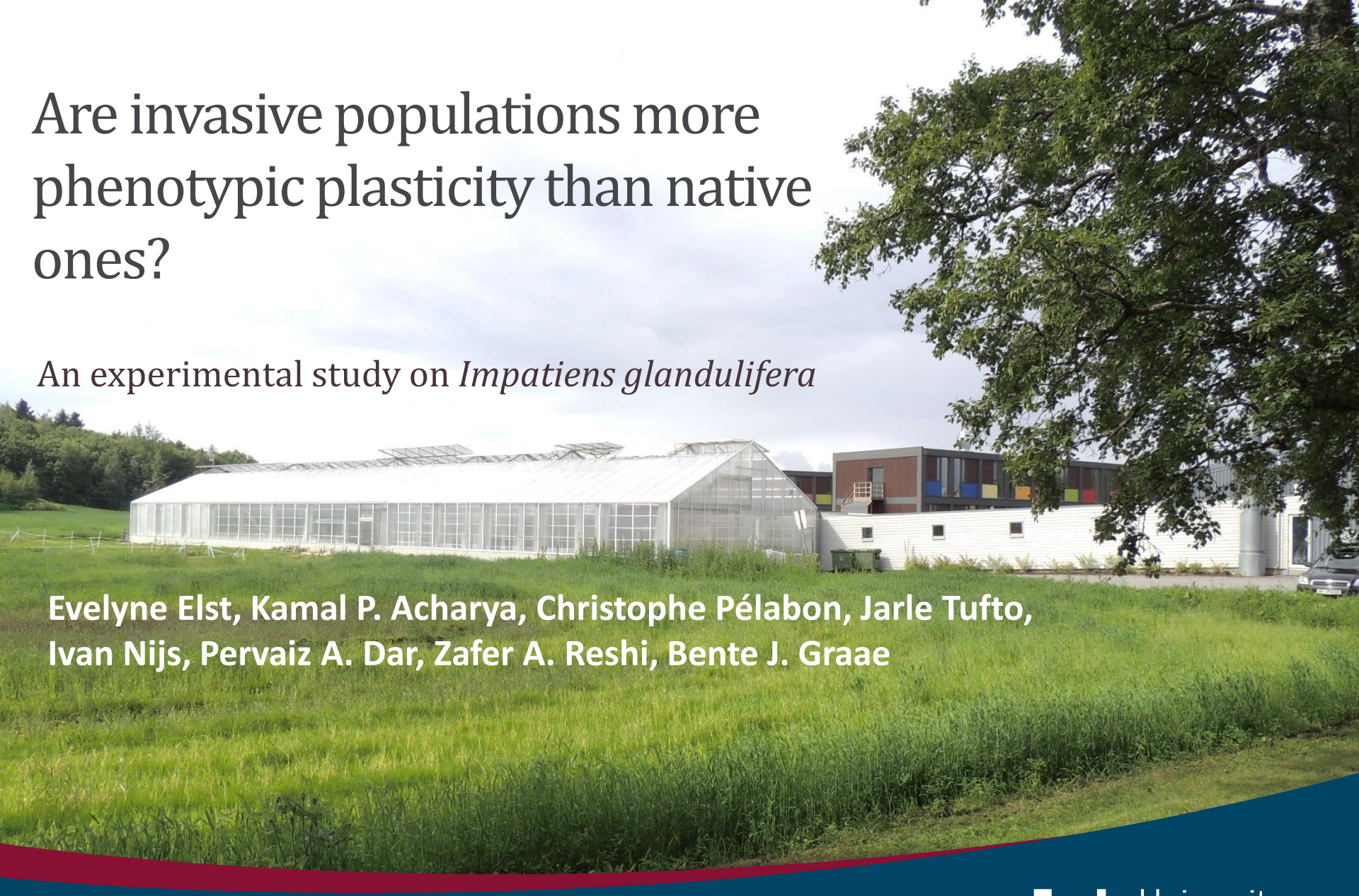
Are invasive populations more phenotypic plasticity than native ones?

An experimental study on *Impatiens glandulifera*



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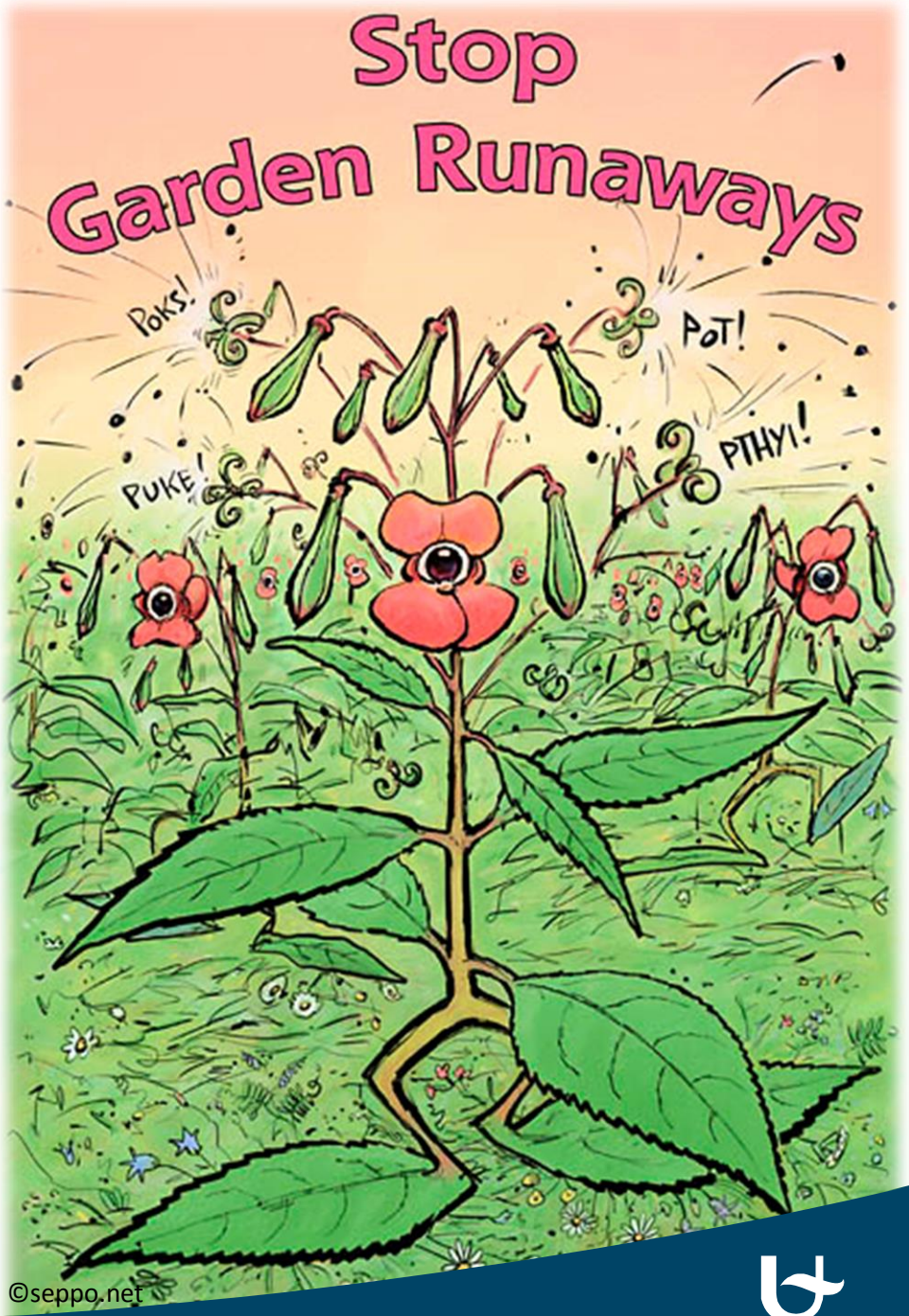
Introduction

Biological invasion
- Global phenomenon

Problems
- Ecological
- Economic

Mechanisms & properties
- Predict
- Manage



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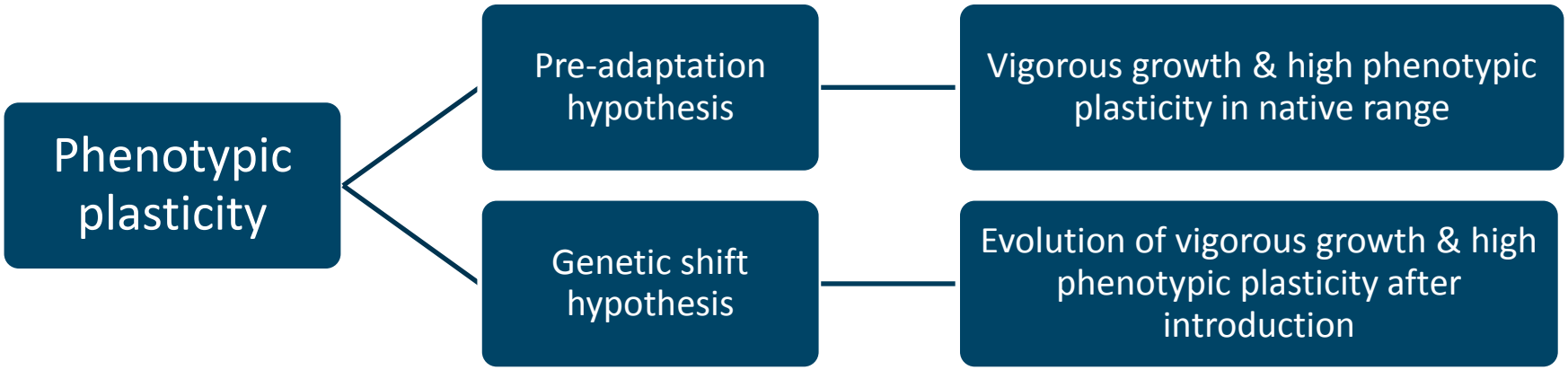
Hypotheses


Phenotypic plasticity
Pre-adaptation hypothesis
Vigorous growth & high phenotypic plasticity in native range
Genetic shift hypothesis
Evolution of vigorous growth & high phenotypic plasticity after introduction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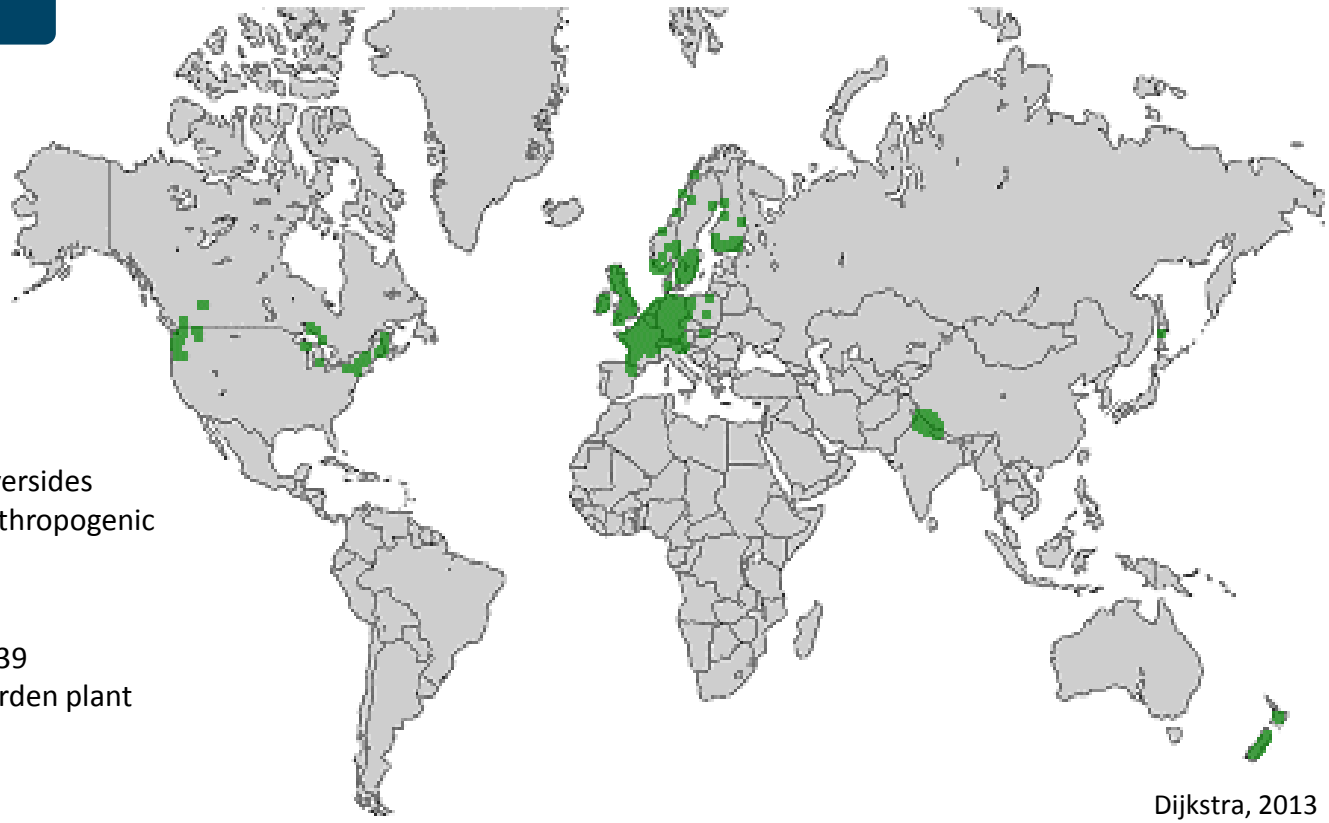
Methodology

Study species and populations

Impatiens glandulifera
= Himalayan balsam

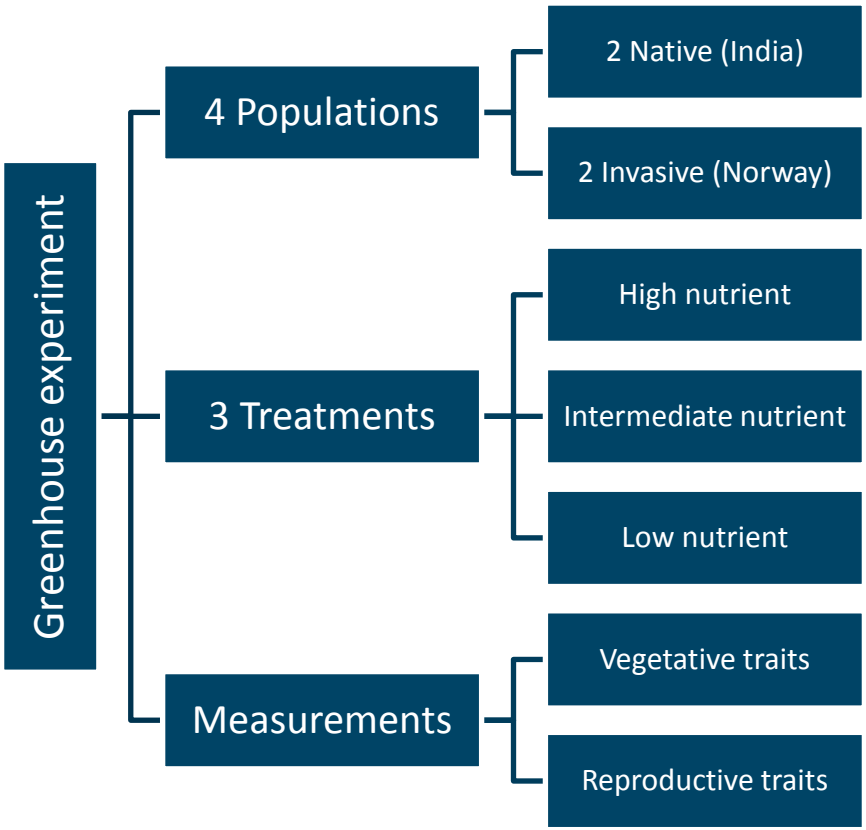
- Balsaminaceae
- Annual
- Nutrient rich & wet habitats
  - Riversides
  - Anthropogenic
- India
  - 1839
  - Garden plant
- Impact



Dijkstra, 2013

Methodology

Experimental design & measurements

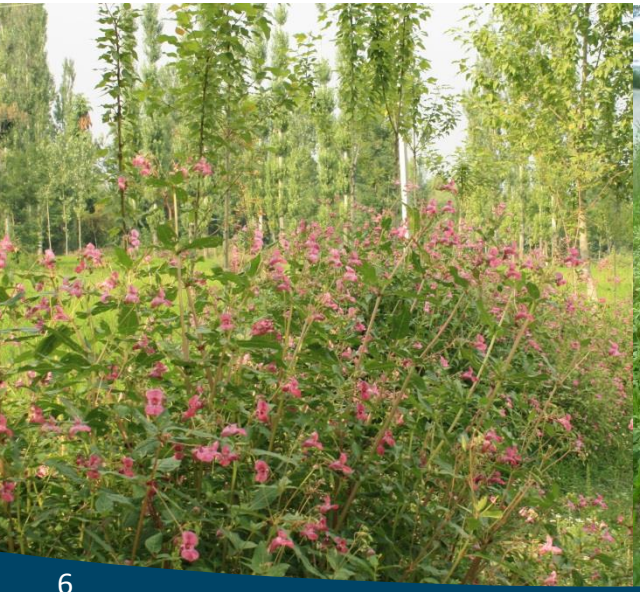


Methodology

Statistics

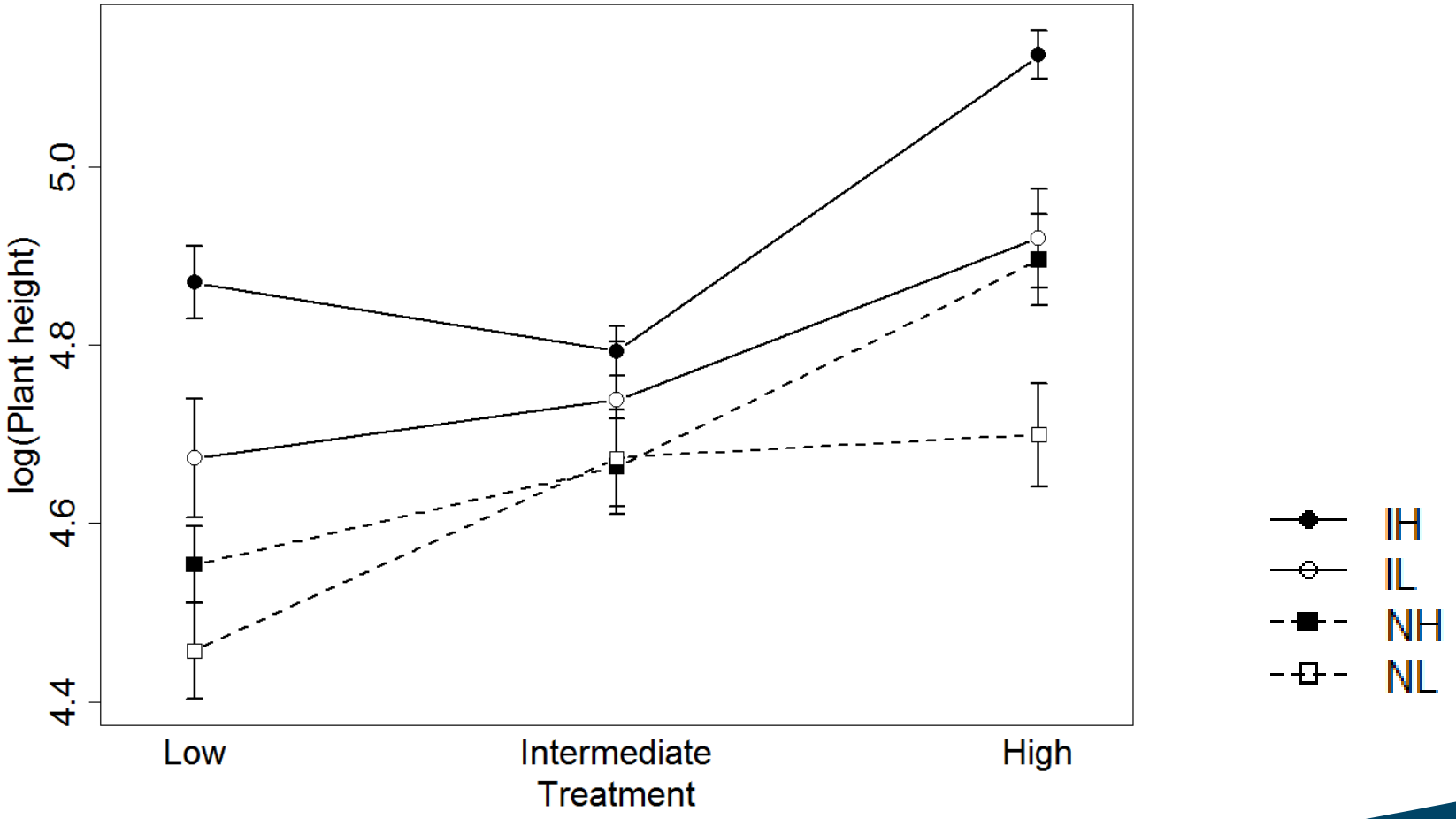
Non-linear Mixed-effect model

Fixed	Random	
Treatment * Population	Intercept: Maternal family	Slope: Treatment
Difference in phenotypic plasticity between populations	Genetic variation among family	Genetic variation in reaction norm



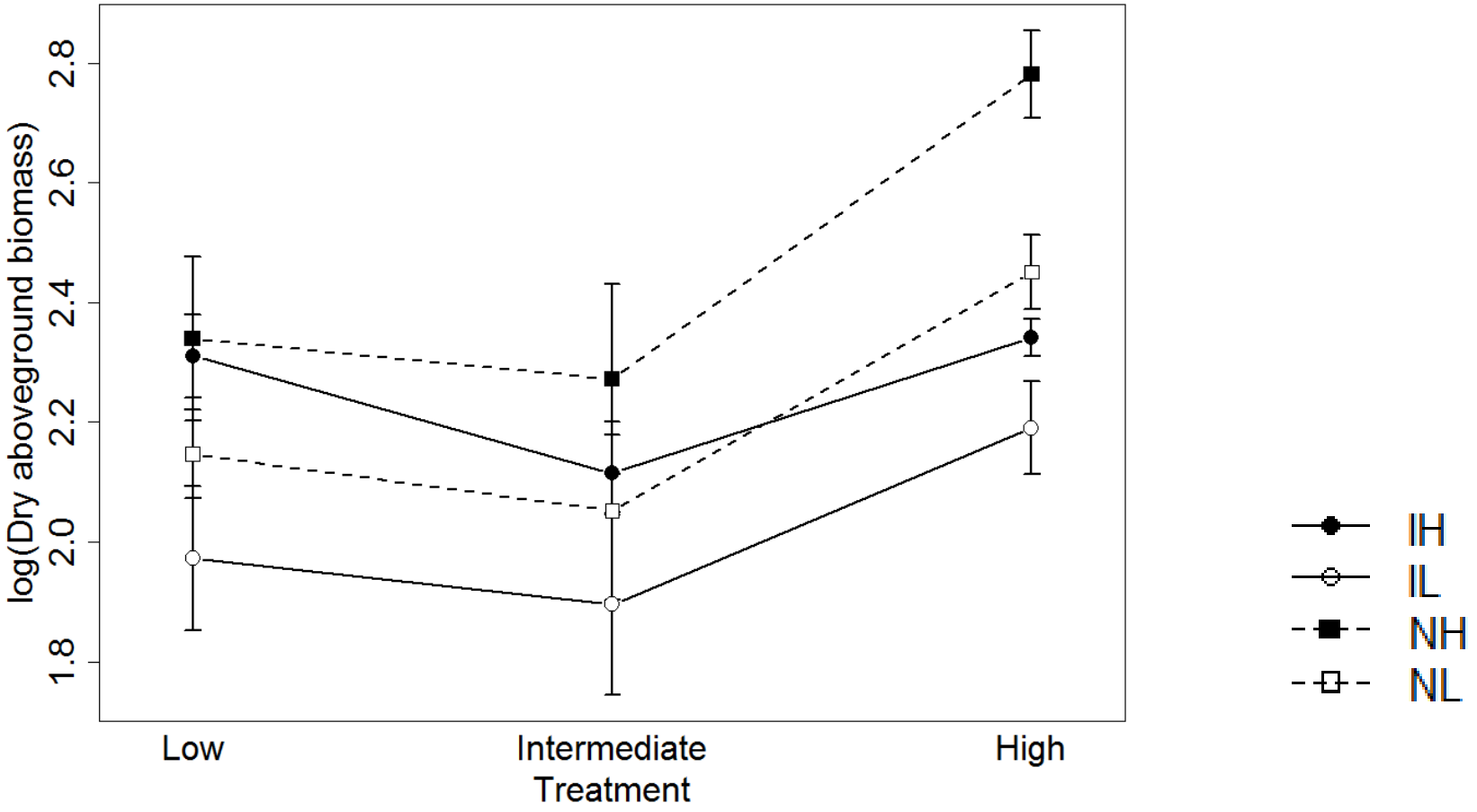
Results

Vegetative traits



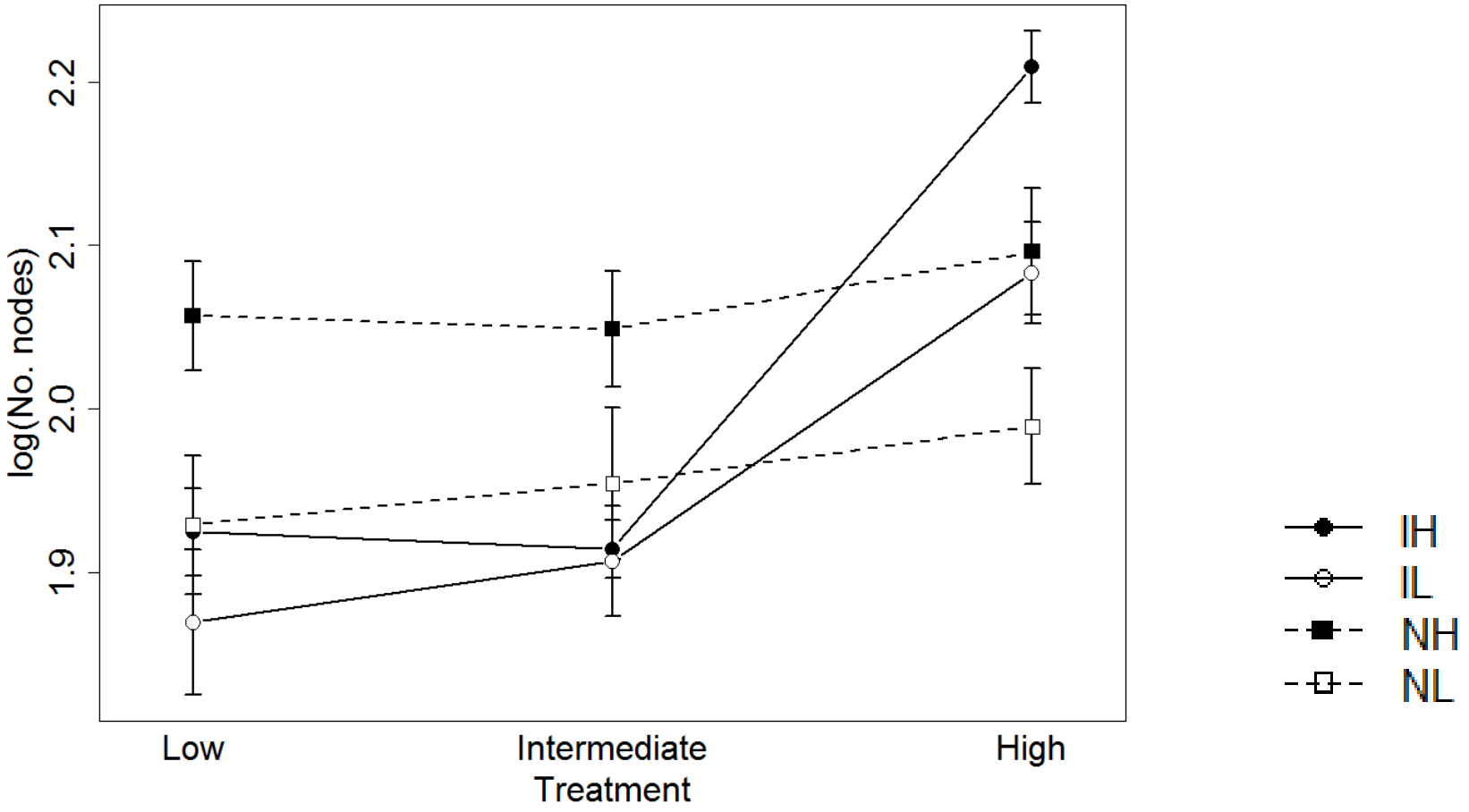
Results

Vegetative traits



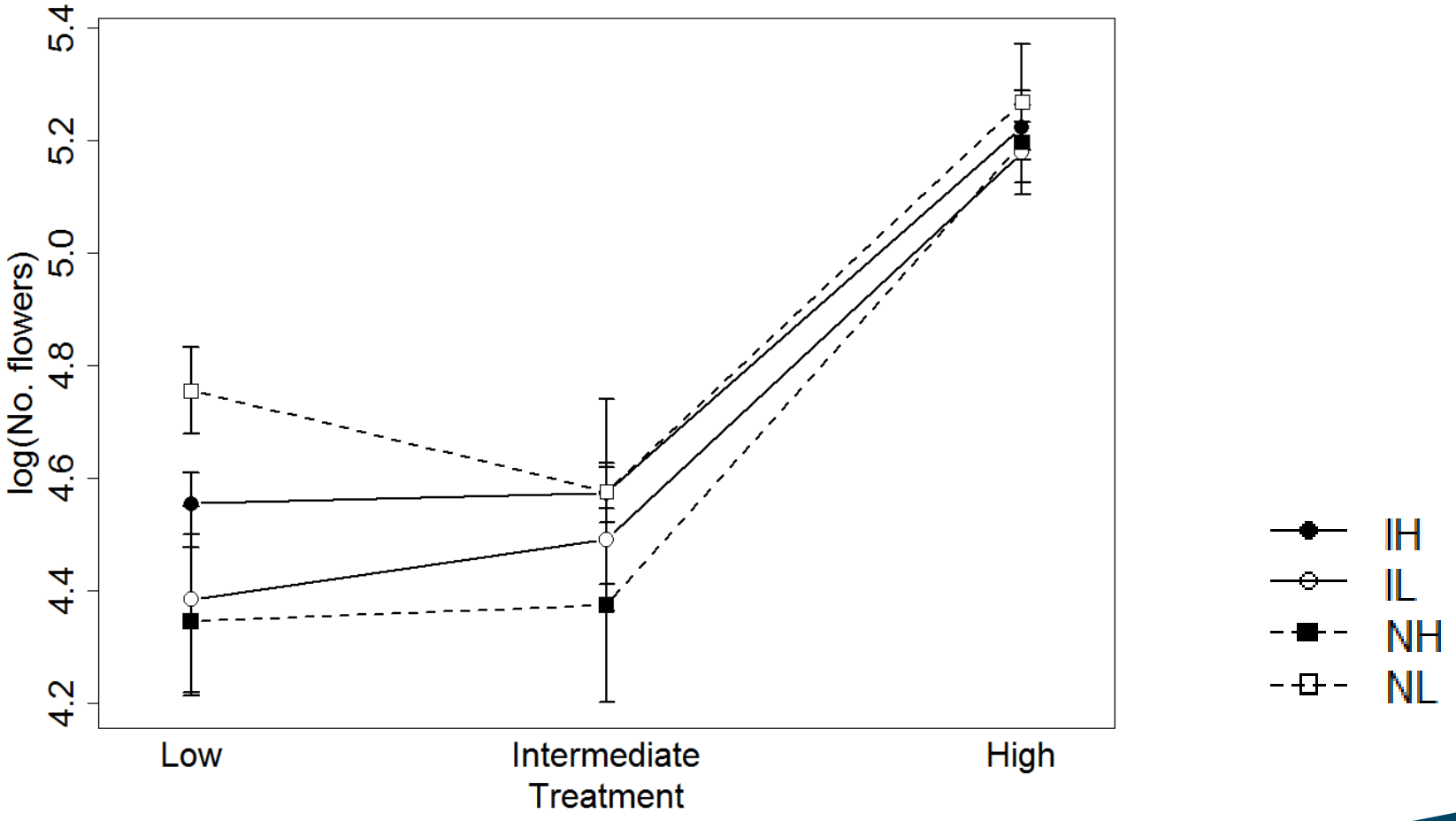
Results

Vegetative traits



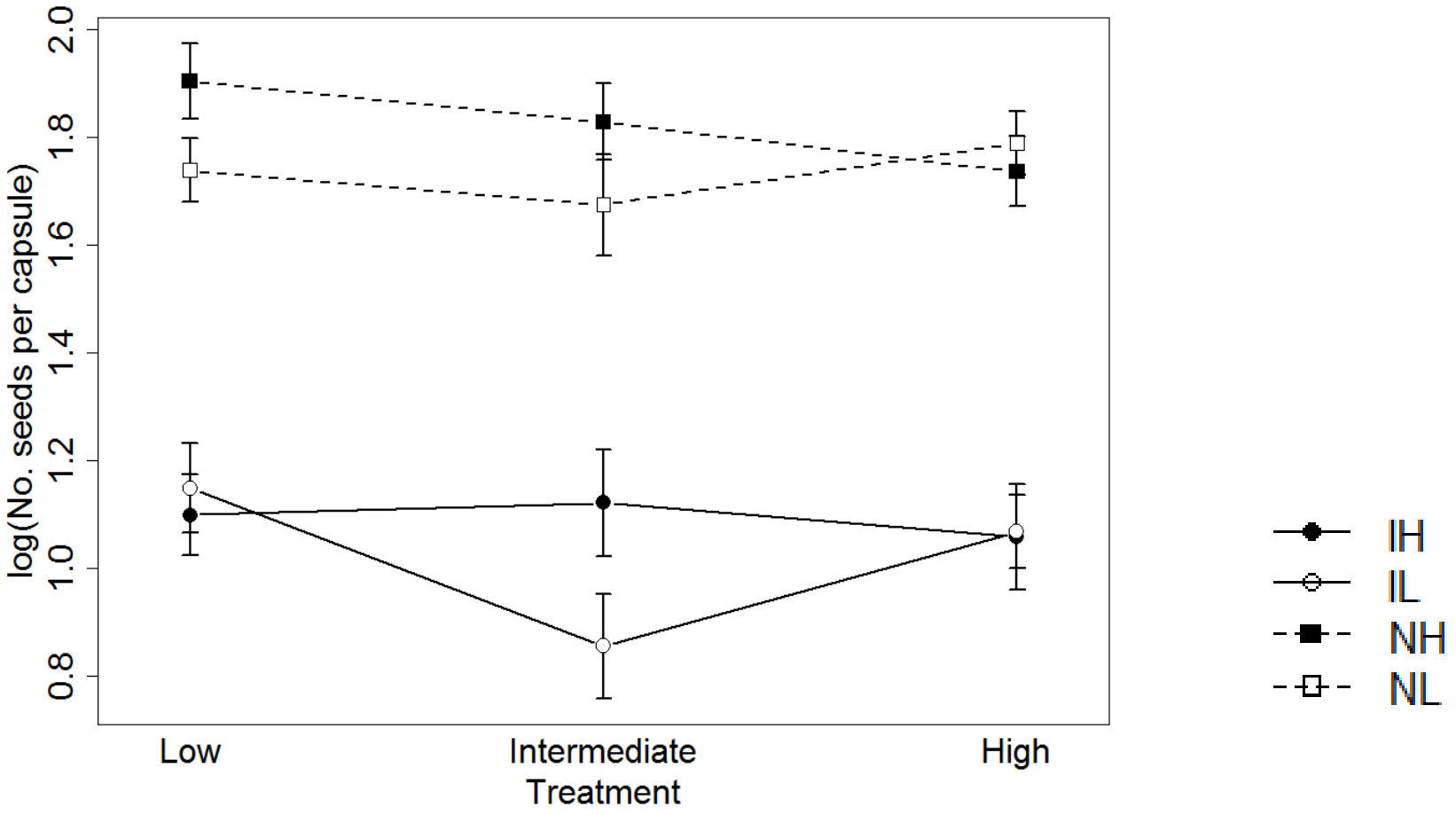
Results

Reproductive traits



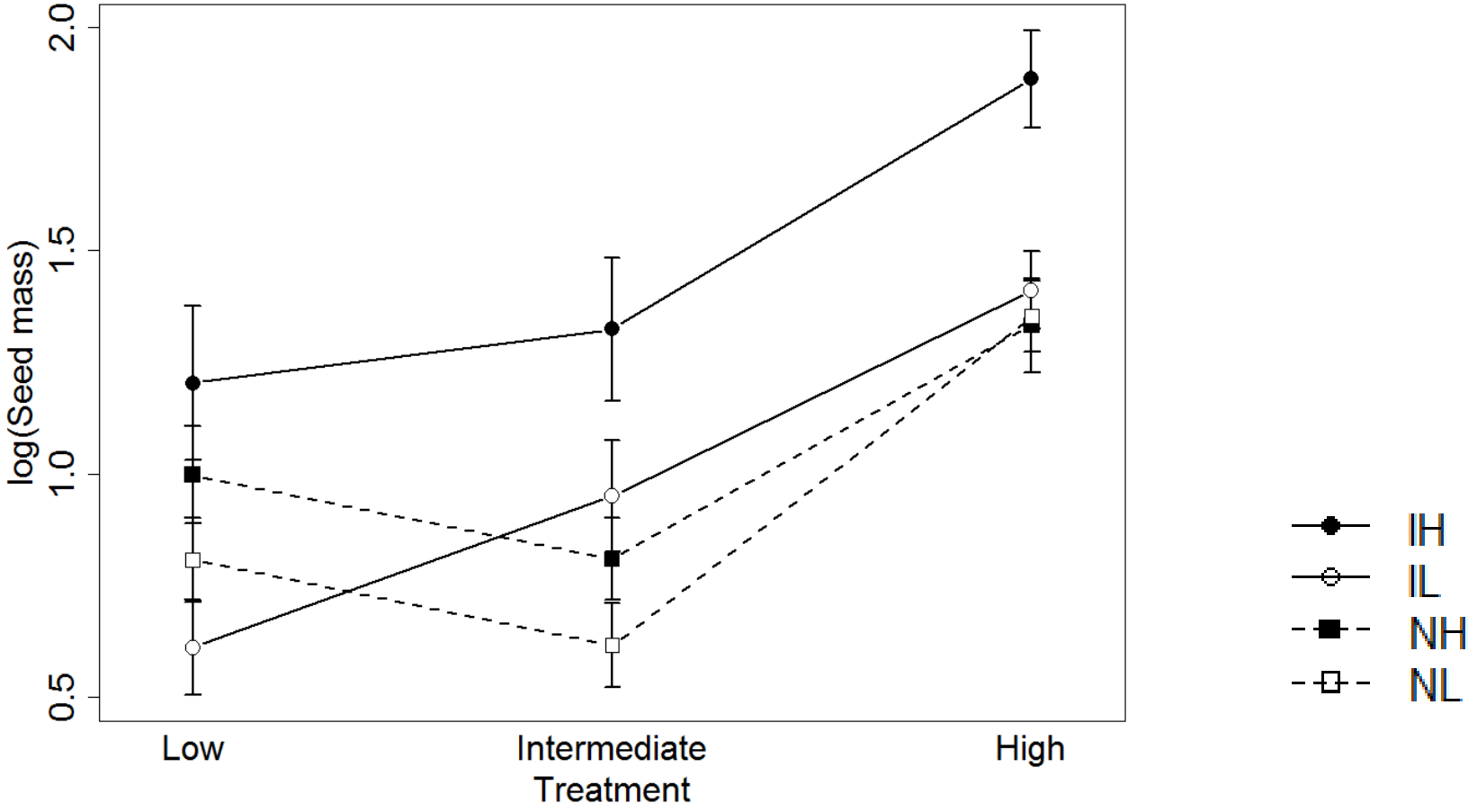
Results

Reproductive traits



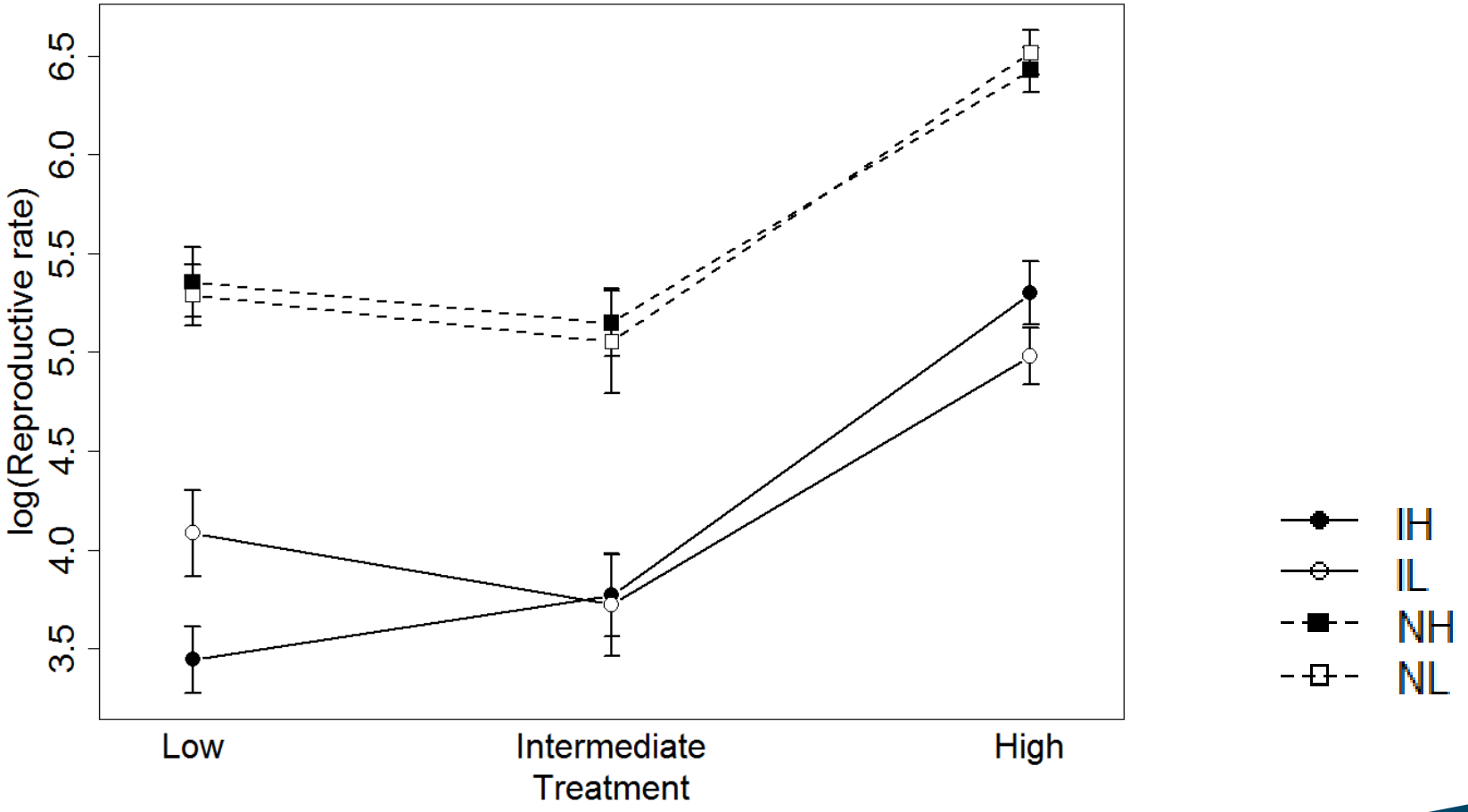
Results

Reproductive traits

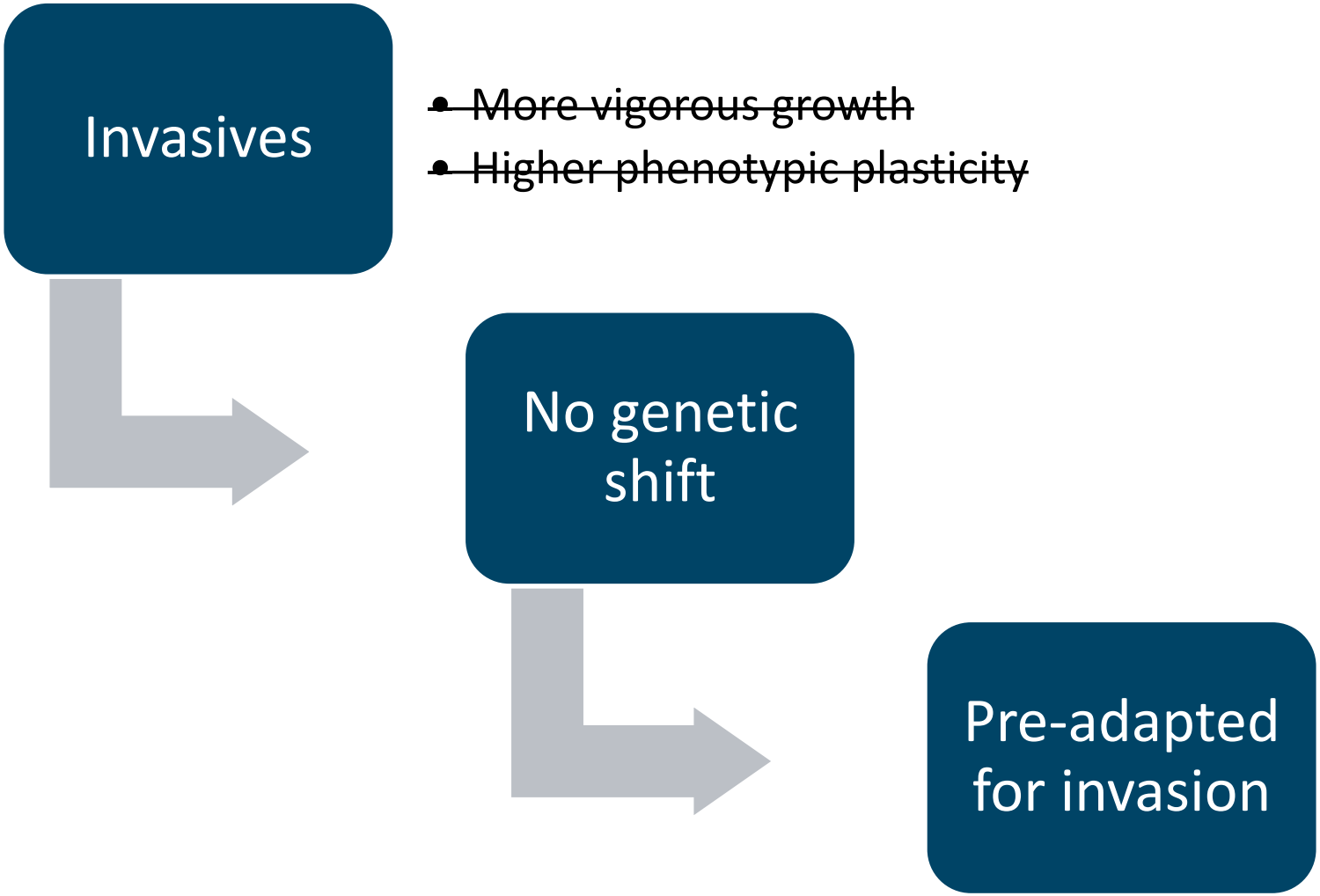


Results

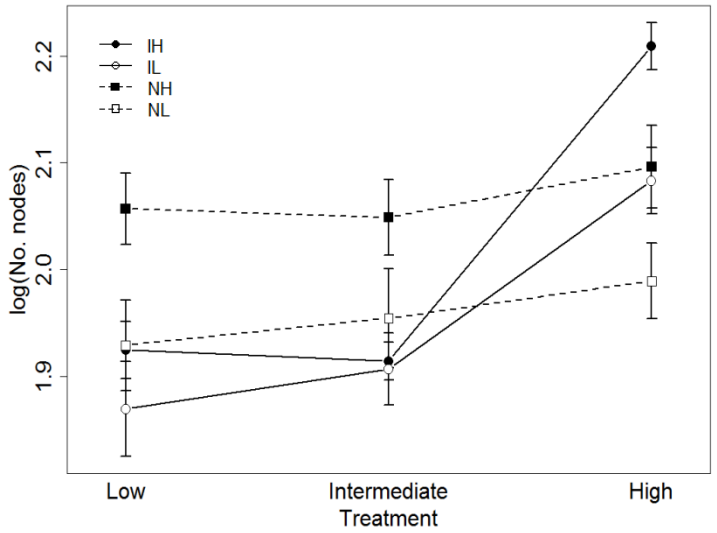
Reproductive traits



Discussion


Invasives
~~• More vigorous growth~~
~~• Higher phenotypic plasticity~~
No genetic shift
Pre-adapted for invasion

Discussion



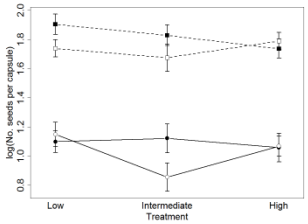
Number of nodes

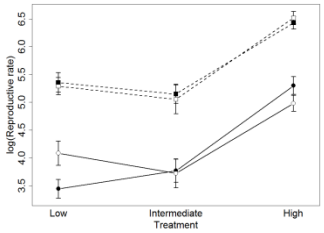
- Invasives higher phenotypic plasticity
- Significant random intercept
  - Genetic variation among family

- Other traits:
  - Absence genetic variation of family and plasticity
    - Similar reaction norm?

Discussion

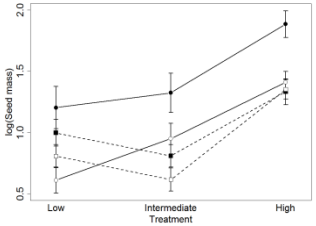
Invasives





Successful invader

Seed mass



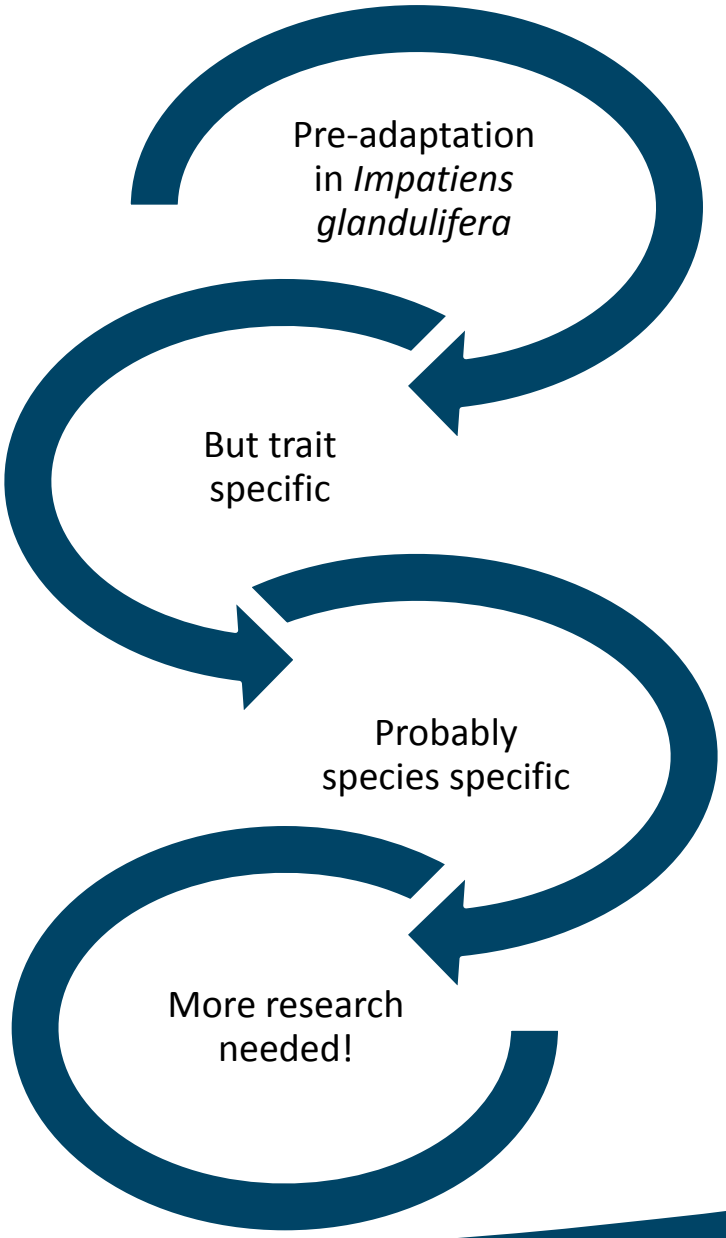
Nutrients!

- Better in High treatment
- Field: invasive populations = high nutrients → seed mass

Habitat

- Disturbed
- Nutrient rich

Conclusion


Pre-adaptation in *Impatiens glandulifera*
But trait specific
Probably species specific
More research needed!

Universiteit Antwerpen

Nansenfondet og de dermed forbundne fond

NTNU
Norwegian University of Science and Technology











Thank you for your attention!

University of Antwerp