Drought Vulnerability of Neotropical Canopy Trees and Lianas

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Florida International University
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UNIVERSITY OF CALIFORNIA, RIVERSIDE

Functional diversity and responses to drought in tropical forests (**DROUGHT**)

Damien Bonal, Nicolas Angeli, Pascale Maillard, Christian Hossann, Sabrina Coste, Jean-Yves Goret, Benoit Burban, Jocelyn Cazal, Heidy Schimann, Elaine Louisanna, Maricar Aguilos, Patrick Heuret, Bruno Herault, Camillle Ziegler, Maguy Dulormne, Celine Leroy, Nathalie Sejalon-Delman, Marc Buee, Cyrille Bach, Melanie Roy, Sophie Manzi, Isabelle Marechaux, Jerome Chave, Elodie Courtois, Clement Stahl, Erik Verbruggen, Ivan Janssens, Hans Verbeeck, Elizabeth Kearsley, Hannes De Deurwaerder, Louis Santiago, Mark De Guzman, Chris Baraloto, Ken Feeley, Oscar Valverde, Lucy Rowland, Patrick Meir, Herve Cochard, Corinne Vacher, Celine LaLanne, Patrick Leger, Sylvain Delzon, Regis Burlett, Gaelle CapDeVille, Laurant Lamarque, Jose Torres, Nathan Mcdowell, Charlotte Grossiord, Lawren Sack, Megan Bartlett

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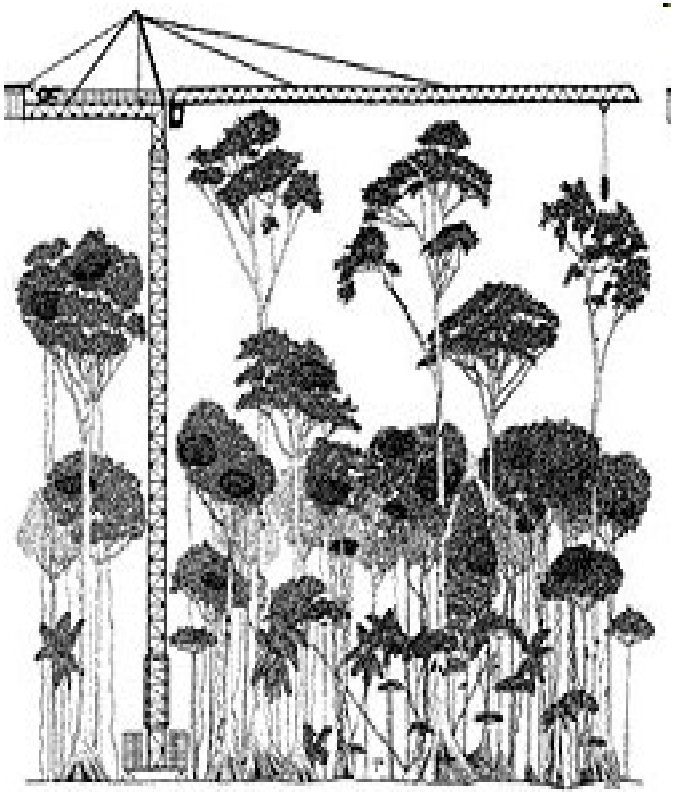
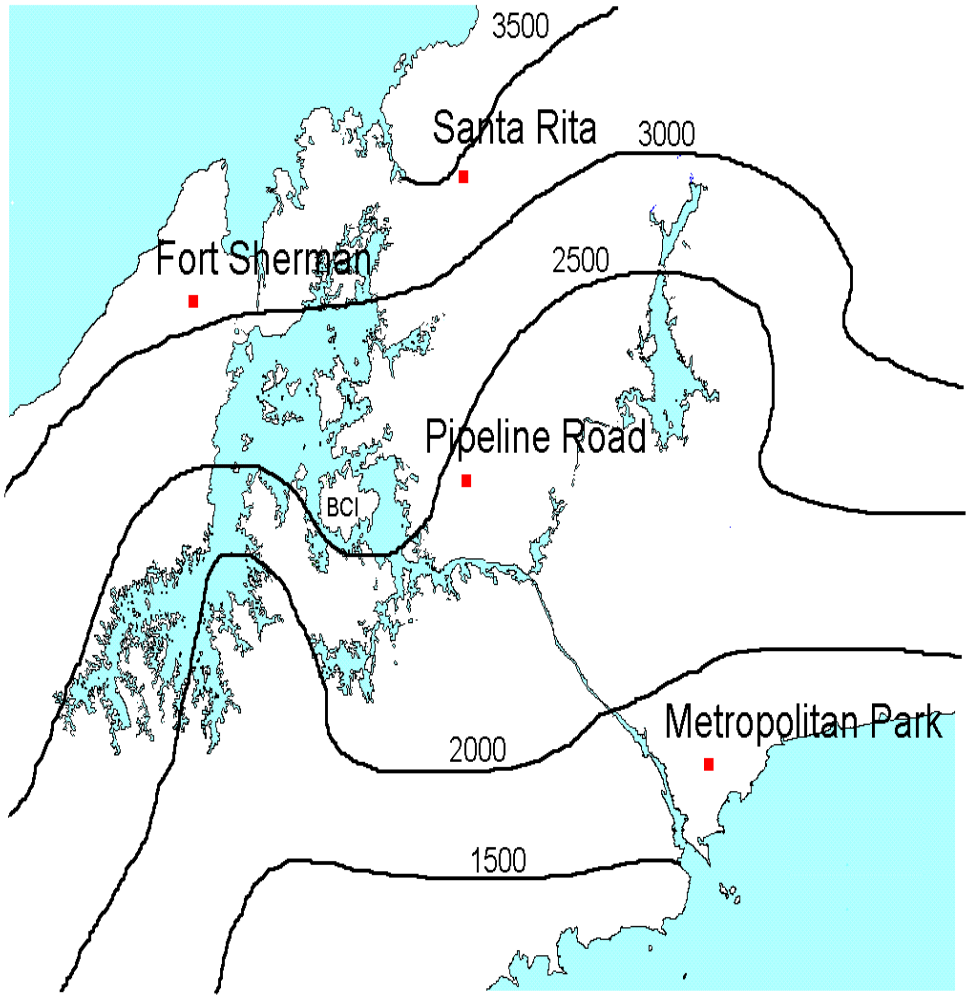
biodiversité amazonienne

Panama Canopy Cranes

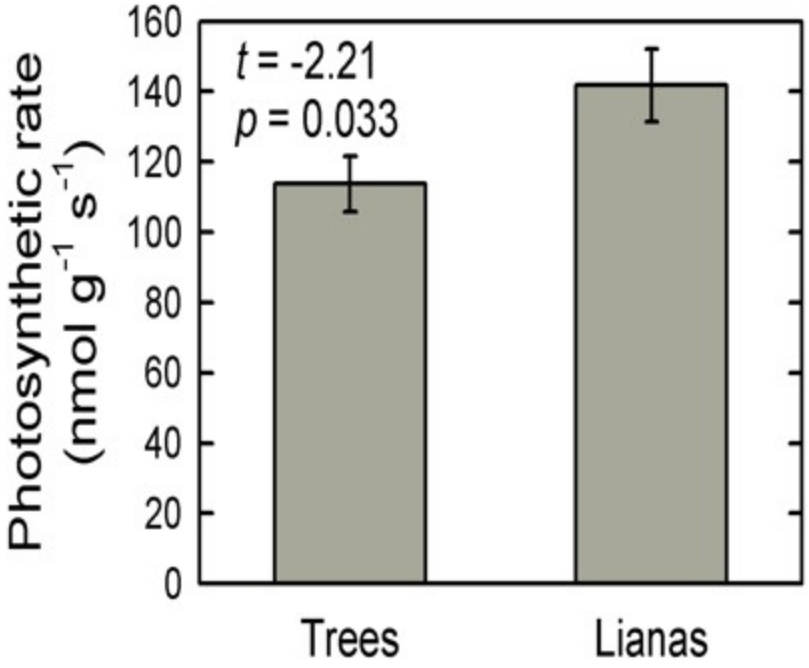




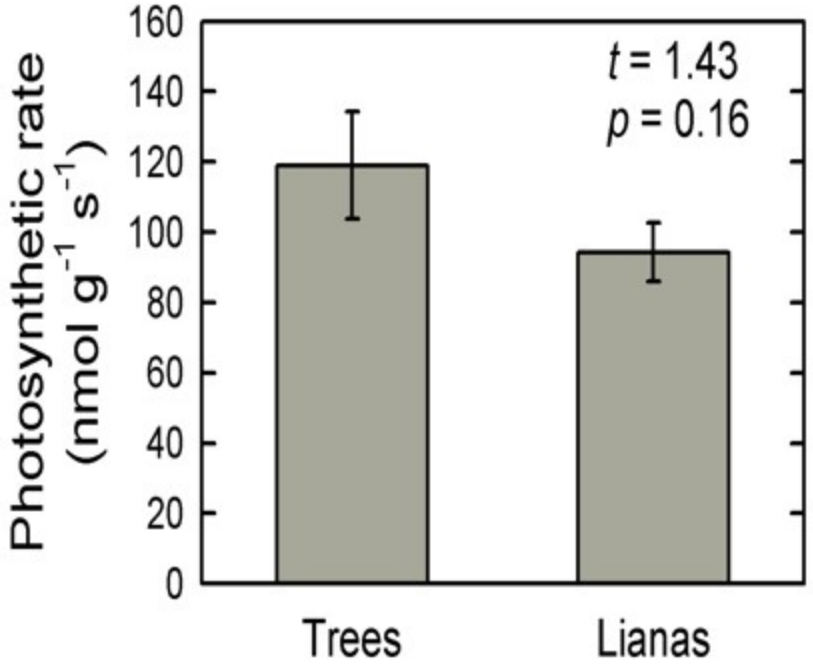
Question 1:

- Does the magnitude of hydraulic trait differences in trees and lianas vary with precipitation?

Lianas appear to lose their advantage as annual precipitation increases

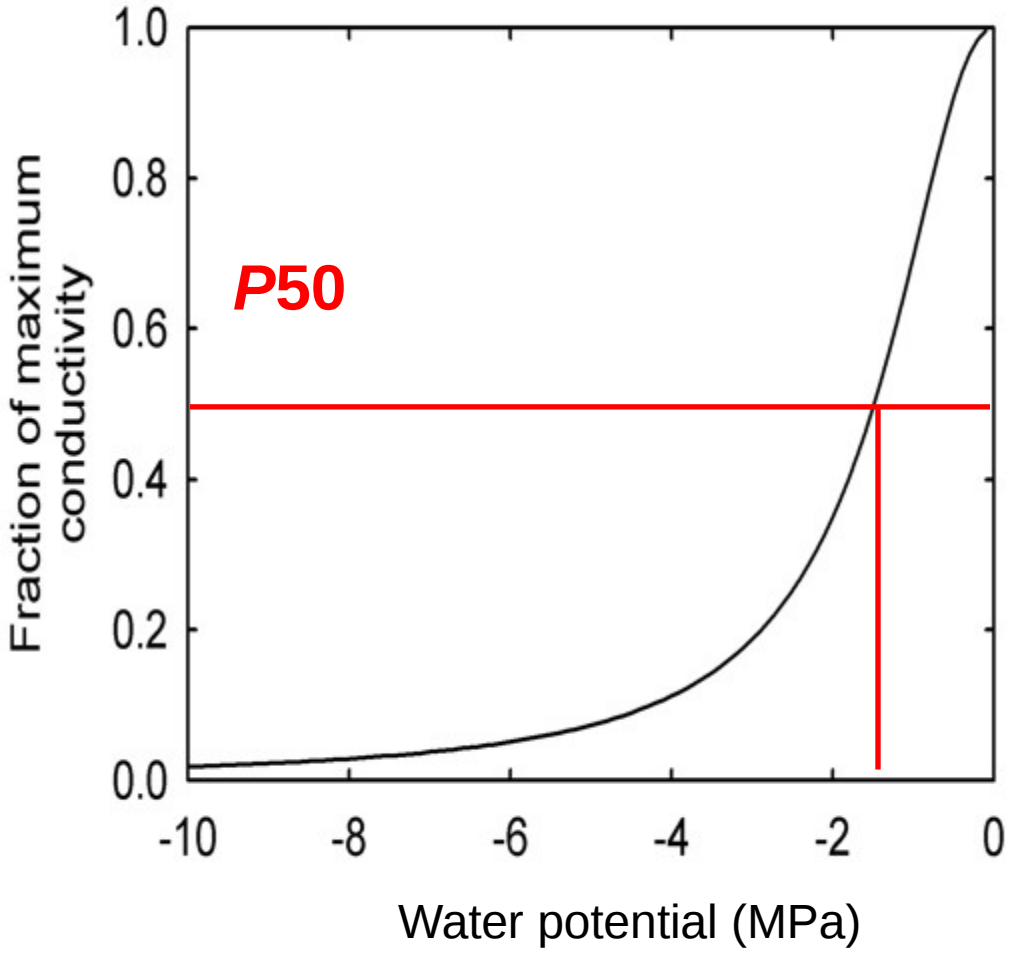


Cai, Schnitzer & Bongers (2009)
1550 mm yr-1 precipitation



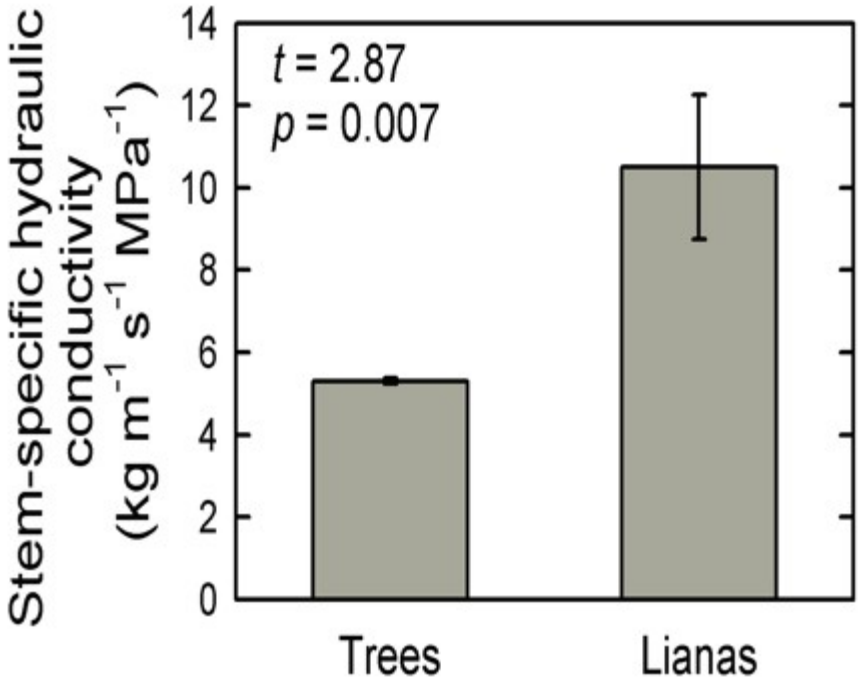
Santiago & Wright (2007)
3100 mm yr-1 precipitation

Vulnerability to drought-induced xylem cavitation "vulnerability curve"



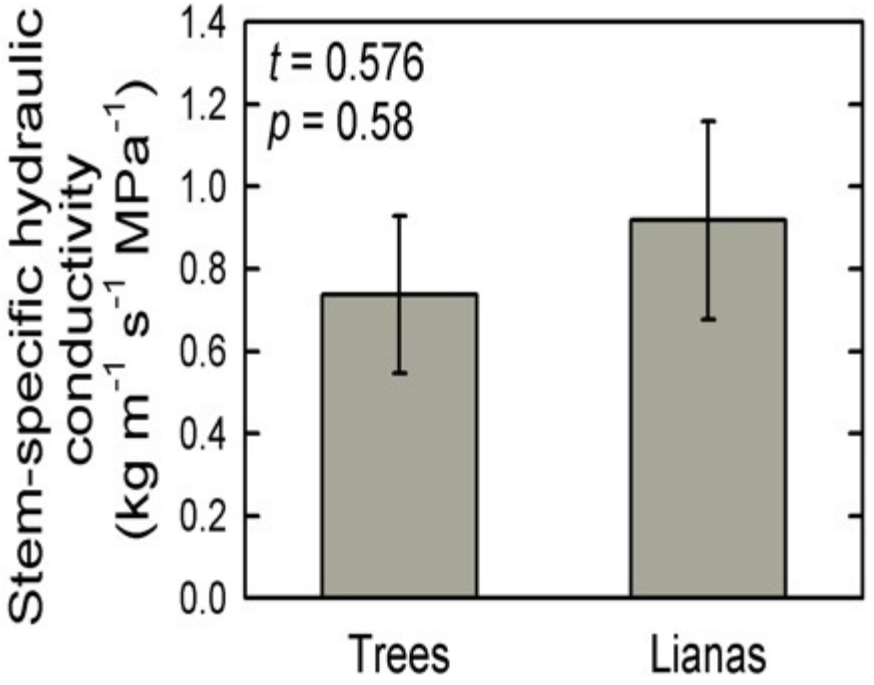
Differences in *K*s are greater in drier forests

Parque Metropolitano Crane
1800 mm yr-1



De Guzman, Santiago, Schnitzer, Álvarez-Cansino (2016) Tree Physiology

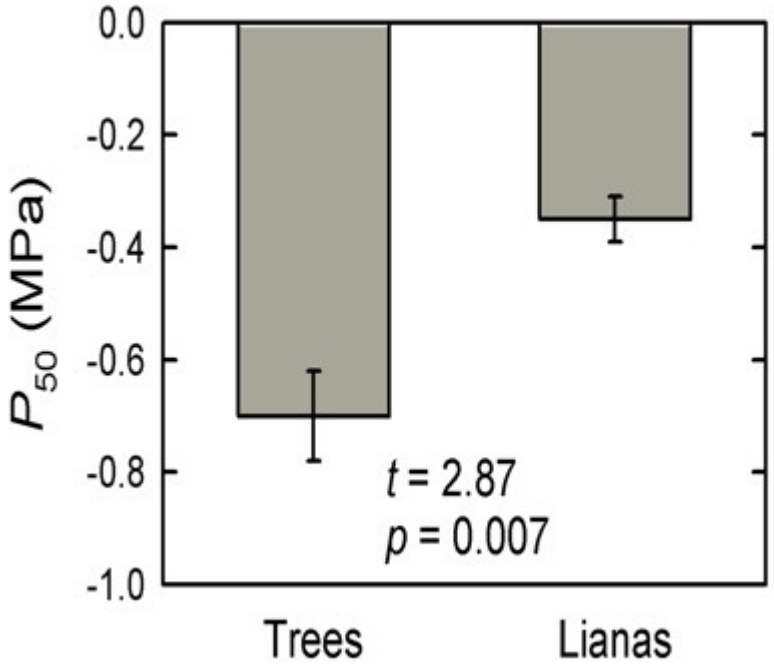
San Lorenzo Crane
3100 mm yr-1



De Guzman, Acosta-Rangel, Winter, Bonal, Santiago (unpublished)

Differences in *P*50 are greater in drier forests

Parque Metropolitano Crane
1800 mm yr-1



De Guzman, Santiago, Schnitzer, Álvarez-Cansino (2016) Tree Physiology

San Lorenzo Crane
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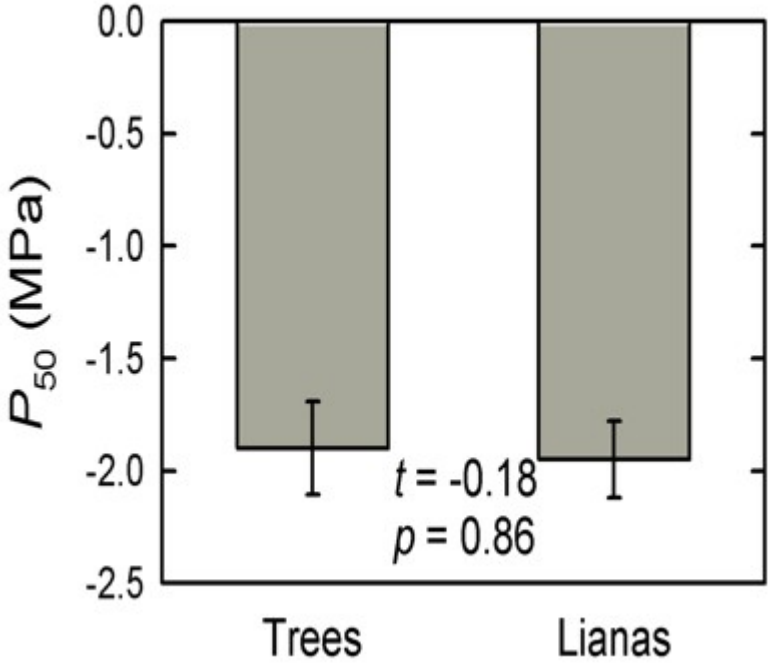


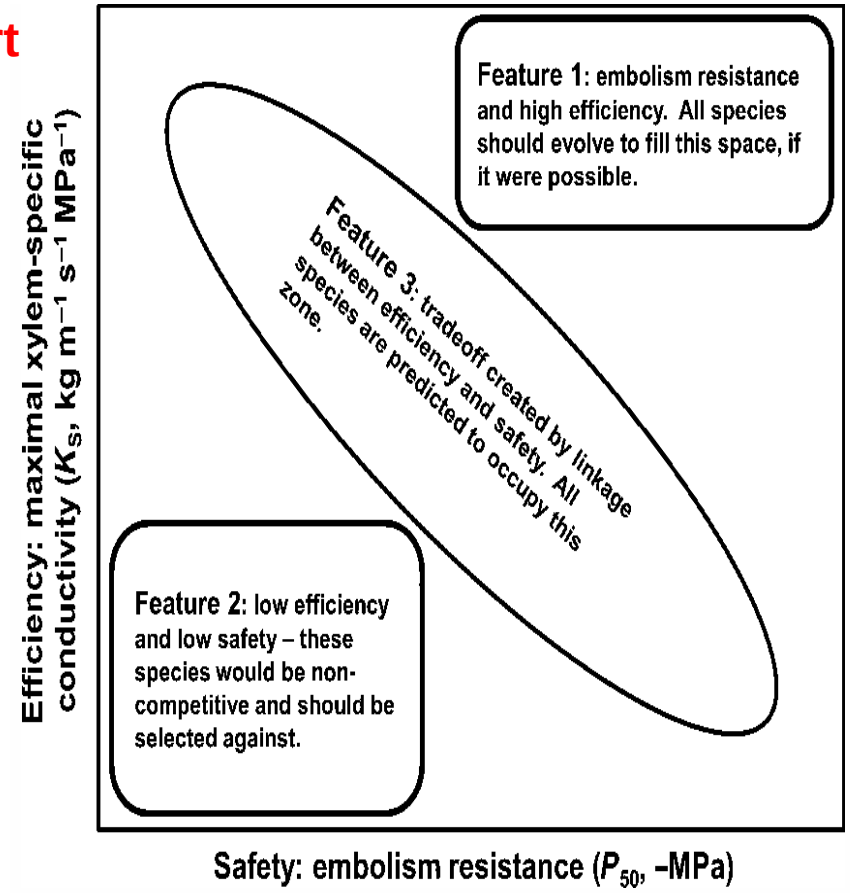
De Guzman, Acosta-Rangel, Winter, Bonal, Santiago (unpublished)

Question 2:

- Does the hydraulic safety versus efficiency trade-off apply to lianas?

The hydraulic safety versus efficiency trade-off

More efficient water transport



Safer xylem; more resistant

Gleason et al. (2016) *New Phytologist*

The hydraulic safety versus efficiency trade-off

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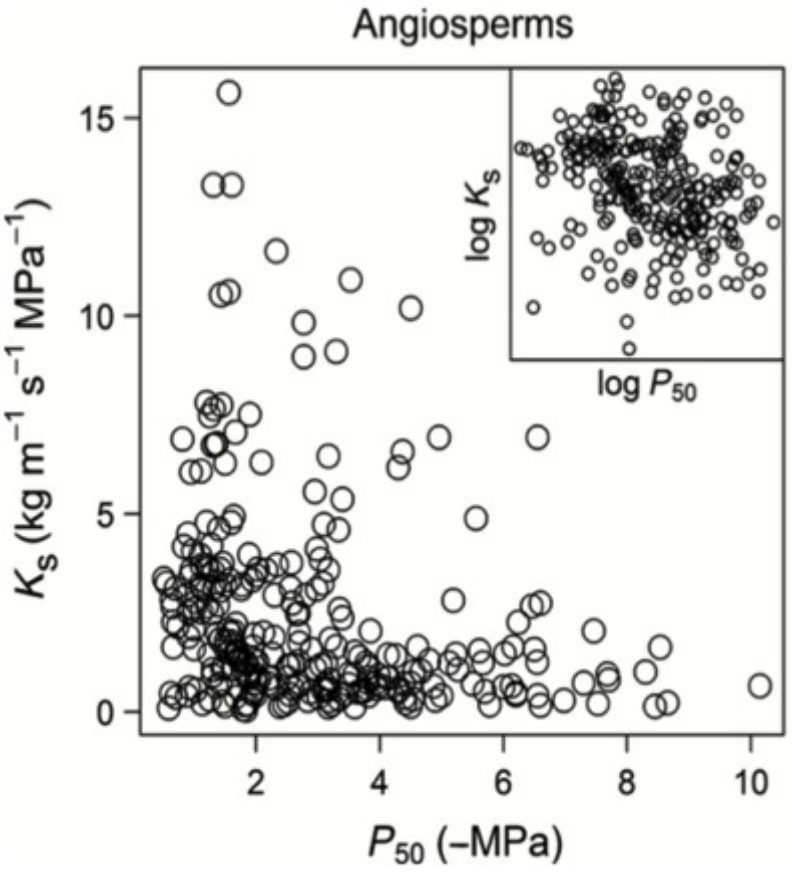

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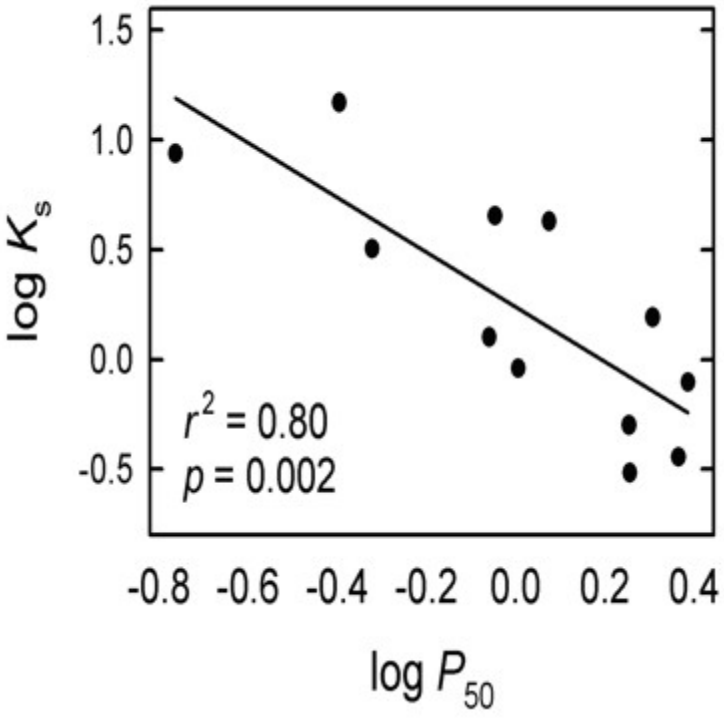
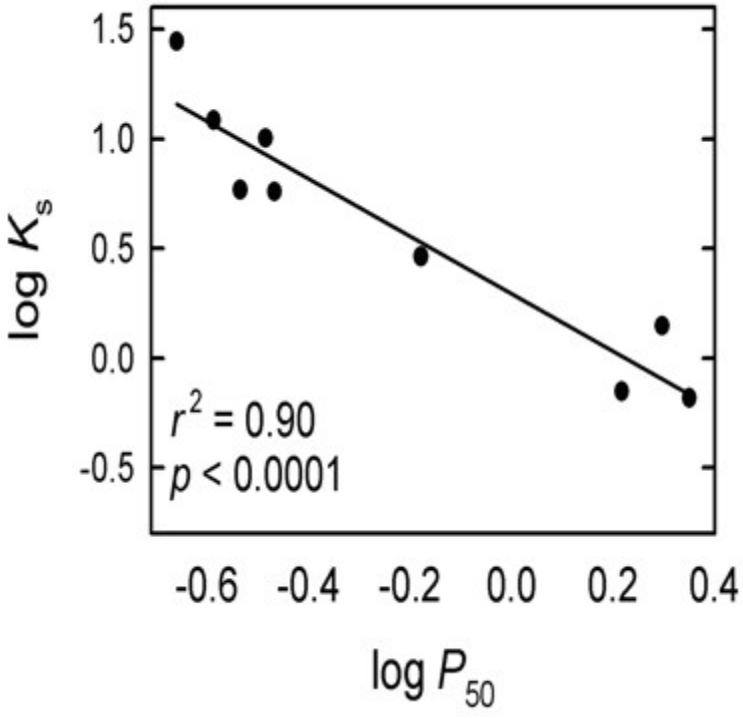
Gleason et al. (2016) *New Phytologist*

Lianas show stronger safety-efficiency trade-off than trees

Trees



Lianas

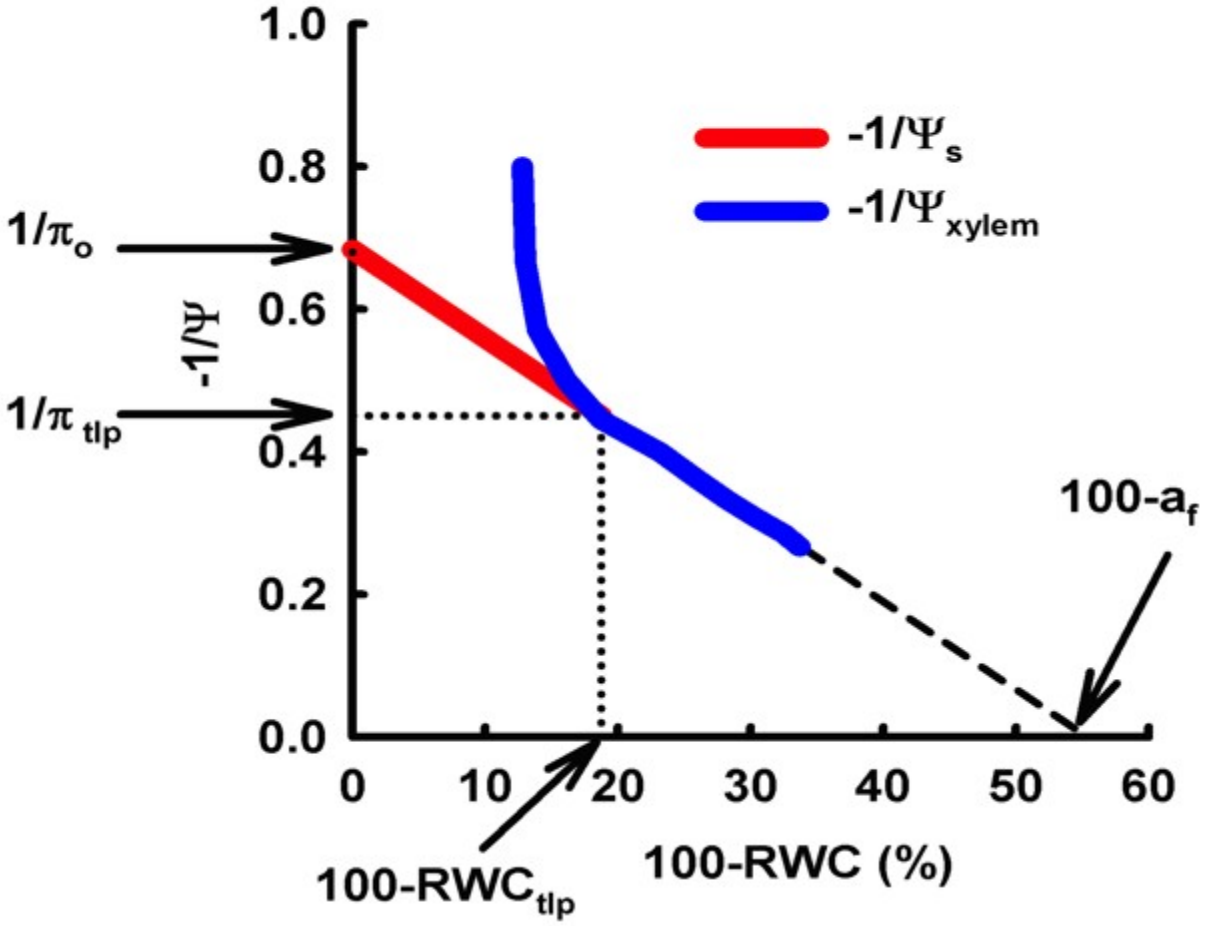


De Guzman, Santiago, Schnitzer, Álvarez-Cansino, Acosta-Rangel, Winter, Bonal, Baraloto, *et al.* (*Tree Physiology* (2016) and *unpublished data*)

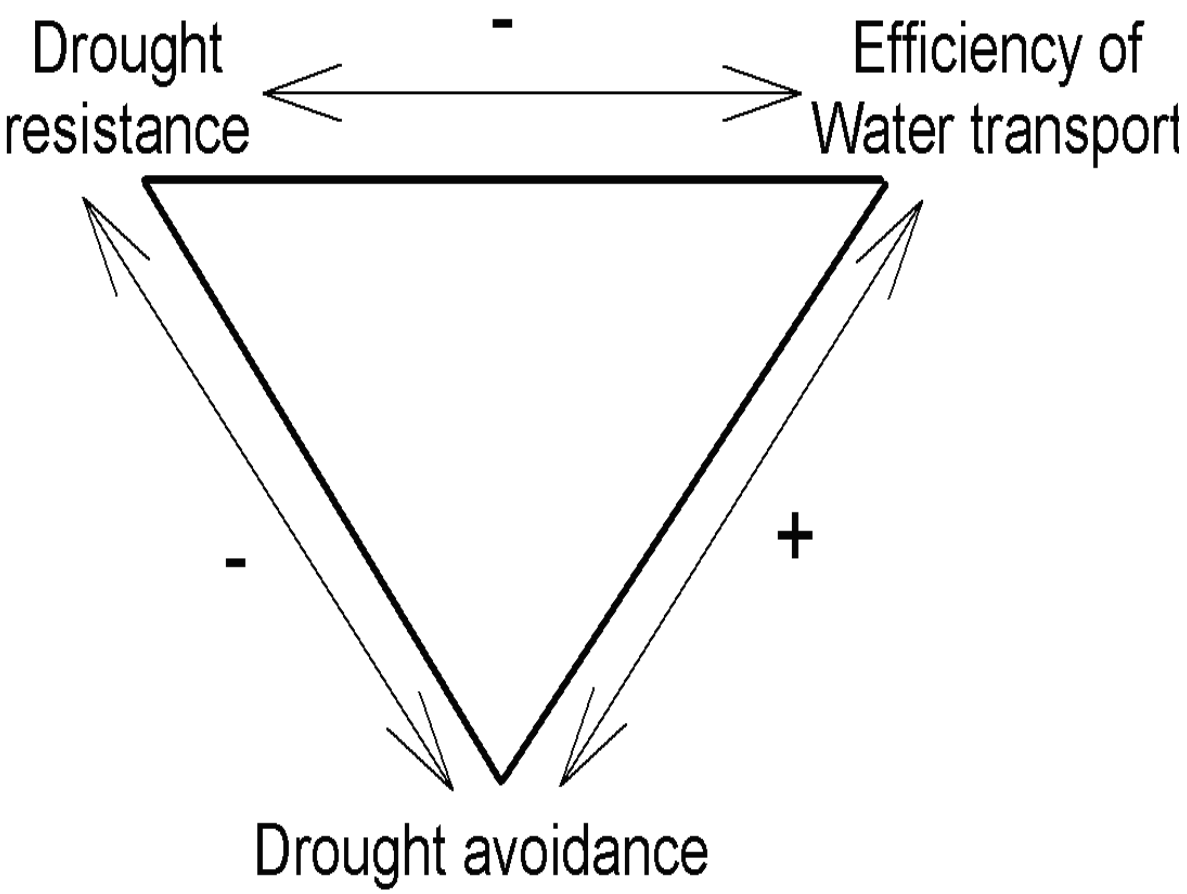
Question 3:

- Coordination with drought avoidance traits?

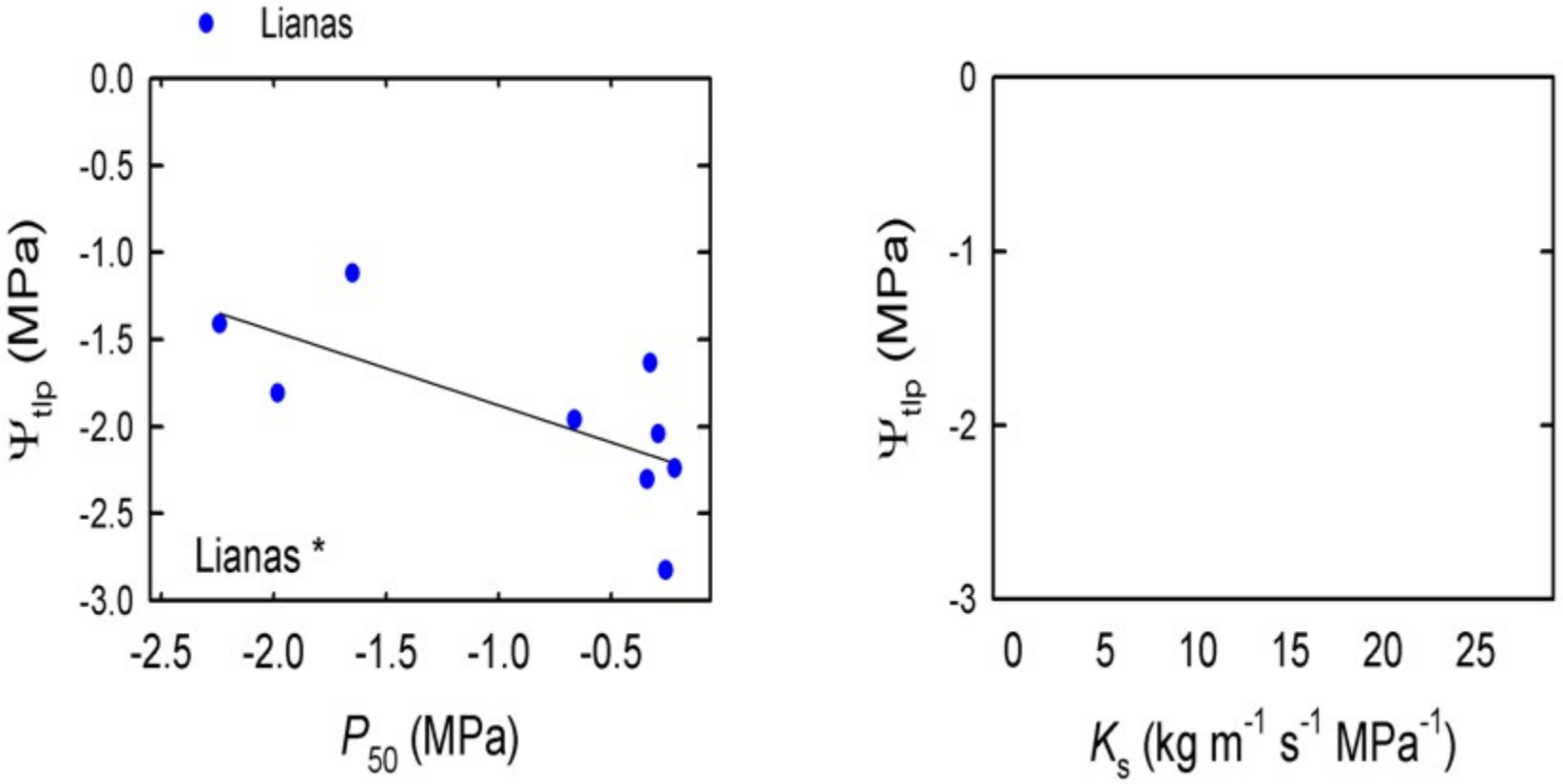
Stem pressure-volume curve: Drought avoidance traits



Expected linkages among hydraulic traits



Evidence of safety-avoidance coordination in lianas – trees no
No evidence of efficiency-avoidance trade-off



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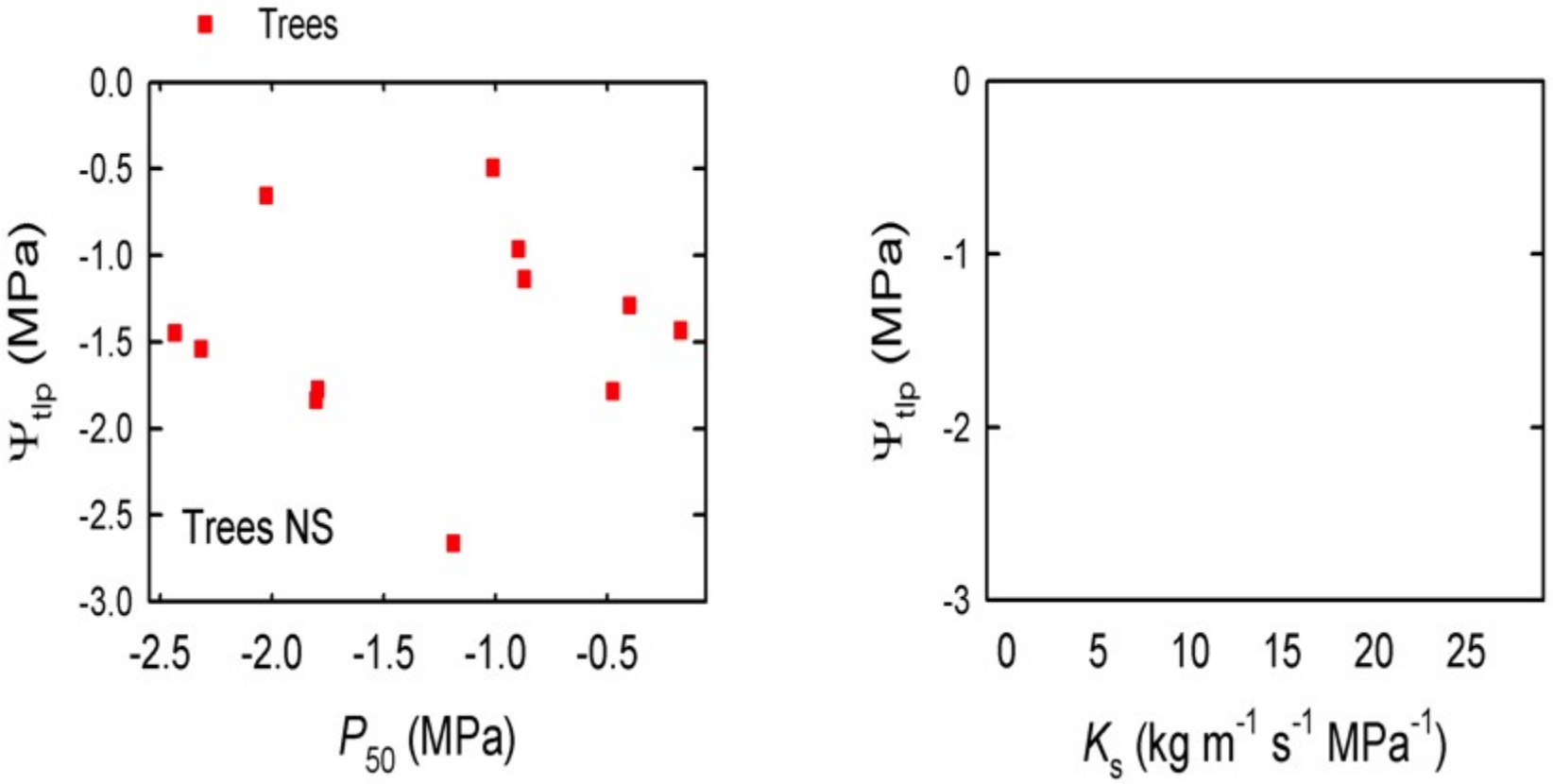

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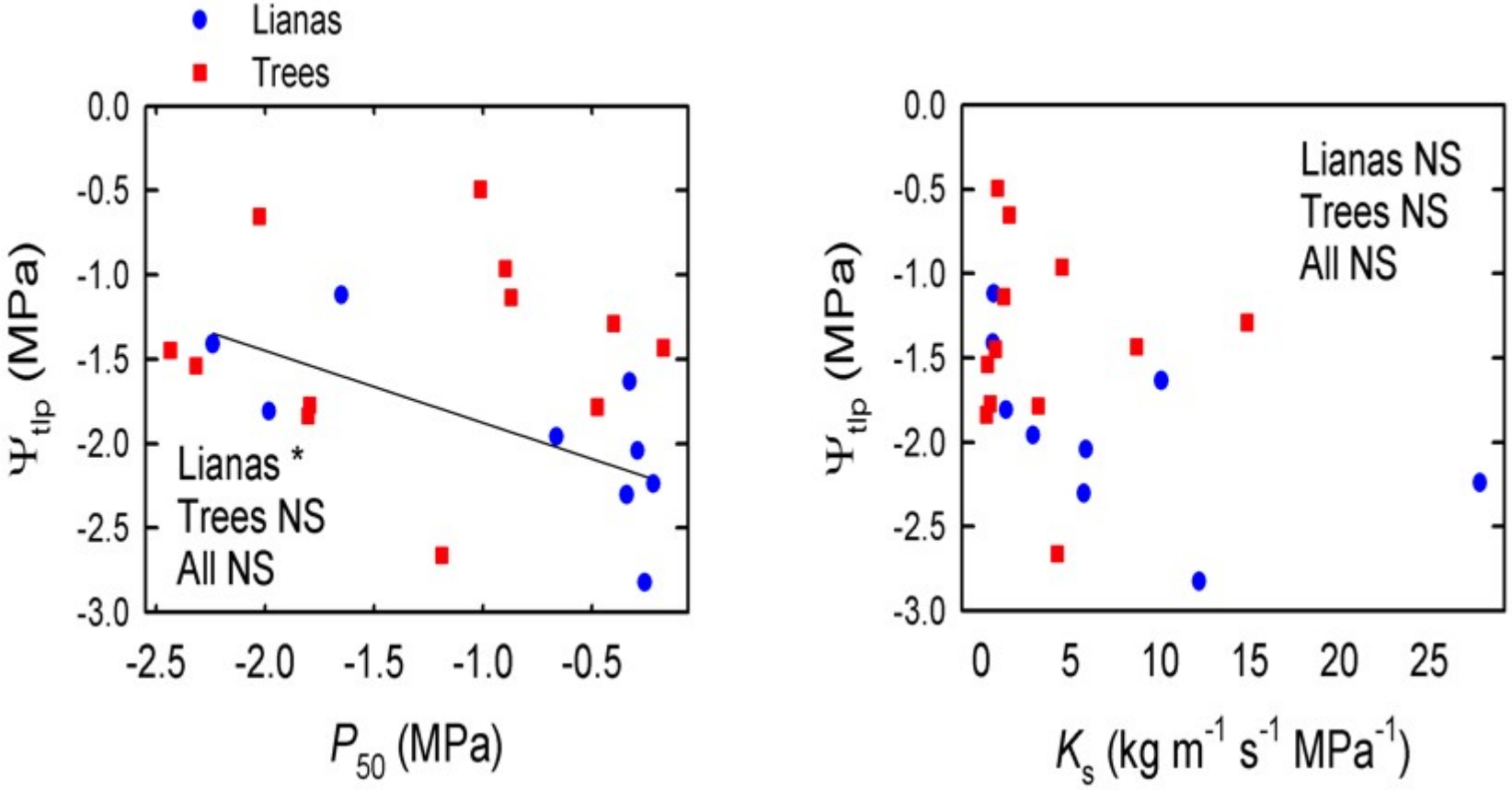
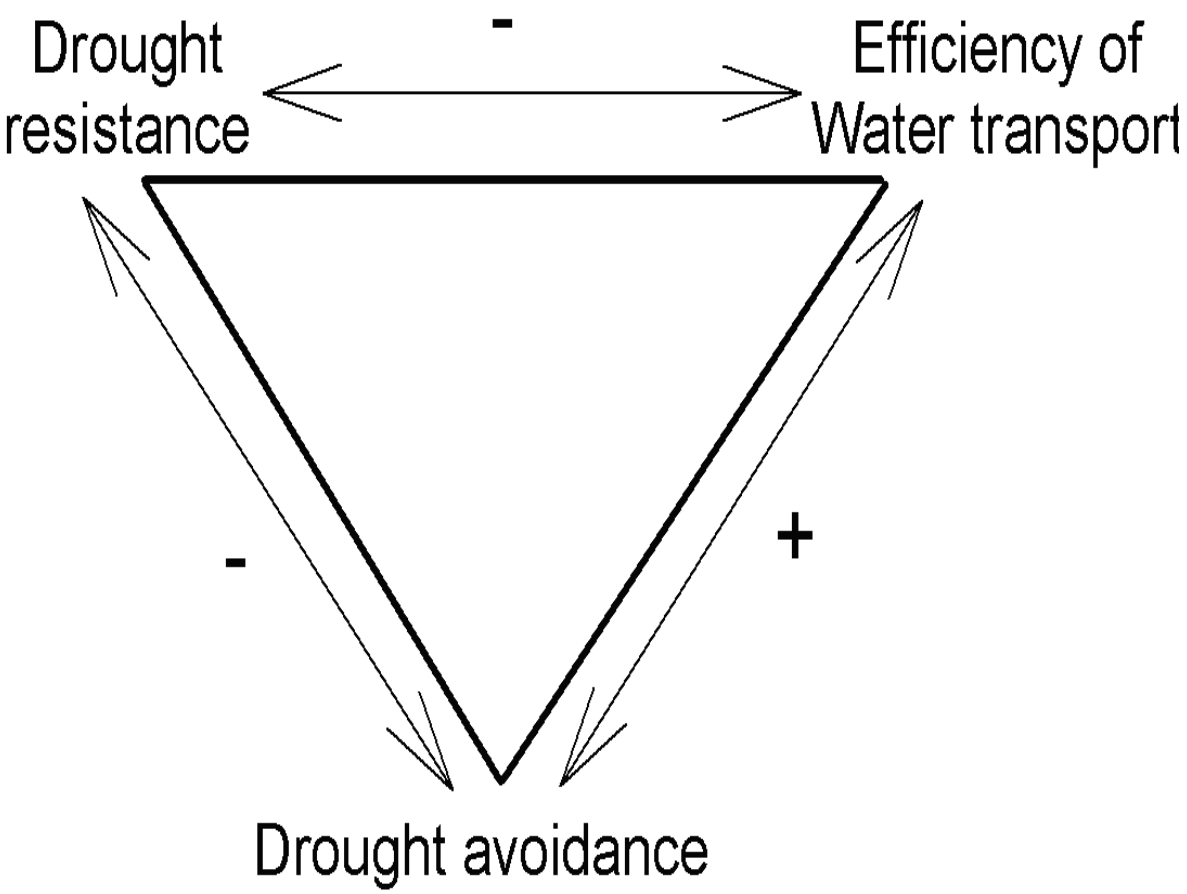


De Guzman, Santiago, Acosta-Rangel, Winter, Bonal, (*unpublished data*)

Expected linkages among hydraulic traits



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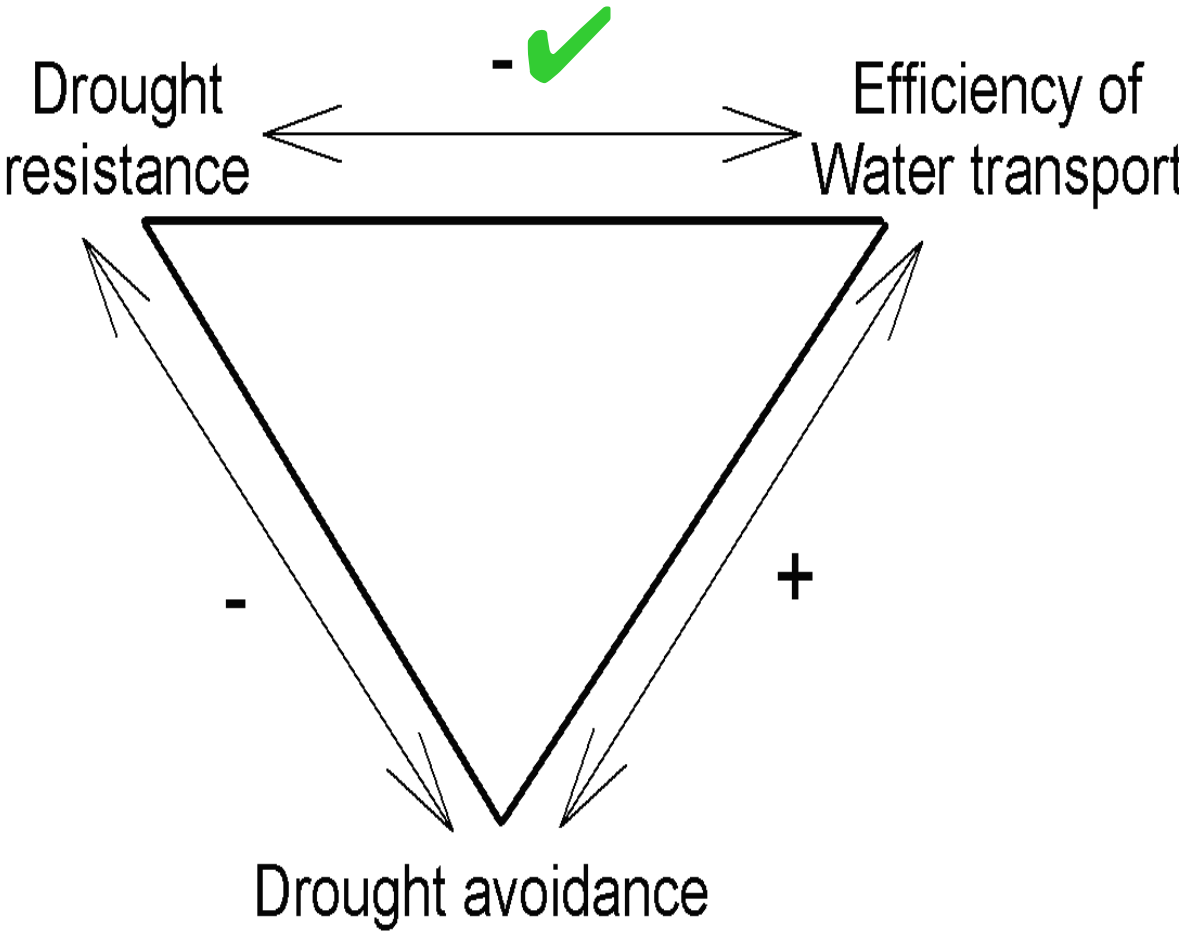

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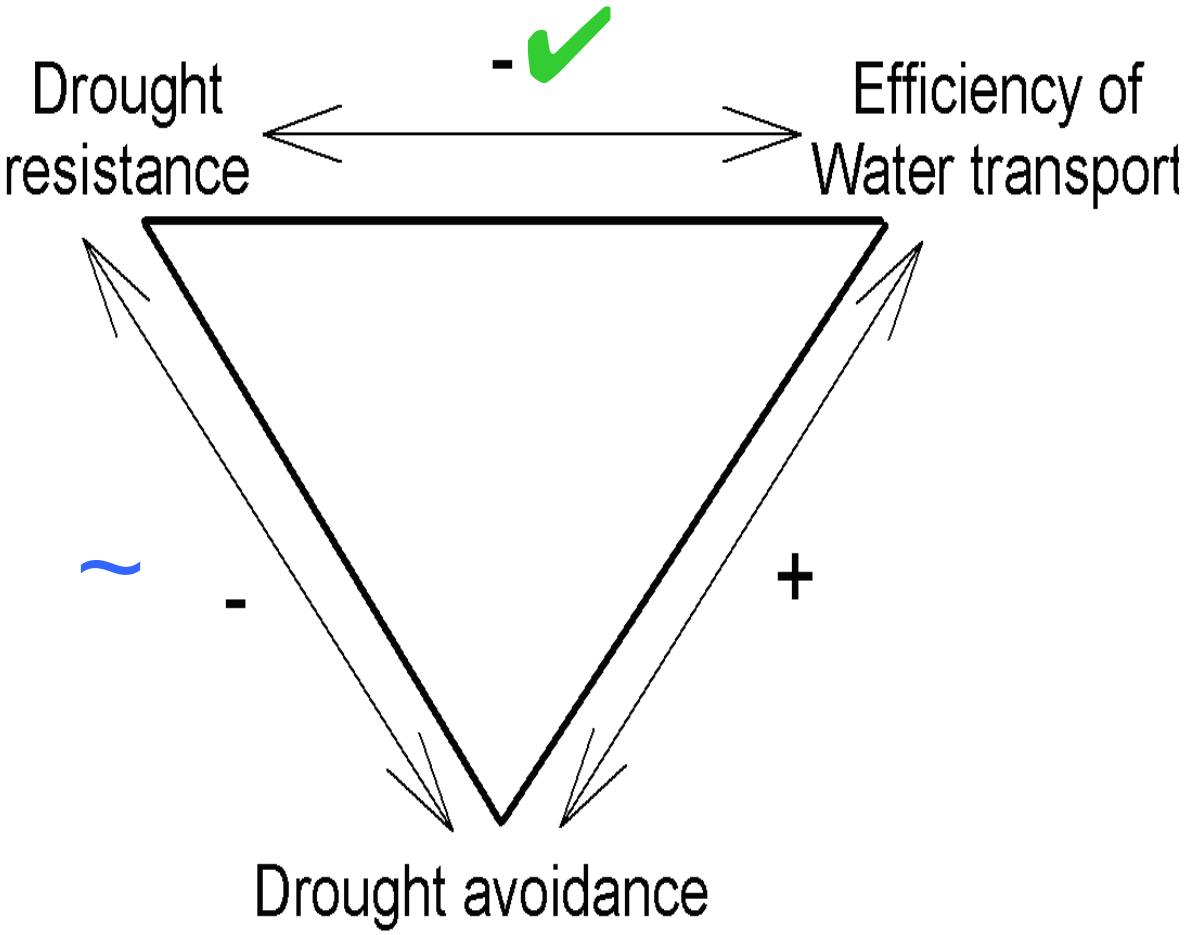

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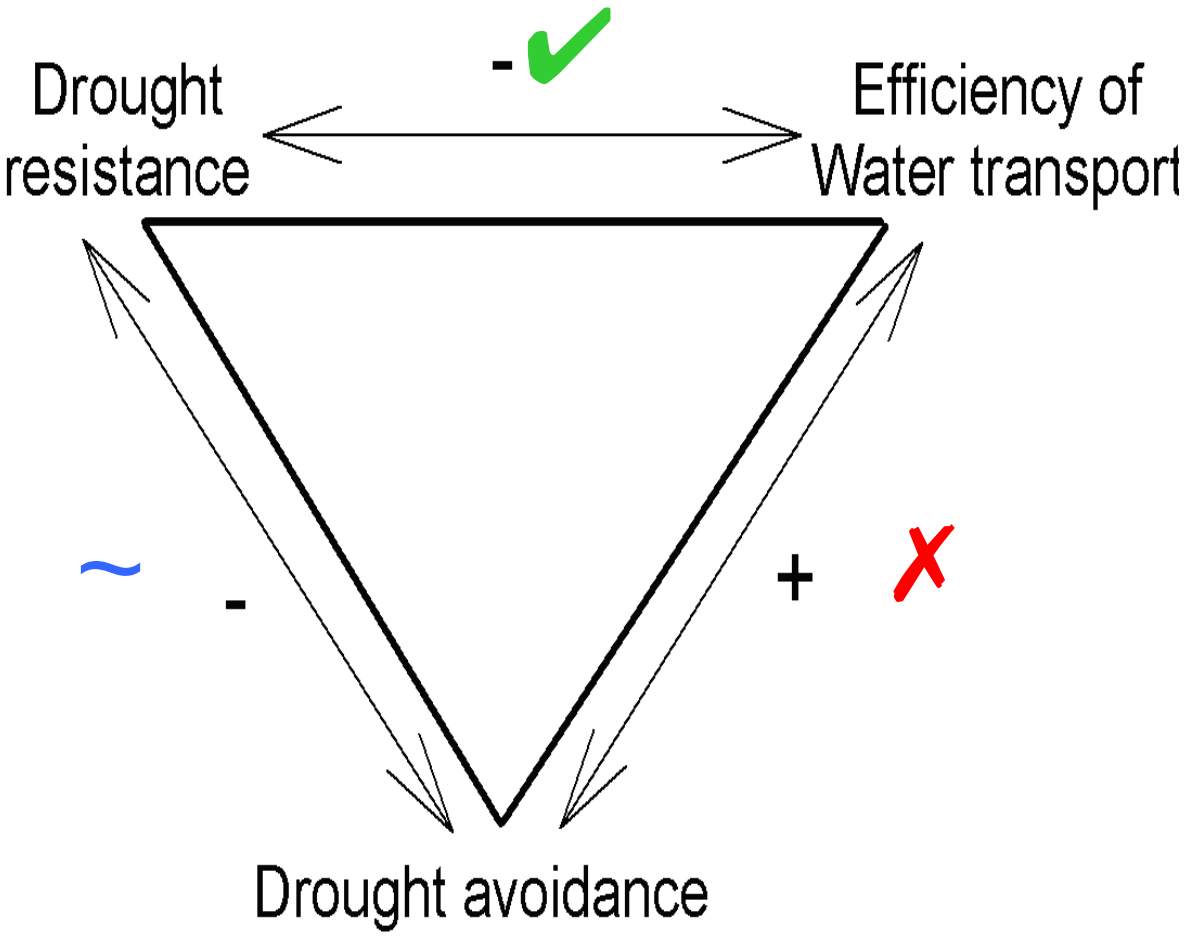

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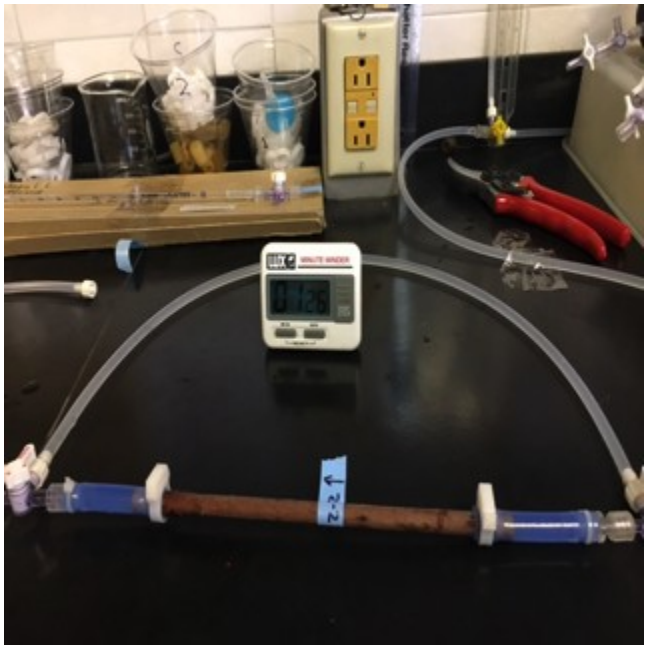
- Coordination with drought avoidance traits? ✗

Thank you!



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