients stocks in invaders



[Ca, Mg, K, Mn...]

Invaded



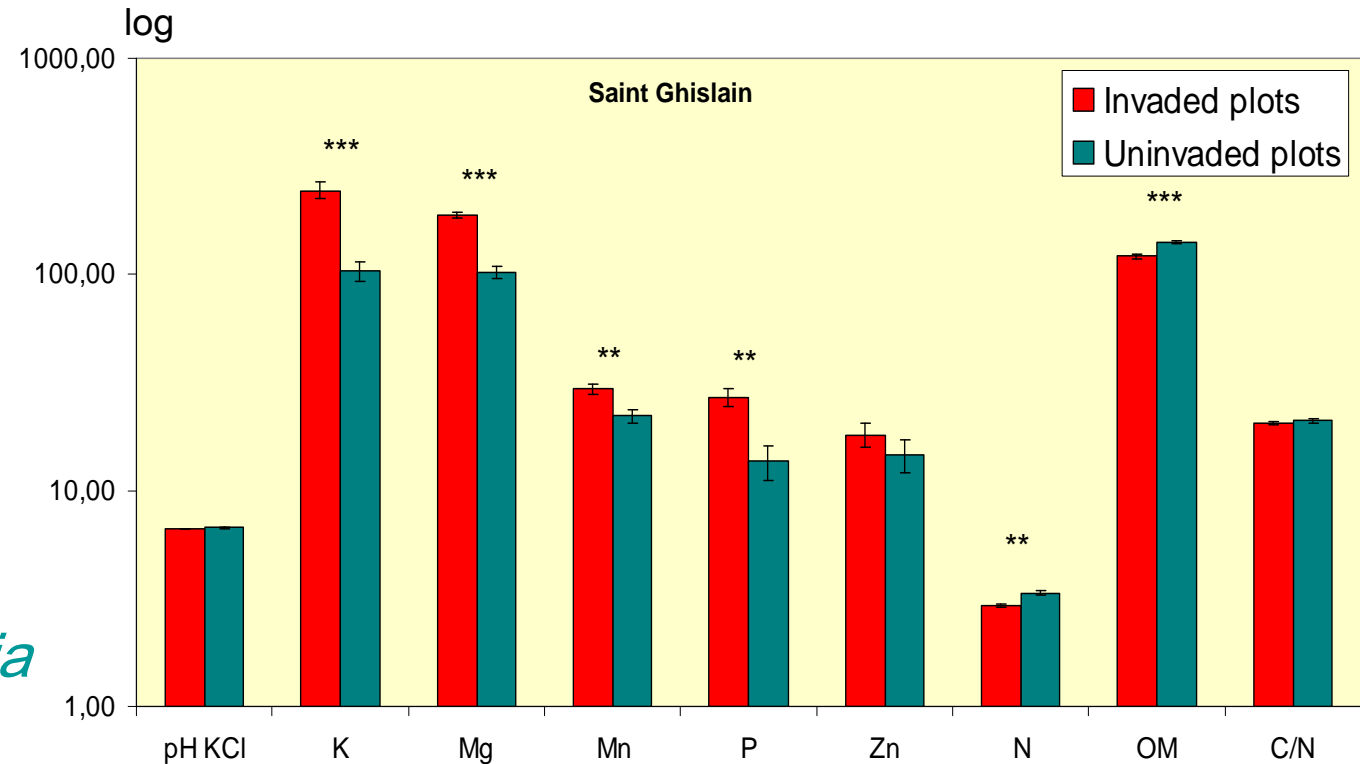


# Results

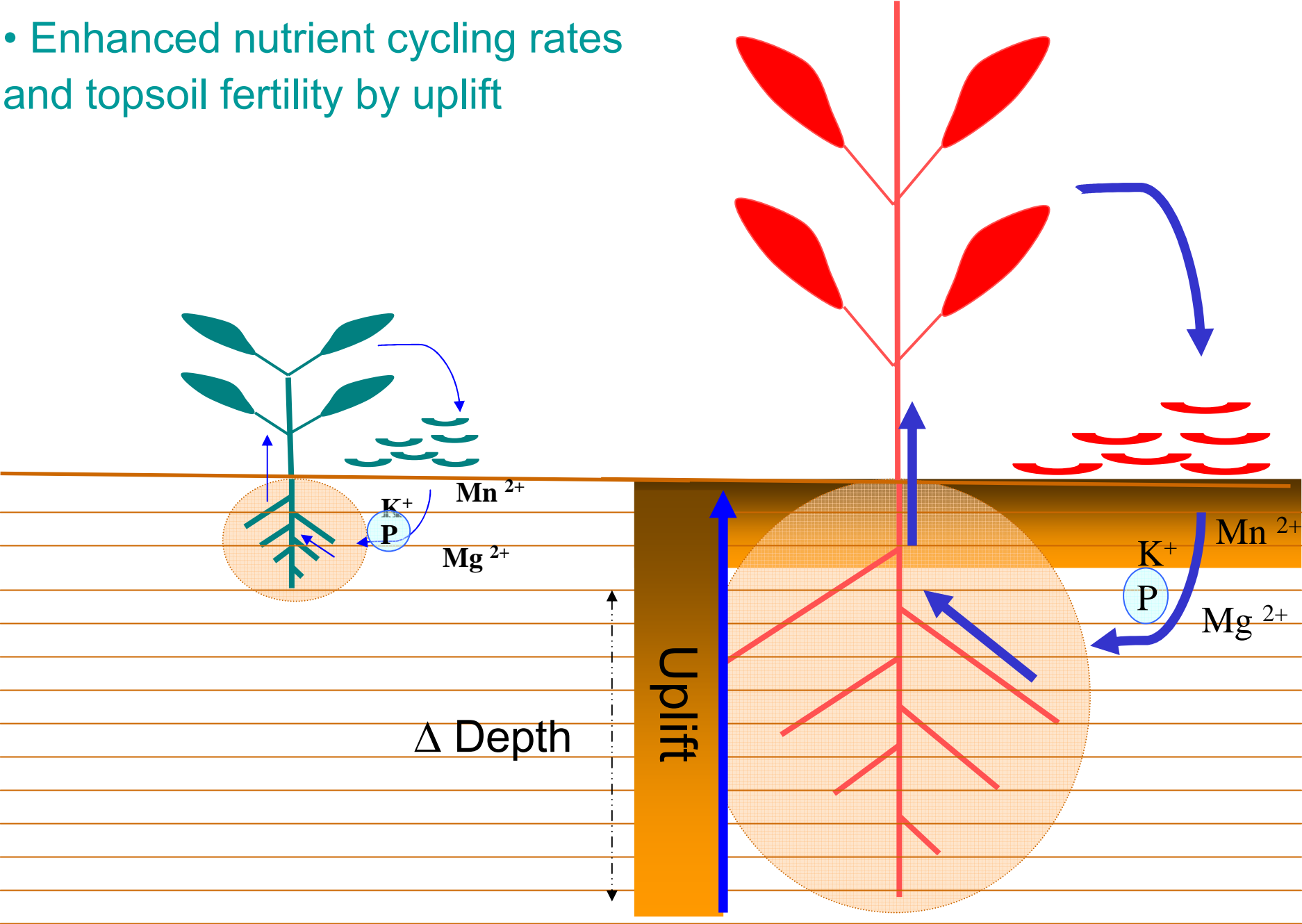
## Impacts depend on SPECIES

### 1. *Fallopia japonica* :

- Higher nutrient concentrations in invaded soils
- Higher nutrient stocks in *Fallopia*



- Enhanced nutrient cycling rates and topsoil fertility by uplift

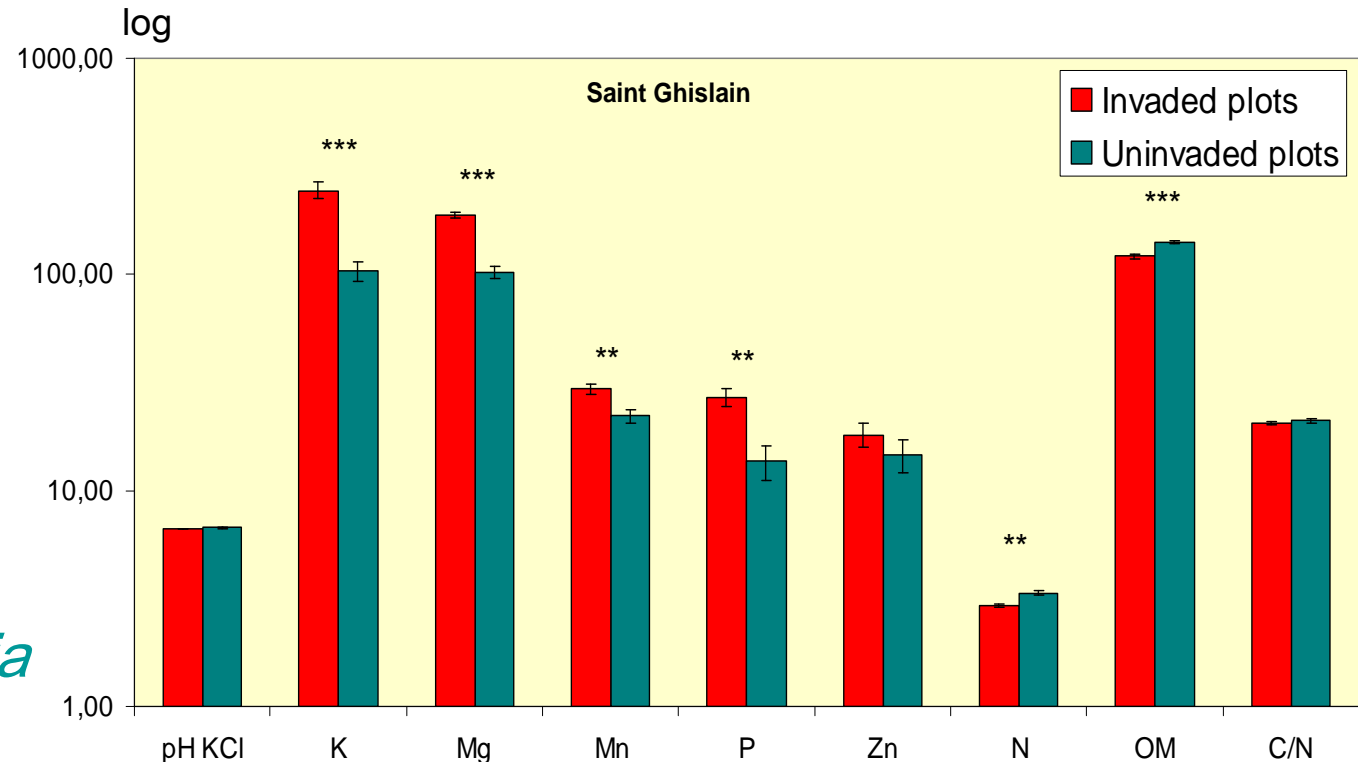


# Results

## Impacts depend on SPECIES

### 1. *Fallopia japonica* :

- Higher nutrient concentrations in invaded soils
- Higher nutrient stocks in *Fallopia* phytomass



➔ • Enhanced nutrient cycling rates and topsoil fertility by uplift

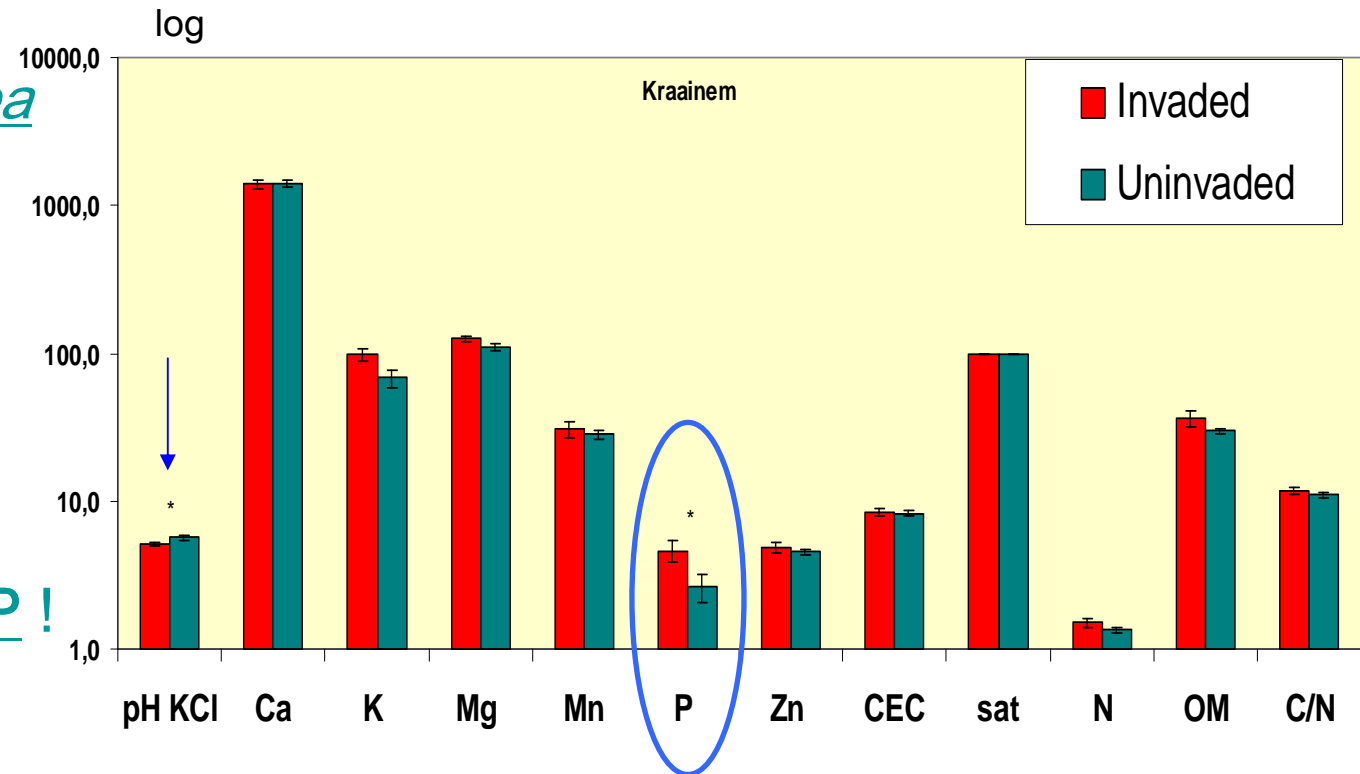
➔ • Soil homogenisation in invaded ecosystems

# Results

## Impacts depend on SPECIES

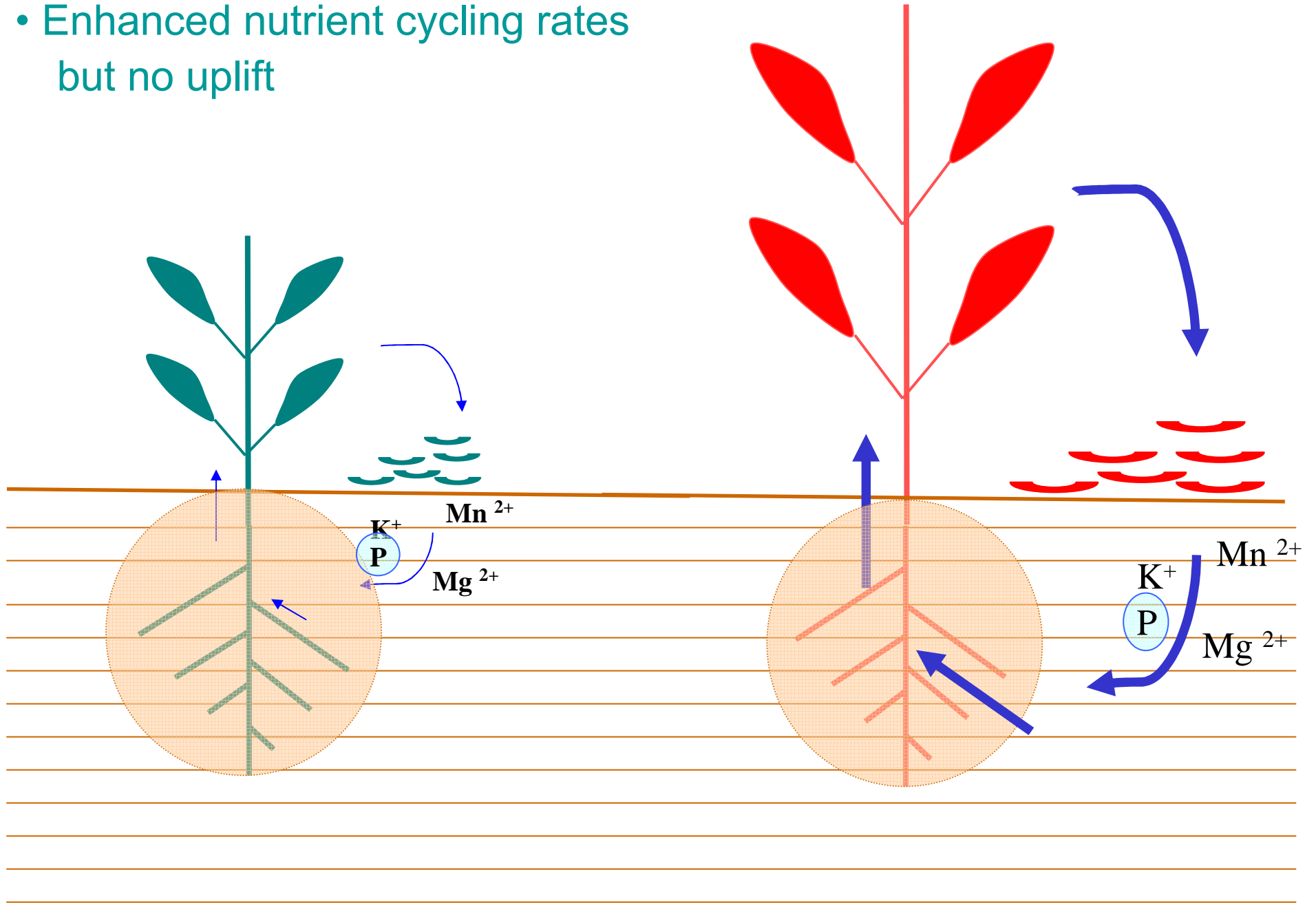
### 2. *Solidago gigantea*

- Slight increased nutrient concentrations in invaded soils but P!

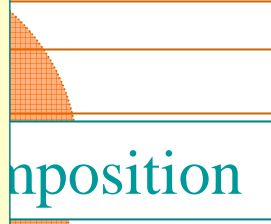
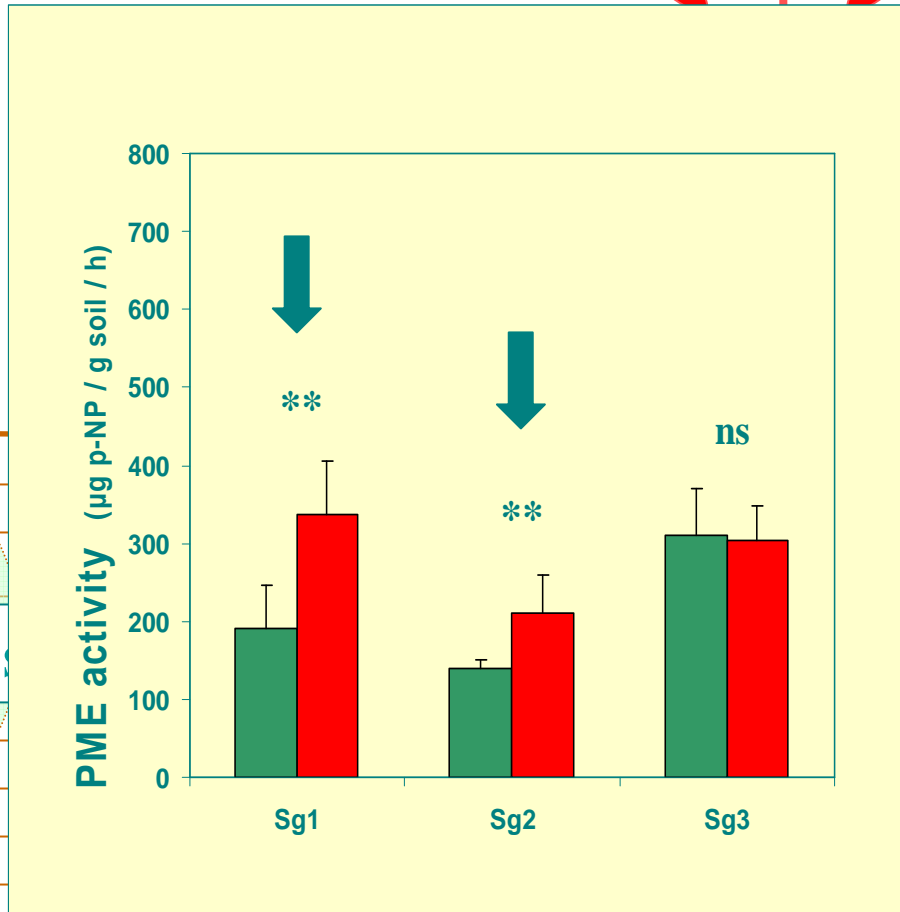
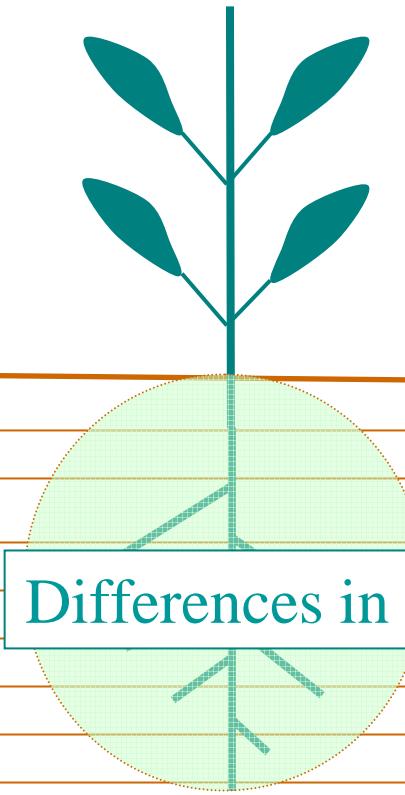


- Higher nutrient stocks in *Solidago* phytomass

- Enhanced nutrient cycling rates but no uplift





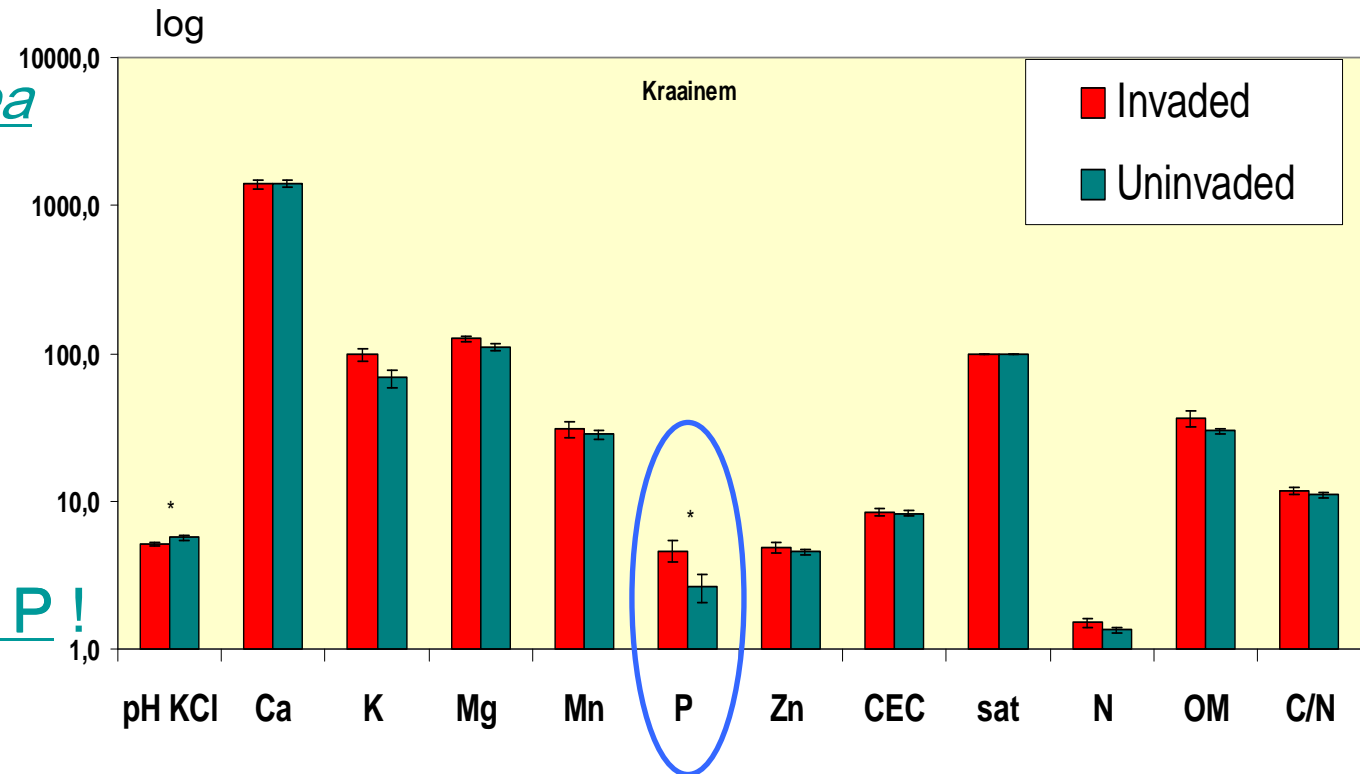


# Results

## Impacts depend on SPECIES

### 2. *Solidago gigantea*

- Slight increased nutrient concentrations in invaded soils but P!
- Higher nutrient stocks in *Solidago* phytomass



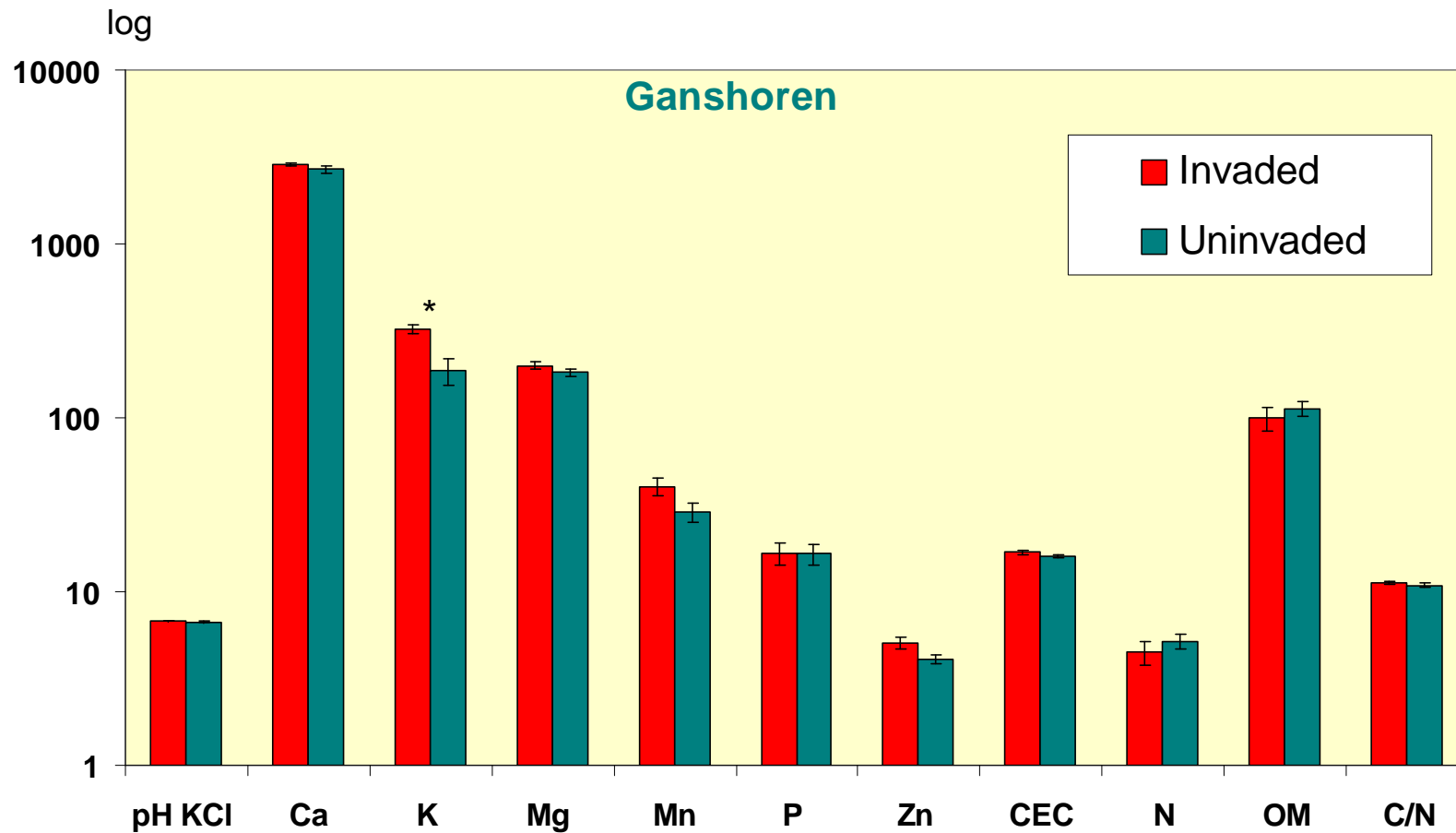
- Enhanced nutrient cycling rates but no uplift

# Results

## Impacts depend on SPECIES

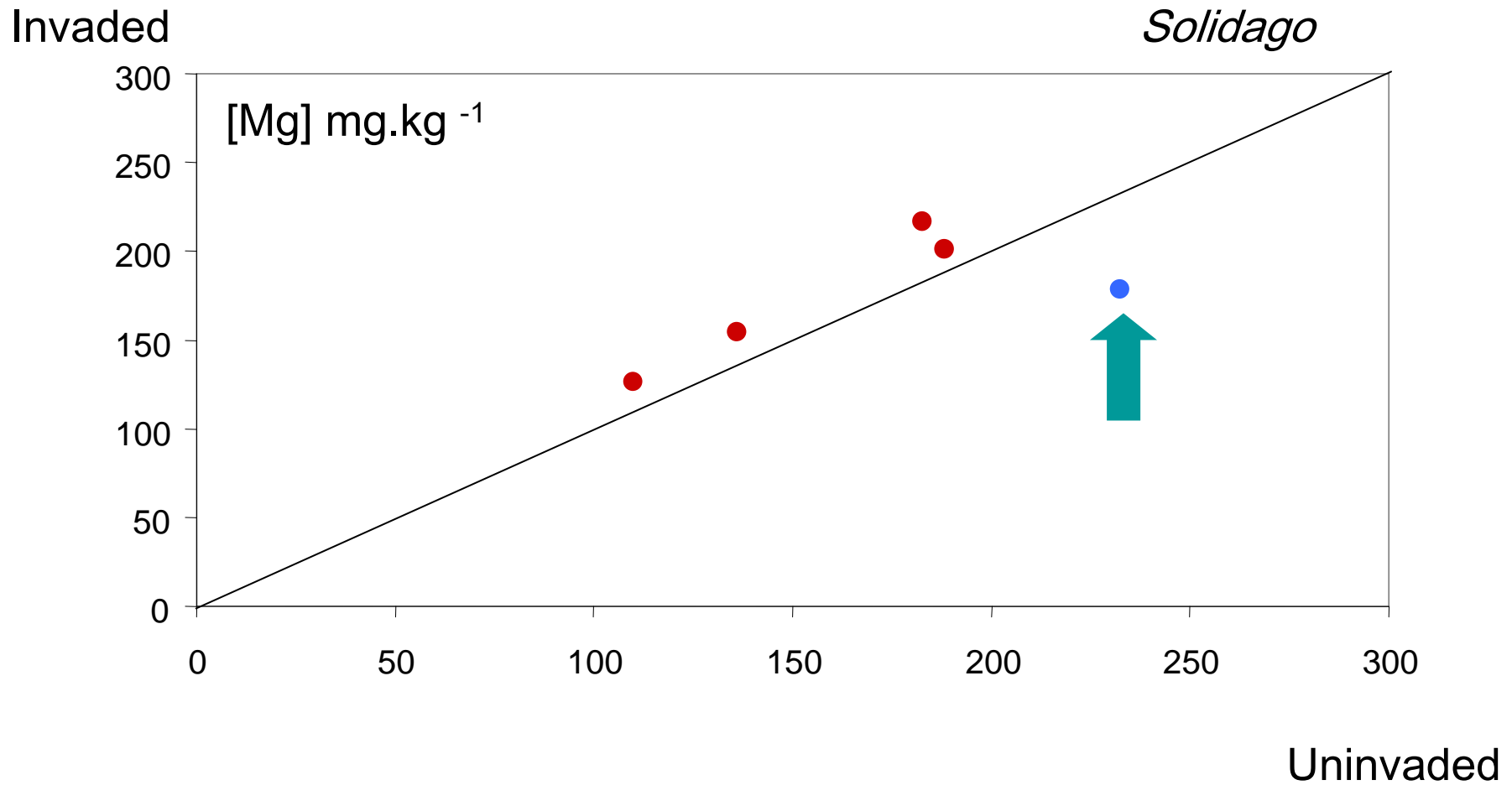
### 3. *Heracleum mantegazzianum*

- No evident impact on soil chemistry

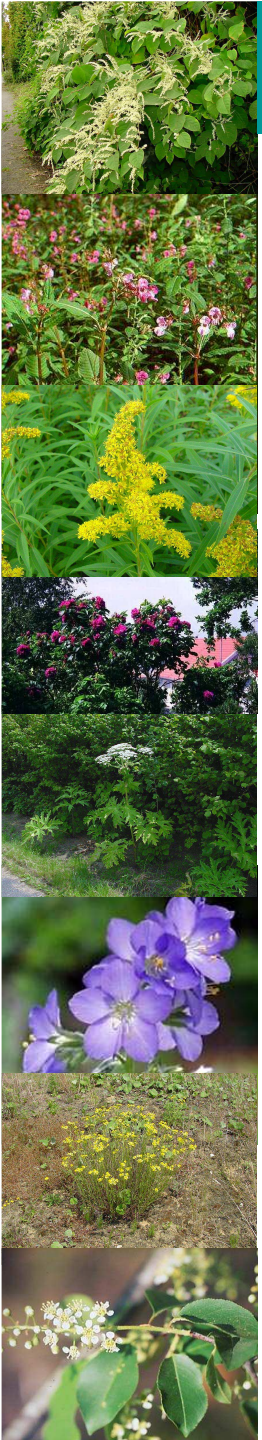


# Results

## Impacts depend on ECOSYSTEMS



## Conclusion



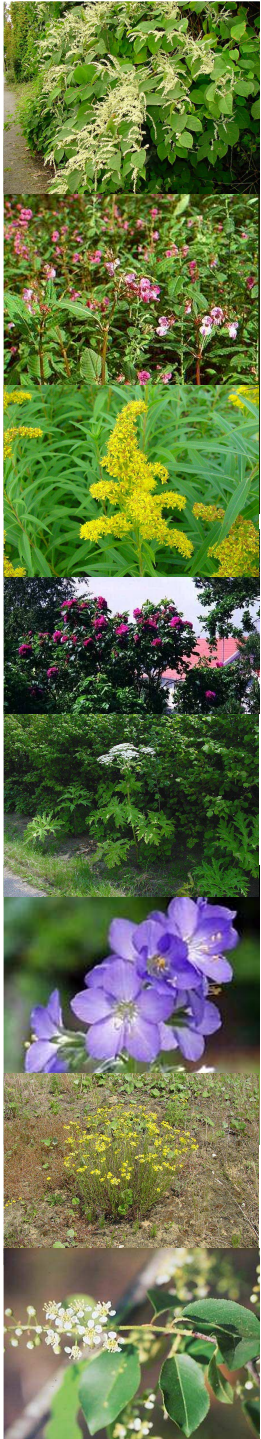
No assessment of durability

Longterm modifications of topsoil characteristics are possible

Restoration may be difficult

Implications for secondary succession





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Cécile Herr

Thank you !