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Weed traits and population dynamics

Introduction

- A weed population is made up of a number of states:
    - seedbank
    - seedlings
    - mature plants
    - fresh seed
- Transition between states is mediated by species-specific parameters

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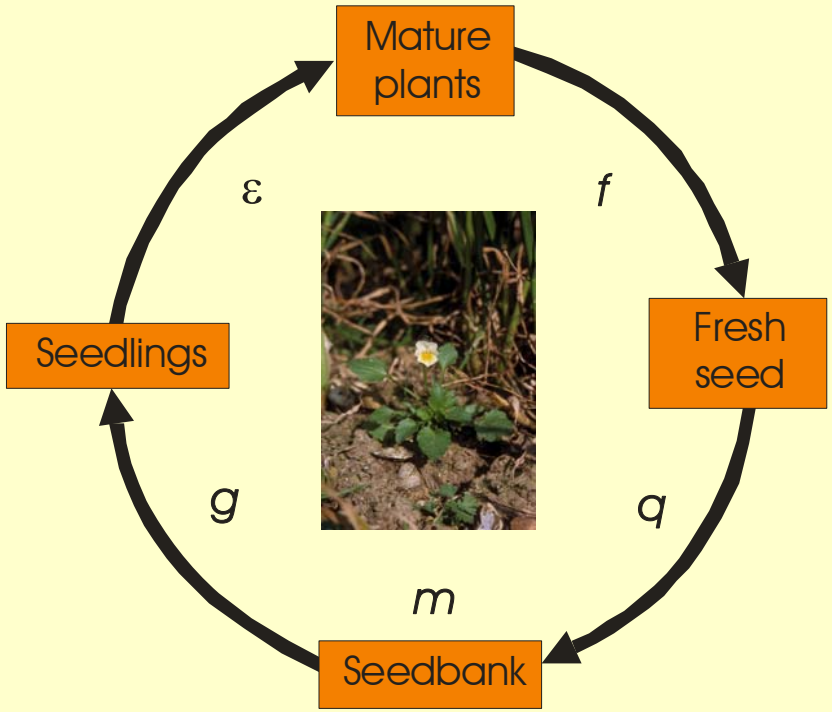
Weed traits and population dynamics

Introduction



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Weed traits and population dynamics

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- Species parameters are determined by plant functional traits

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Weed traits and population dynamics

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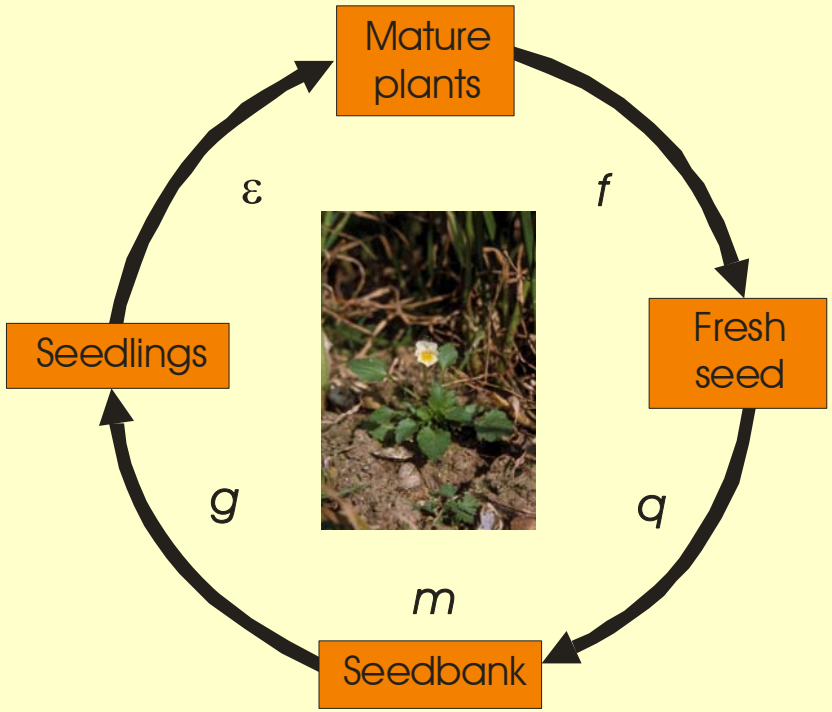

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Weed traits and population dynamics

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	Model parameter	**Eco-physiological traits**
m	Seed mortality	Dormancy
g	Germination	Seed size Dormancy T^{o}C & H_2O requirements
ε	Competitive index	Seed size RGR Height
f	Fecundity	Seed size Flowering time
q	Losses of fresh seed	Dormancy Palatability

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Weed traits and population dynamics

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- A weed population is made up of a number of states:
    - seedbank
    - seedlings
    - mature plants
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- Transition between states is mediated by species-specific parameters

- Species parameters are determined by plant functional traits

- These traits will also determine the sensitivity of a species to environmental and management filters

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Weed traits and population dynamics

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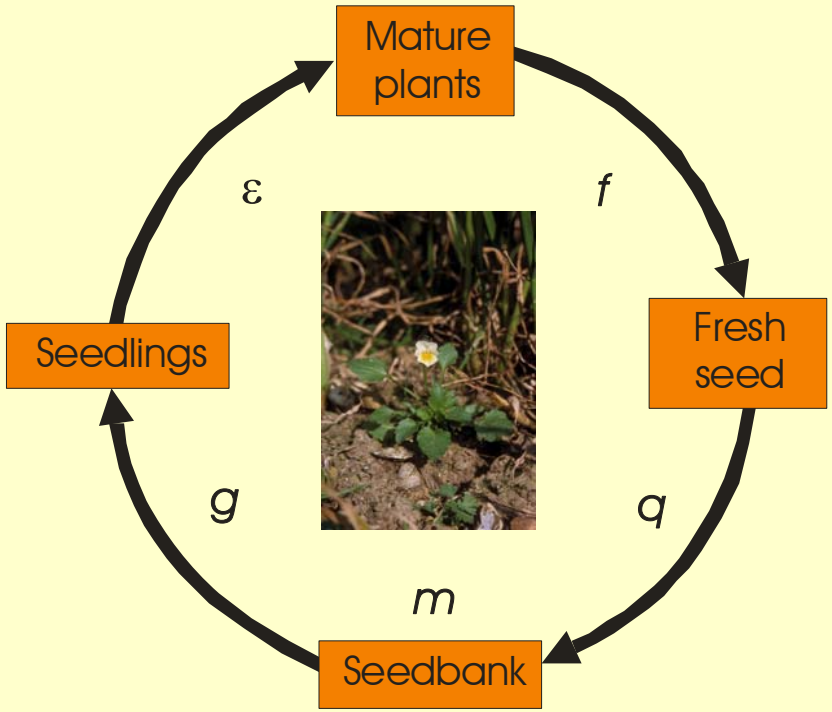

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Weed traits and population dynamics

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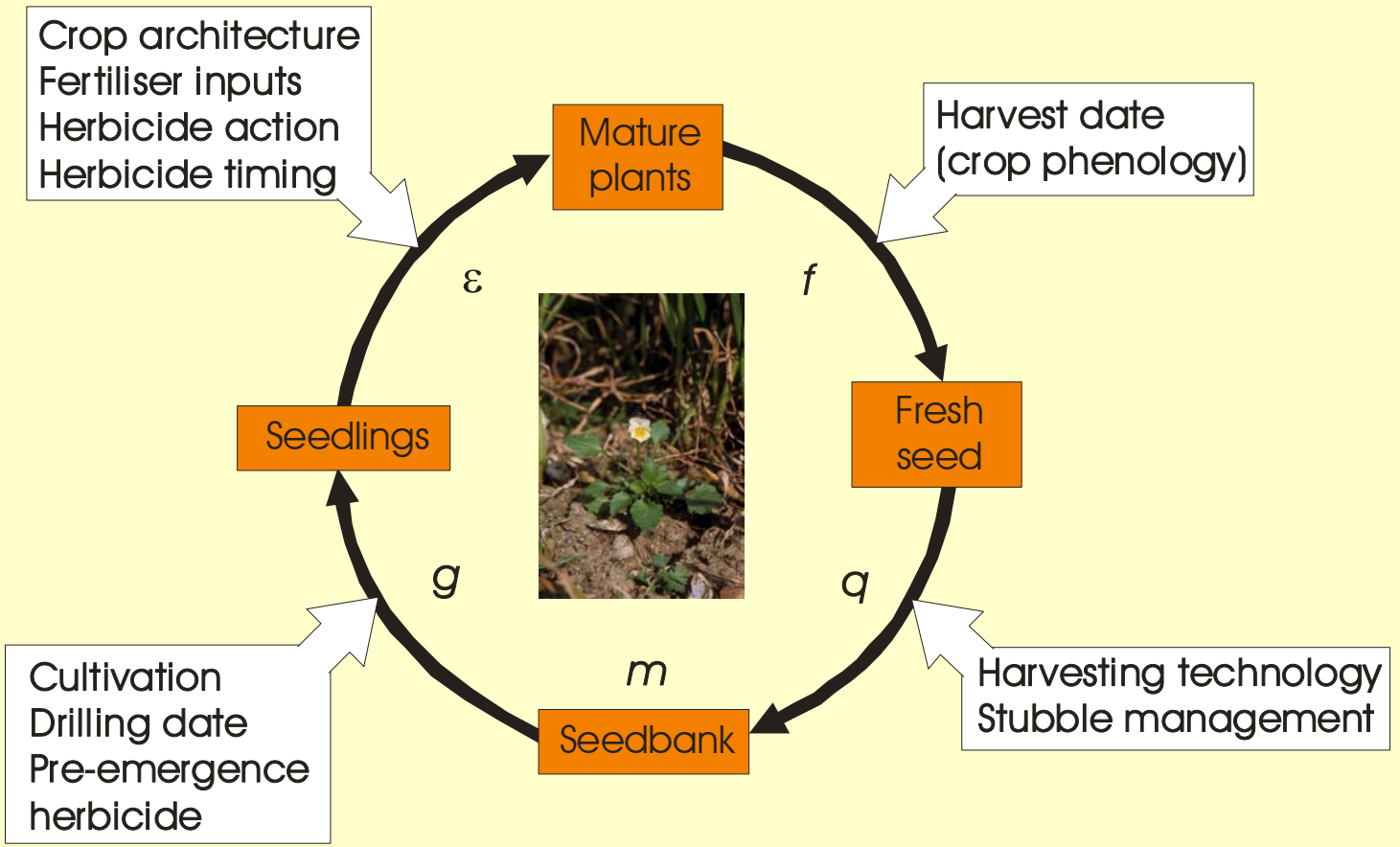

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Weed traits and population dynamics

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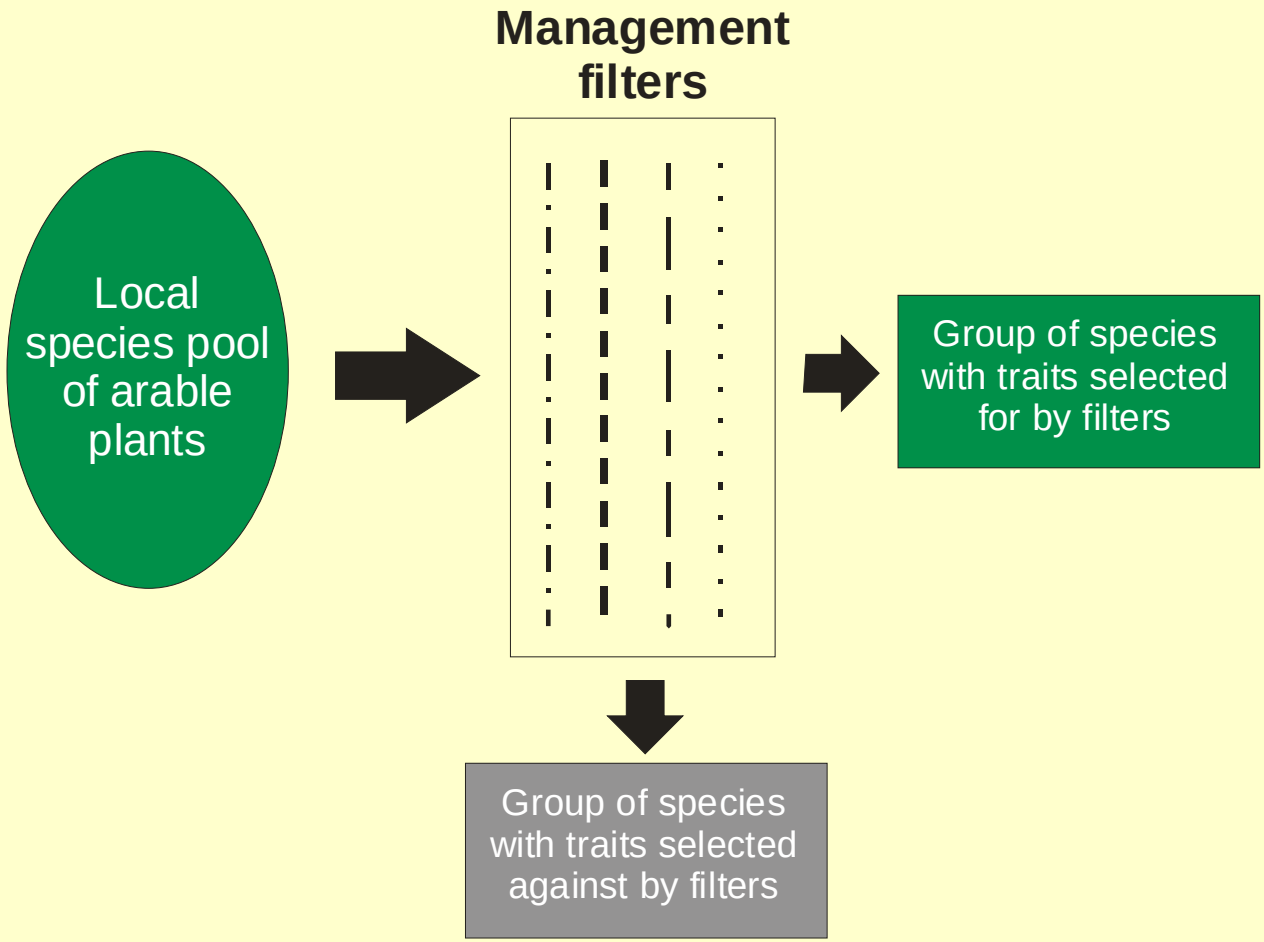

Booth & Swanton (2002) Weed Science 50: 2-13

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Weed traits and population dynamics

Key questions

1. Can we observe empirical relationships between values of model parameters and plant traits?

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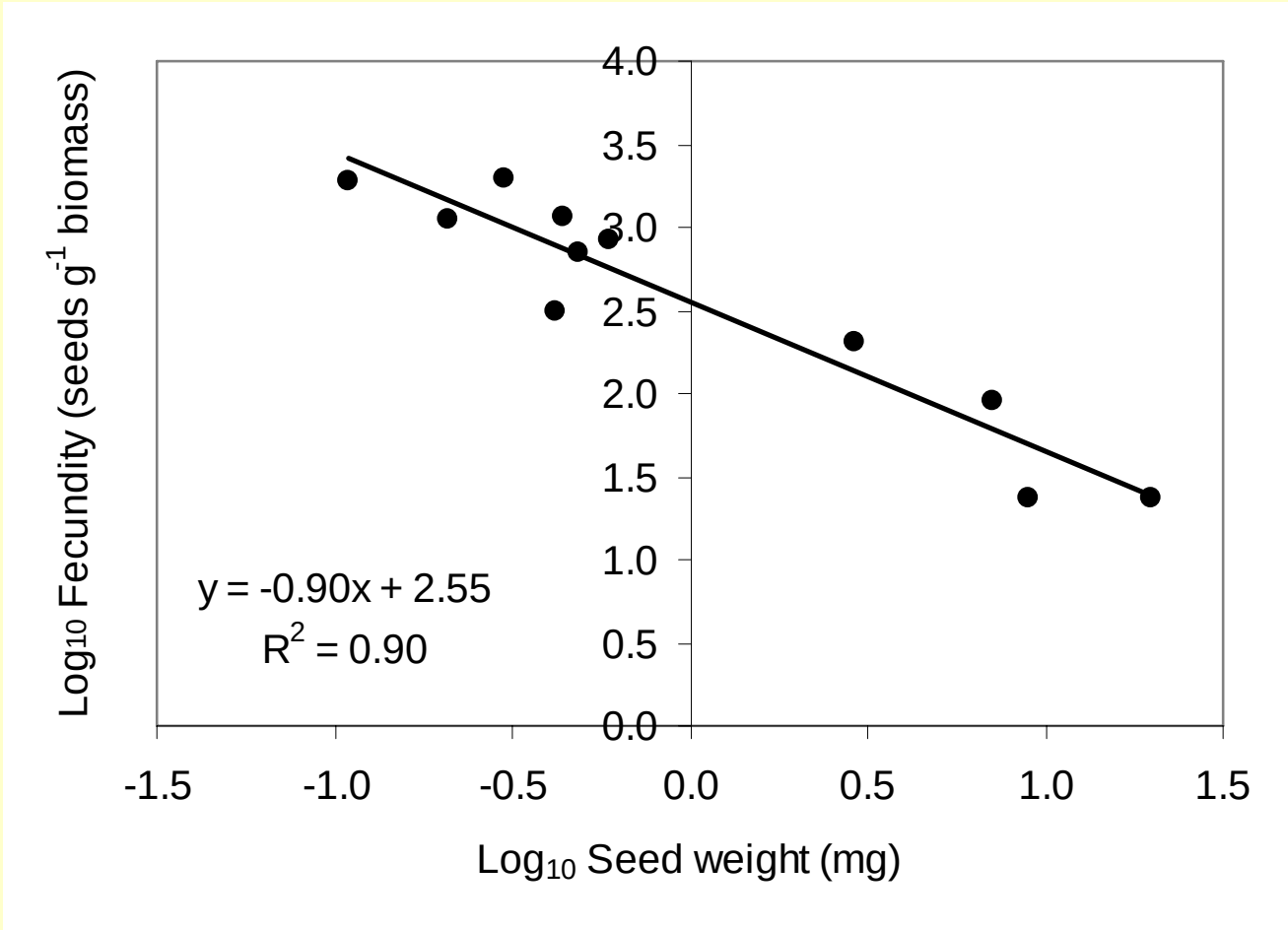
Weed traits and population dynamics

Relating model parameters to plant traits



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Weed traits and population dynamics

Key questions

1. Can we observe empirical relationships between values of model parameters and plant traits?

2. Can we identify the traits that determine the contrasting response of different species to management filters?

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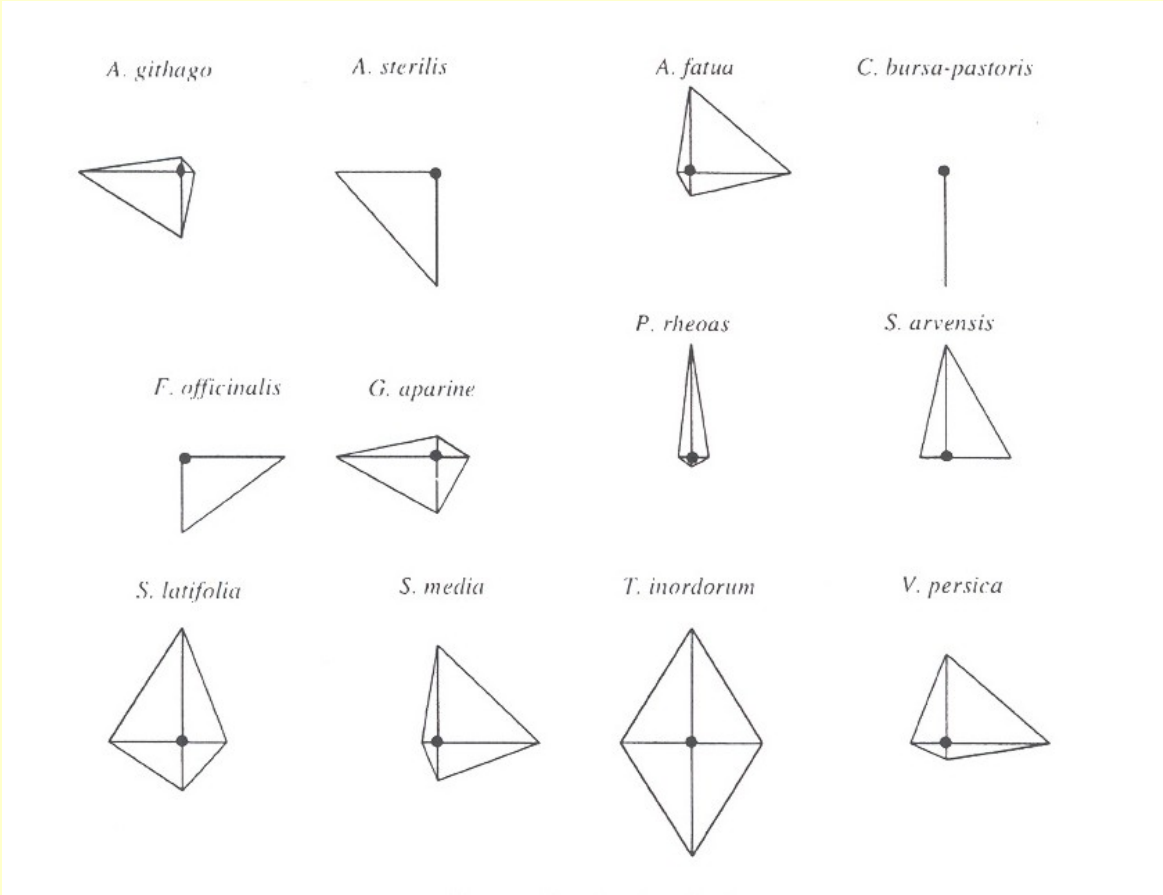
Weed traits and population dynamics

Contrasting responses to management



Conventional, ploughed

Conventional, Minimum tillage

Organic, Minimum tillage

Organic, ploughed

McClosky *et al.* (1996) Journal of Vegetation Science 7: 799-808

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Weed traits and population dynamics

Key questions

1. Can we observe empirical relationships between values of model parameters and plant traits?

2. Can we identify the traits that determine the contrasting response of species under different scenarios?

3. Can we identify functional groups of plants that respond in a similar way to management based on trade-offs between functional traits ?

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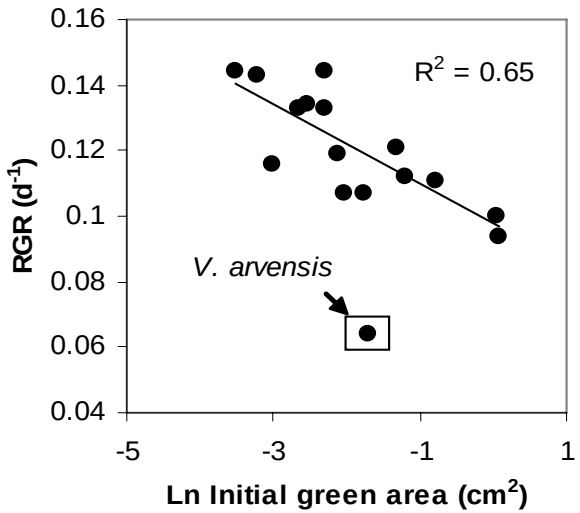
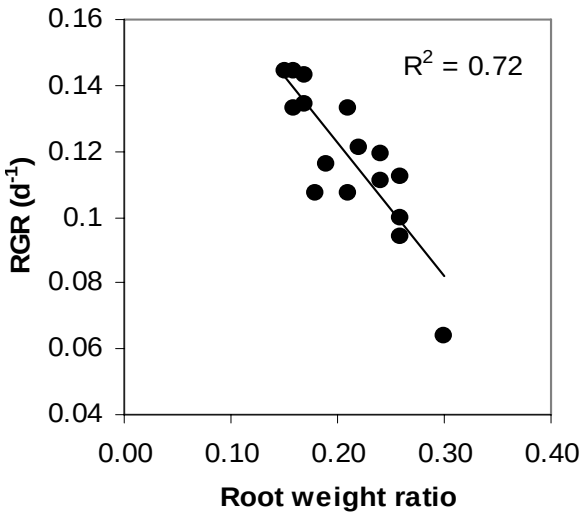
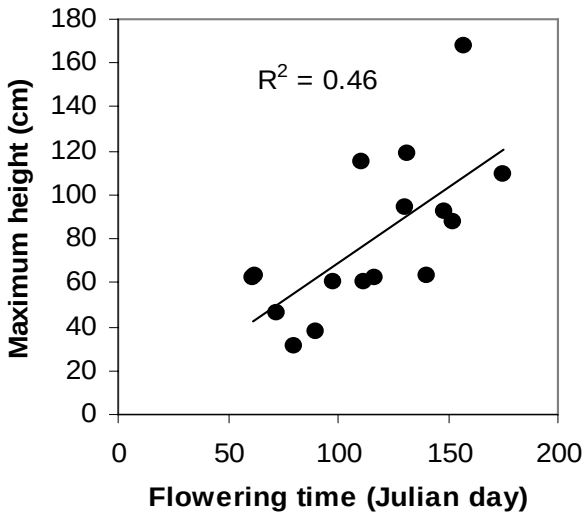
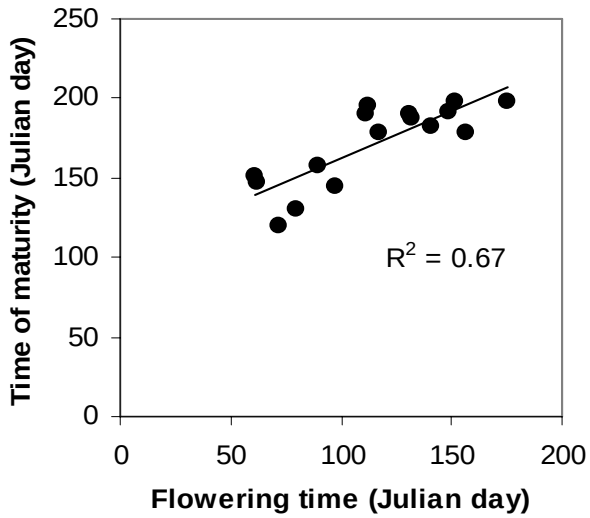
Weed traits and population dynamics

Identifying functional groups









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Weed traits and population dynamics

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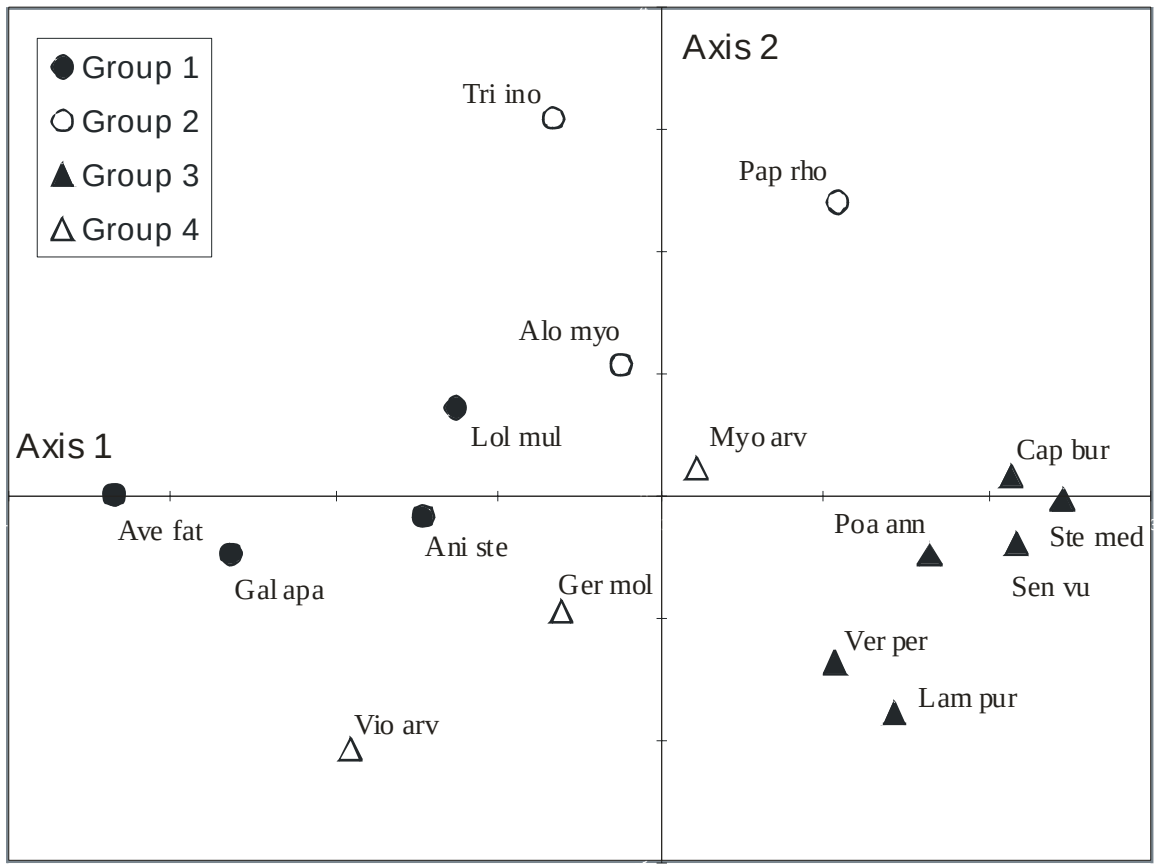

Storkey (2006) Weed research 46: 513-522

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Weed traits and population dynamics

Key questions

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2. Can we identify the traits that determine the contrasting response of species under different scenarios?

3. Can we identify functional groups of plants that respond in a similar way to management based on trade-offs between functional traits ?

Specific → Generic

Population dynamics → Community assembly

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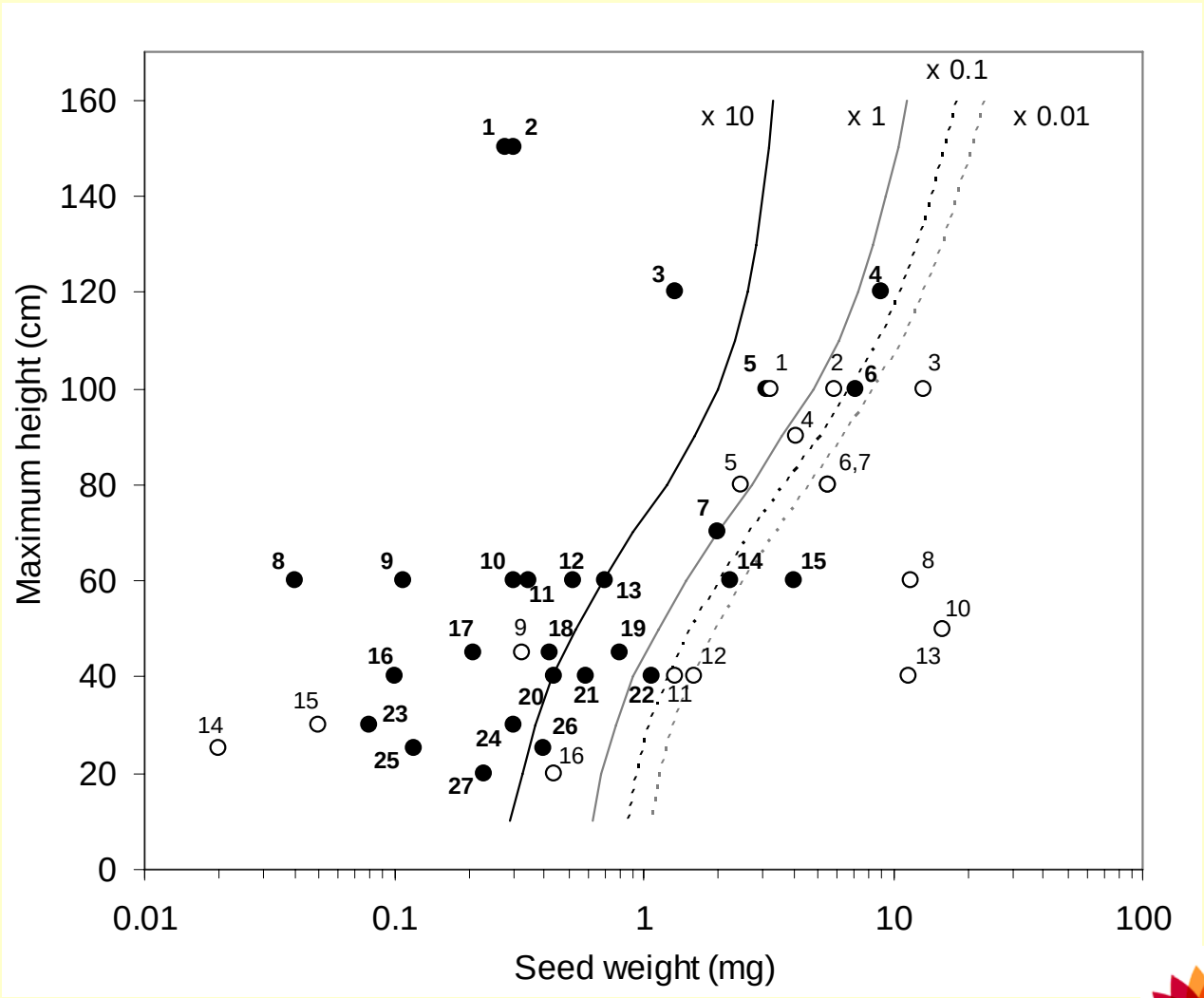
Weed traits and population dynamics

Plant traits and weed community dynamics



Storkey (2007) Journal of Applied Ecology *submitted*

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Weed traits and population dynamics

A possible way forward

1. Identify the important functional traits that influence the behaviour of the population dynamics model.

2. As well as compiling a database of the model parameters, also collect information on these traits.

3. Look for correlations between the traits and functional groups of species with similar trait syndromes.