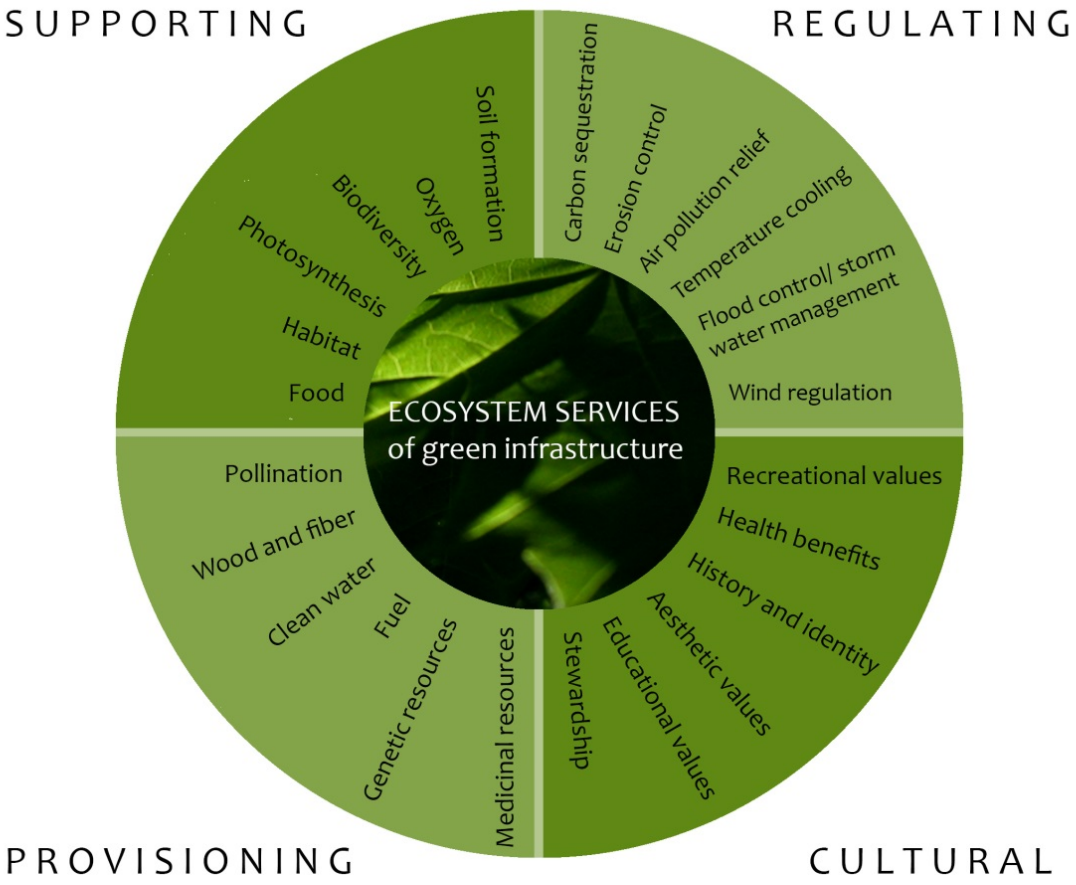
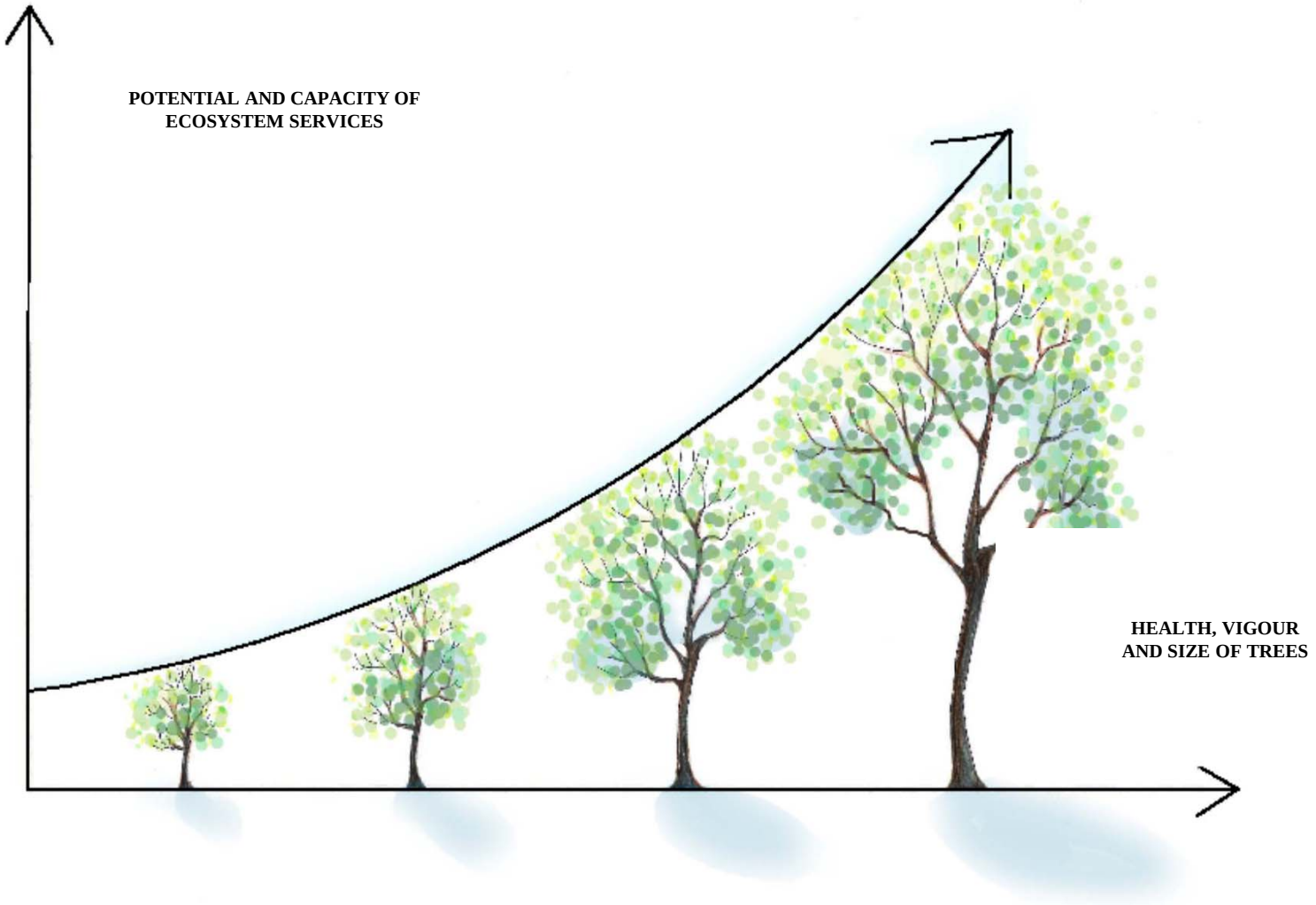
Improving urban resilience through tree selection – new findings in the search of right tree for right site situation

Henrik Sjöman, SLU Alnarp & Gothenburg Botanical Garden
henrik.sjoman@slu.se & henrik.sjoman@vgregion.se

Trees and ekosystem services

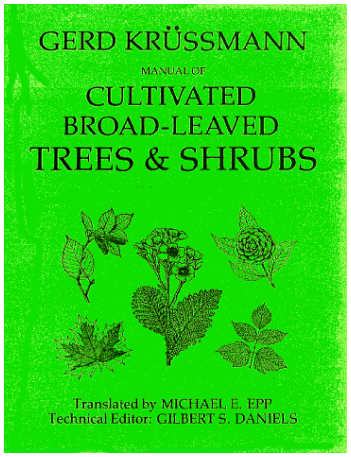


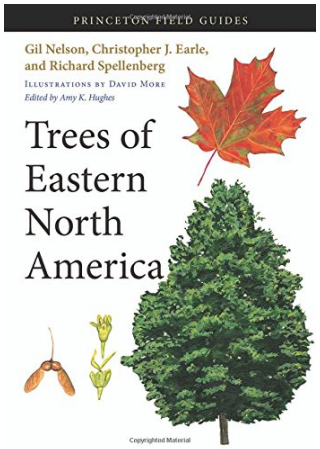
(Deak Sjöman 2016)

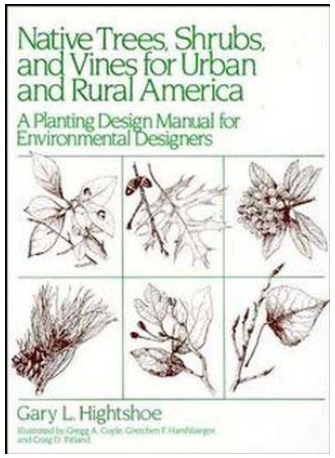

POTENTIAL AND CAPACITY OF
ECOSYSTEM SERVICES
HEALTH, VIGOUR
AND SIZE OF TREES

Acer pseudoplatanus, Lund, Sweden

Advice from literature?





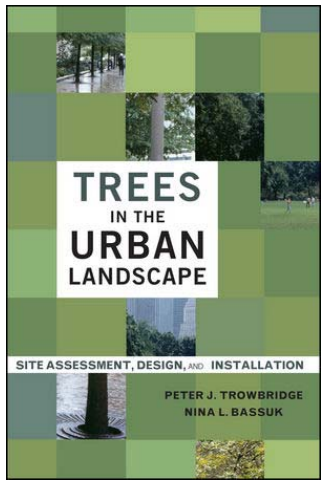


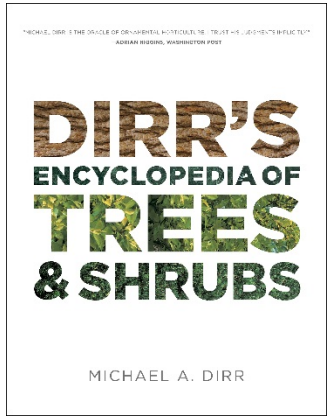
Acer nigrum

- 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)





Learning from nature

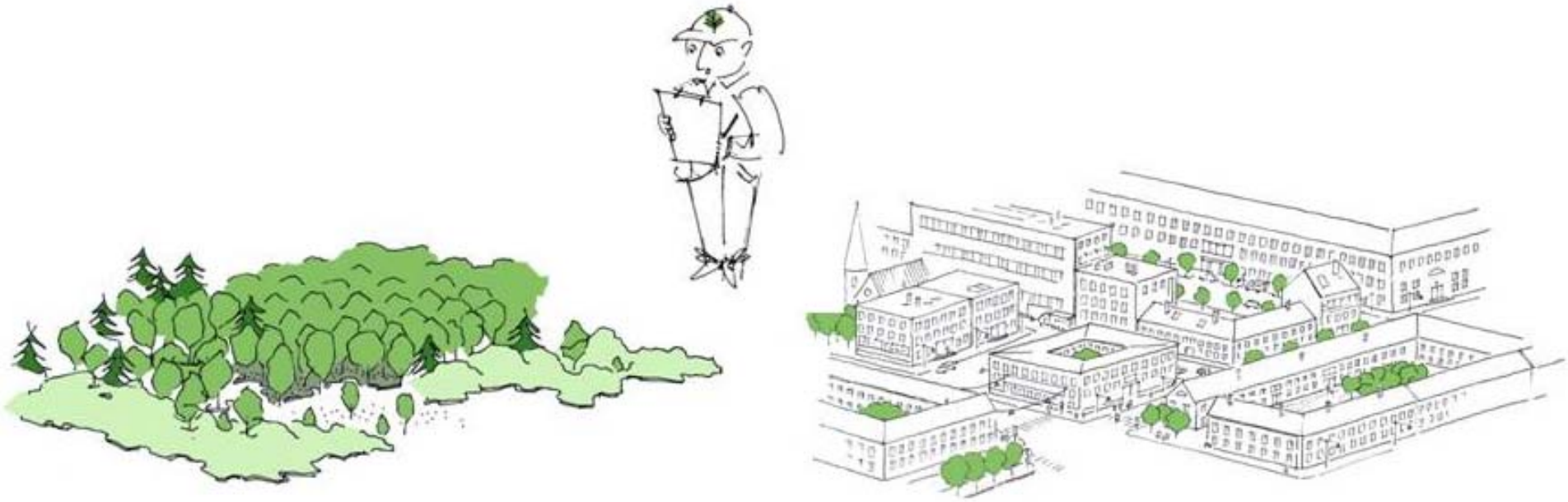


Illustration Johanna Deak Sjöman


Terminator 3: The Redemption developer Paradigm Entertainment publisher Atari
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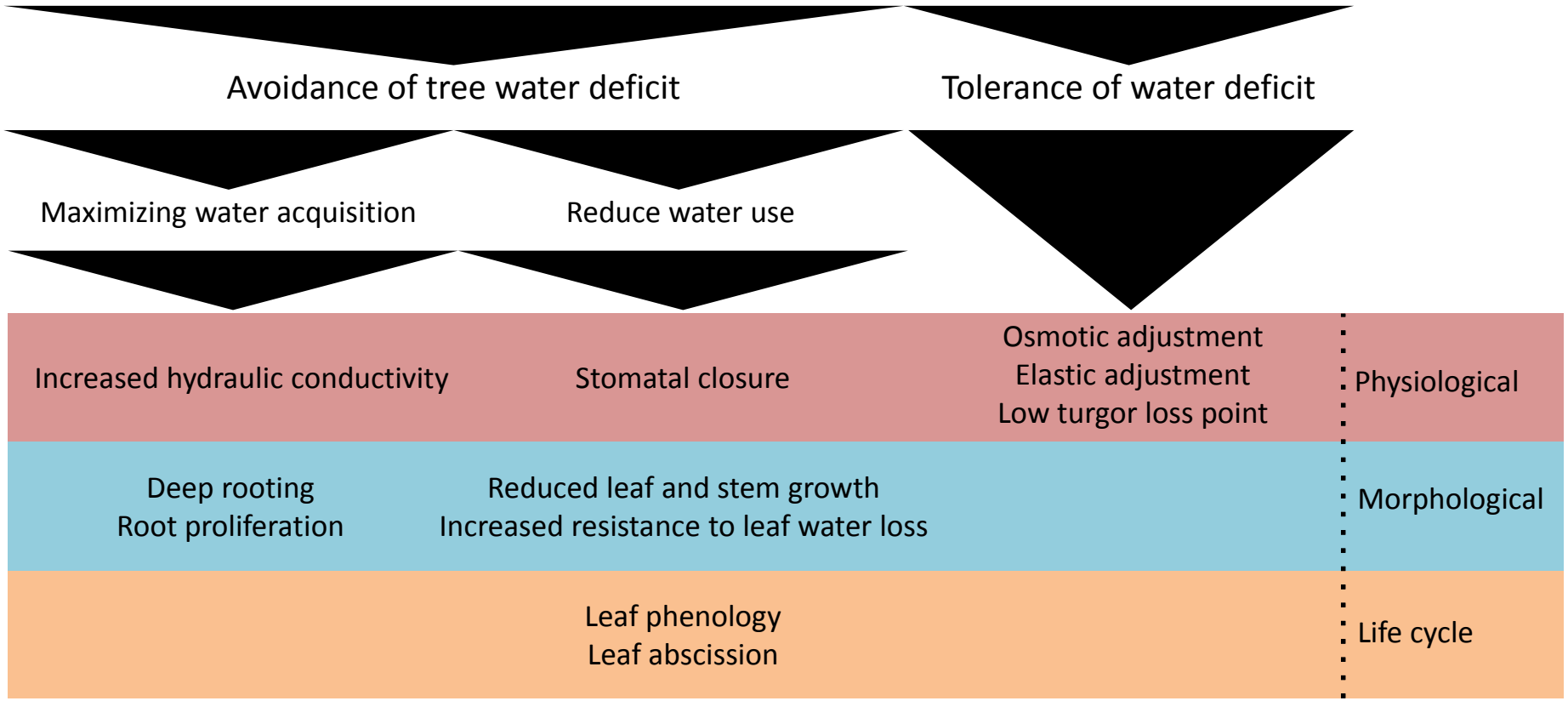
“Everybody has a plan until they get punched in the face”.

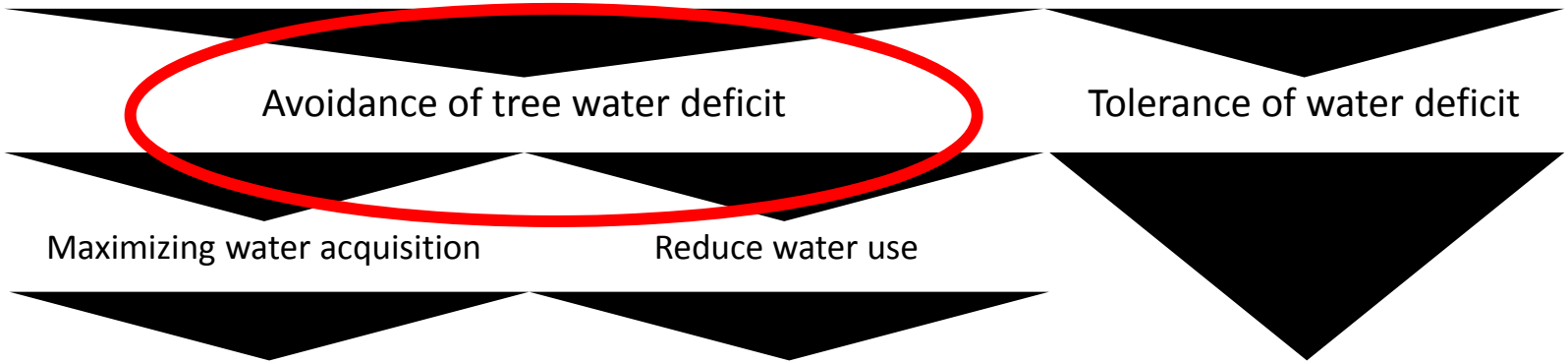
- Mike Tyson

Adaptations to limited water availability



(Hirons 2013)

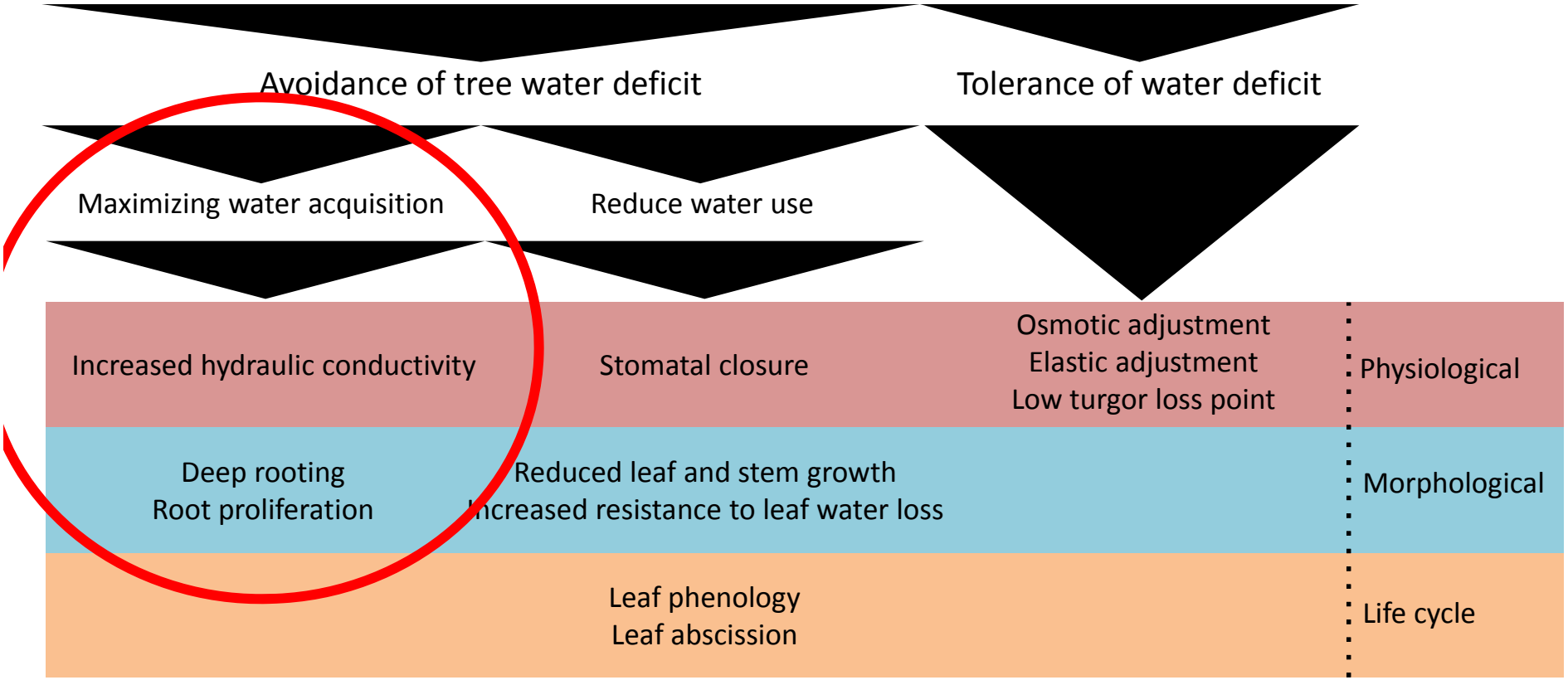
Adaptations to limited water availability



Increased hydraulic conductivity	Stomatal closure	Osmotic adjustment Elastic adjustment Low turgor loss point	Physiological
Deep rooting Root proliferation	Reduced leaf and stem growth Increased resistance to leaf water loss		Morphological
	Leaf phenology Leaf abscission		Life cycle

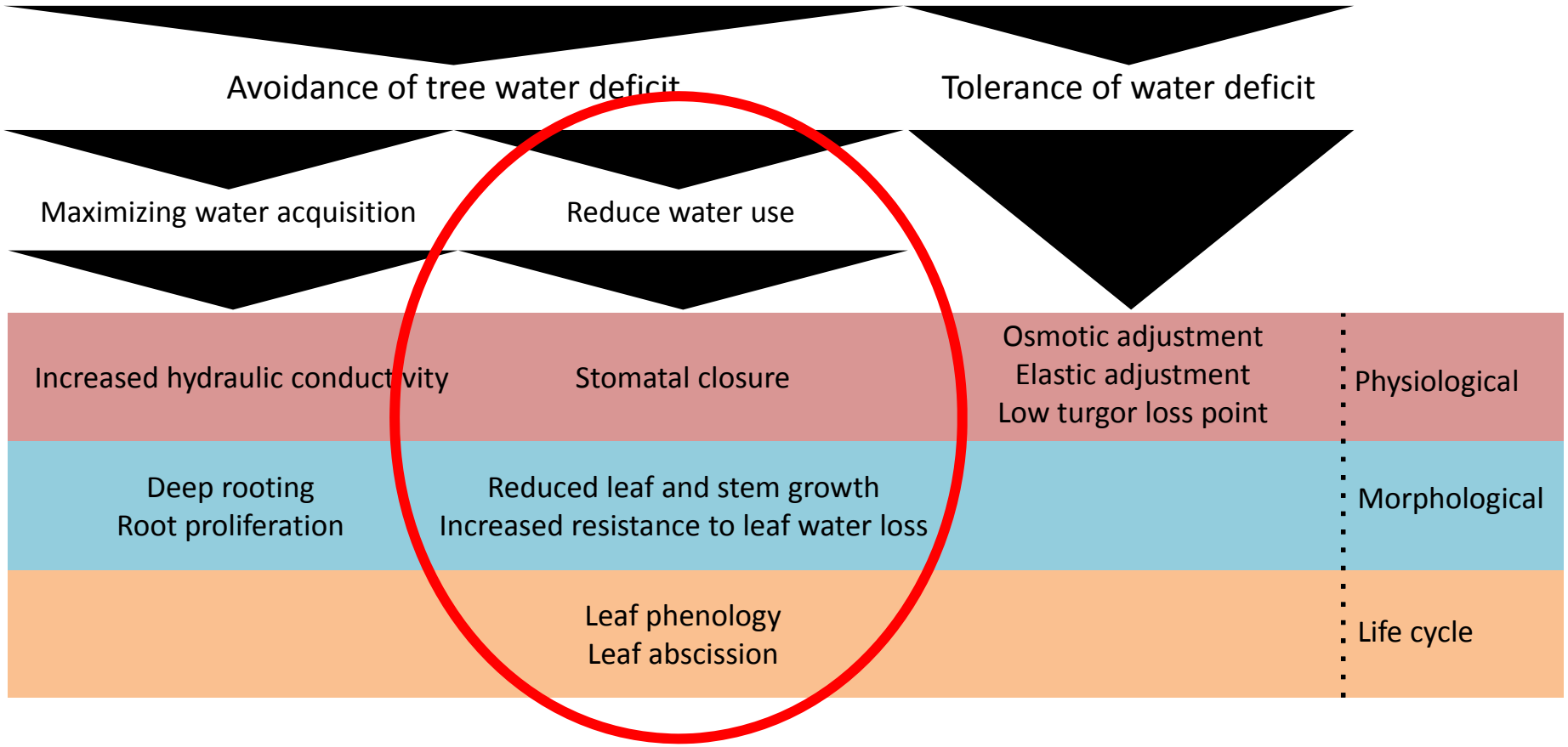
(Hirons 2013)

Adaptations to limited water availability



(Hirons 2013)

Adaptations to limited water availability



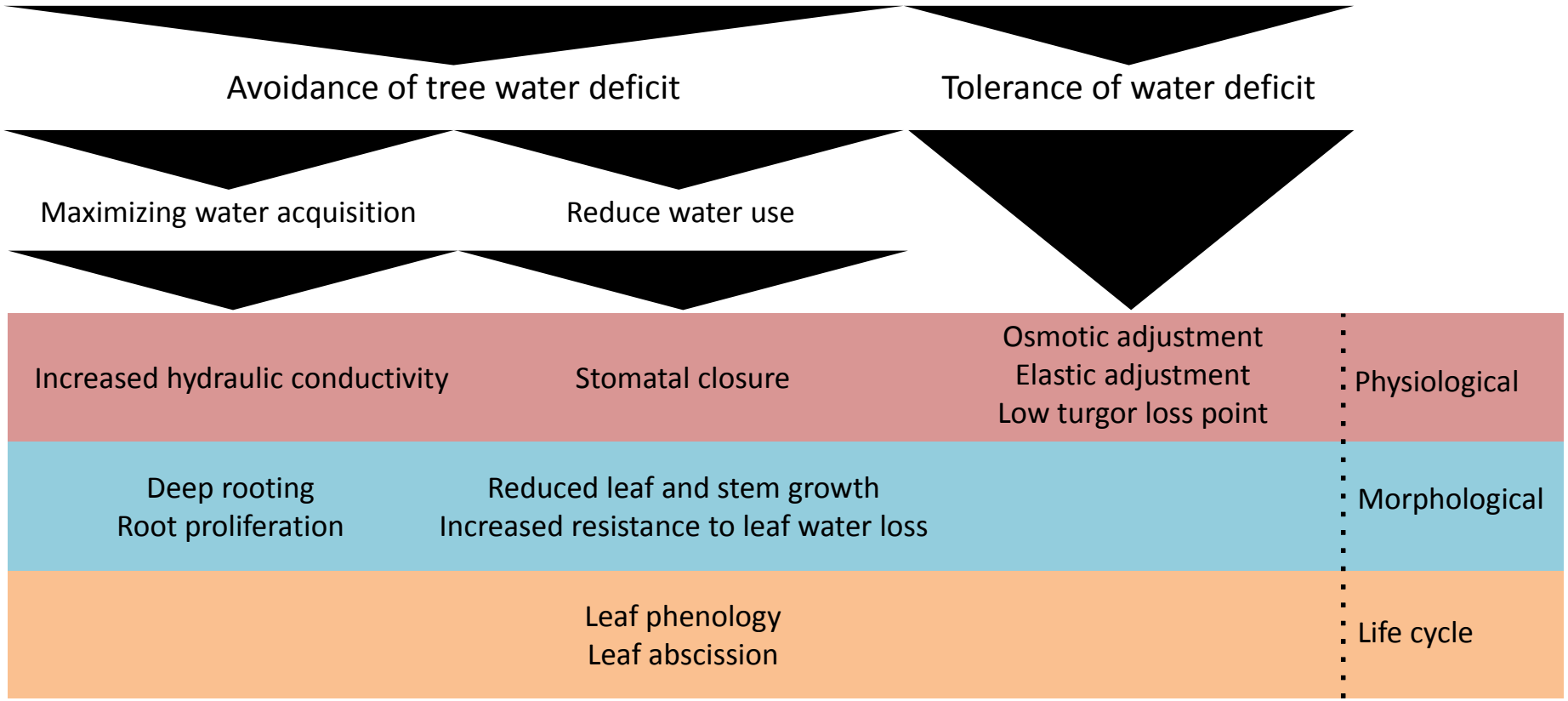
(Hirons 2013)


Cercidiphyllum japonicum

Tilia tomentosa, Moldavia 2010

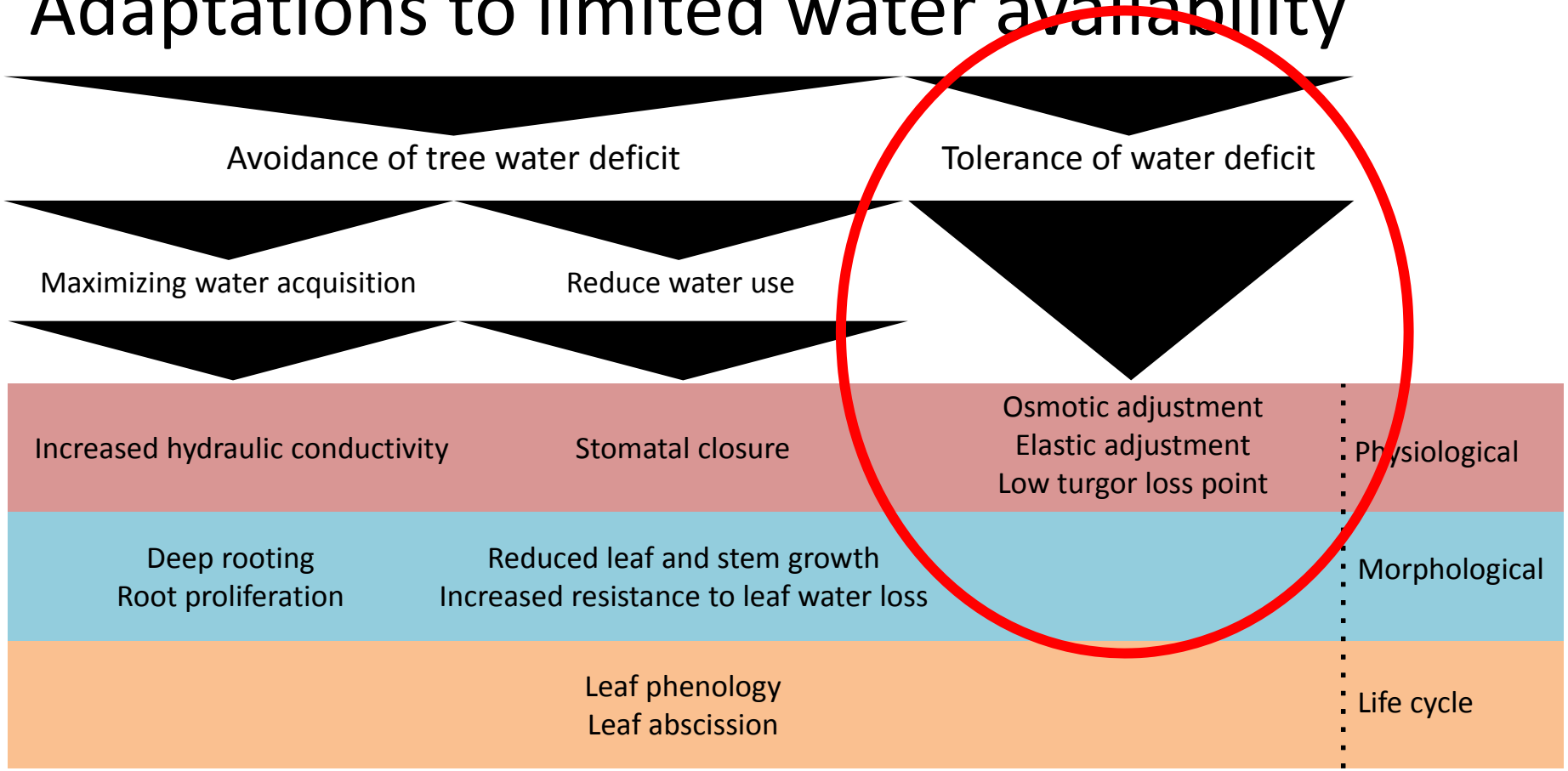
Oak and silver lime forest, Northeast Romania

Adaptations to limited water availability



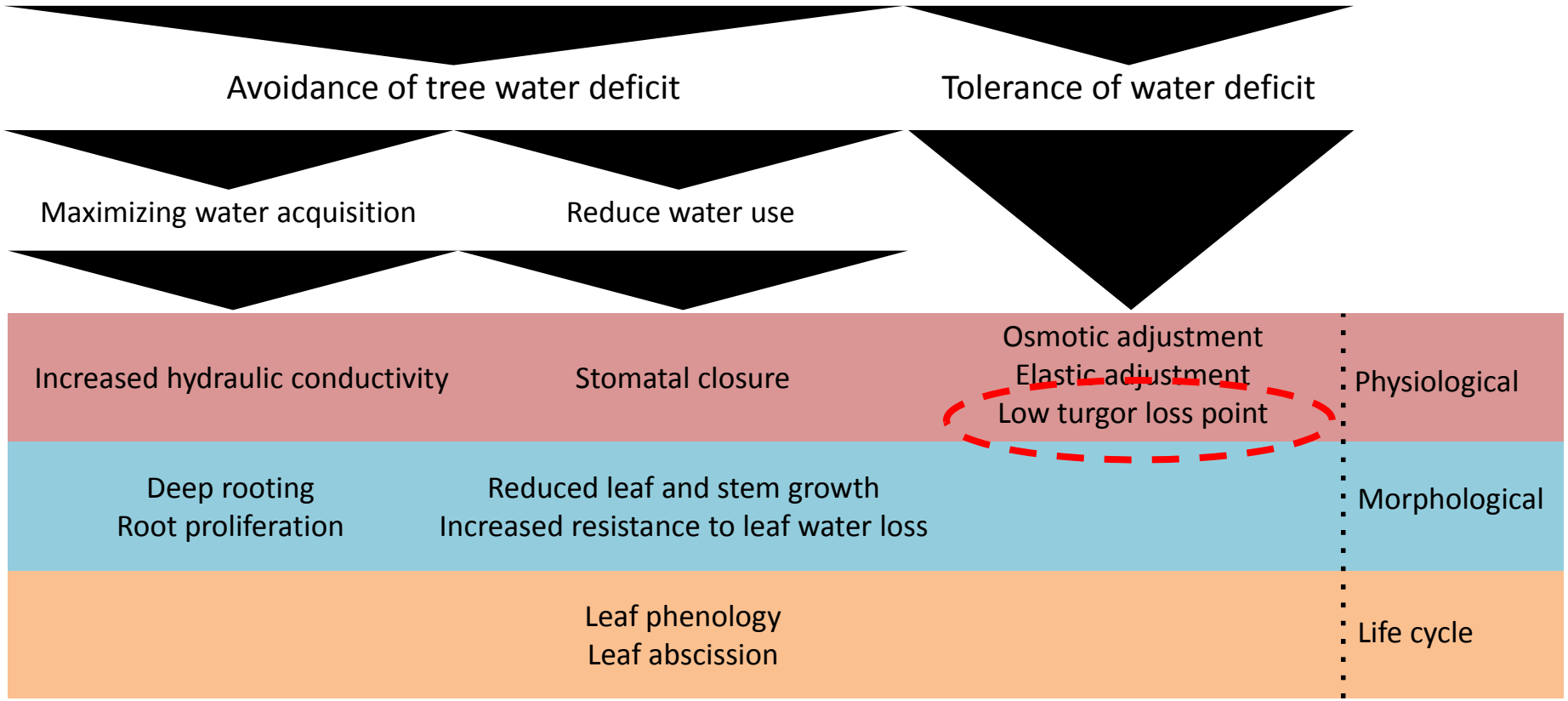
(Hirons, 2013)

Adaptations to limited water availability



(Hirons, 2013)

Adaptations to limited water availability

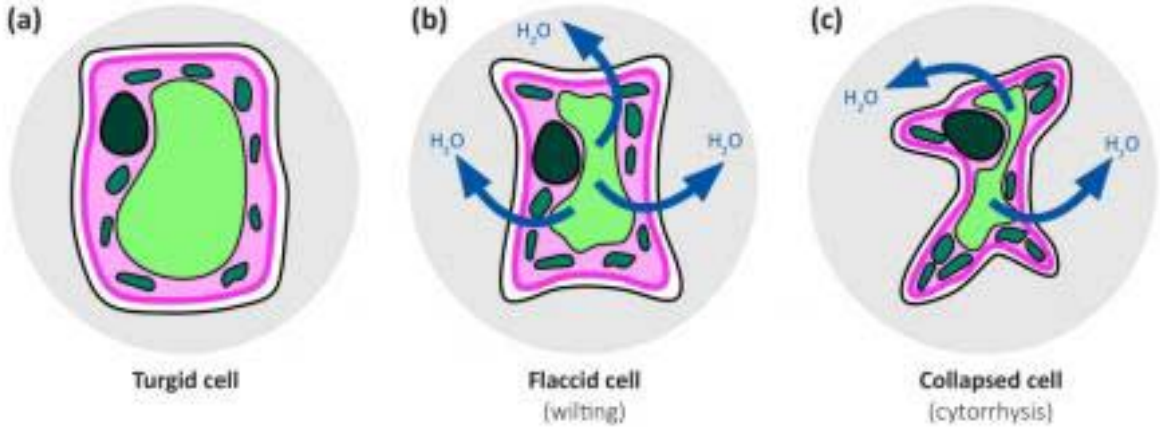


(Hirons, 2013)

Leaf turgor loss point as a drought tolerance indicator

- Leaf turgor loss point can be used as a universal measure of physiological drought tolerance that is quantifiable and measurable

- Rank species in terms of their physiological drought tolerance



Turgid cell

Flaccid cell
(wilting)

Collapsed cell
(cytorrhysis)

Leaf turgor loss point as a drought tolerance indicator

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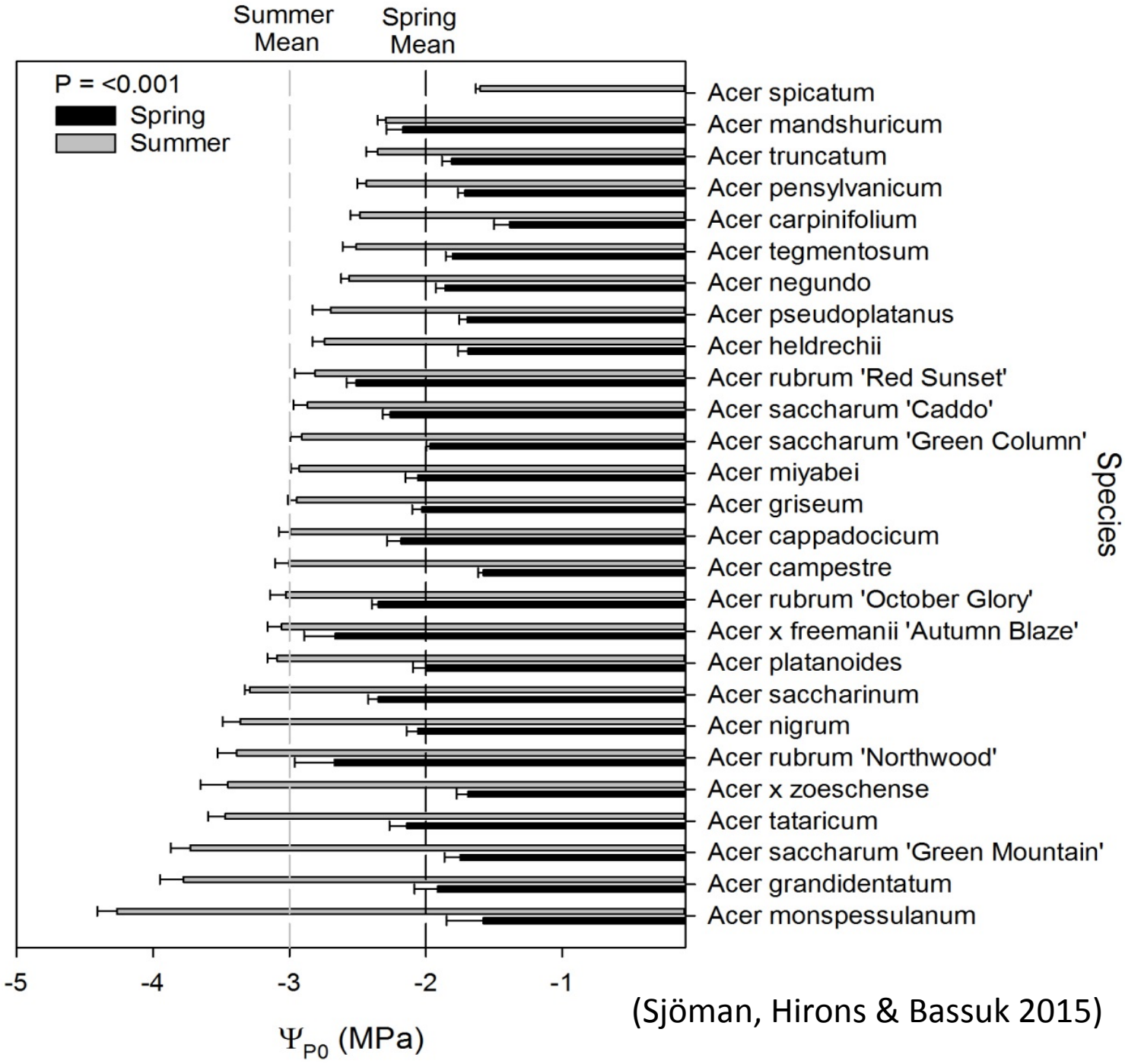
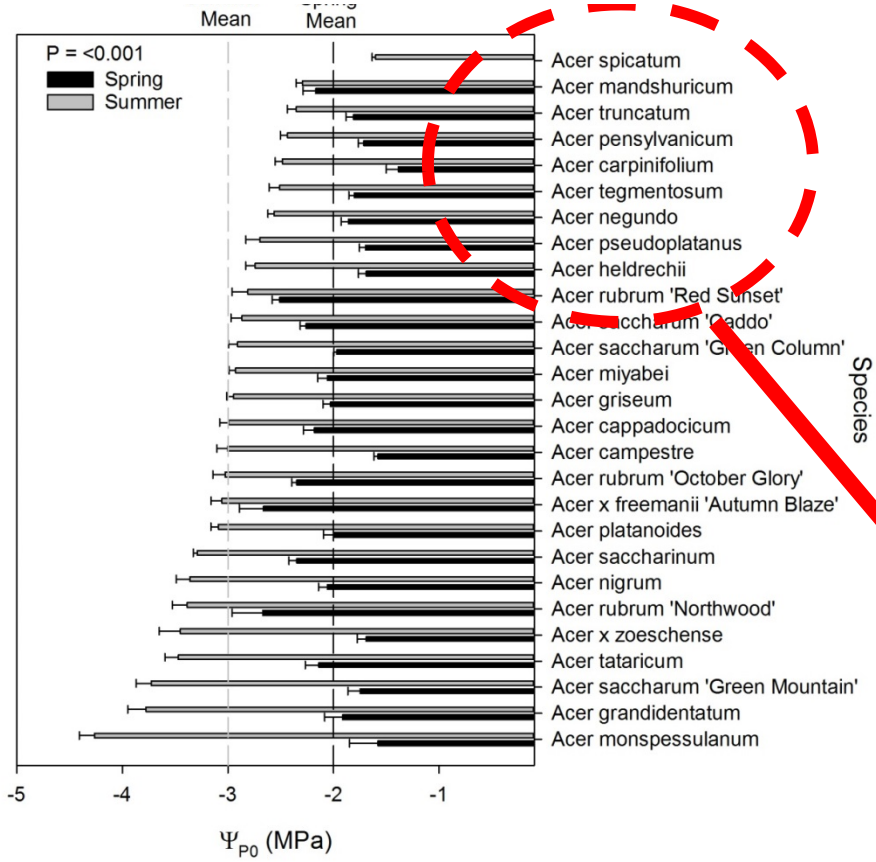


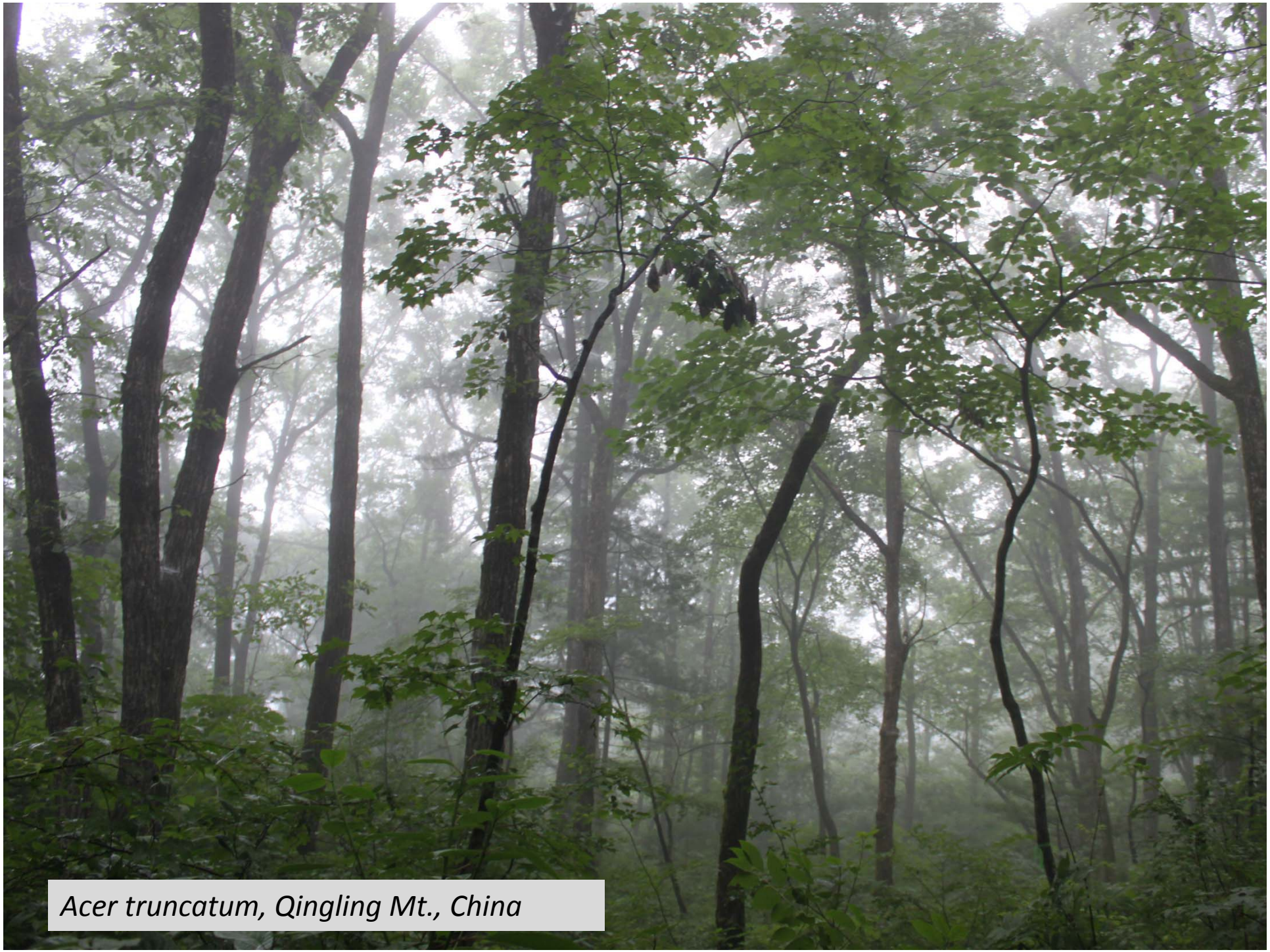
(Sjöman, Hirons & Bassuk 2015)


Mean
Mean
P = <0.001
Spring
Summer
Acer spicatum
Acer mandshuricum
Acer truncatum
Acer pensylvanicum
Acer carpinifolium
Acer tegmentosum
Acer negundo
Acer pseudoplatanus
Acer heldrechii
Acer rubrum 'Red Sunset'
Acer saccharum 'Caddo'
Acer saccharum 'Green Column'
Acer miyabei
Acer griseum
Acer cappadocicum
Acer campestre
Acer rubrum 'October Glory'
Acer x freemanii 'Autumn Blaze'
Acer platanoides
Acer saccharinum
Acer nigrum
Acer rubrum 'Northwood'
Acer x zoeschense
Acer tataricum
Acer saccharum 'Green Mountain'
Acer grandidentatum
Acer monspessulanum
Species
-5
-4
-3
-2
-1
Ψ_{P0} (MPa)

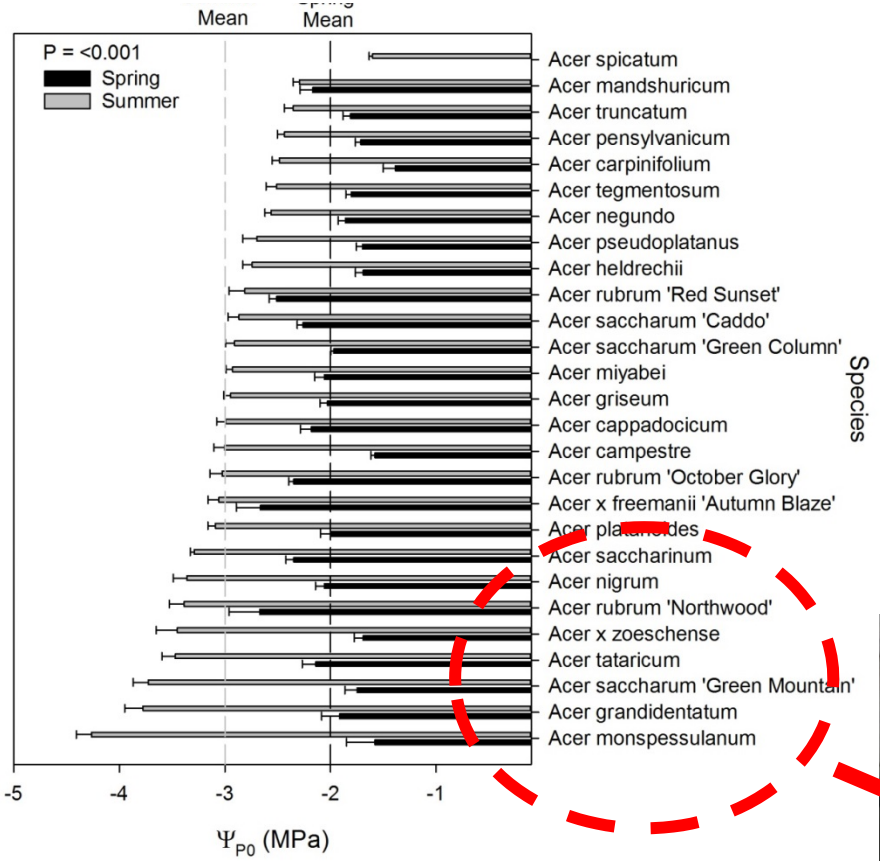

Vermont, USA

Acer pensylvanicum, New York State, USA

Acer spicatum, New York State, USA



Acer truncatum, Qingling Mt., China


Mean
Mean
P = <0.001
Spring
Summer
Acer spicatum
Acer mandshuricum
Acer truncatum
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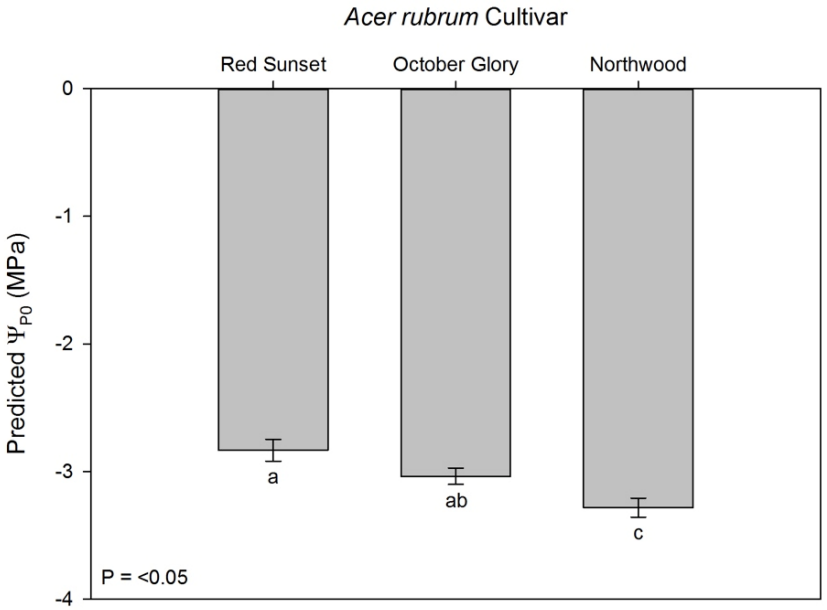
Acer grandidentatum
Acer monspessulanum
Species
-5
-4
-3
-2
-1
Ψ_{P0} (MPa)

Acer grandidentatum, Utah, USA

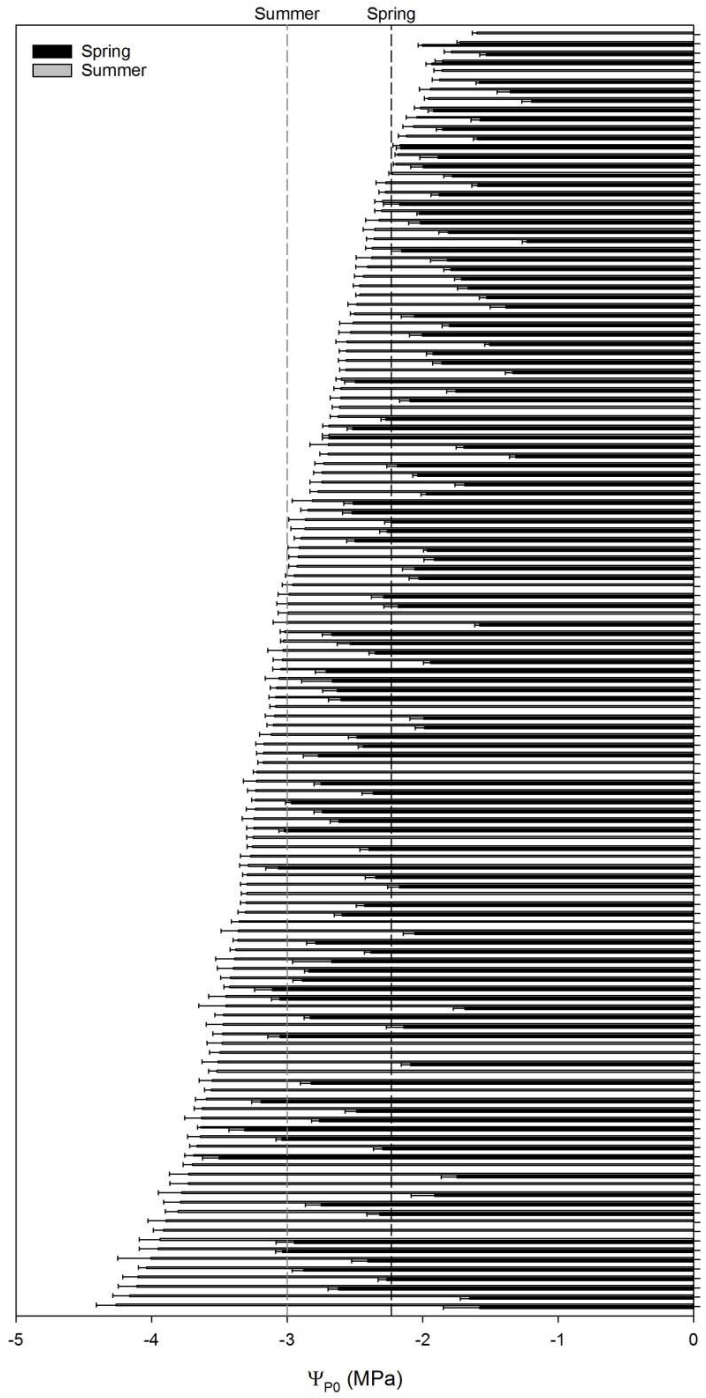
Acer tataricum & Quercus pubescens, Steppe Forest in northeast Romania

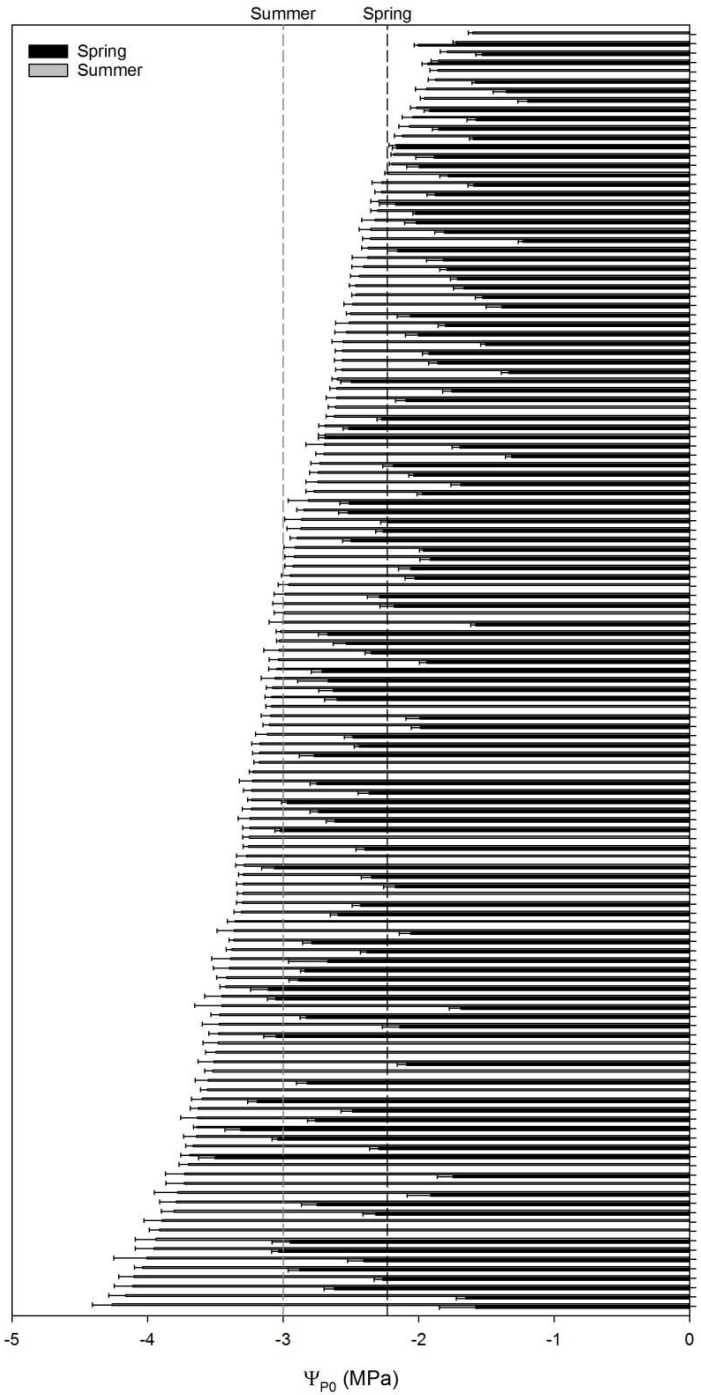
Acer tataricum, Lund, Sweden

Acer rubrum

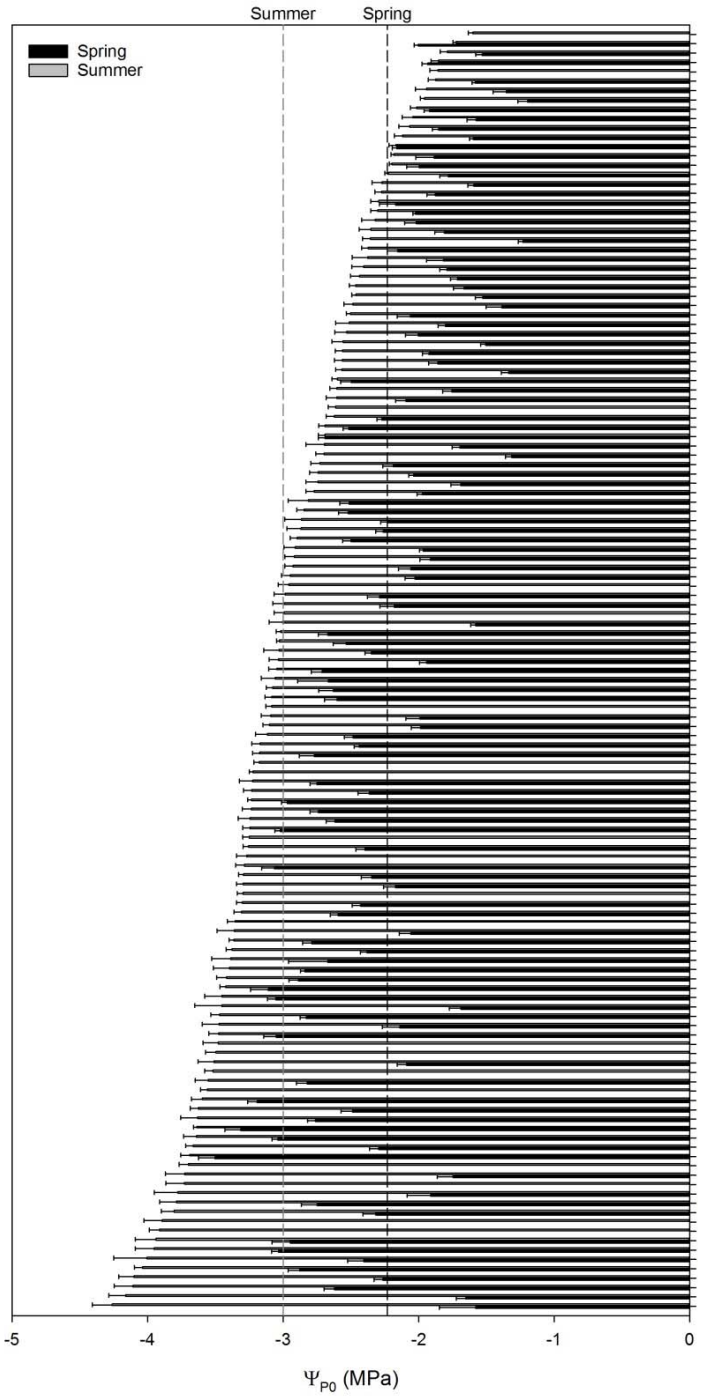


(Sjöman, Hirons & Bassuk 2015)

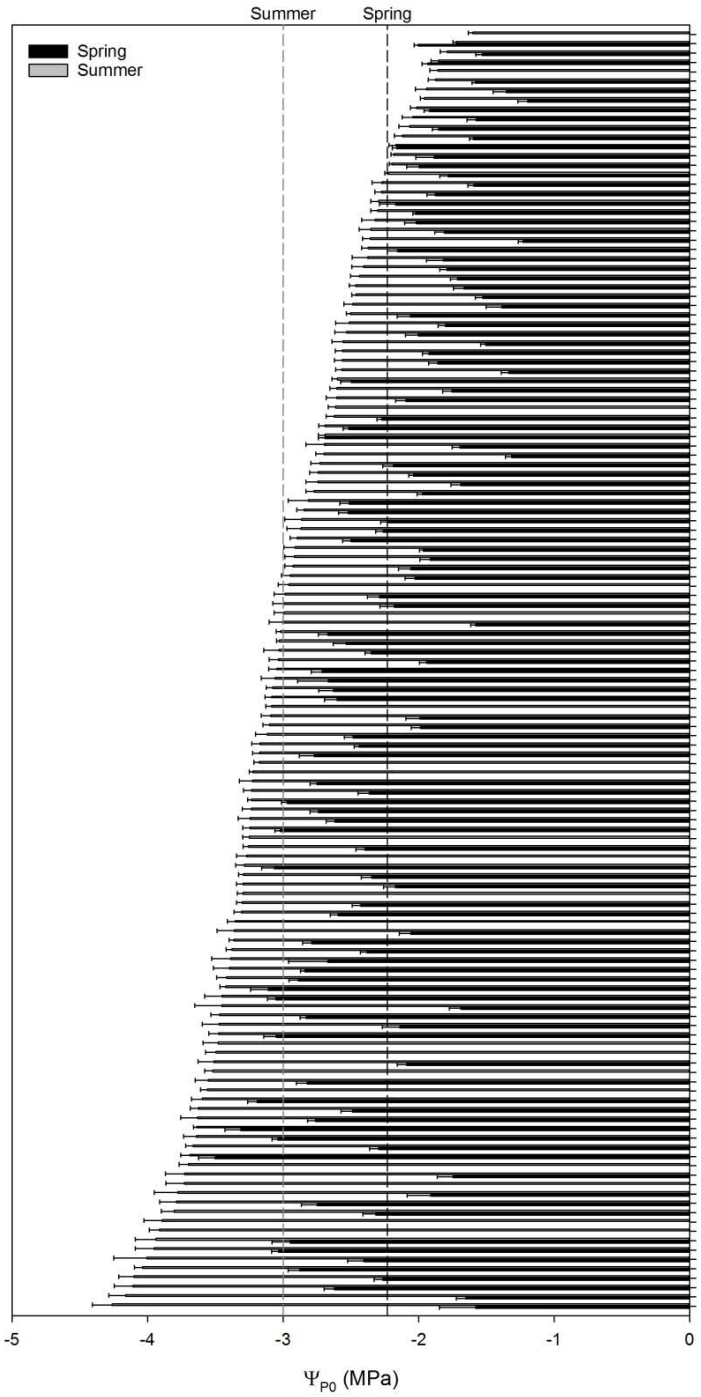

Summer
Spring
Spring
Summer
-5
-4
-3
-2
-1
0
Ψ_{P0} (MPa)



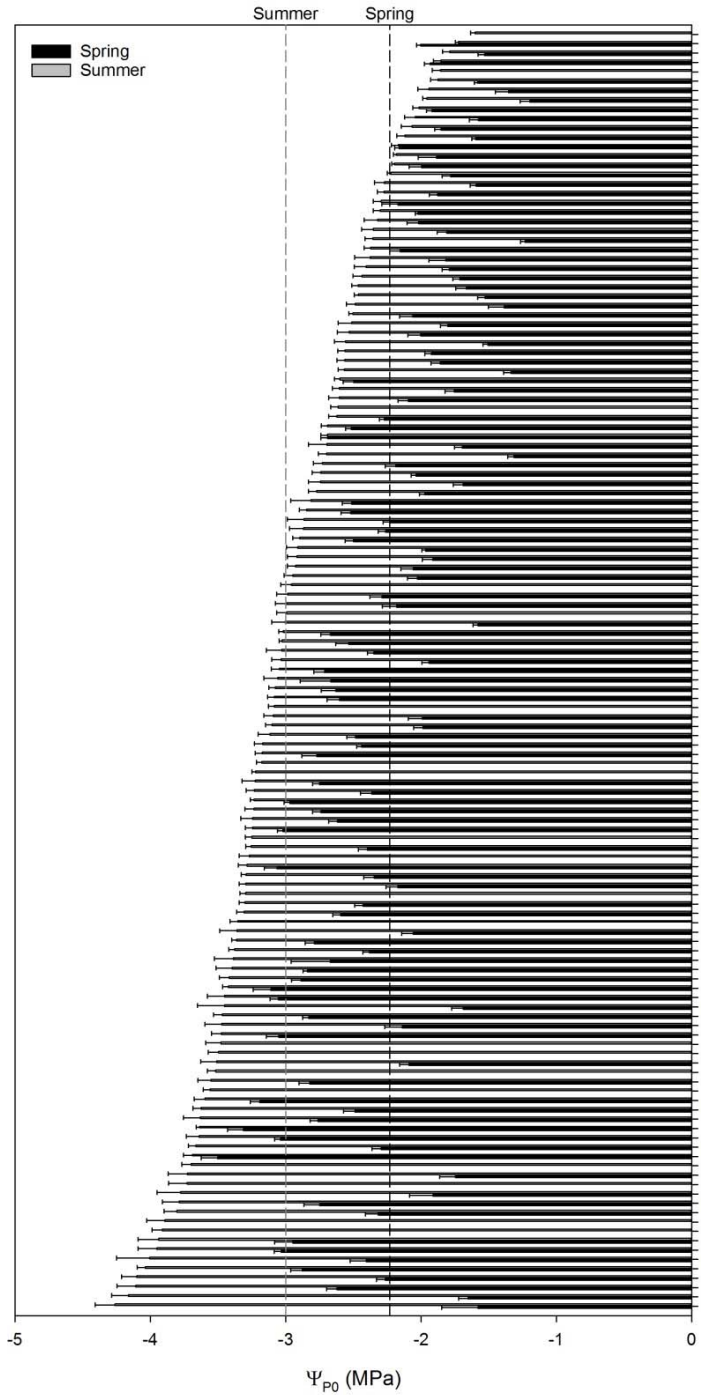
Aesculus flava



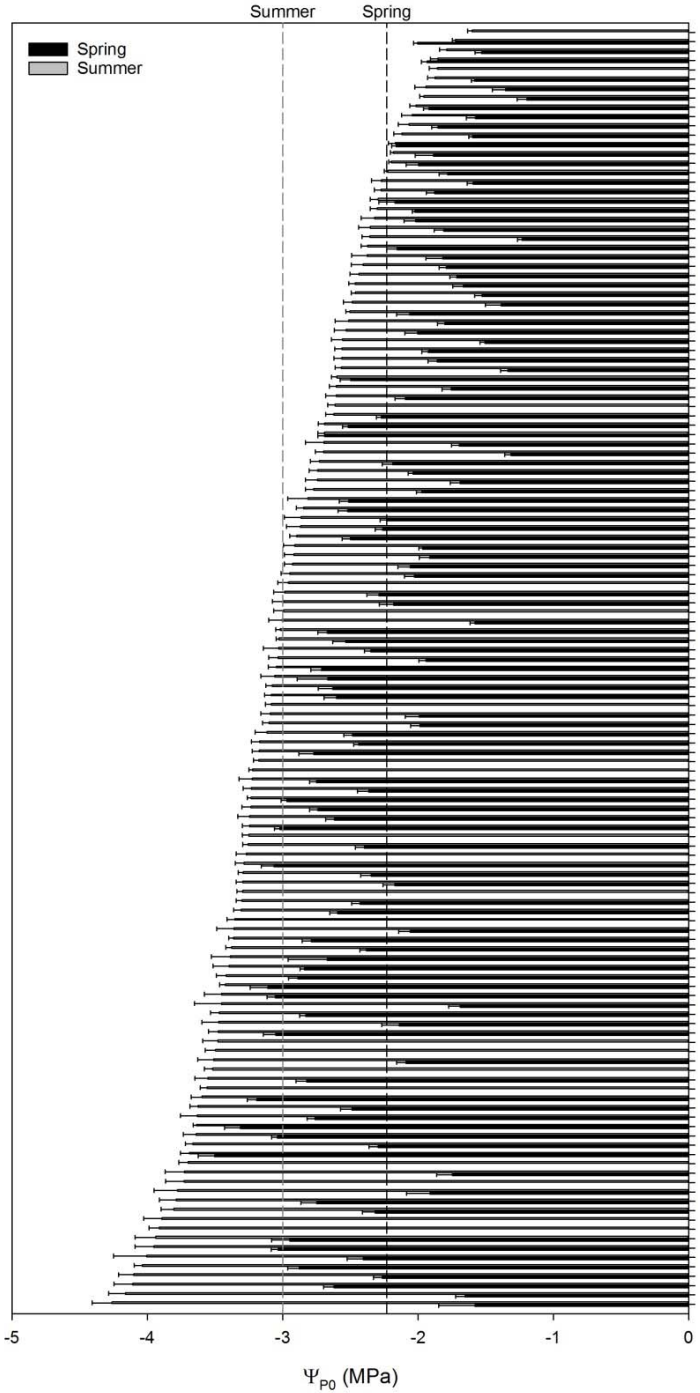
Magnolia kobus



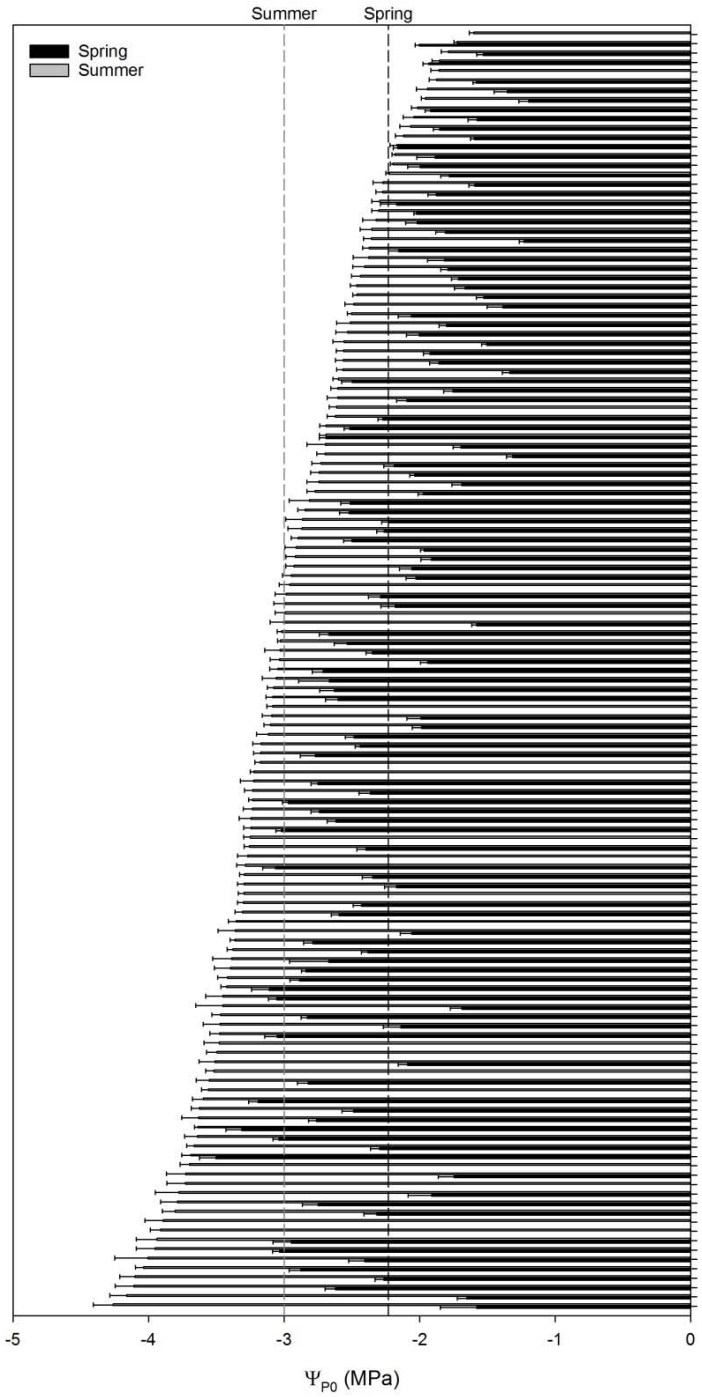
Liriodendron tulipifera



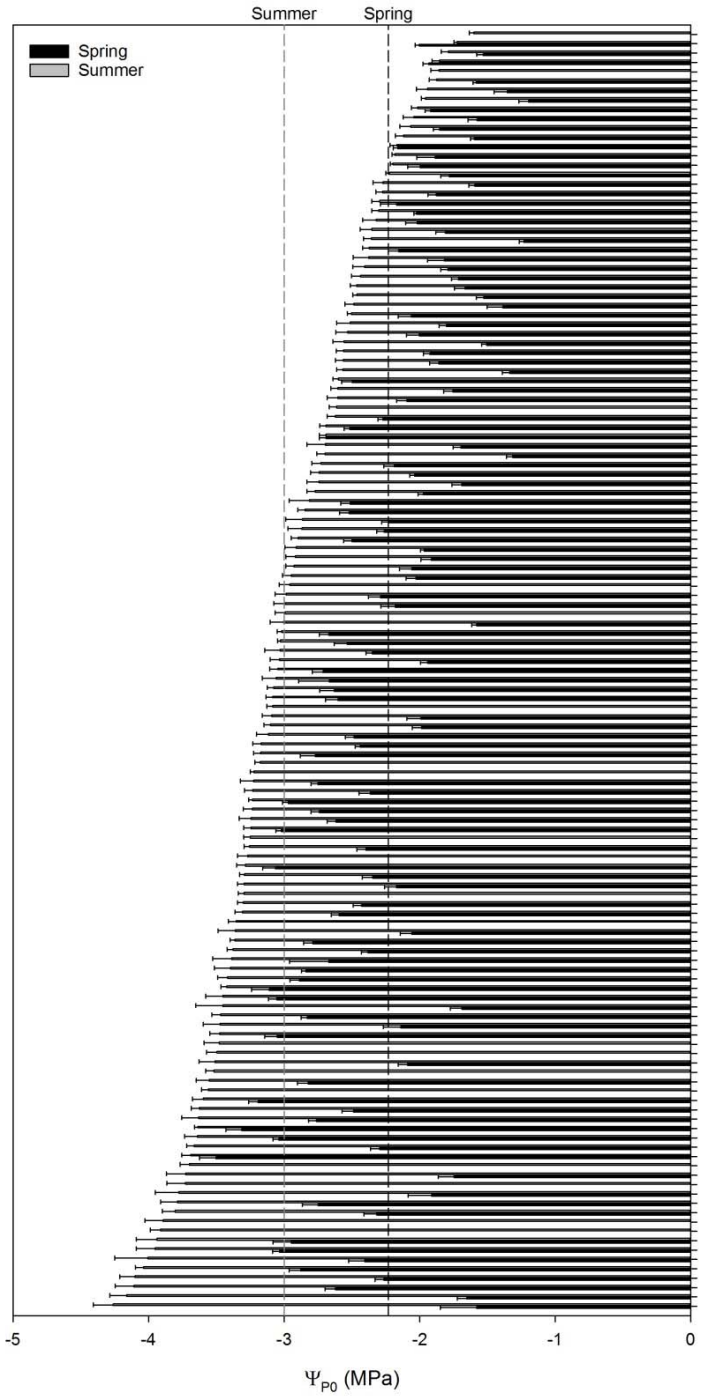
Cercidiphyllum japonicum



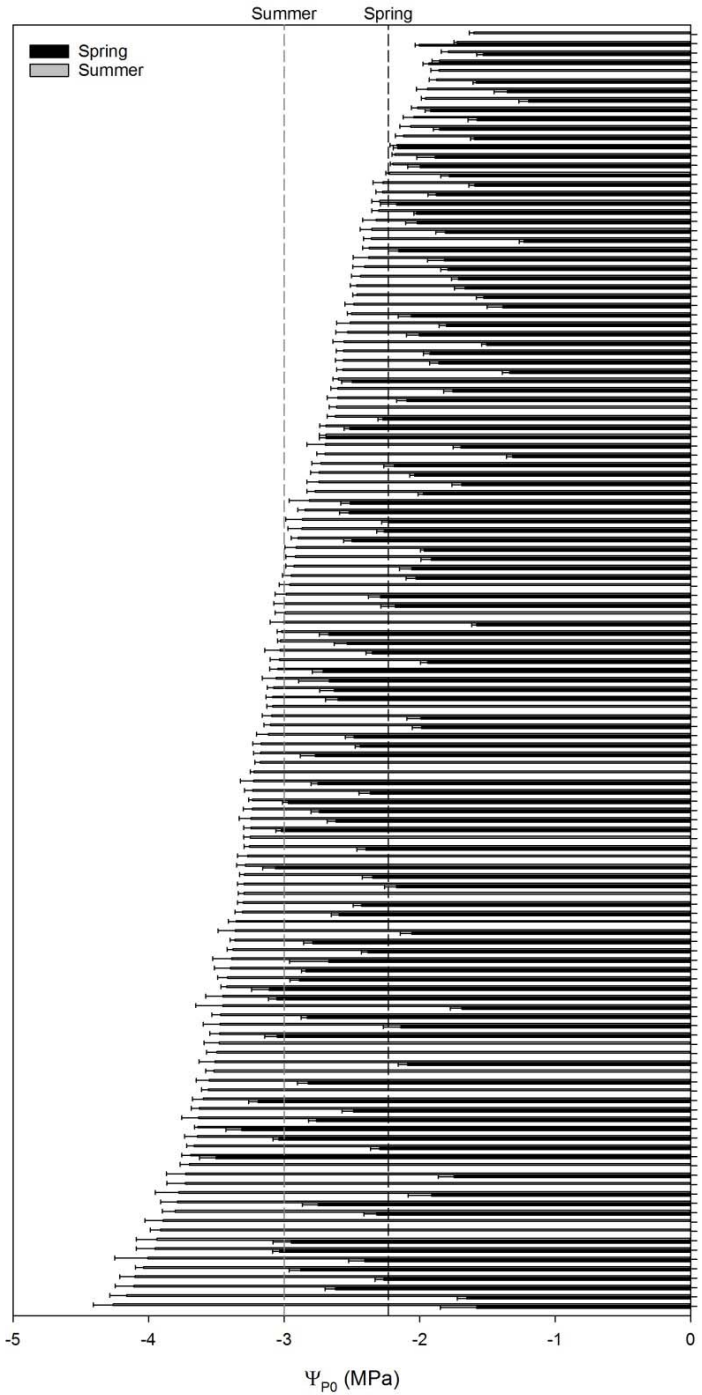
Corylus colurna



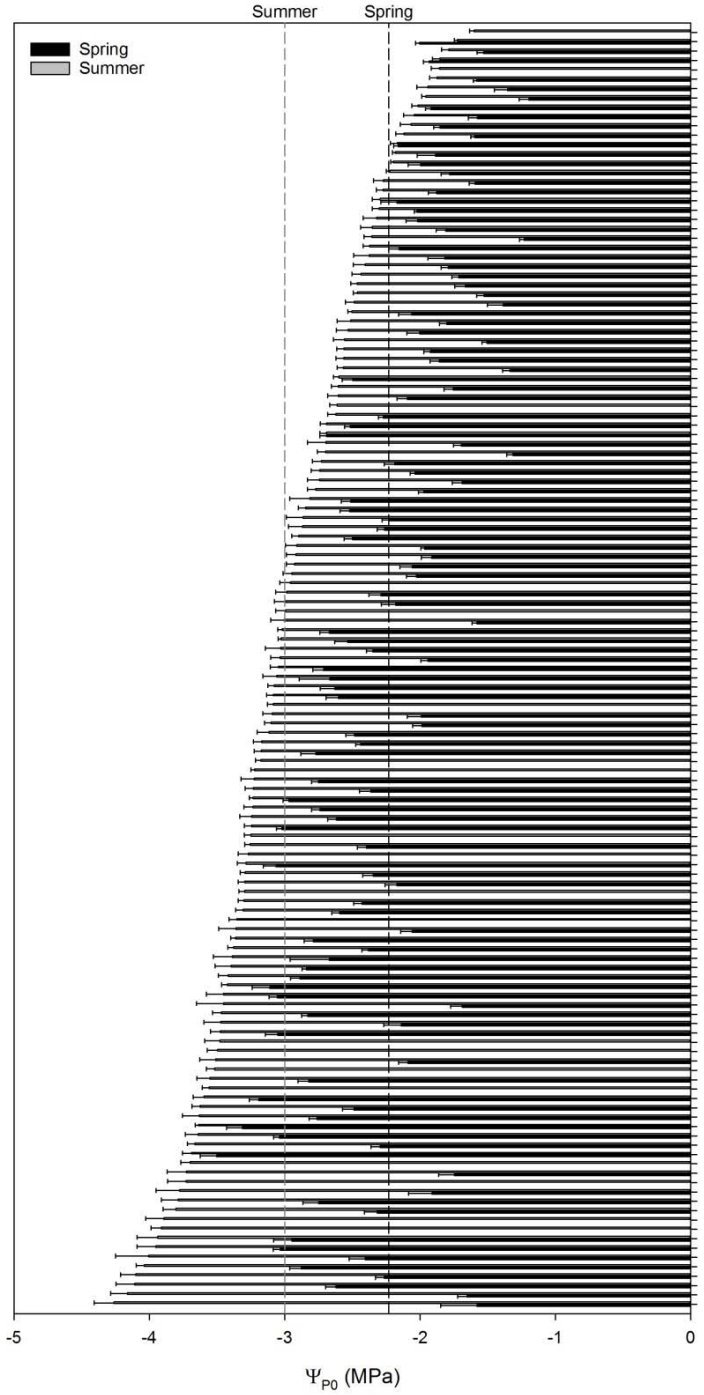
Tilia tomentosa



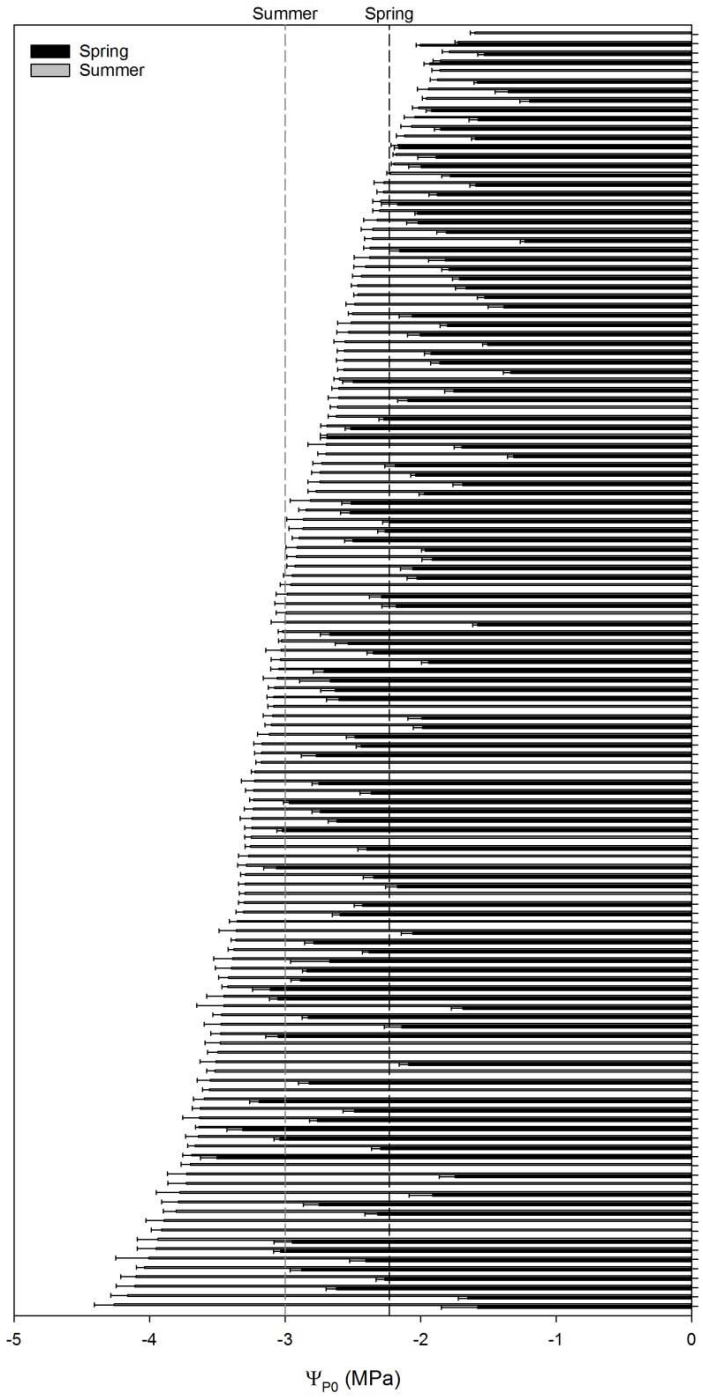
Prunus sargentii



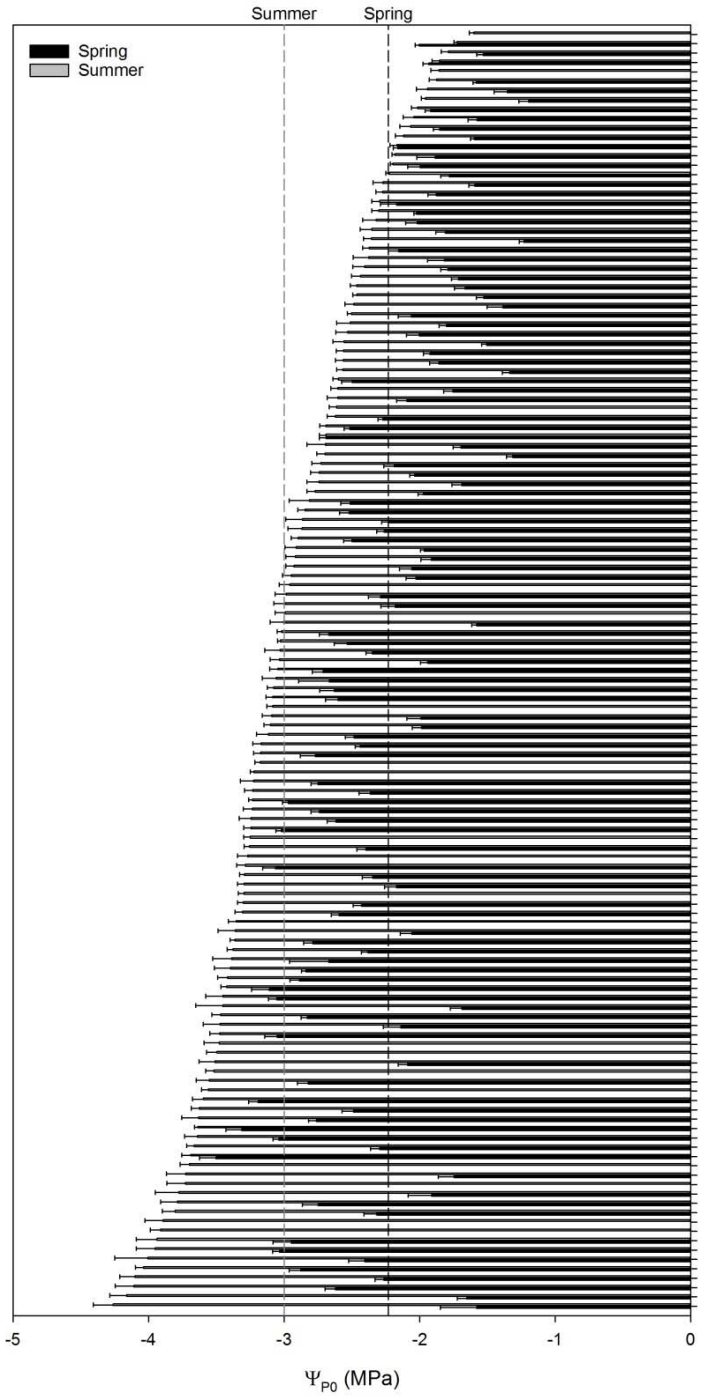
Acer x zoeschense



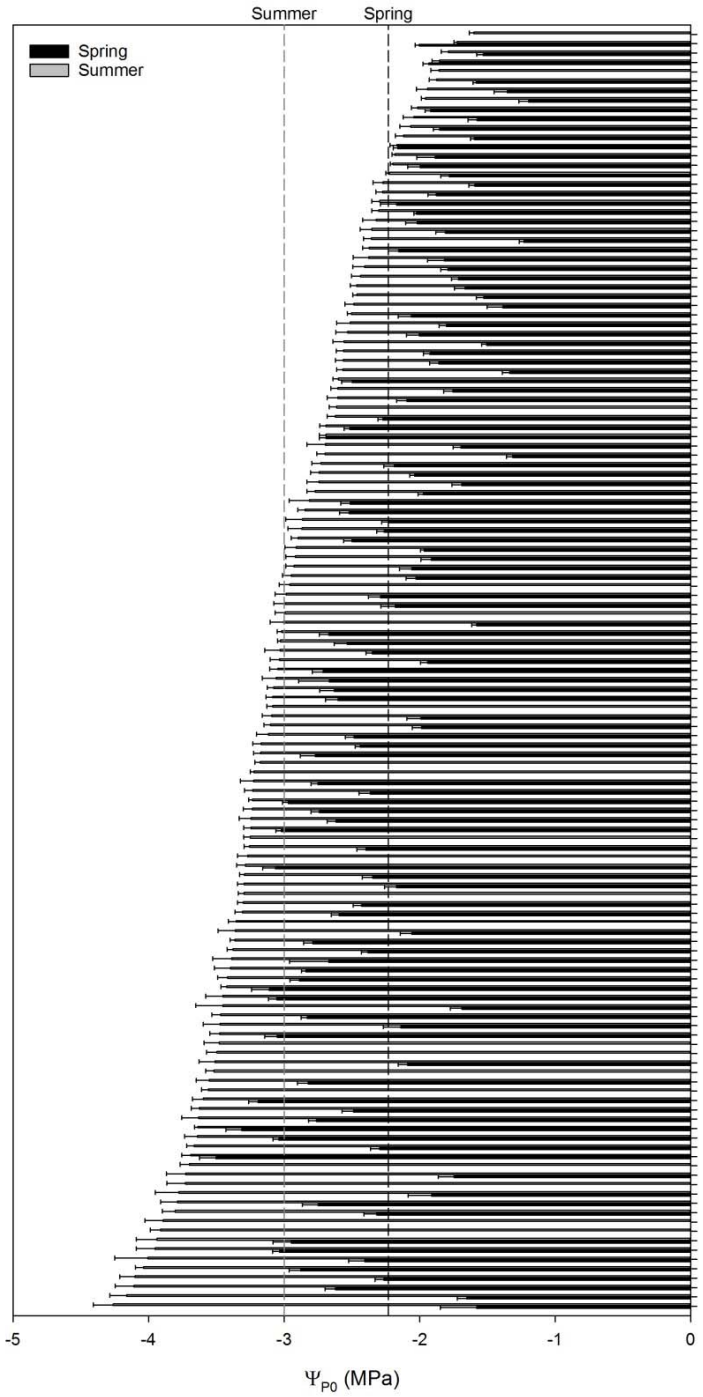
Eucommia ulmoides



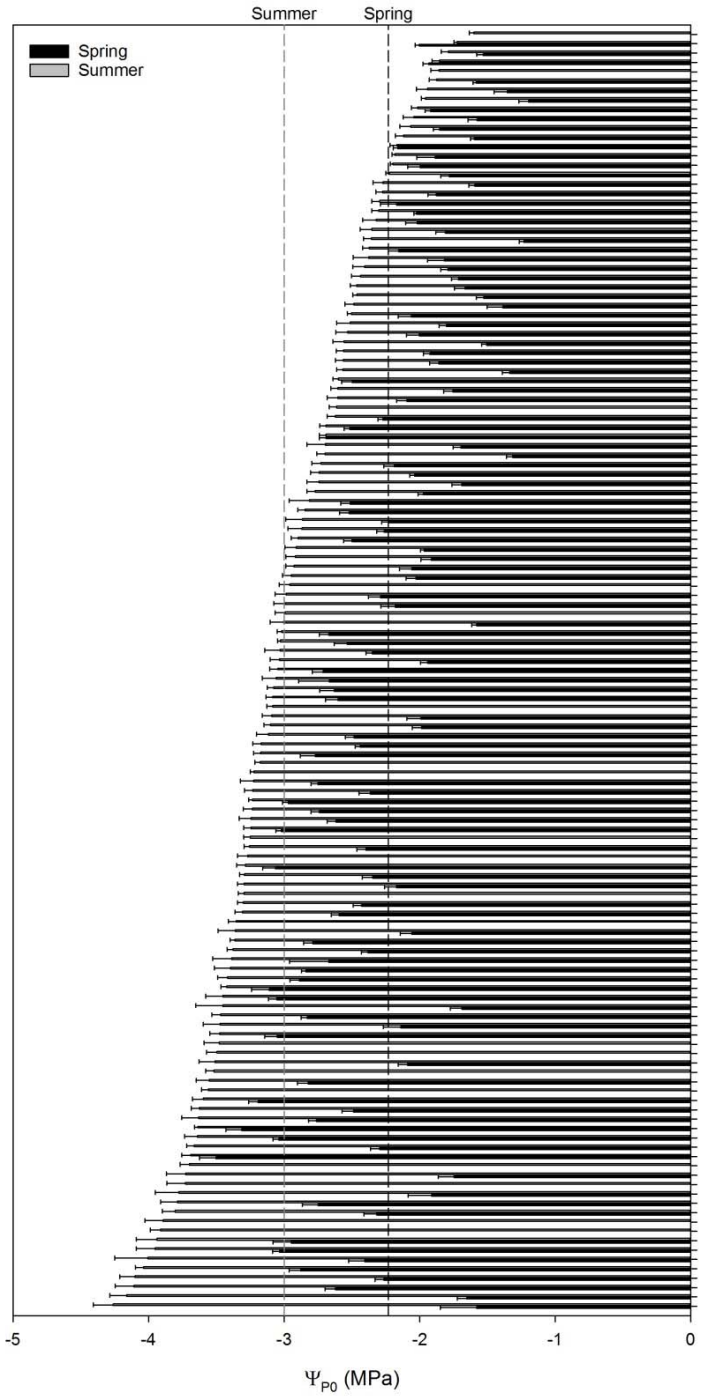
Quercus frainetto



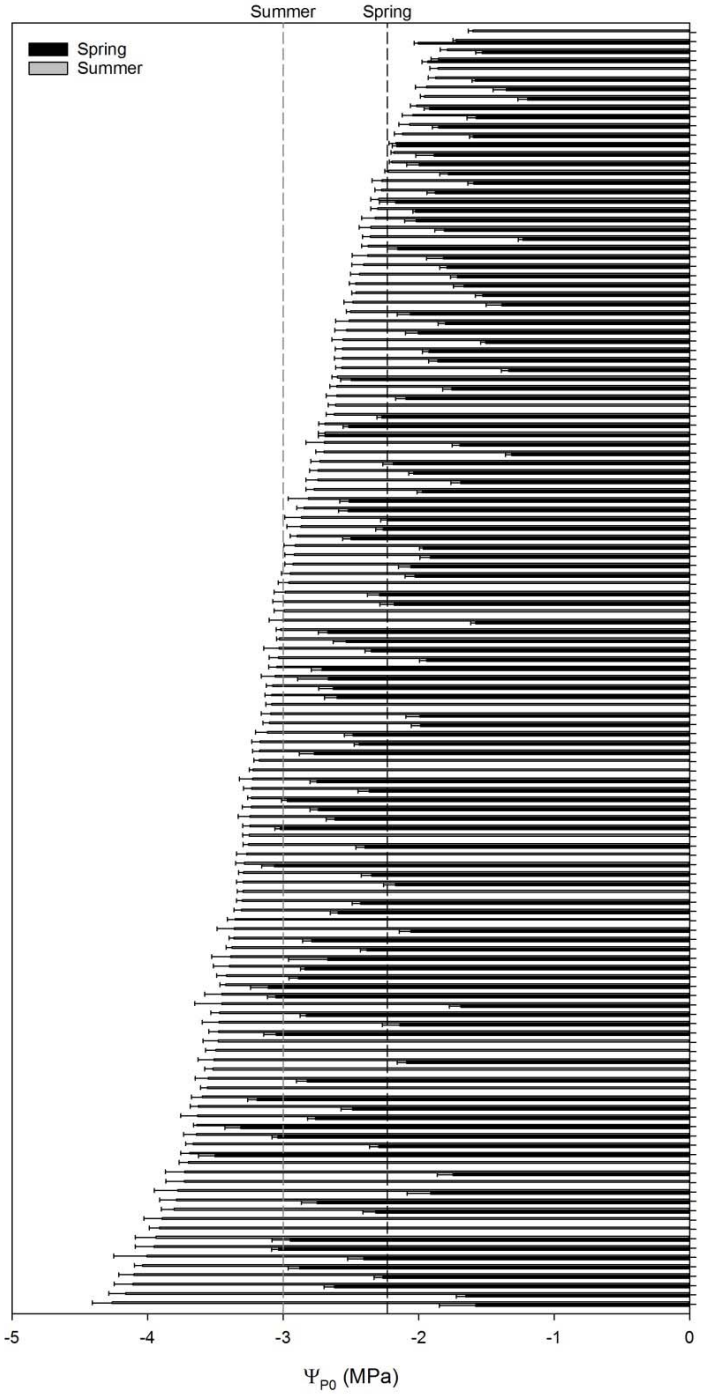
Pinus nigra



Ginkgo biloba



Syringa reticulata



Koelreuteria paniculata

Forskningsrådet
Formas