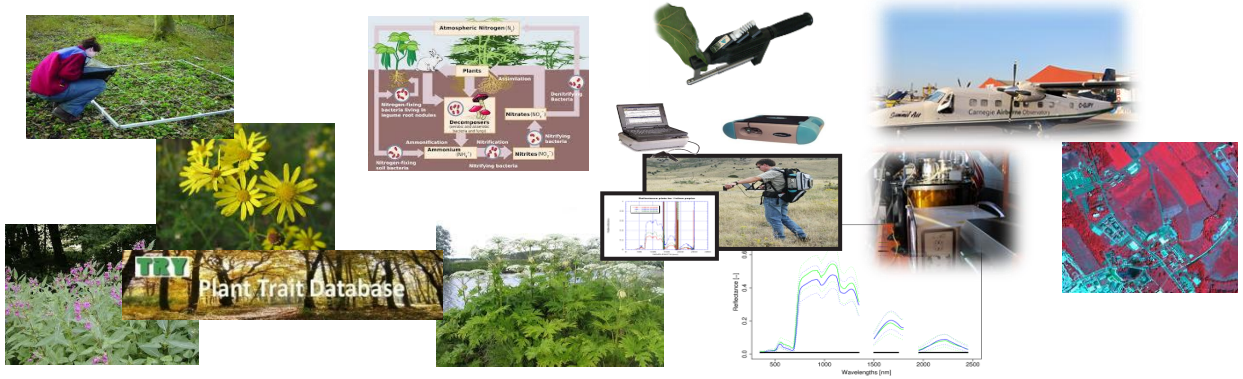
INPLANT

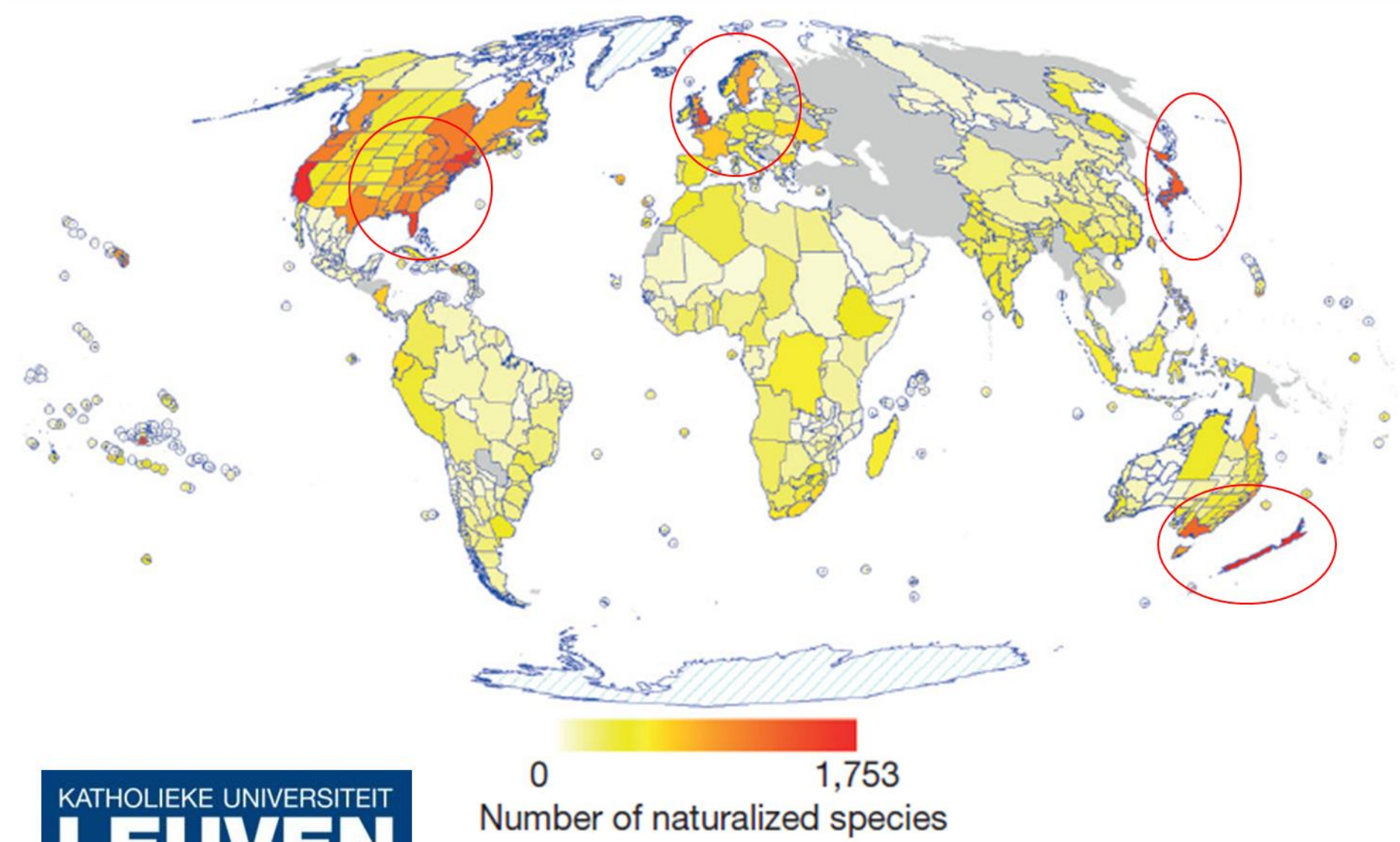
PLANT OPTICAL TYPES TO PREDICT ECOSYSTEM IMPACTS OF PLANT INVASIONS

Ben Somers, Olivier Honnay, Hannes Feilhauer, Elisa Van Cleemput, Laura Vanierschot



8 DECEMBER 2016

Invasives are a major problem : Currently 13,000 plant species (3.9% of the extant flora) have become naturalized somewhere as a result of human activity

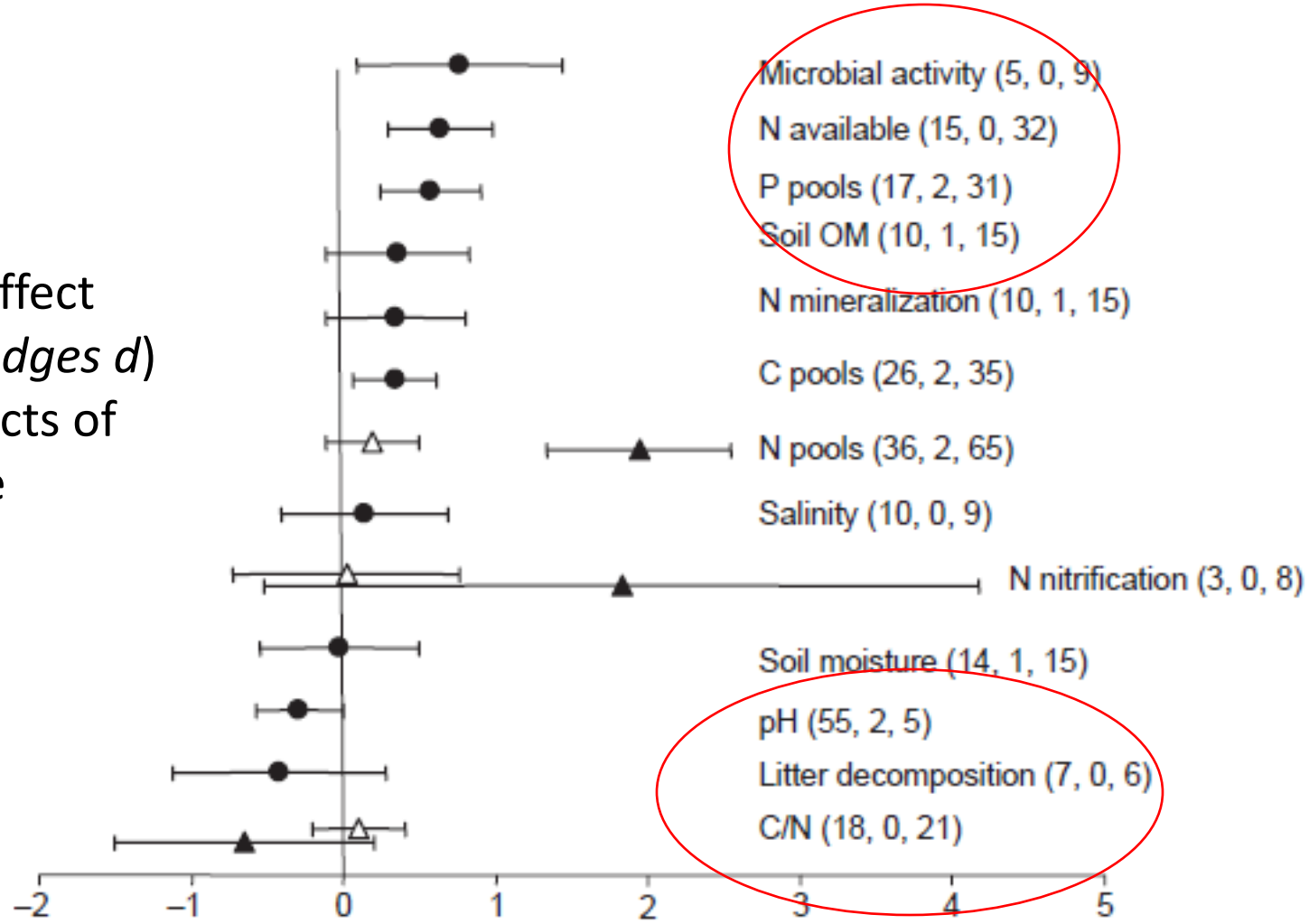


KATHOLIEKE UNIVERSITEIT LEUVEN

Van Kleunen et al. (2015) *Nature*

Invasive plant species also strongly affect the *functioning of ecosystems*

Mean effect size (*Hedges d*) of impacts of invasive species



Vila et al. (2011) *Ecol. Letters*

Predicting the effects of new exotic species on ecosystem functions would allow to set up an _early warning system_

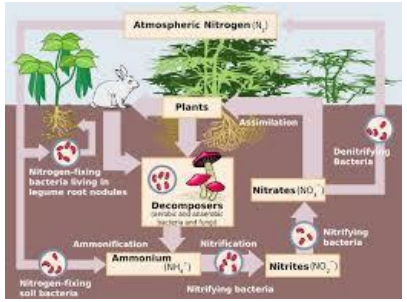
• Predictions have been not successful so far;

• The typical approach among plant ecologists is based on the framework of the **plant traits** (or plant characteristics).

RESEARCH TOPIC

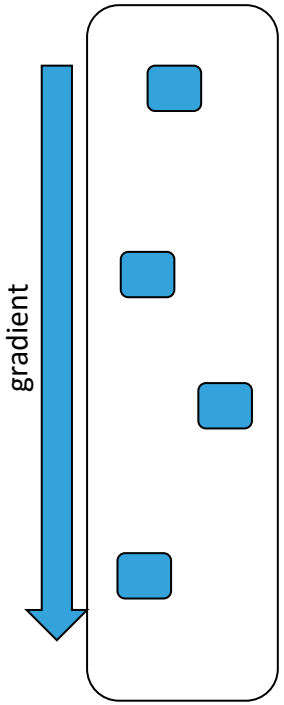
PROCESSES/FUNCTIONS

drivers ? →



→ *PLANT FUNCTIONAL TYPES*

FUNCTIONAL TRAITS



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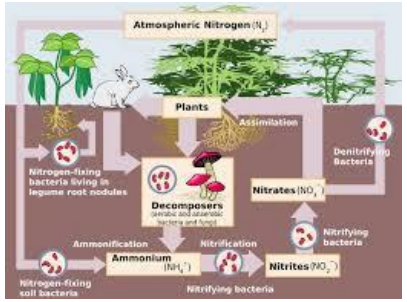
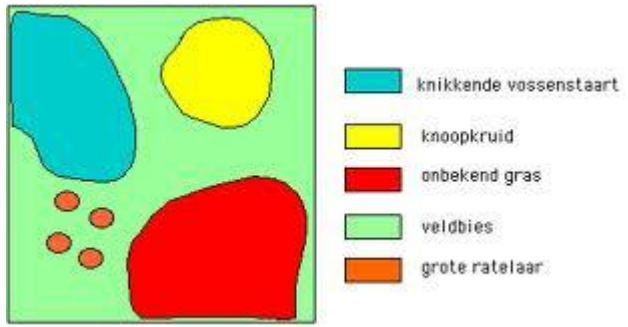


PLANT FUNCTIONAL TYPES

FUNCTIONAL TRAITS

gradient



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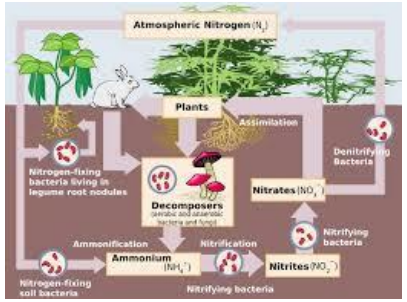

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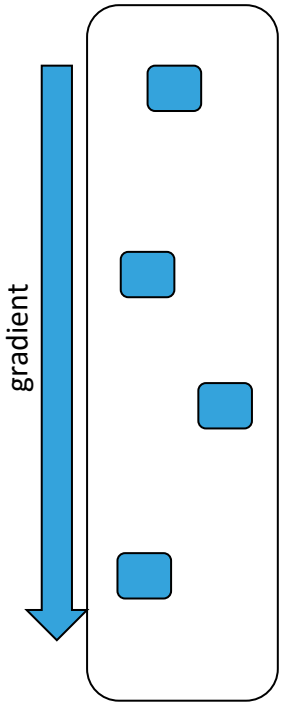

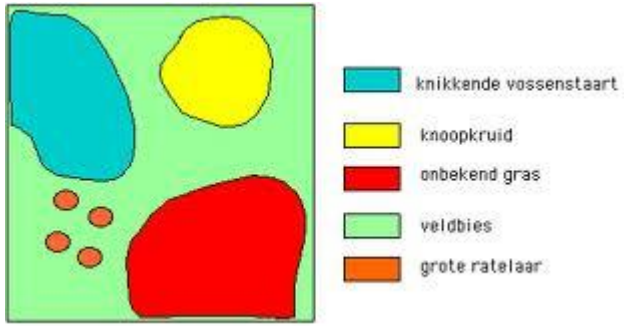

→ **FUNCTIONAL TRAITS**

growth form

life form

nutrients

biomass

leaf size/shape

rooting depth

seed mass

vegetation height

TRY Plant Trait Database

The LEDA Traitbase

RESEARCH TOPIC

PROCESSES/FUNCTIONS

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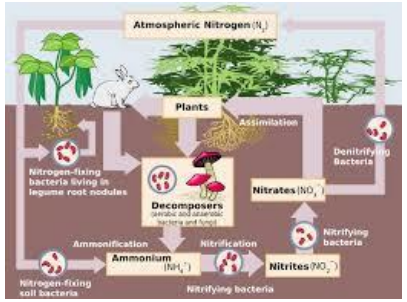

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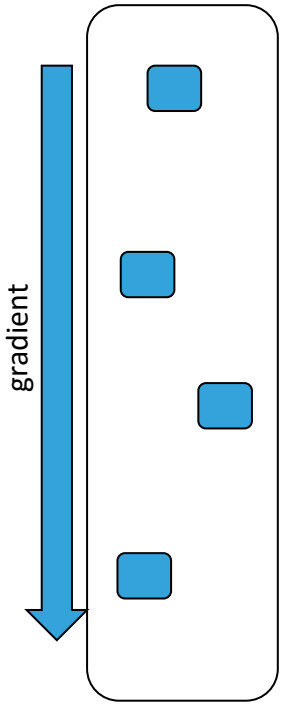

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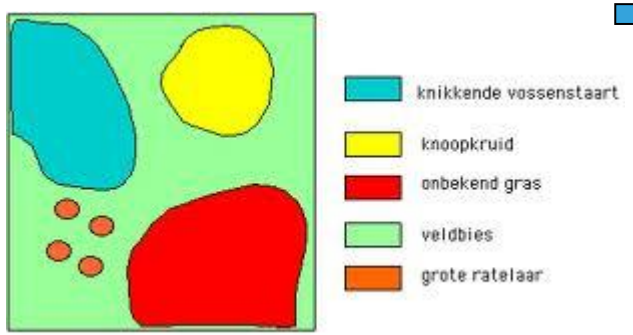

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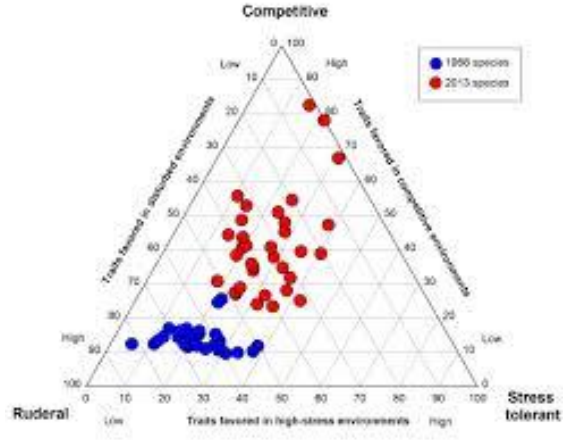

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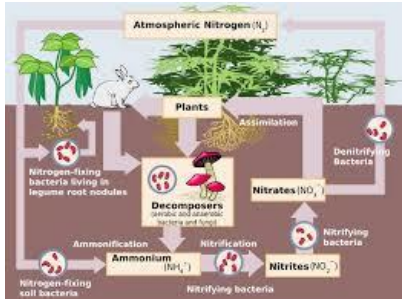

PLANT FUNCTIONAL TYPES

FUNCTIONAL TRAITS

gradient

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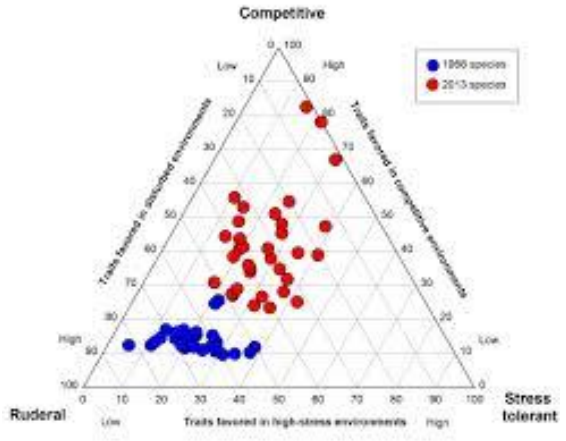

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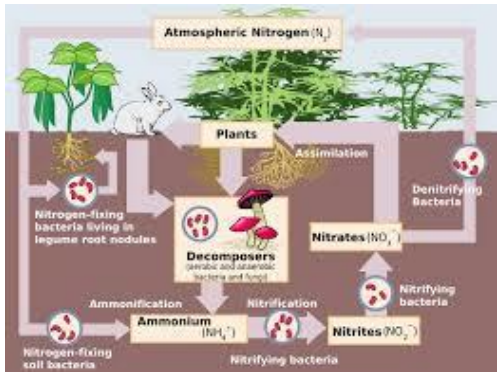

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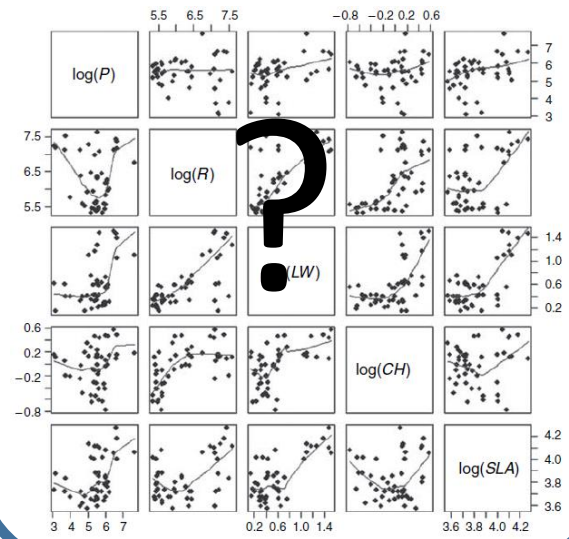
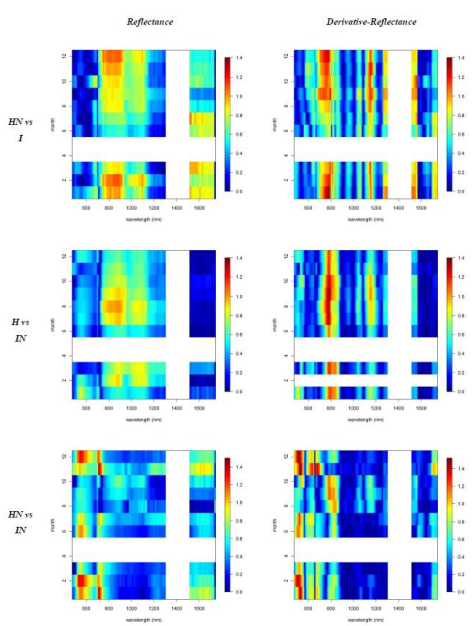


BELSPO VEGEMIX PROJECT



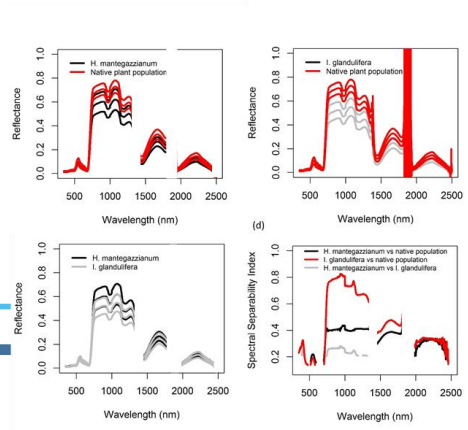
Somers & Asner (2012)

MASTER THESIS PROJECT

KU LEUVEN

FACULTEIT WETENSCHAPPEN

Detectie en impactbepaling van invasieve plantensoorten op basis van hyperspectrale *remote sensing*.



USTIN & GAMON, NEW PHYTOLOGIST, 2010

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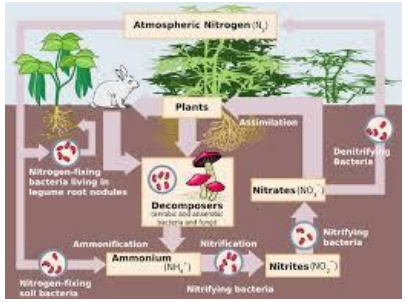

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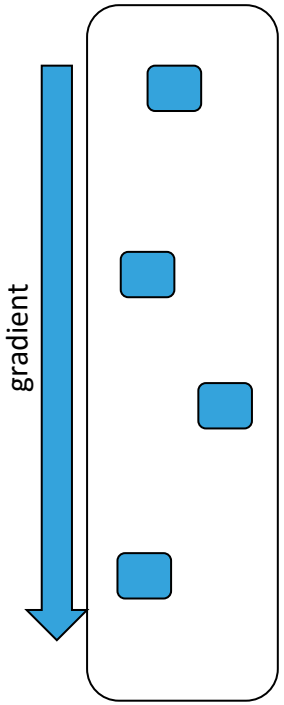

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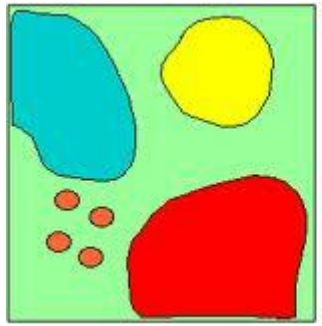

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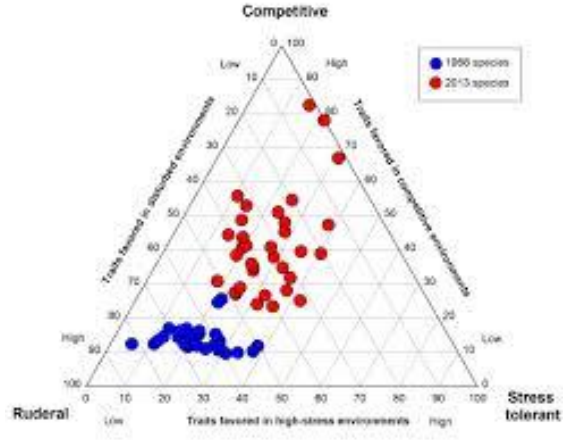

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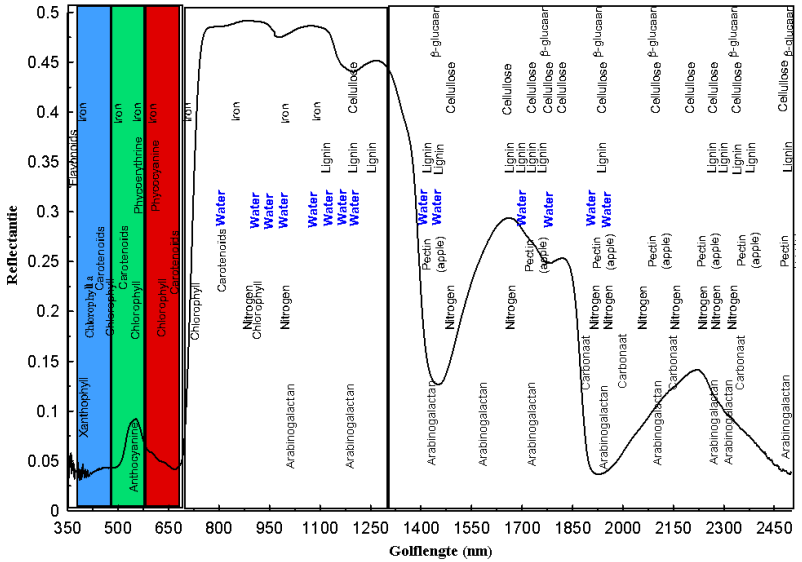

SPECTRAL INFORMATION?

Foliar defense & longetivity
(cellulose, lignin, phenols, tanins)

Ligth Capture & growth
(pigments, nutrients, leaf mass)

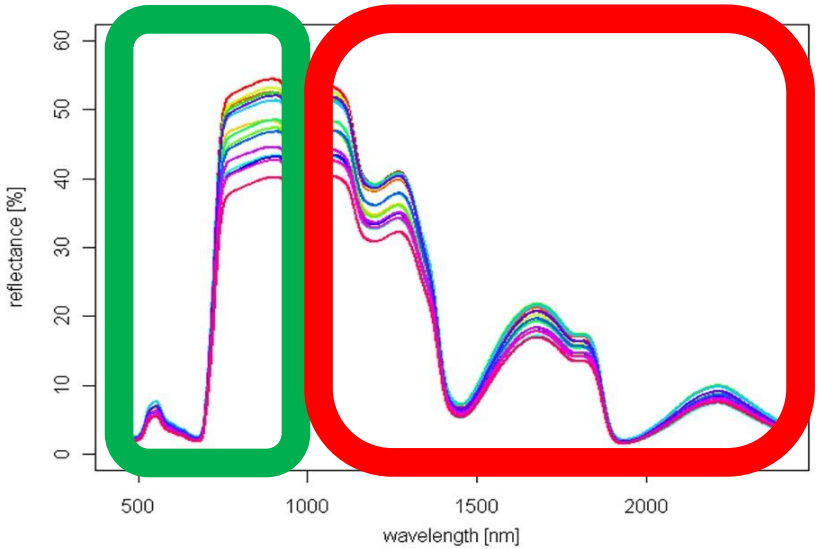

Fig. 3: measured hyperspectral canopy reflectance curves

RESEARCH TOPIC

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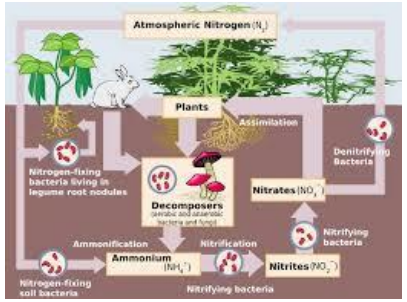
drivers ?



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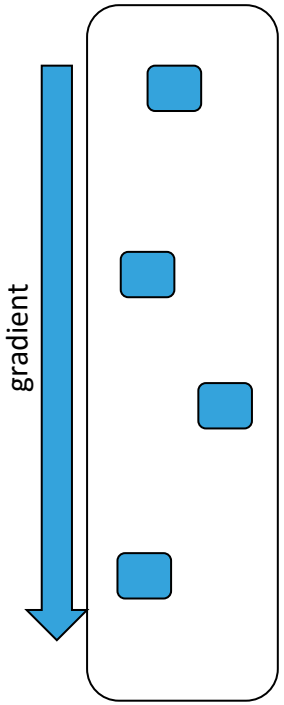

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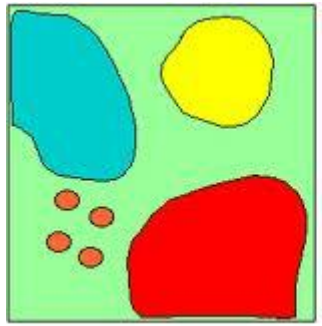

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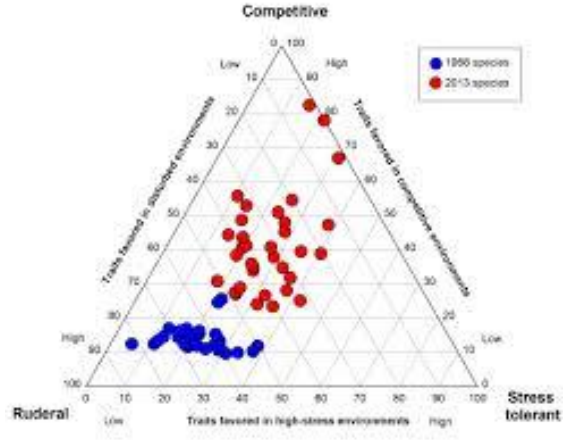

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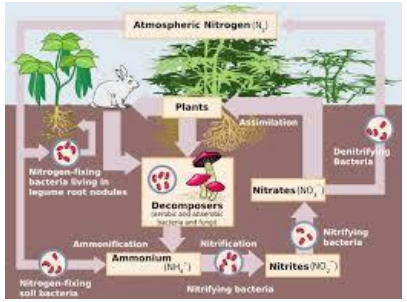
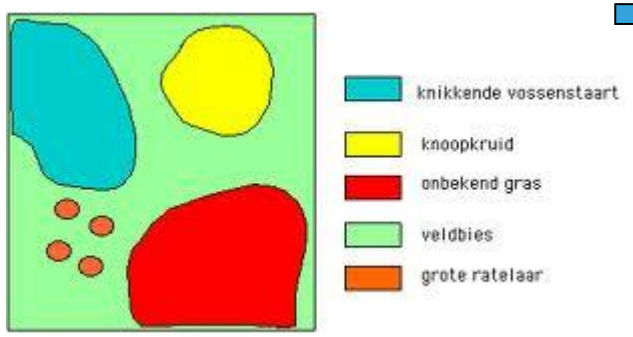


PLANT OPTICAL TYPES

SPECTRAL INFORMATION

gradient



OPTICAL TRAITS

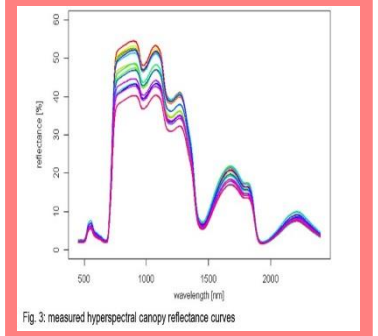


Fig. 3: measured hyperspectral canopy reflectance curves

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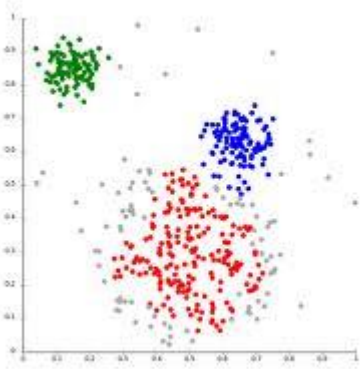

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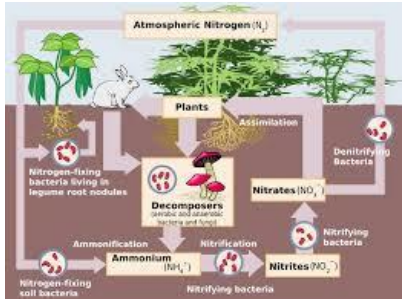

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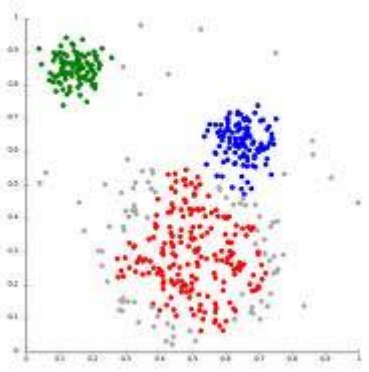

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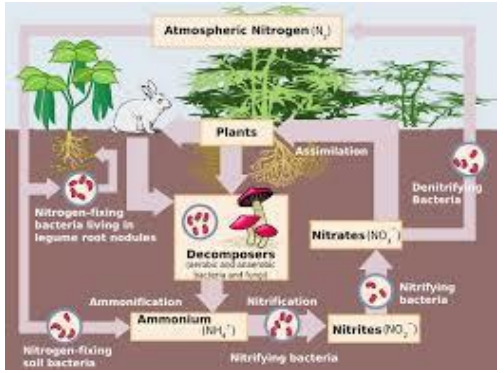
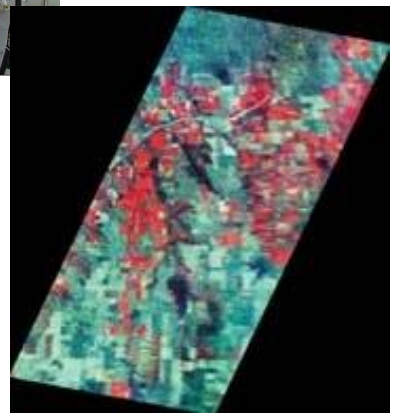


Spectral Information?



OBJECTIVES

To develop novel 'plant optical types'-based approaches to evaluate and to predict the impact of invasive plant species on ecosystem functioning

PROOF OF CONCEPT STUDY!!!!!

PROJECT CONCEPT

Solidago gigantea
(perennial rhizomatous geophyte, roadsides, distubred grasslands)

Impatiens glandulifera
(annual; river banks)

FIELDWORK – DATA COLLECTION

RESEARCH PROGRAMME FOR EARTH OBSERVATION 'STEREO III'
THEMATIC PROJECT PROPOSALS CALL 2015