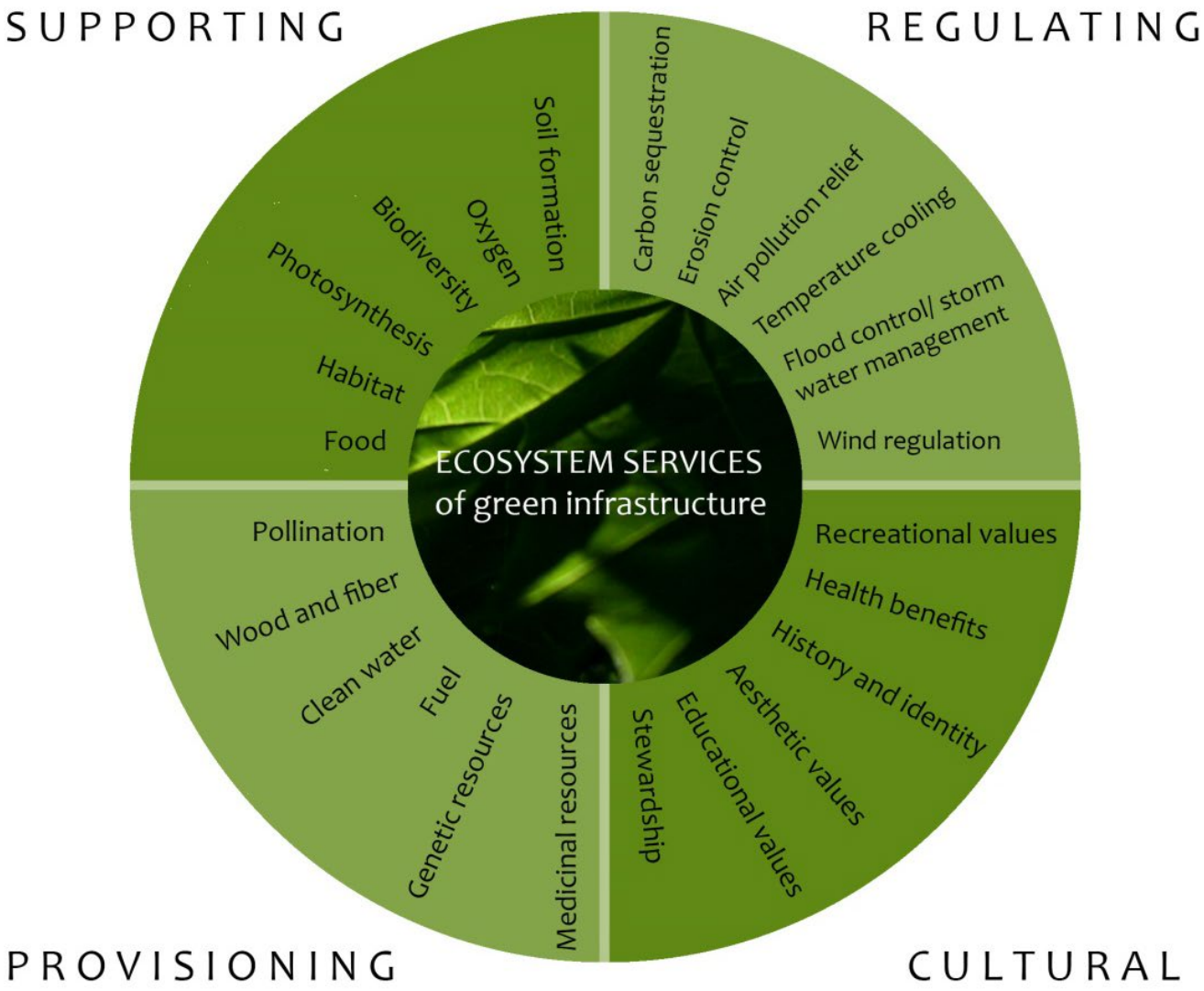
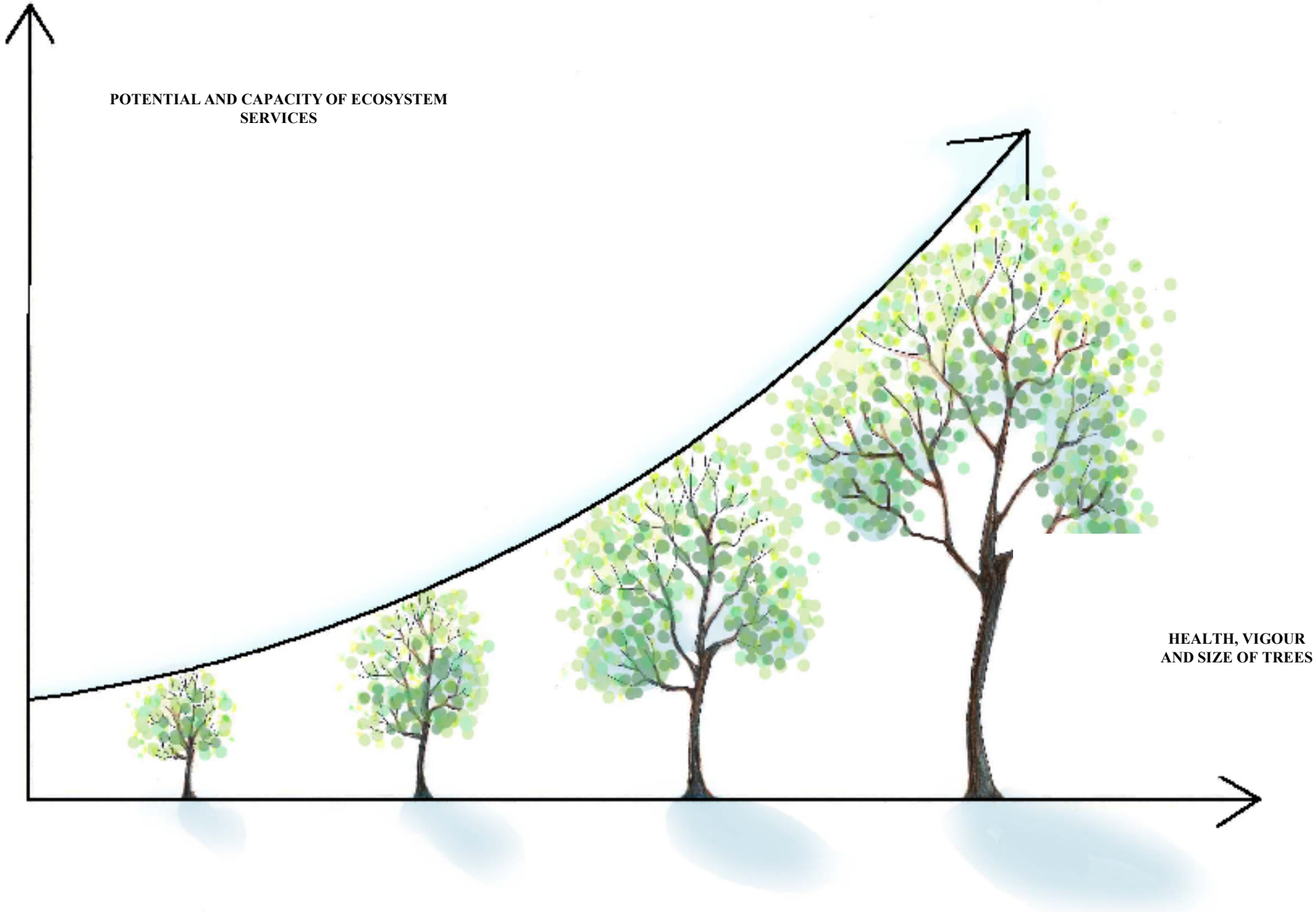
Plant Health and Urban Forestry

Henrik Sjöman
Gothenburg Botanical garden / Swedish University of Agricultural Science

Trees and ecosystem services



(Deak Sjöman, 2016)


POTENTIAL AND CAPACITY OF ECOSYSTEM SERVICES
HEALTH, VIGOUR AND SIZE OF TREES

Acer pseudoplatanus, Lund Sweden

Challanges:

1. **Develop knowledge and experience of different tree species capacity delivering ecosystem services**

2. **Develop knowledge and experience of different tree species capacity for different growing habitats**

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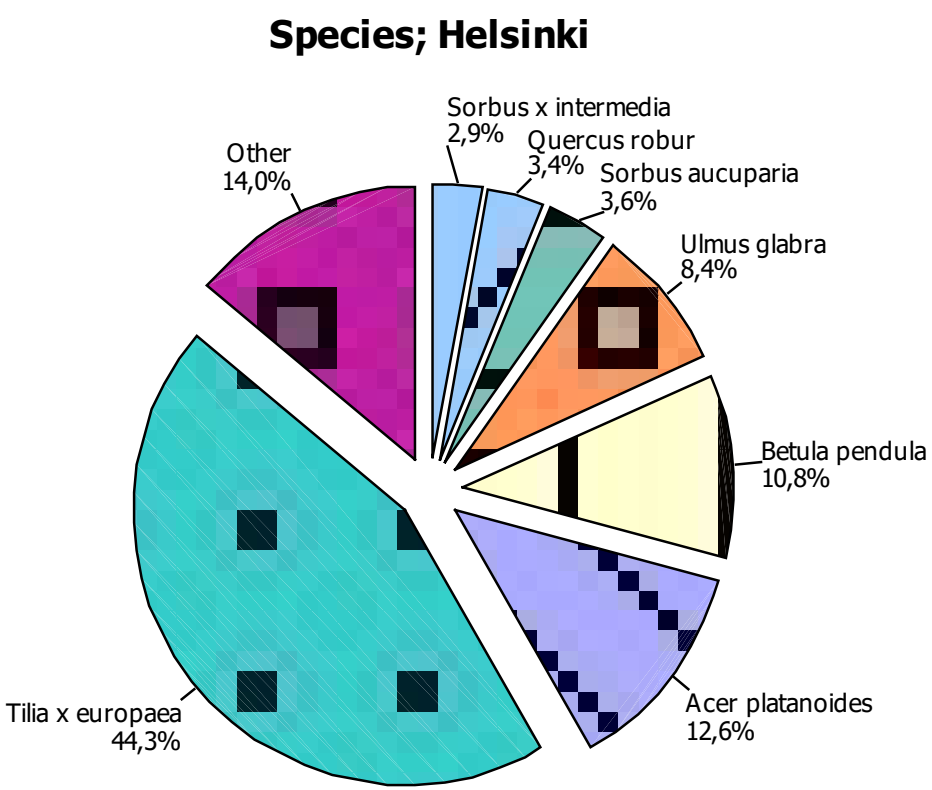
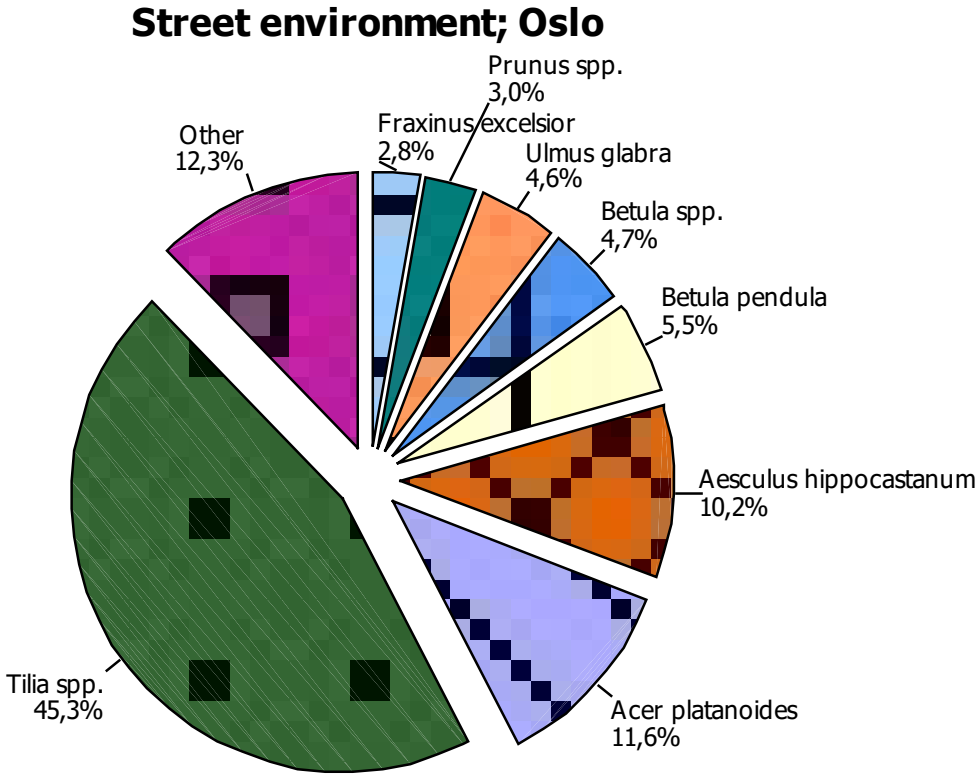
3. Develop knowledge of above mentioned categories on untraditional plant material

Limited diversity of urban trees





(Sjöman et al. 2012; Sjöman & Östberg, 2018)

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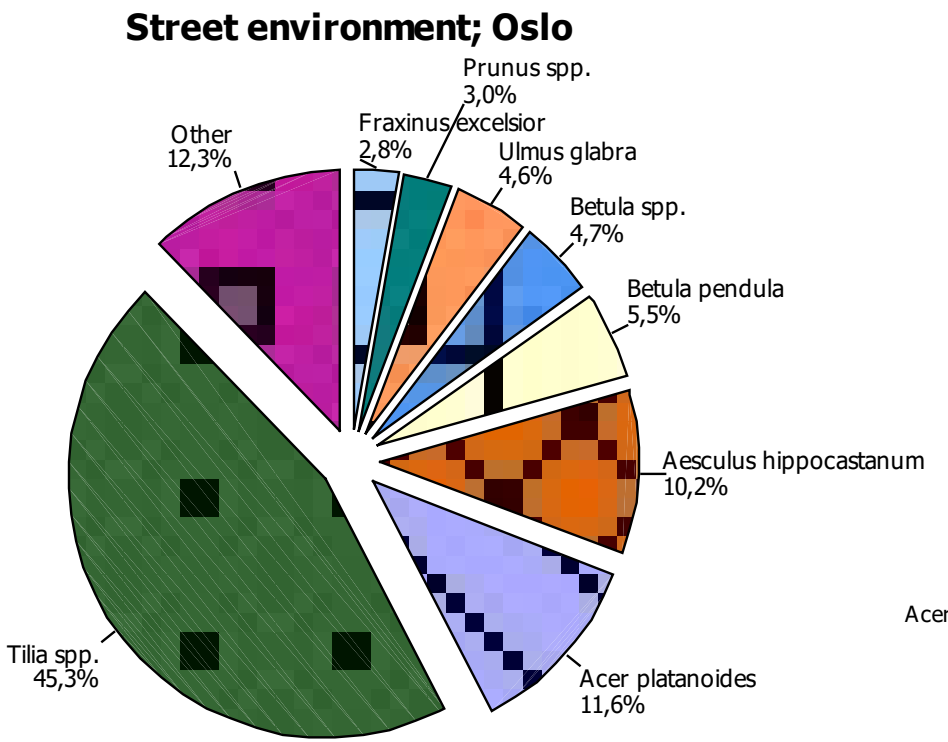

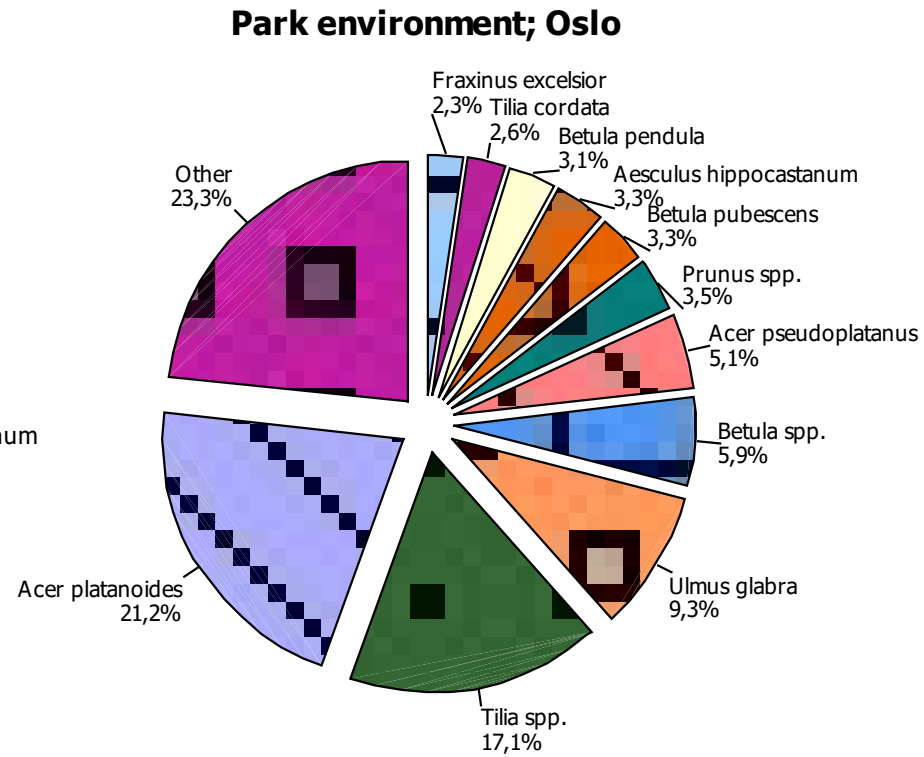

(Sjöman et al. 2012; Sjöman & Östberg, 2018)

Asian Longhorned Beetles

Asian longhorned Beetle (*Anoplophora glabripennis*) = **137**

Citrus Longhorned Beetle (*Anoplophora chinensis*) = ***188***

(Sjöman et al. 2014)

Tree loss scenario in 10 Nordic cities

Scenario/ beetle species	All	Aarhus	Espoo	Gothenburg	Helsinki	Copen-hagen	Malmo	Oslo	Stockholm	Tampere	Turku
Realistic scenario ALB	33%	27%	29%	29%	32%	27%	33%	42%	41%	51%	30%
Worst-case scenario ALB	77%	77%	41%	79%	88%	84%	81%	96%	81%	92%	60%
Realistic scenario CLB	21%	31%	21%	16%	20%	15%	23%	20%	25%	23%	21%
Worst-case scenario CLB	62%	76%	30%	62%	45%	64%	72%	51%	65%	71%	66%
Realistic scenario ALB+ CLB	45%	46%	59%	37%	40%	34%	47%	54%	47%	64%	38%
Worst-case scenario ALB+ CLB	94%	96%	97%	92%	98%	96%	96%	97%	98%	97%	80%

Table 5. Potential tree losses (% of total) in the 10 major Nordic cities, caused by longhorned Asian longhorned beetle (ALB) and citrus longhorned beetle (CLB), separately or combined, in a realistic and a worst-case scenario

(Sjöman & Östberg, 2018)

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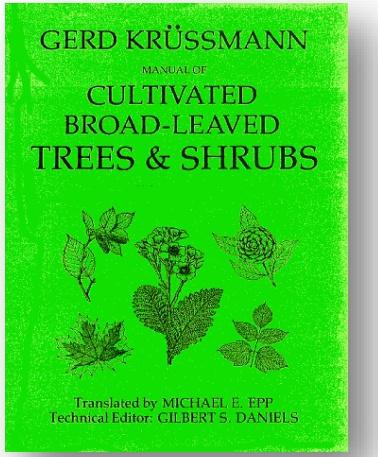
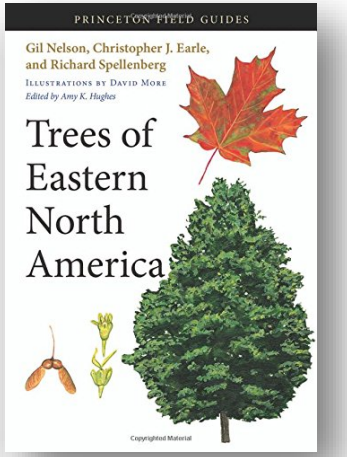
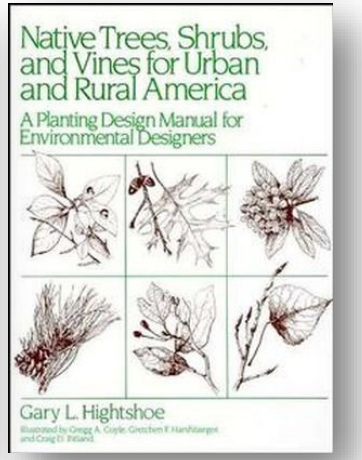
Advice from literature?





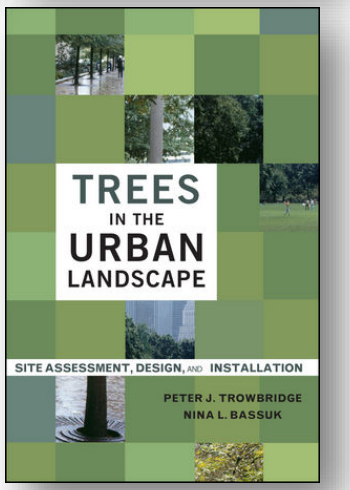


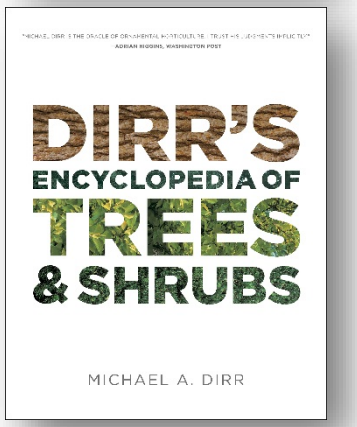
Acer nigrum

- Heat and drought tolerant (Dirr (2009)
- Sensitive for heat and drought (Hightshoe 1988)
- Prefers sites that are more humid (Beaulieu 2003)
- Has a higher drought tolerance than sugar maple (Bassuk et al. 2009)

Acer negundo

- Useful for sandy, dry to sterile soil (Krüssmann 1982)
- Drought tolerant (Stoecklein 2001)
- Its native habitat is along streams and ponds (Grimm 2002)
- Native in moist habitats but perform well also in poor, wet, or dry habitats (Dirr 2009)
- Very heat and drought tolerant (Hightshoe 1988)
- Grows along shores of permanent bodies of water (Krüssmann, 1986)
- Like humid areas (Beaulieu 2003)
- Grows along stream banks, flood plains, swamps (Spellenberg et al. 2014)





(Sjöman et al. 2016)

Learning from nature

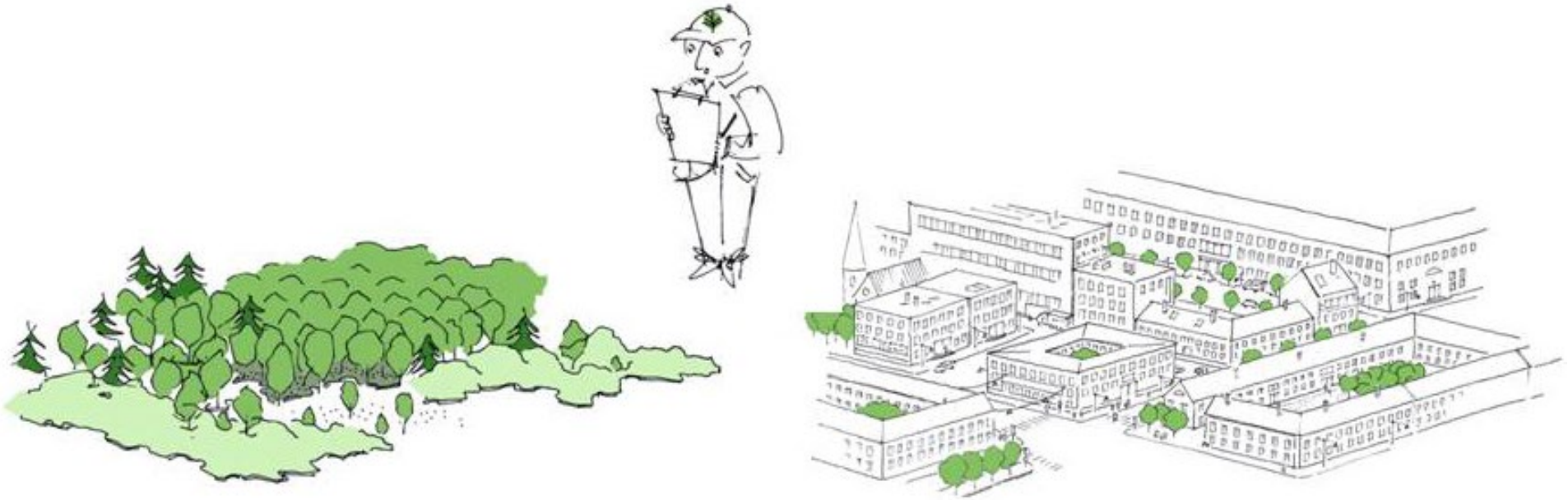


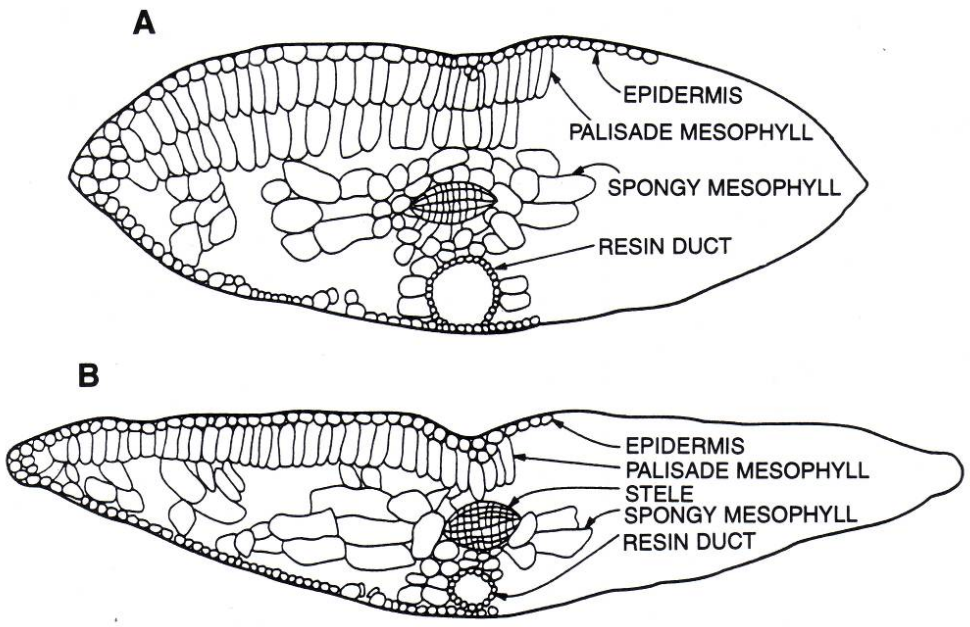
Illustration Johanna Deak Sjöman

Functional Ecology


Pinus sylvestris


Populus tremula

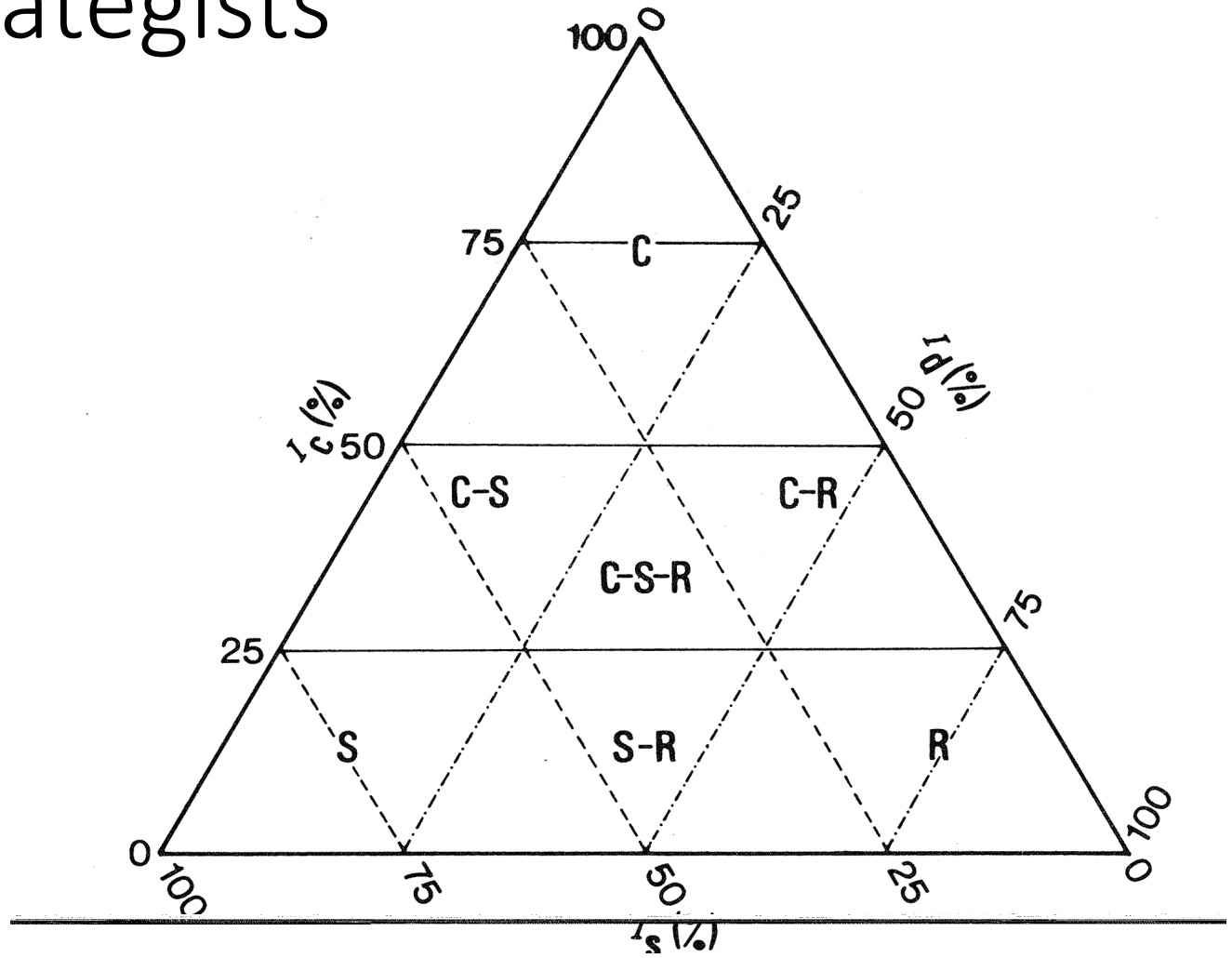
Leaf Economics



Schematic of *Tsuga heterophylla* needles grown in the sun (**A**) and shade (**B**) Two palisade mesophyll layers can clearly be seen in addition to the flatter, broader shade needle. (Tucker and Emmingham 1977 – Cited Kozlowski and Kramer 1997)

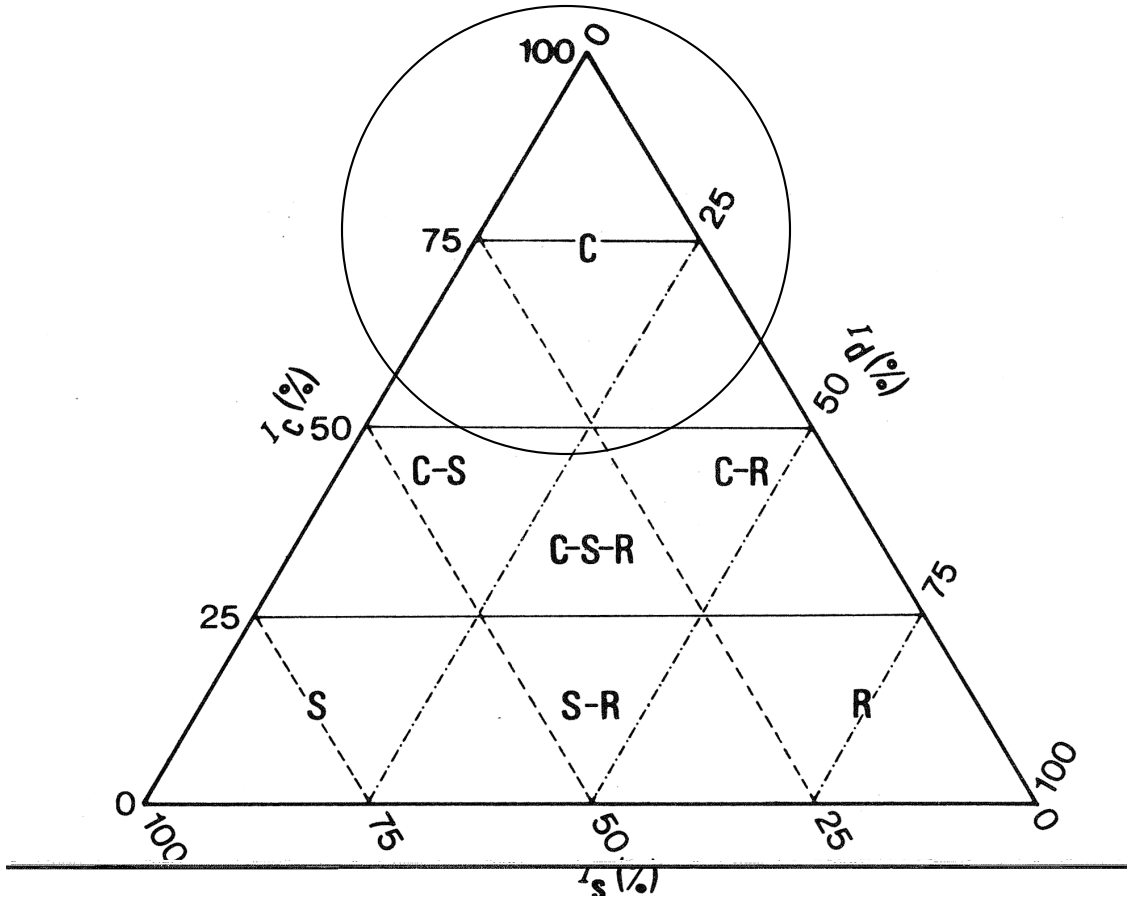

fast
slow

Plant strategists



(Grime 1979, 2002)

Competative trees

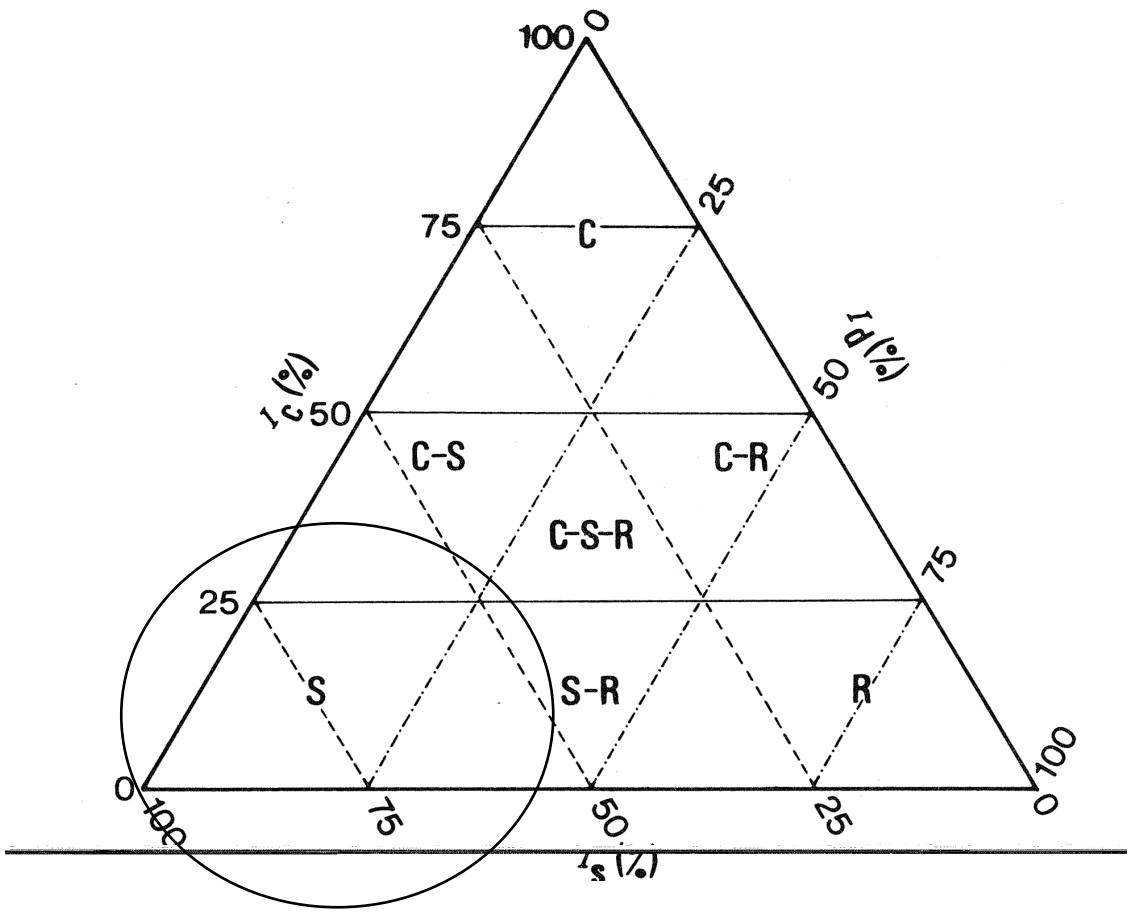


C-strategists *are species that in the best and quickest way possible can assimilate the energy and space, both above and under ground, and by doing so get an advantage through powerful growth.*

These trees grows in habitats with high amounts of resources – water, nutrient etc. In drier and poorer habitats these species are less competative.

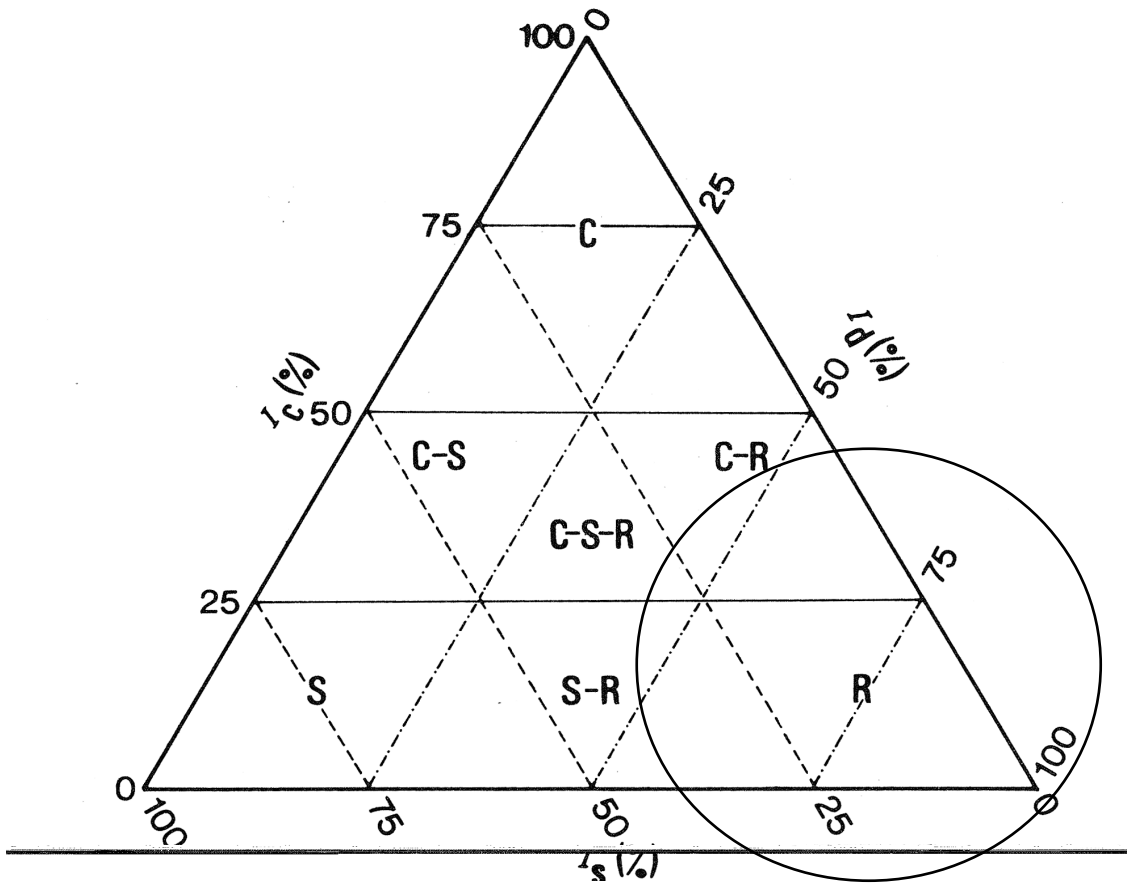
Stress tolerant trees

S-strategists *can be tolerant to one or several stress factors e.g. warm and dry habitats, cold temperatures, shade etc.*



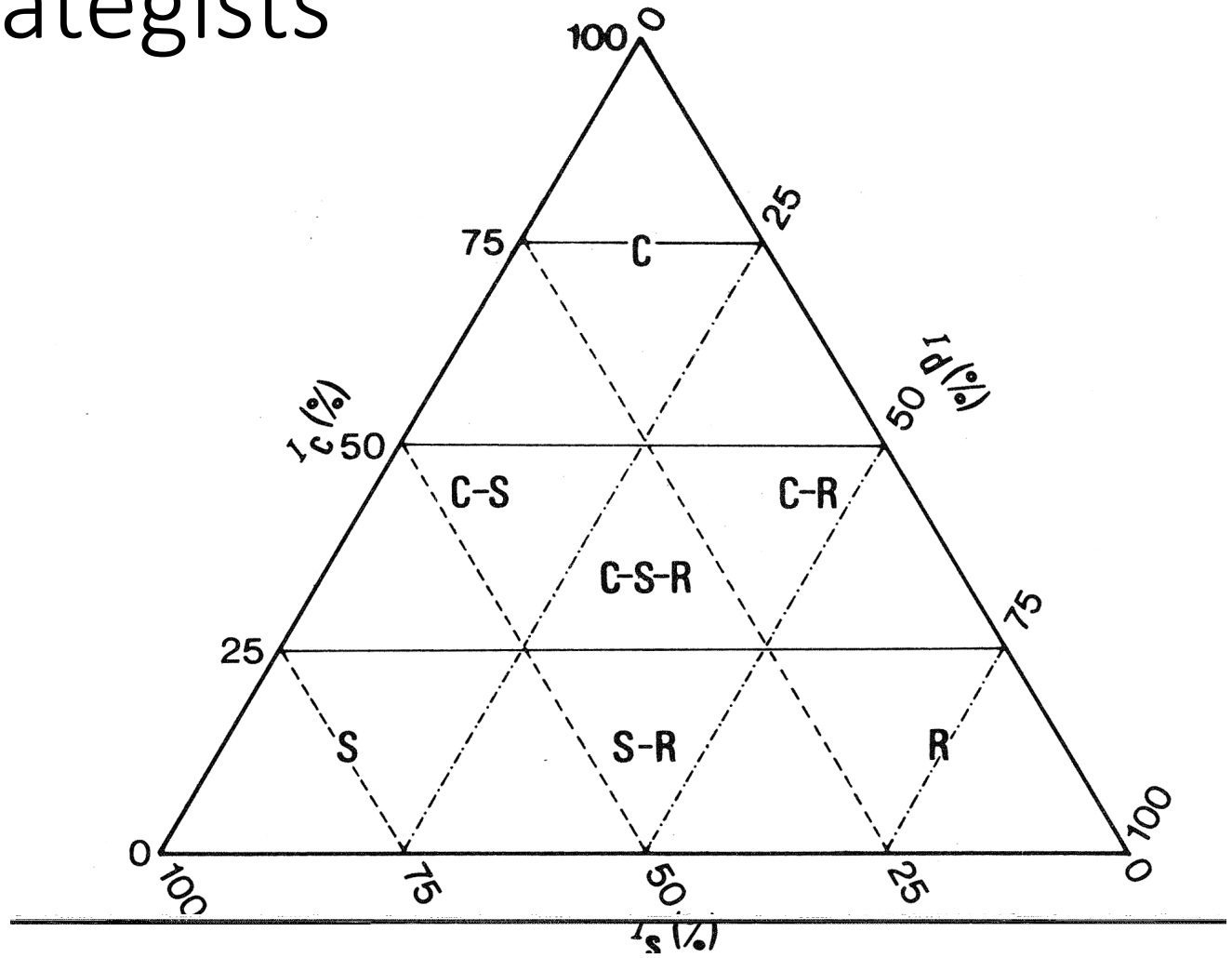

Frösvi
220 m

Ruderal species

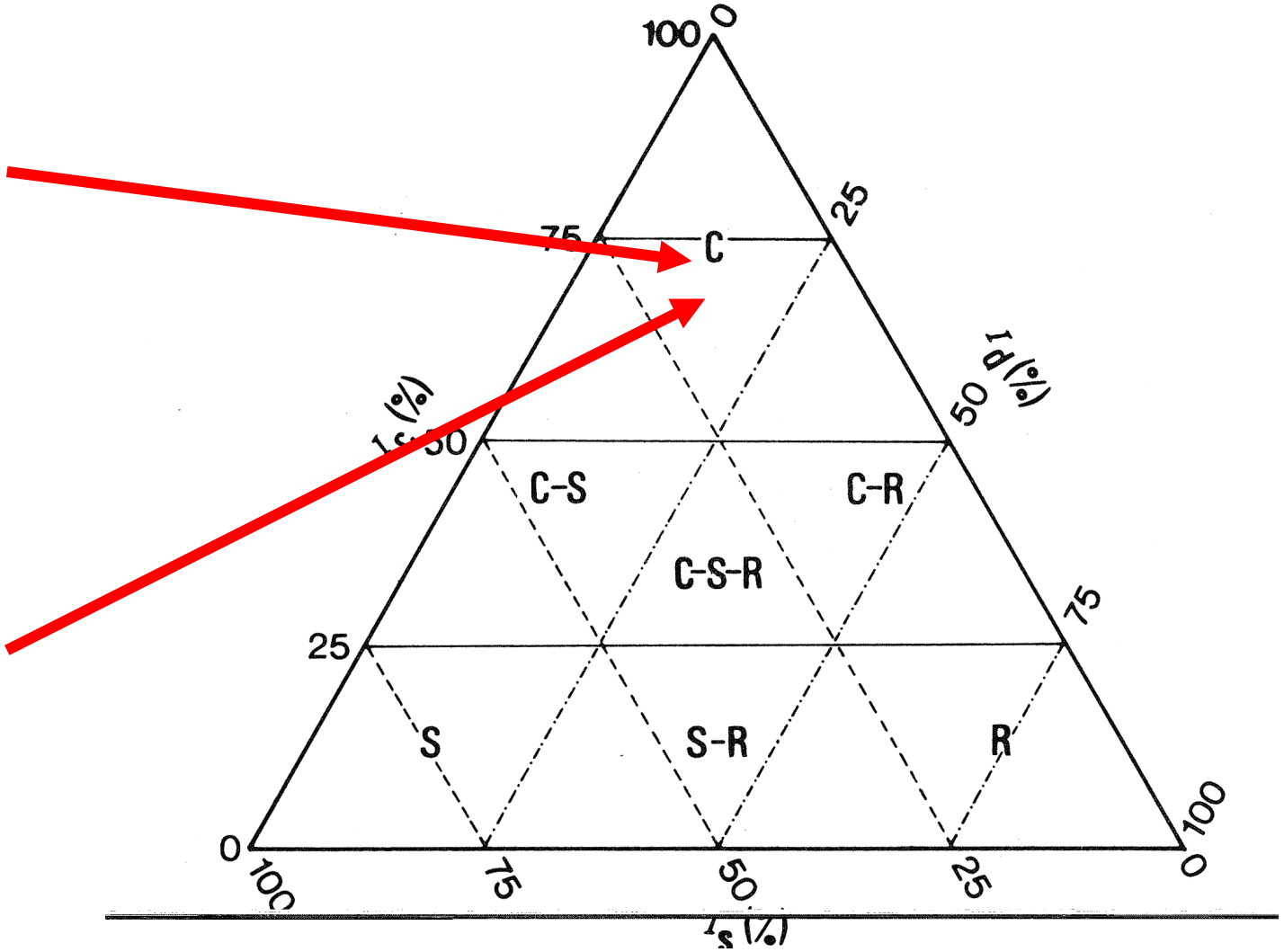


R-strategists *thrive in disturbed ecosystems where they can quickly establish themselves in young or disturbed vegetation system.*

Plant strategists



(Grime 1979, 2002)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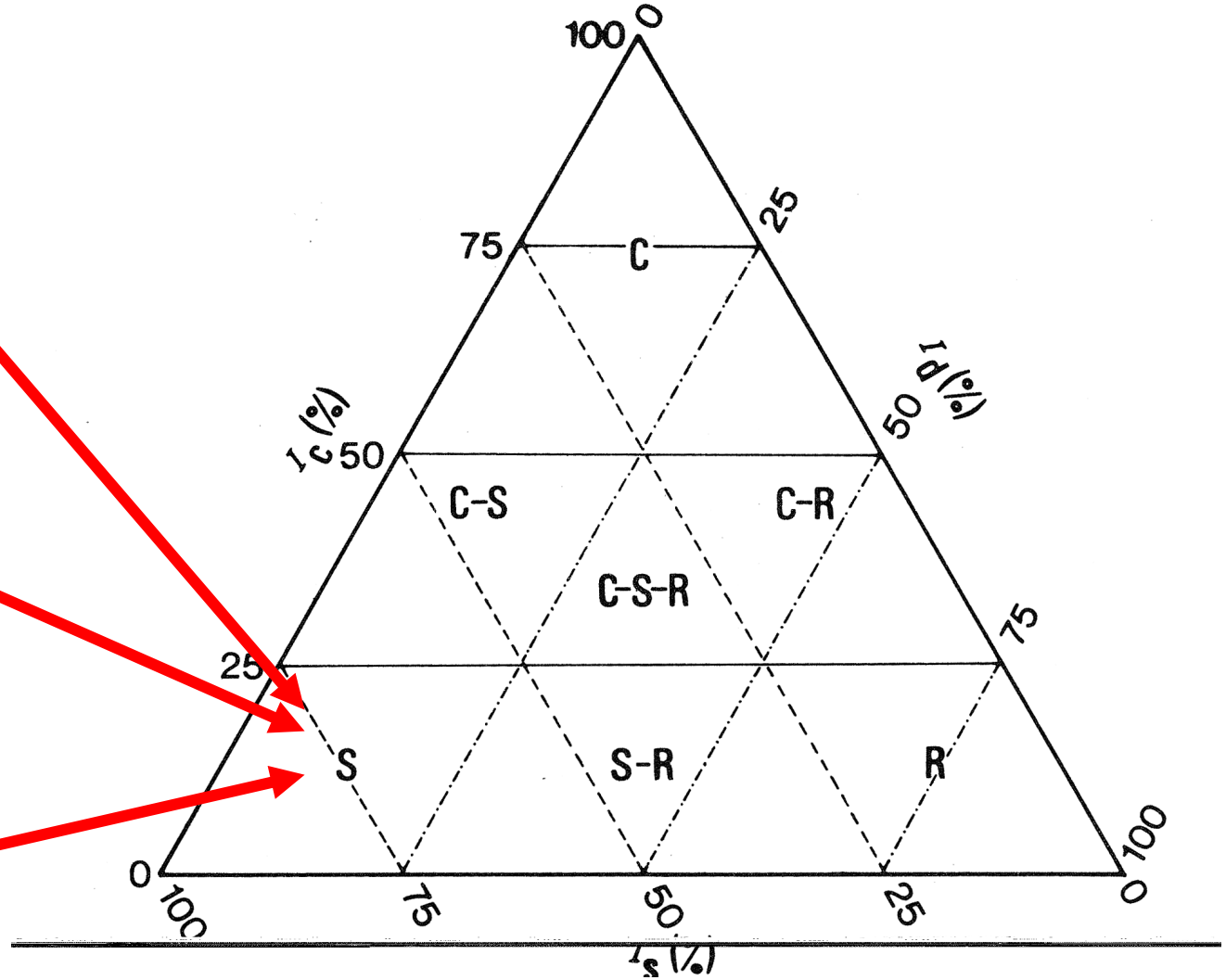
McDonald's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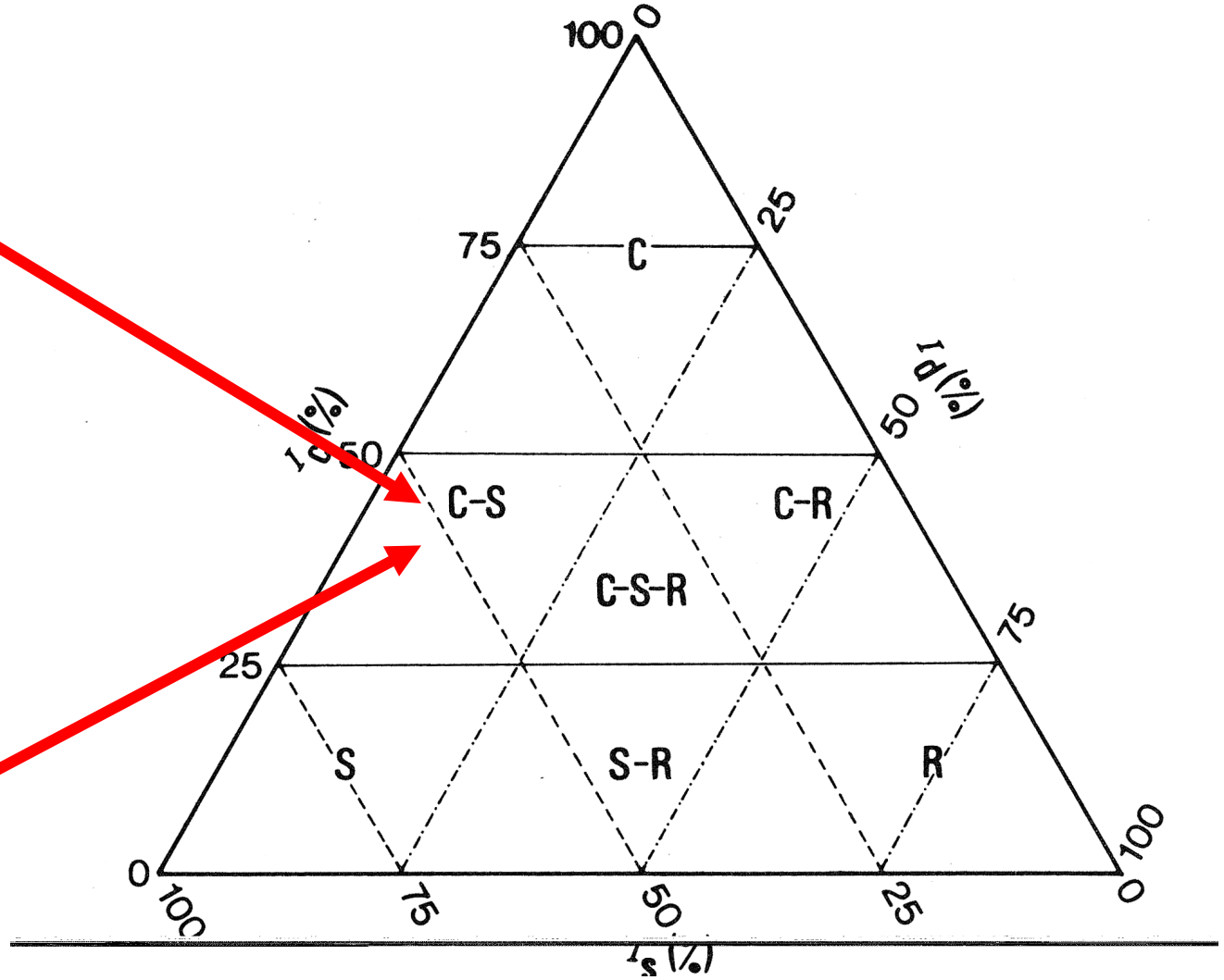
Falks rondell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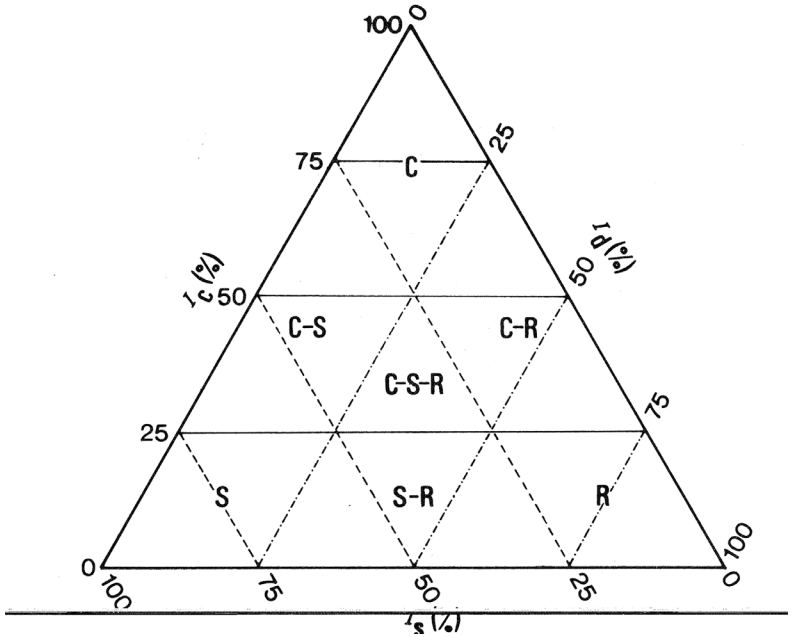
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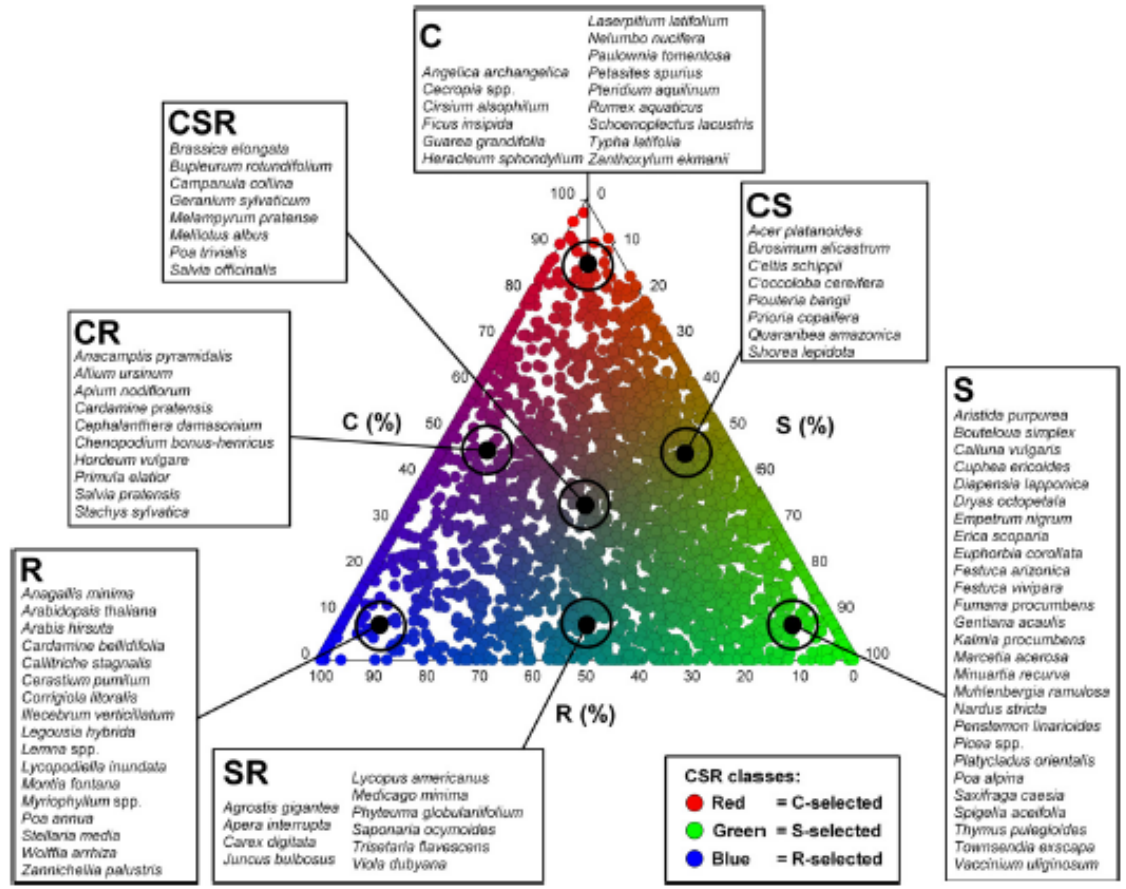
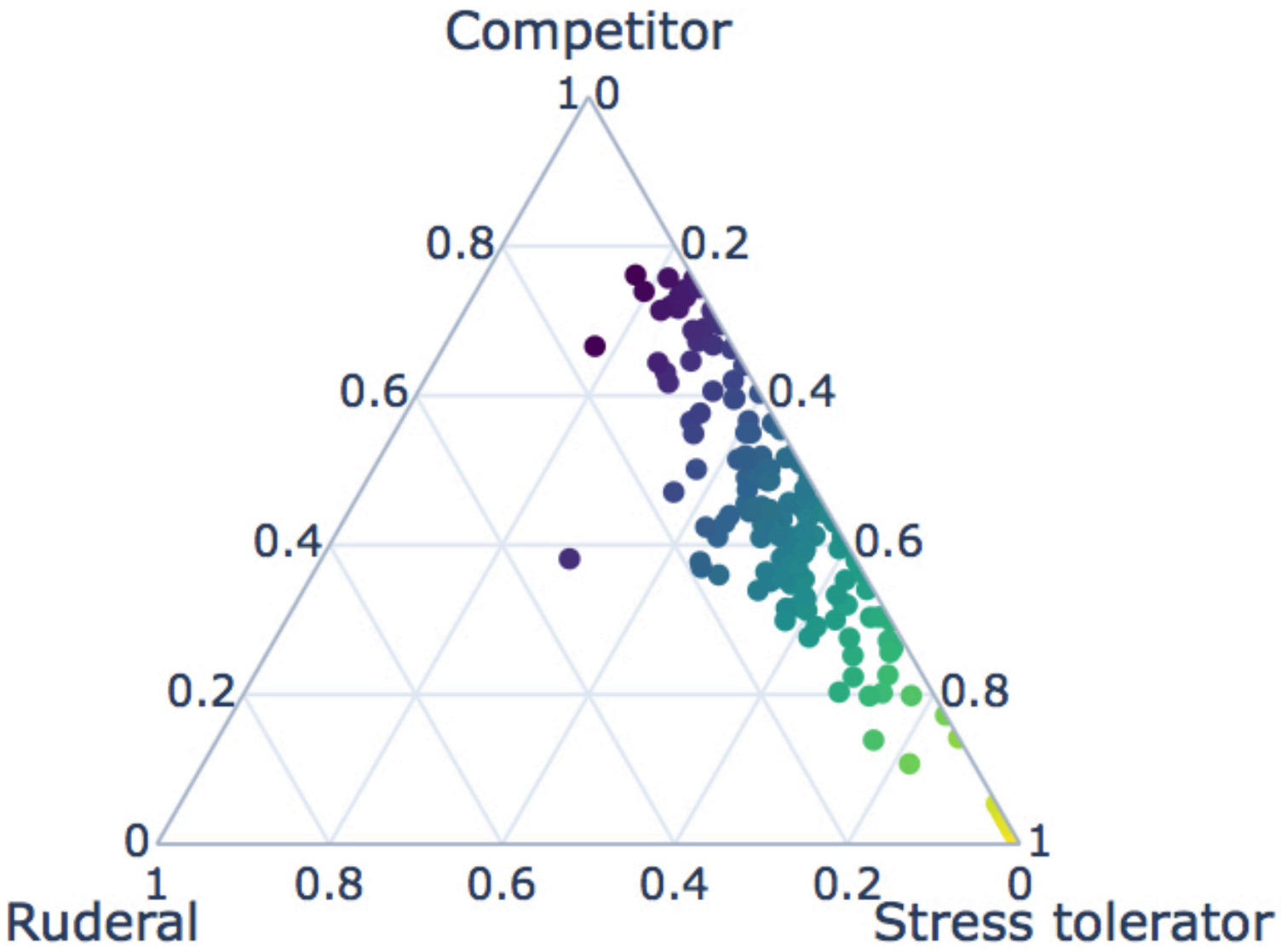


(Pierce et al. 2017)

CSR ordination of species growing in Alnarp arboretum



(Sjöman et al. – in progress)

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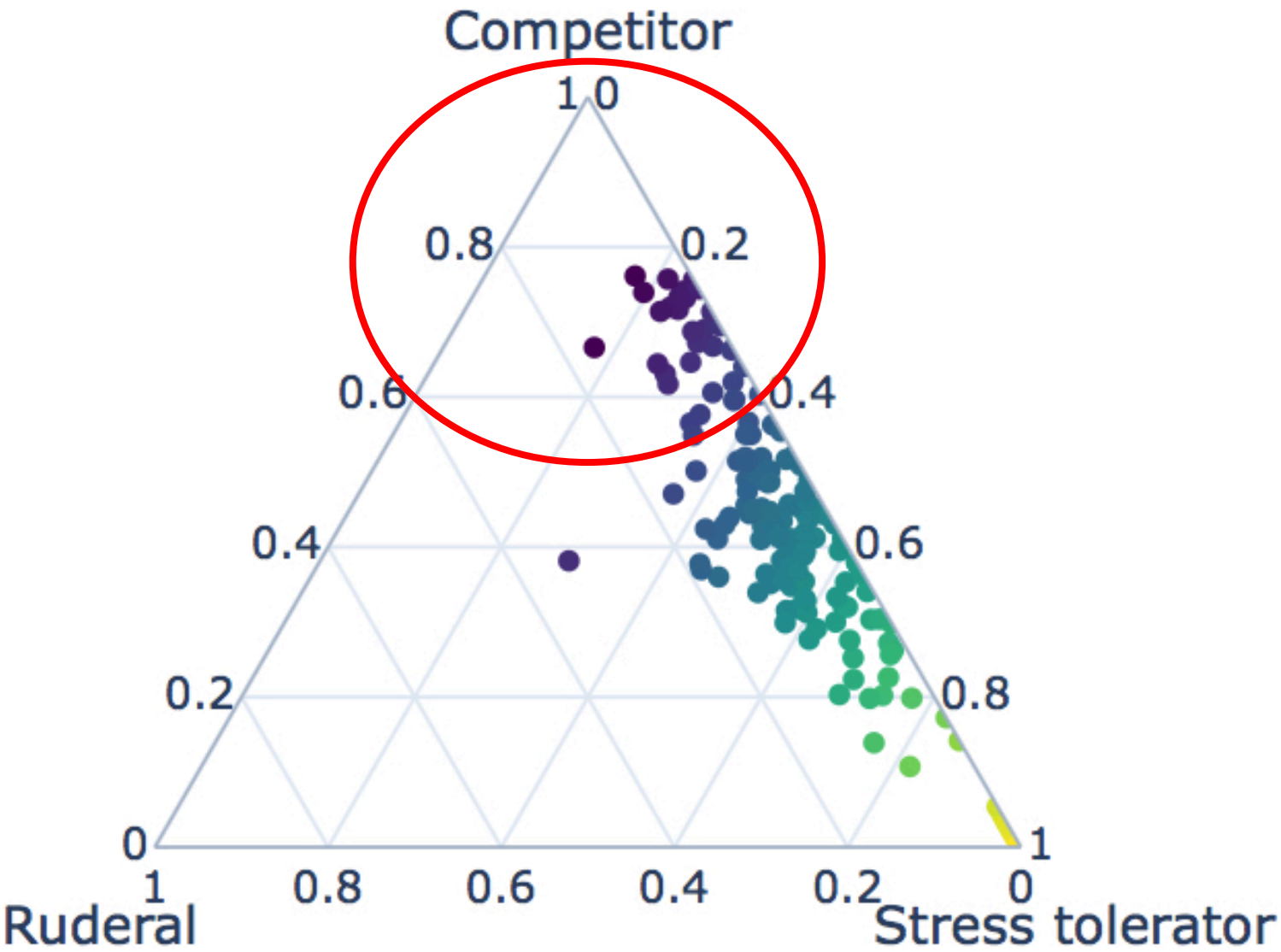

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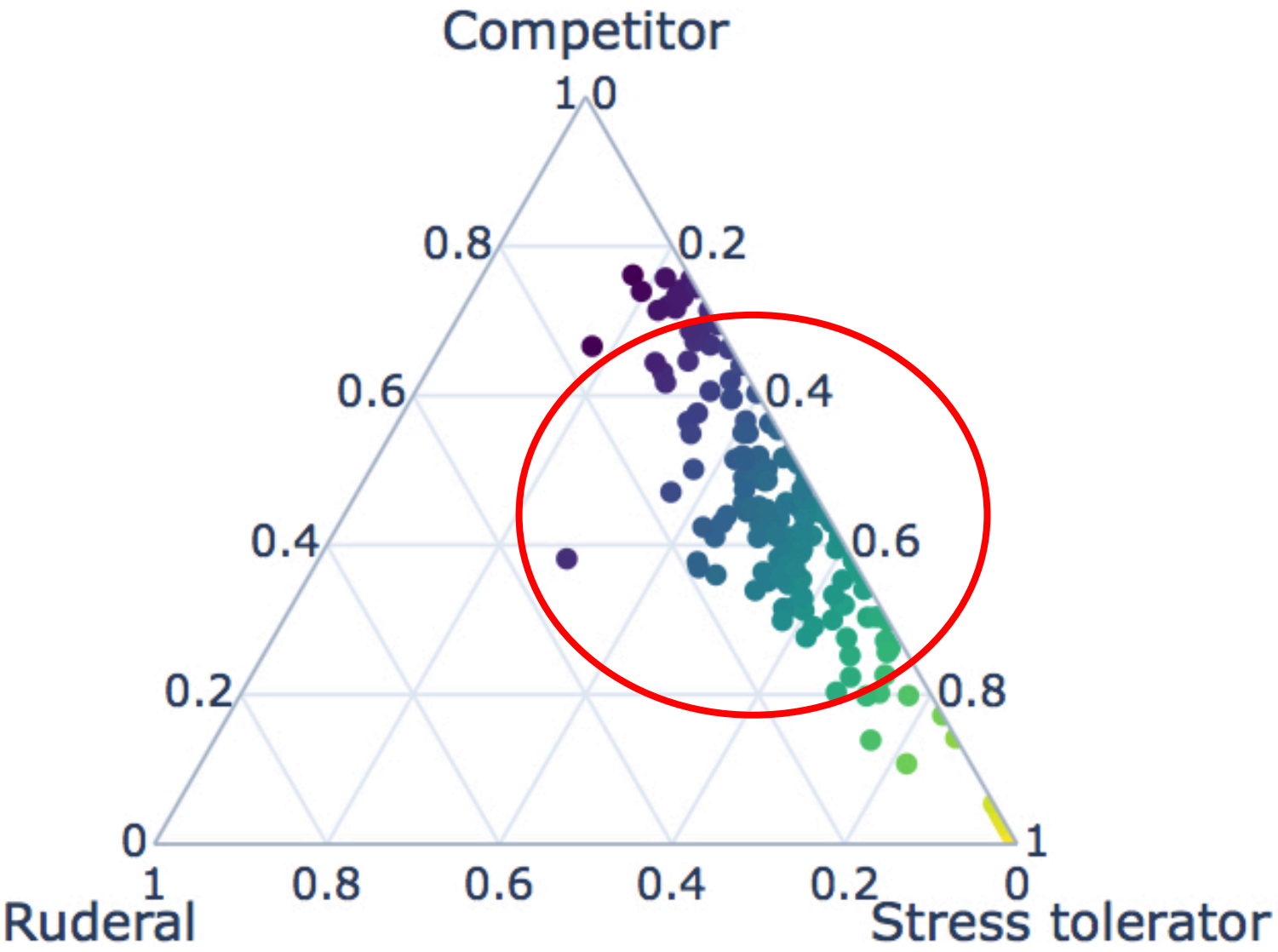

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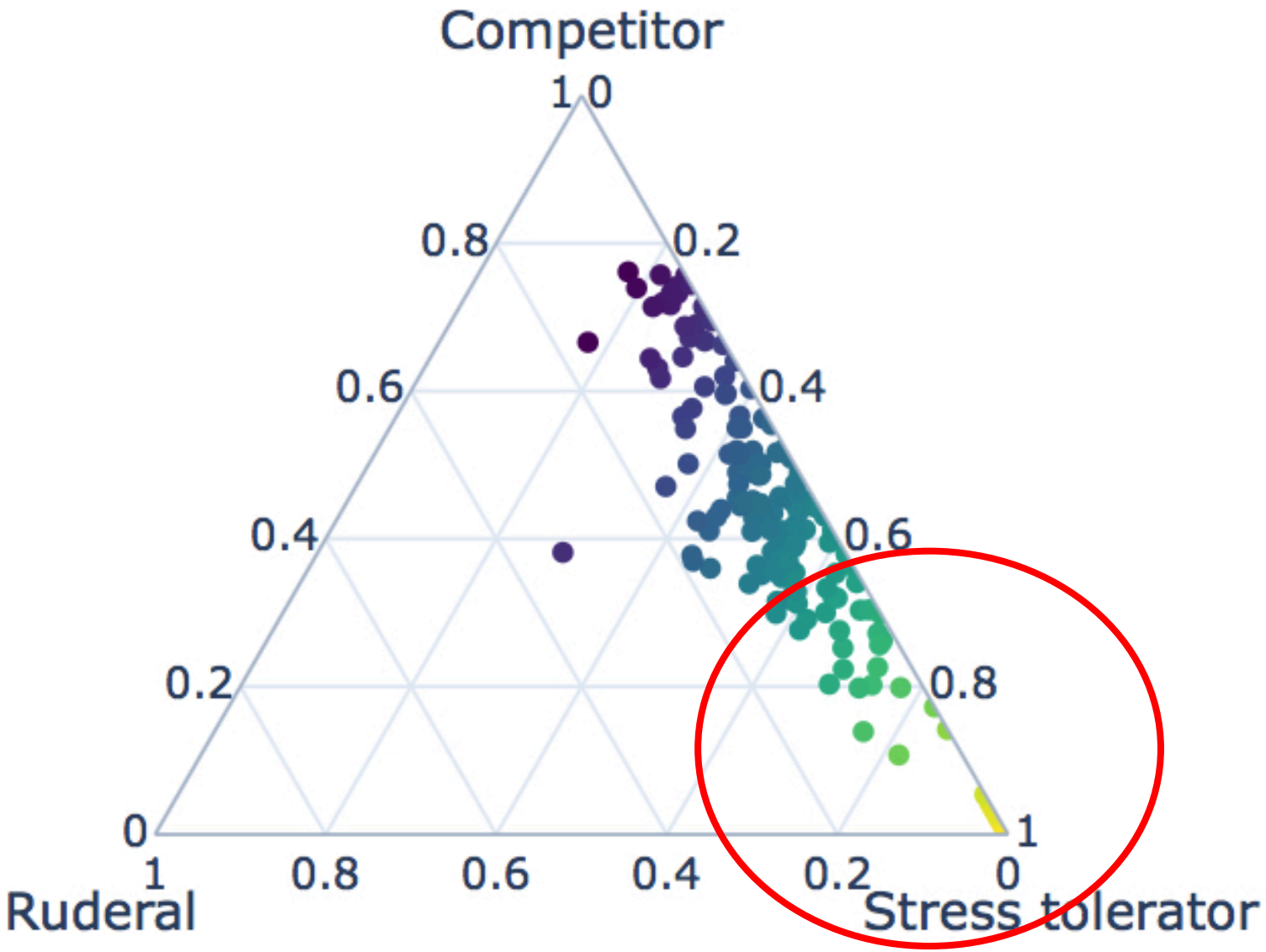

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*Take
home message