

# Ecology for Gardeners

- understanding long-term performance



# Themes

- Plant survival strategies and what this means for plant selection for gardeners
- Long-term plant performance: what this means and how gardeners can predict it

Need to understand ornamental plants  
**ecologically,**  
as well as horticulturally.

## THINKING ECOLOGICALLY ABOUT ORNAMENTAL PLANTS

Involves thinking about:

- The conditions in which they grow best -  
which is not necessarily the same as that in  
which they grow in their country of origin
- How the planting will develop
- How plants will compete with each other over  
time

## The CSR model of plant survival strategies

### Competitors

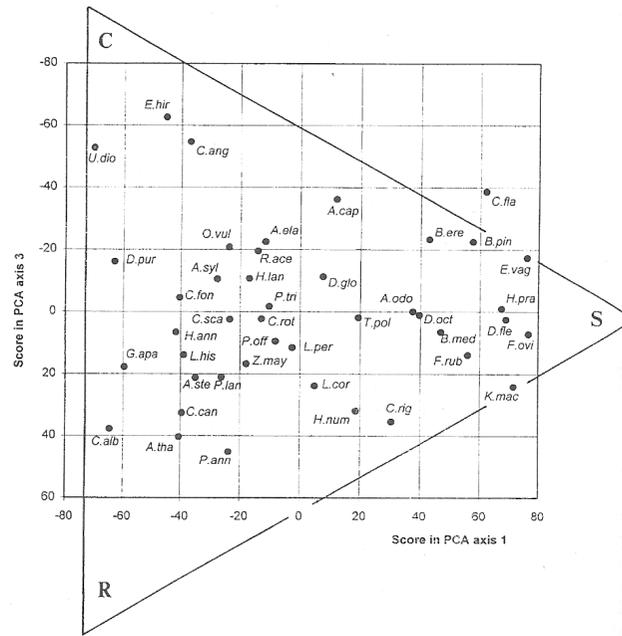
- high resource environments

### Stress tolerators

- low resource environments

### Pioneers (ruderals)

- short-lived opportunists



## C - competitors

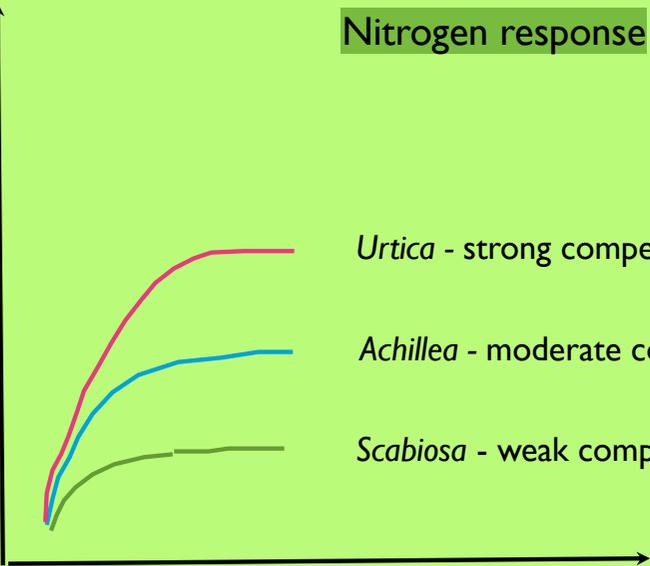
have a high level of dominance

- highly 'mobile'
- dominate fertile sites, as they can make maximum use of high levels of resources

**BUT** are liable to reduce the level of diversity

Nitrogen response

Growth



*Urtica* - strong competitor

*Achillea* - moderate competitor

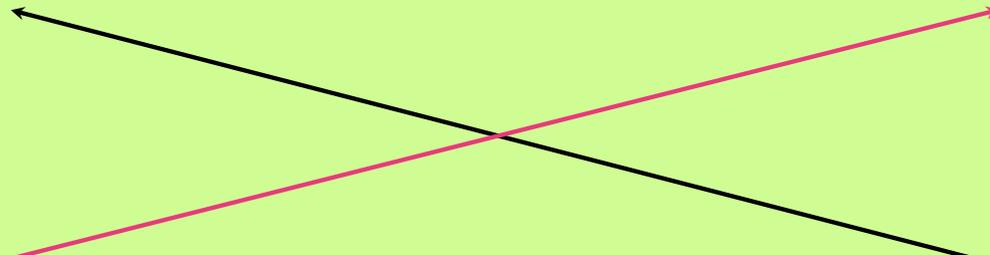
*Scabiosa* - weak competitor

Nitrogen

In fertile, resource rich environments, 'the winner takes all'

Fertility

Species diversity



In poor environments, no one plant can monopolise resources

## Competitors tend to :

- have large, lush, soft leaves
- be rapid growing
- be tall
- have means by which they reproduce vegetatively:
  - runners, rapidly growing rhizomes etc.

## Competitors - their problems:

- rapid, even aggressive growth creates a variety of problems:
- large quantity of material to remove at end of season
- competition between species reducing diversity and hence visual effect

## S- Stress tolerators

Are adapted to flourish in low-resource environments

- low nutrient (poor, shallow, sandy etc, soil)
- drought
- shade
- other problems which reduce ability to absorb nutrients such as waterlogging

## Stress tolerators

Conserve resources, so are likely to be:

- evergreen - physically tough foliage
- slow-growing,
- often woody,
- or with storage organs such as bulbs.

## CHOOSING AND WORKING WITH STRESS-TOLERANT PLANTS

Can be paradoxically easier than with competitors:

- they are slow-growing, and so management and inter-species competition are both reduced

**But**

Selection does need to be precisely matched to habitat to avoid losses

## Stressful situations 1

drought (sun and wind)

poor soil

### **sub-shrubs**

- evergreen
- grey/silver foliage
- dense, twiggy growth

grasses with tough tussocky growth

(**cespitose** grasses)

**design** note - overwhelmingly spring flowering

## Sub-shrubs

- Low, ground-hugging habit
- Only weakly woody
- Dense mass of branches - fine twiggy growth
- Often found in habitats where drought possible, and/or infertile soil

## Stressful situations 2

### shade

- many evergreen perennials
- glossy dark green foliage
- ground-covering habit common
- early (or late) growing geophytes
- slow-growing

**design** note - overwhelmingly spring flowering

# Stress avoidance 1

- competitive species which simply become dormant during stressful conditions (mainly drought):
- summer-dormant perennials
  - Mediterranean perennials
  - some woodland perennials

## Stress avoidance 2

- pioneers: annuals and biennials
- geophytes (bulbs, tubers)

## Weeds in stressful environments

- tend not to grow well
- in shade are easily smothered with ground-cover species
- in drought-prone sites can be kept in check with low evergreen shrubs
- but where growth is sparse, may be a problem - hence gravel mulching

# Pioneers

- short-lived plants:
  - annuals
  - biennials
  - short-lived perennials

# Pioneers

- “live fast, die young”
- very useful for spontaneity in gardens
- colour
- good structure
- useful for combining with long-lived perennials for temporary effect (1st year)

## Ruderals (pioneer species)

- annuals, biennials, short-lived perennials
- “live fast, die young”
- species survive through **seed** production, long-term survival of seed in soil **seed bank**
- seed germinates when soil is disturbed
- **pioneer** species occupying bare ground

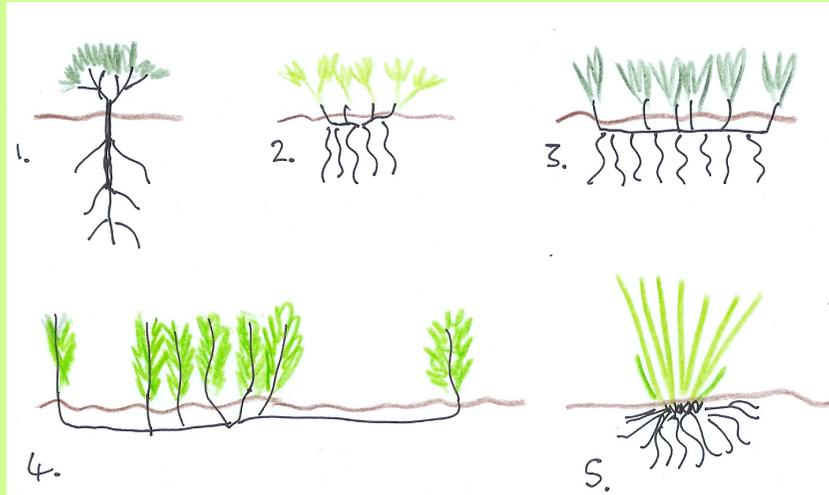
# Perennial longevity

- monocarpic species
  - annuals
  - biennials
  - longer-lived monocarps
- short-lived perennials
- true perennials with vegetative spread

## Short-lived perennials

- difficult to know exact life span
- nearly always set plenty of seed
- often very ornamental
- lack of rooting side-shoots (ramets)

# Vegetative spread in herbaceous perennials



## Vegetative spread in herbaceous perennials

- ramets = potentially independent plants
- gradient between species with well-integrated ramets and less well-integrated ramets
- species without clear ramets either short-lived or vulnerable to damage

**Short-lived perennials  
(non-clonal)**

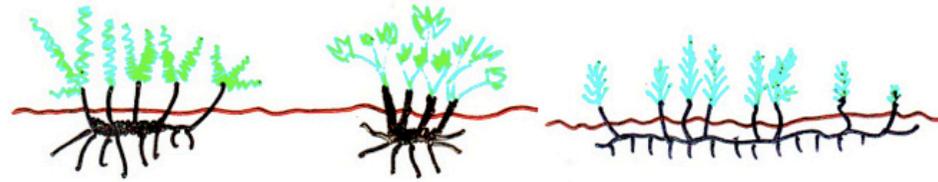
**Potentially long-lived  
perennials (clonal)**

**Long-lived but slow to  
establish perennials (clonal)**

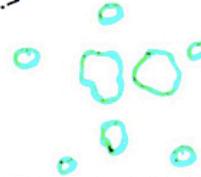
## **Vegetative spread of clonal perennials**

- rate of increase - number of shoots per year
- length of spread - per year
- how persistent are they?

## **Patterns of spread**

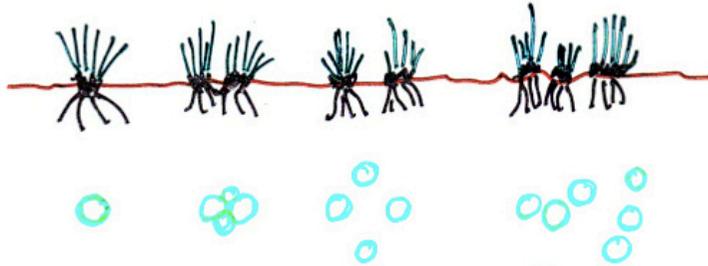


<.....viewed from above.....>



**Phalanx** spreaders march out steadily, with slow-growing ones forming a circular clump, faster-growing ones tending to be more uneven.

**Guerrilla** spreaders send out runners in an unpredictable way, with spaces between the centre and distant outliers generally being filled in later if there is no competition.



**Persistence** - perennials which break up into smaller clumps as they grow are not **persistent**. Older clumps may in turn produce new growth and break up. Persistent perennials continue to occupy ground, with the centre of the clump remaining alive as it gets steadily bigger.



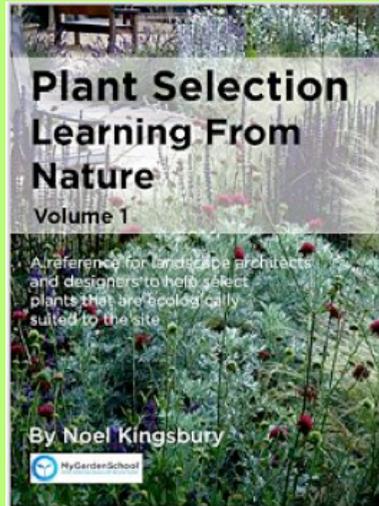
**Long-lived but slow to  
establish perennials (clonal)**

**Its all underground**

Investment in roots

It may take a long time to see results

Long-term domination of the  
environment led by the root system



e-book

available  
from  
Amazon

**Plant Selection: Learning From Nature: A reference for landscape architects and designers to help select plants that are ecologically suited to the site**

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