



Building Drought and Flood Resistant Soils

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OUTLINE

CONSERVATION
IRRIGATION LAB

1

INTRO TO MY LAB

2

RESILIENCE

3

INCREASING DROUGHT
RESILIENCE

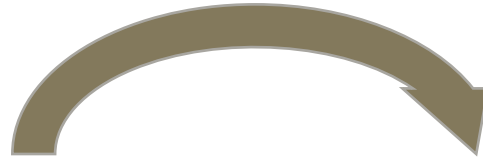
4

INCREASING FLOOD
RESILIENCE

5

KEY PRACTICES

My path





Precision

- ET mapping & modeling
- Water stress ID
- Heatwave management
- New Sensors



Optimization

- Drainage
- Fertigation
- Scheduling
- Deficit irrigation



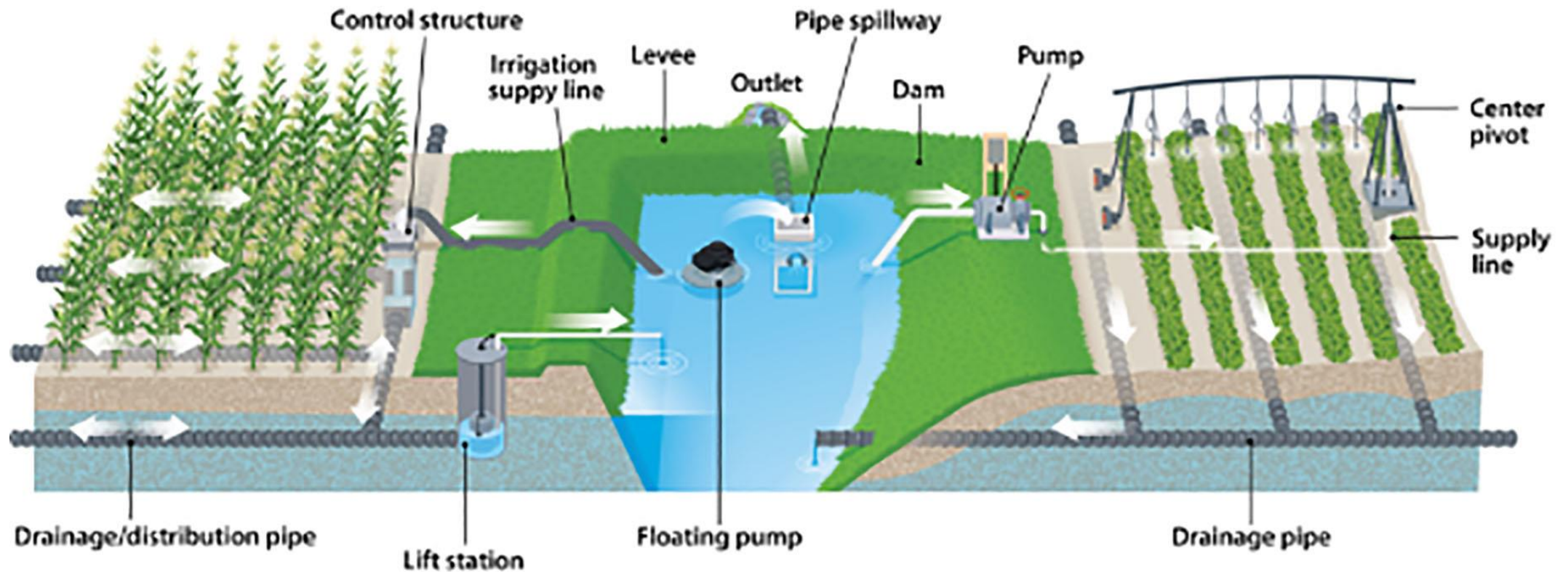
Regenerative

- Drought & flood resilience
- Soil physical health benefits/tradeoffs
- Regional water planning
- Smart amendments

**Climate change impacts
agriculture and environment
by increasing weather
whiplash (🤢 + ☁️⚡️🌧️ = 🌀 🌟)**

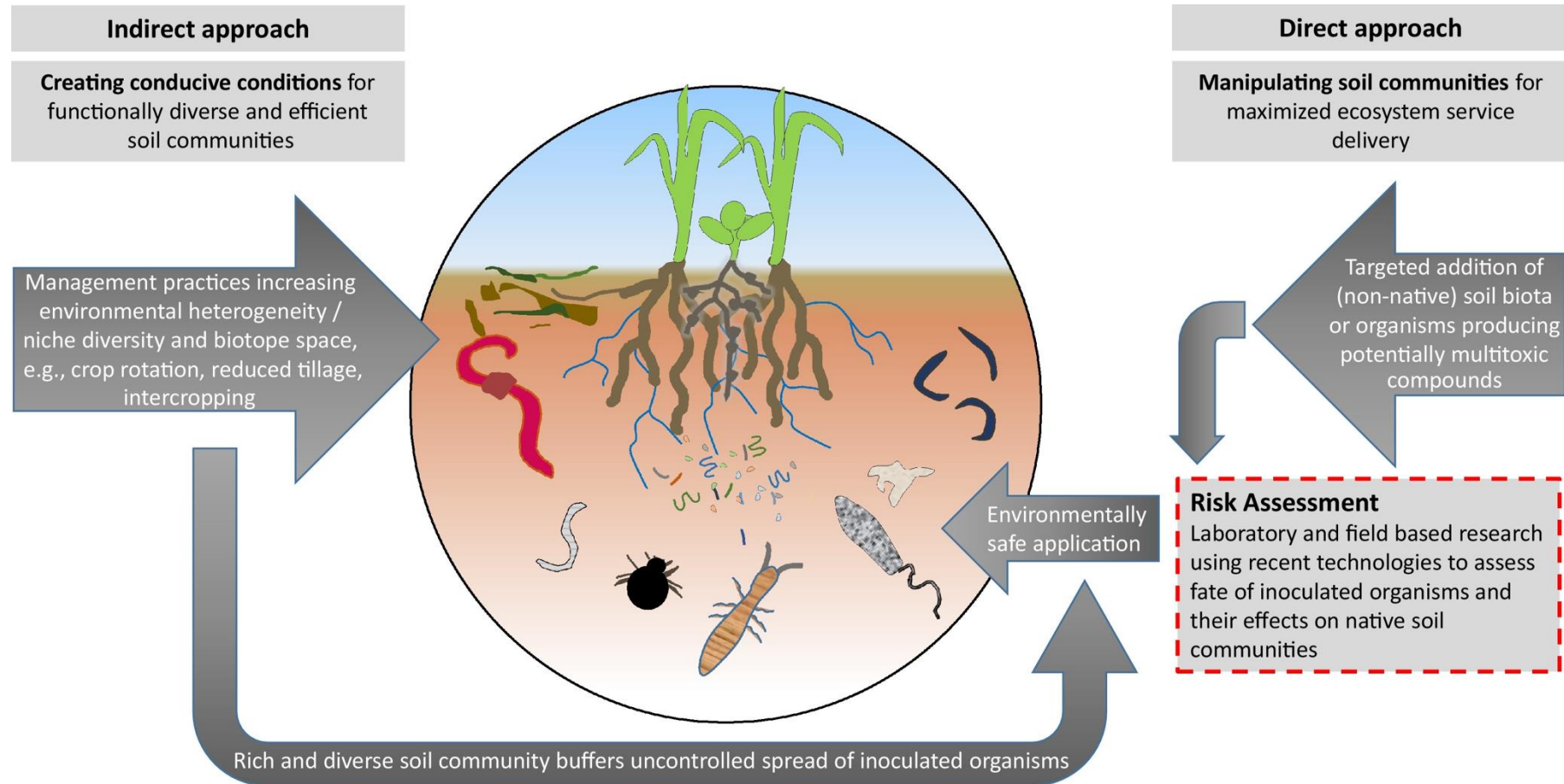


Irrigation and Drainage Engineering

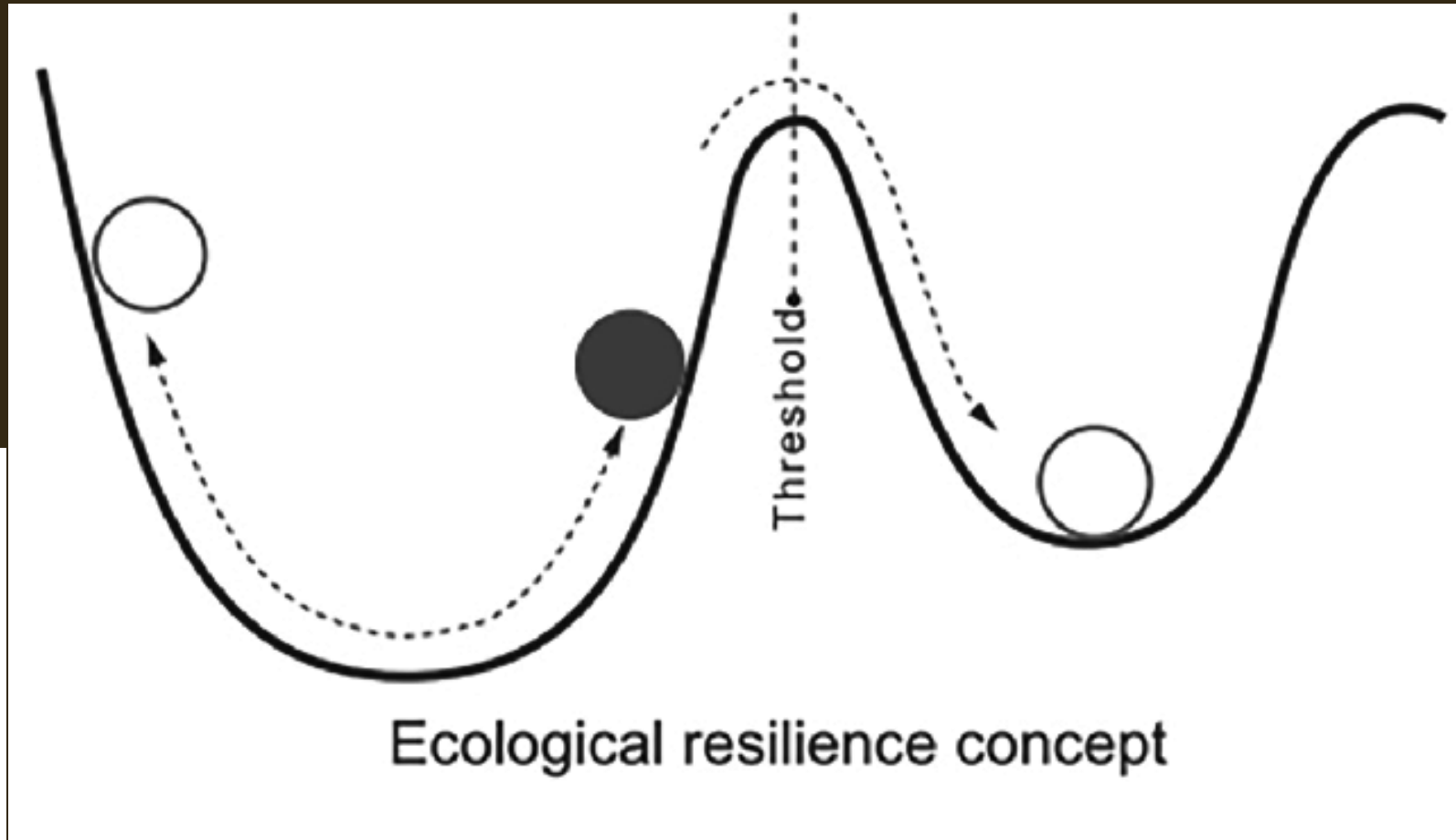




Ecological Engineering

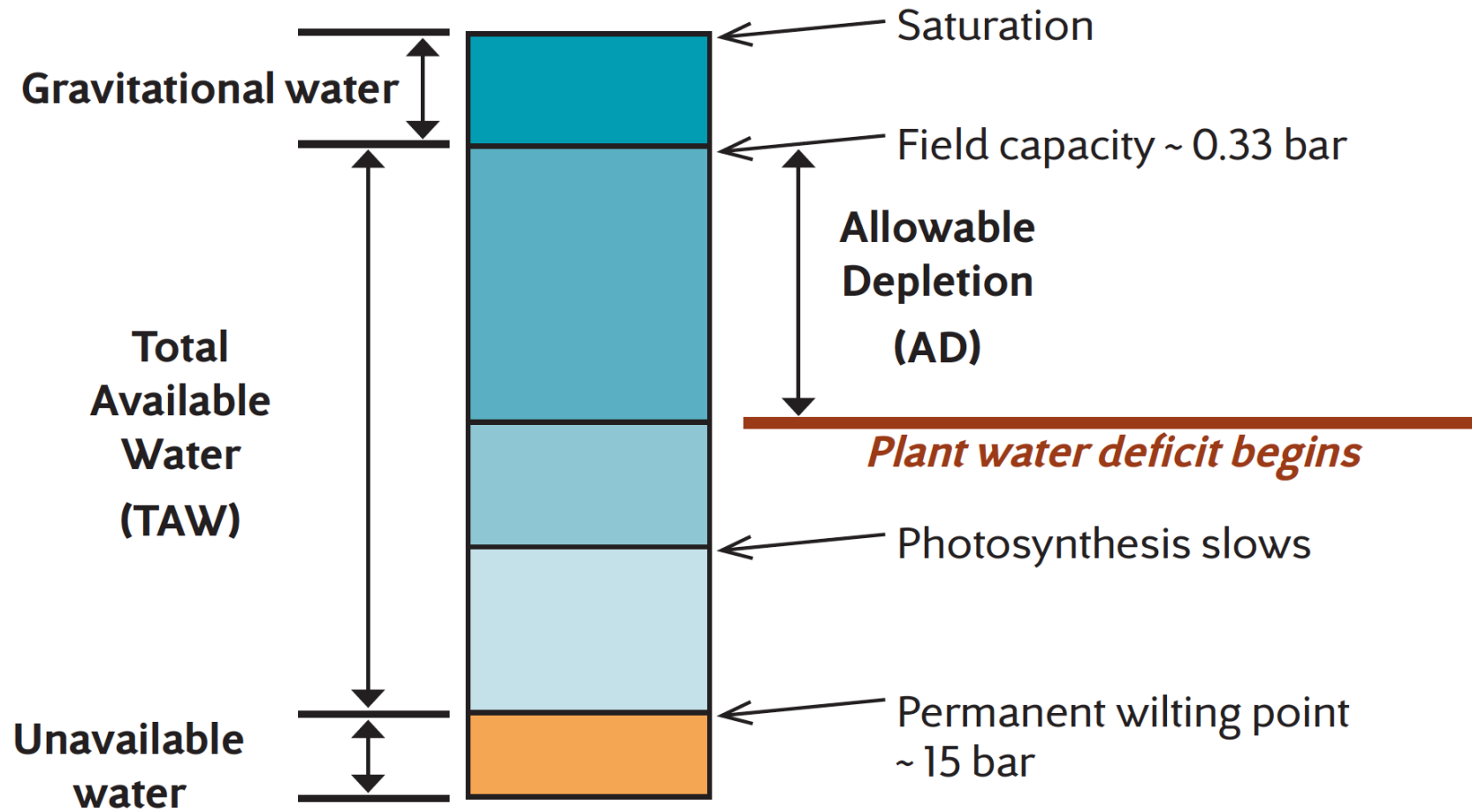


— What is a resilient soil?



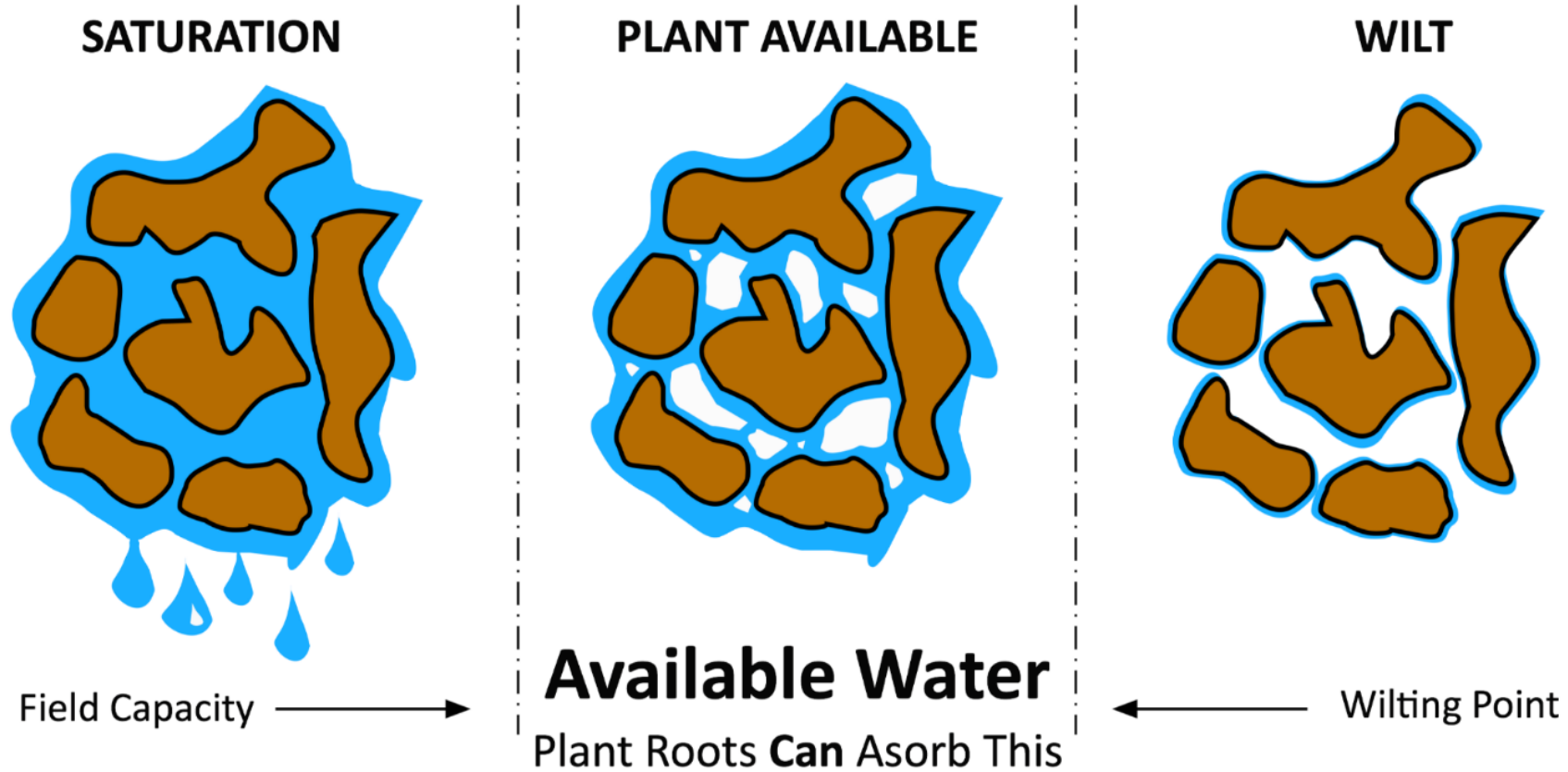


Water storage in soils



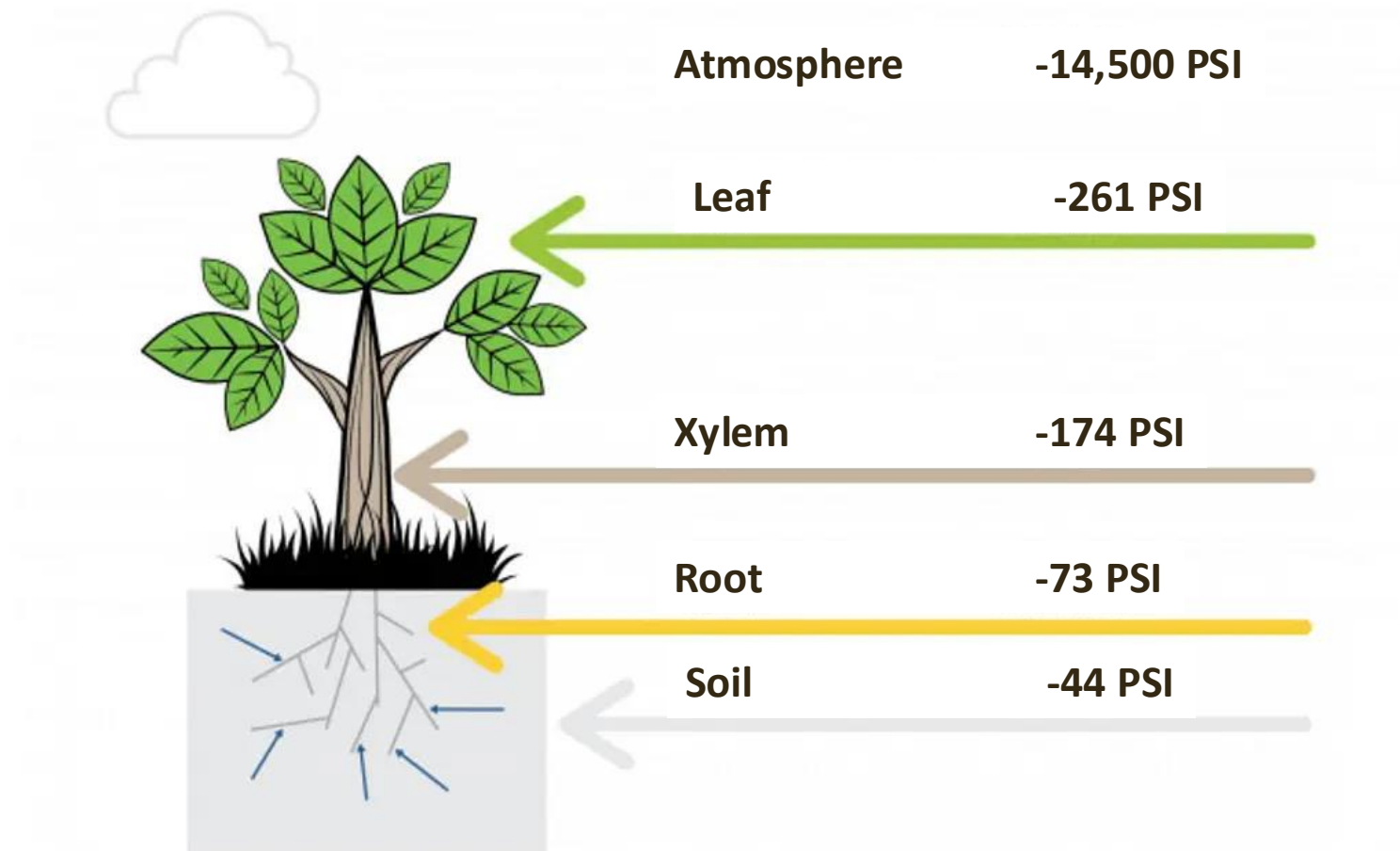


Water storage in soils



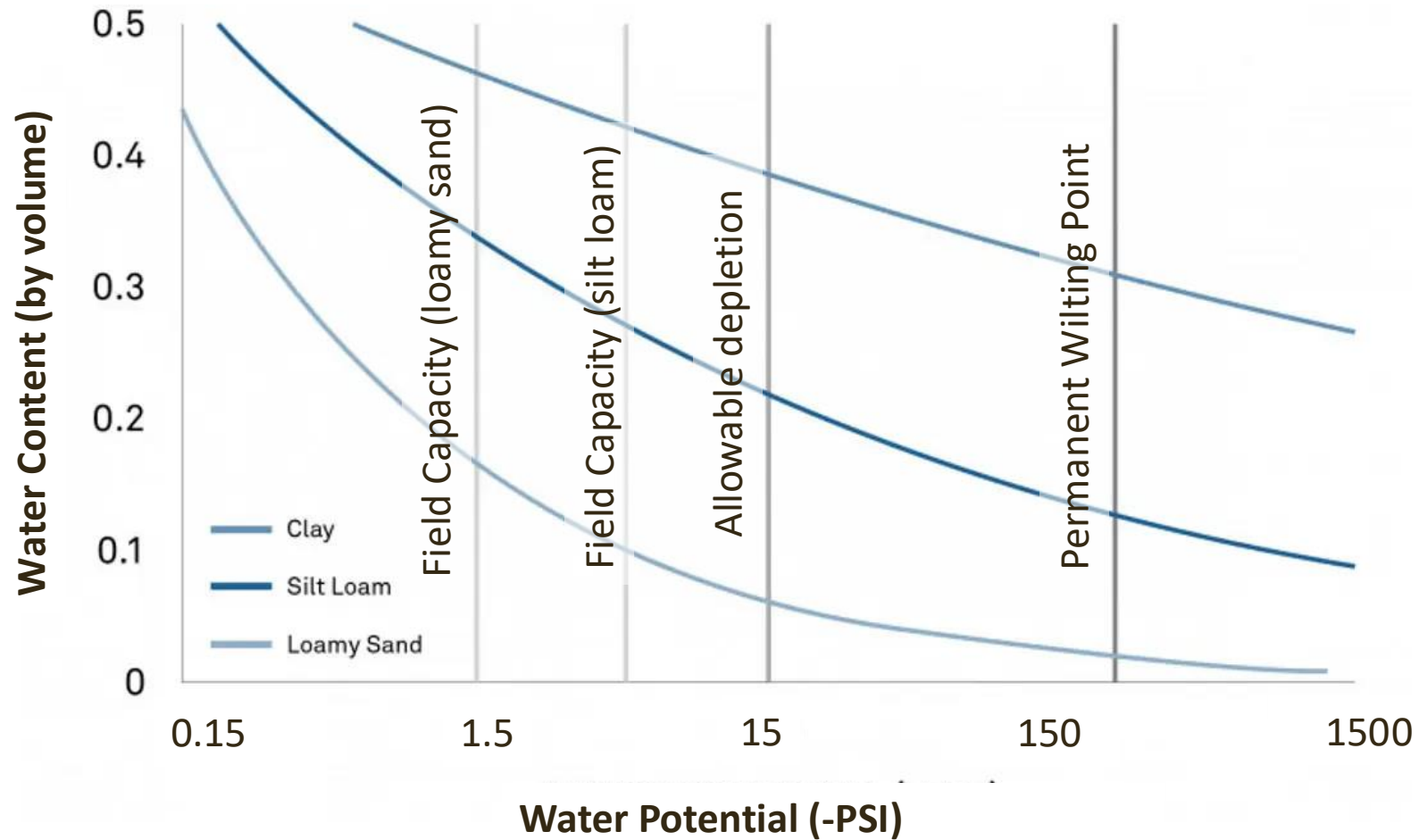


Water moves from high to low 'potential' (suction)

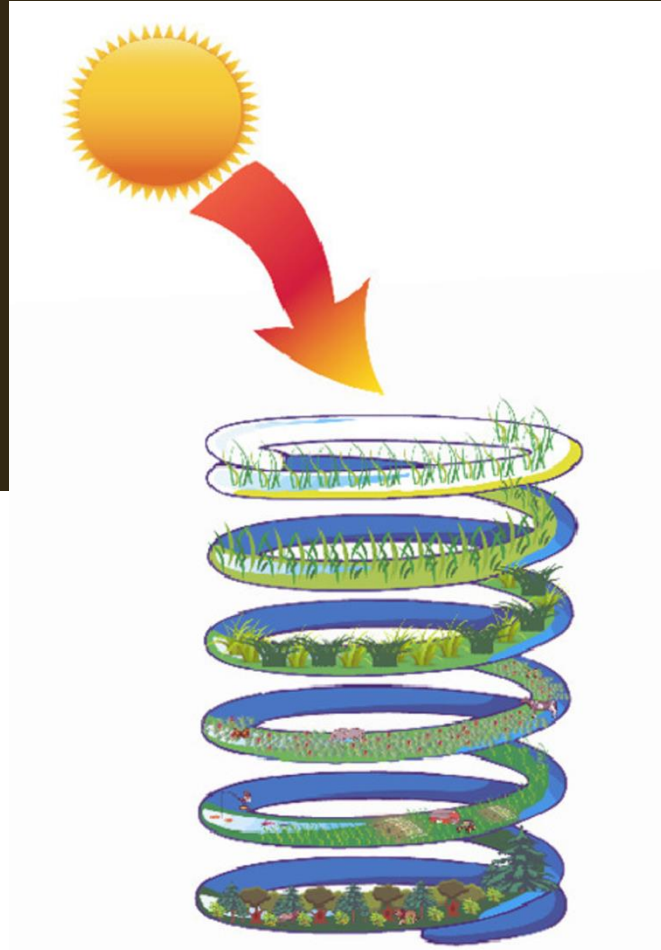




Water storage in soils is texture dependent

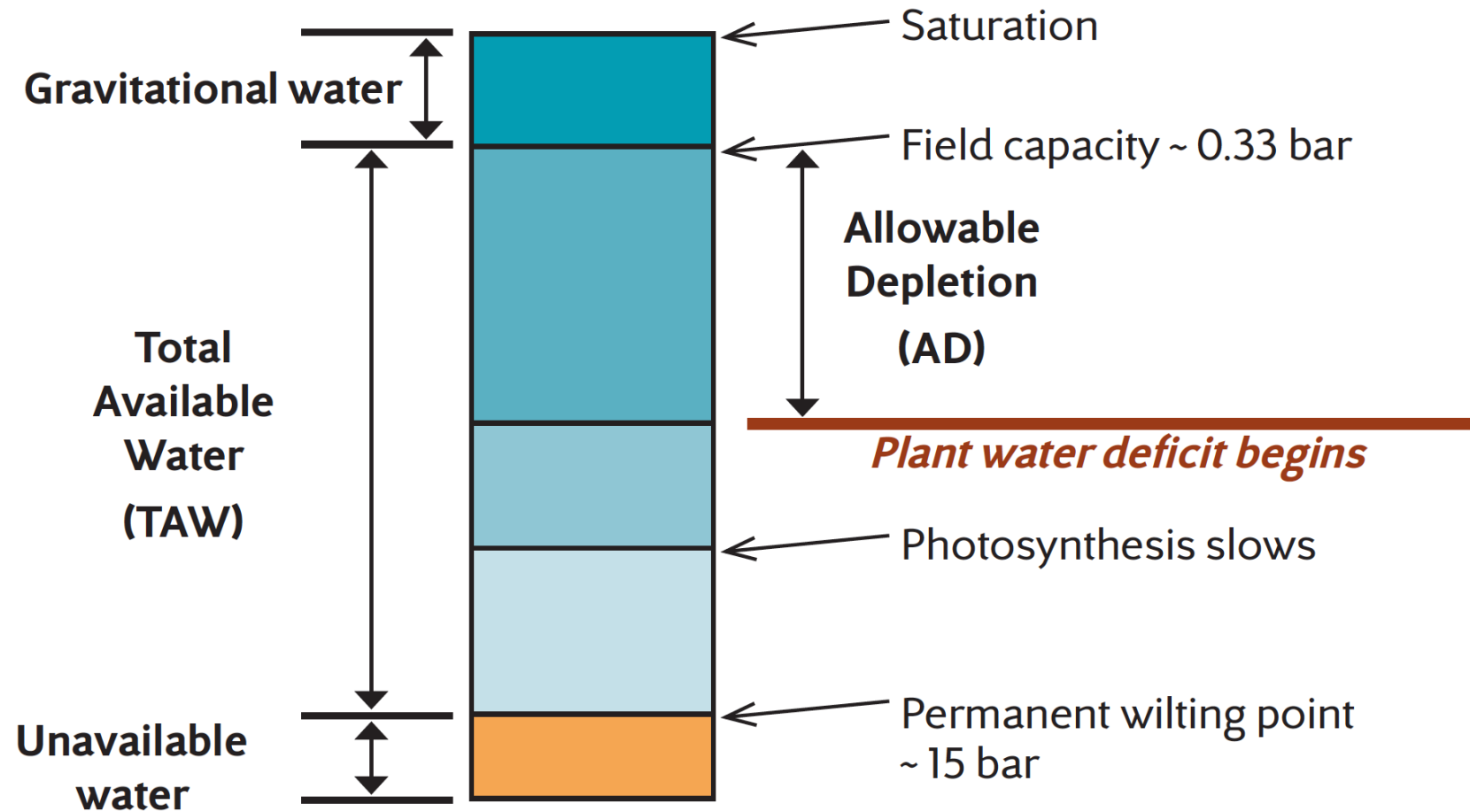


— What is a drought resilient soil?



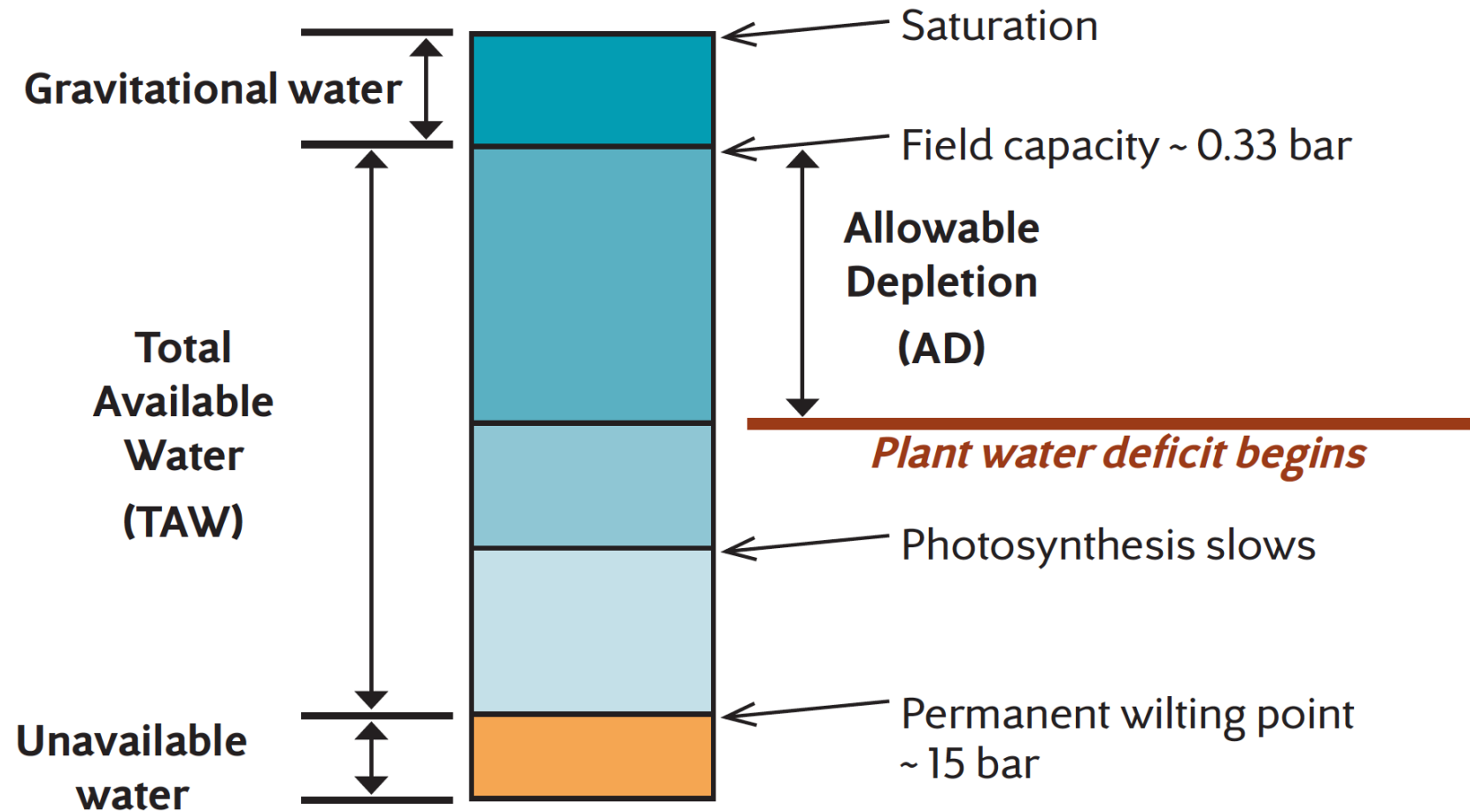


Drought resilient soils maximize their 'tank' size

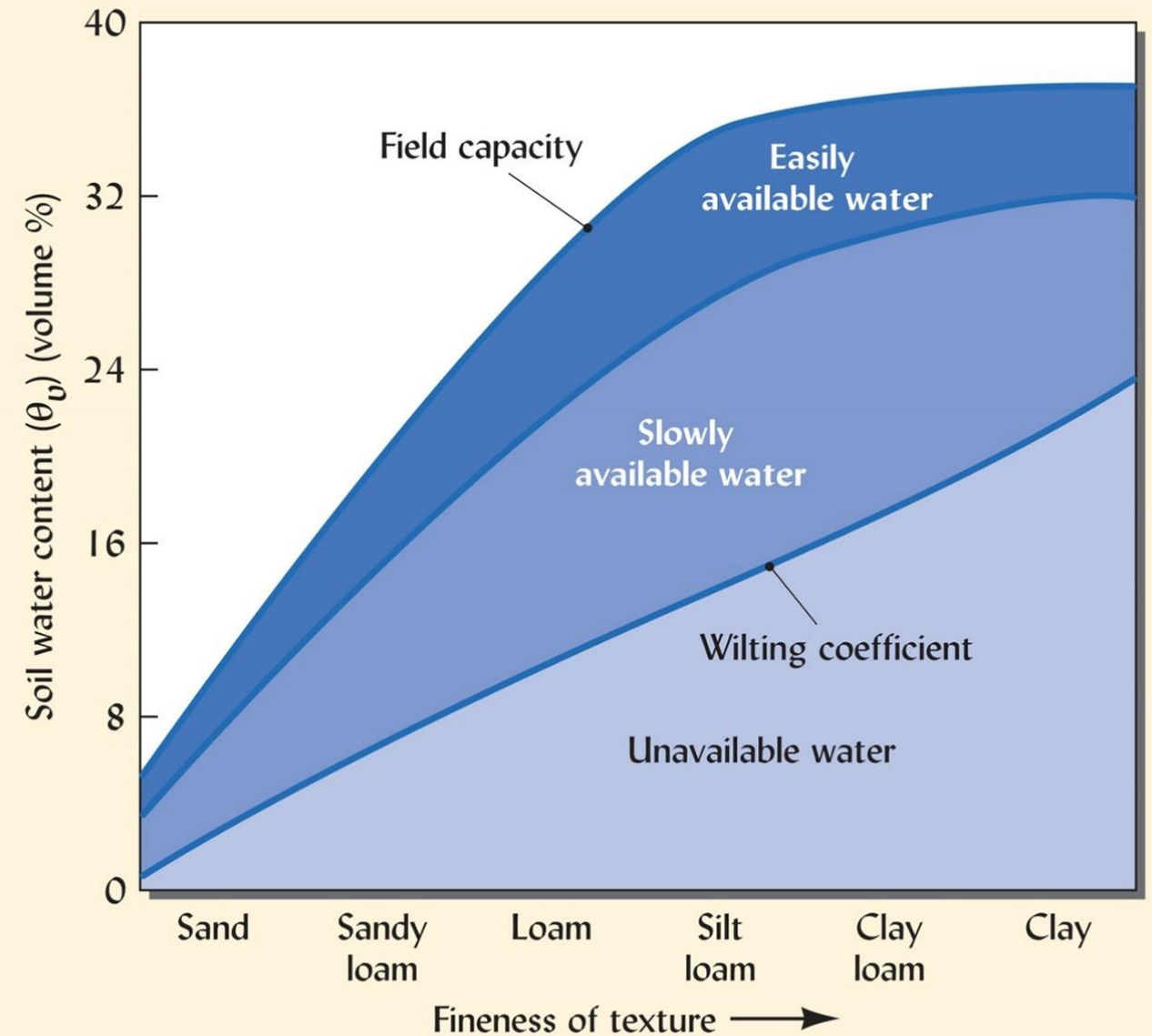




How to increase the 'tank size'?

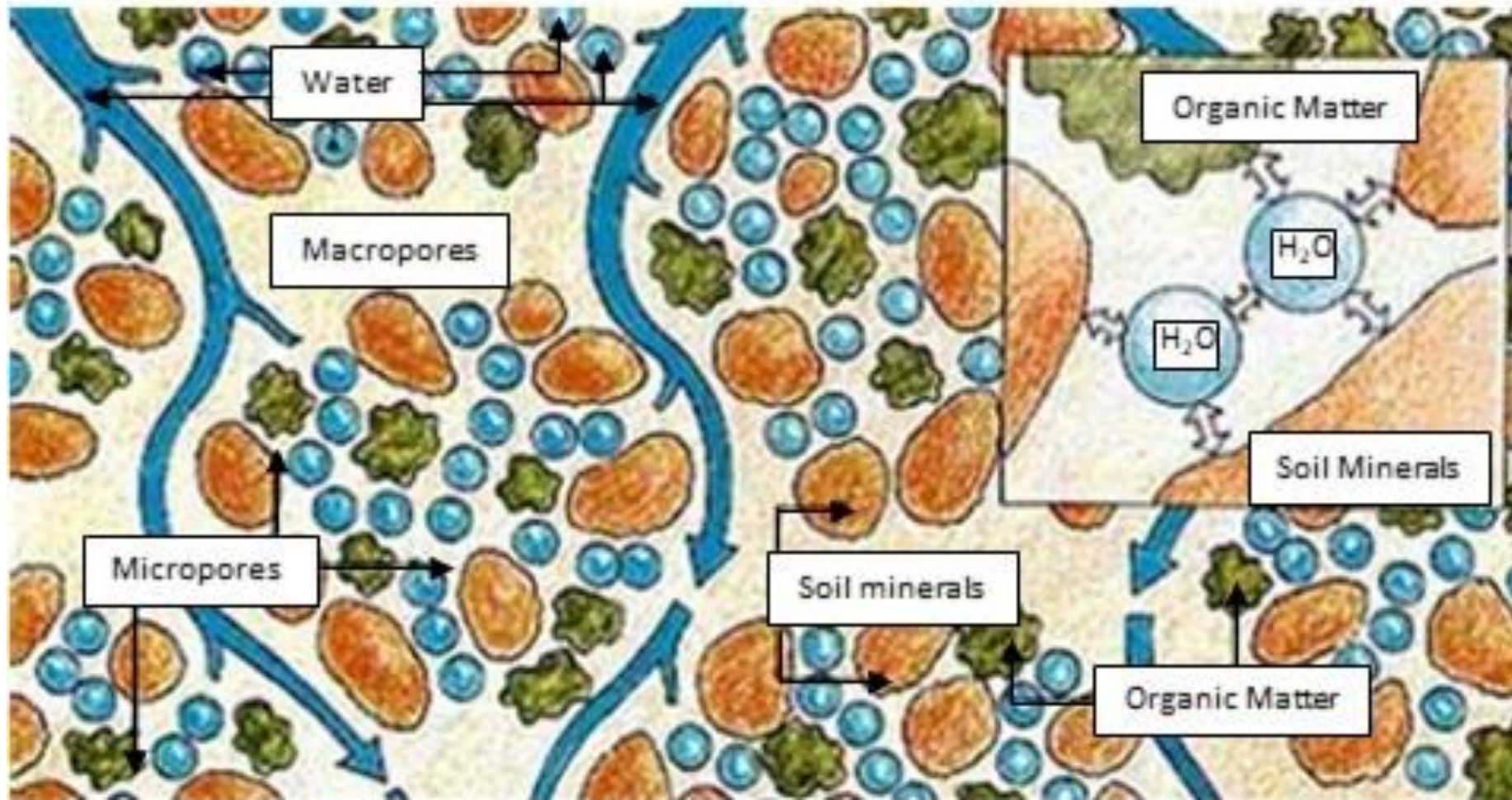


**Unfortunately, you
are stuck with
your soil texture**





Can change your soil structure w/OM



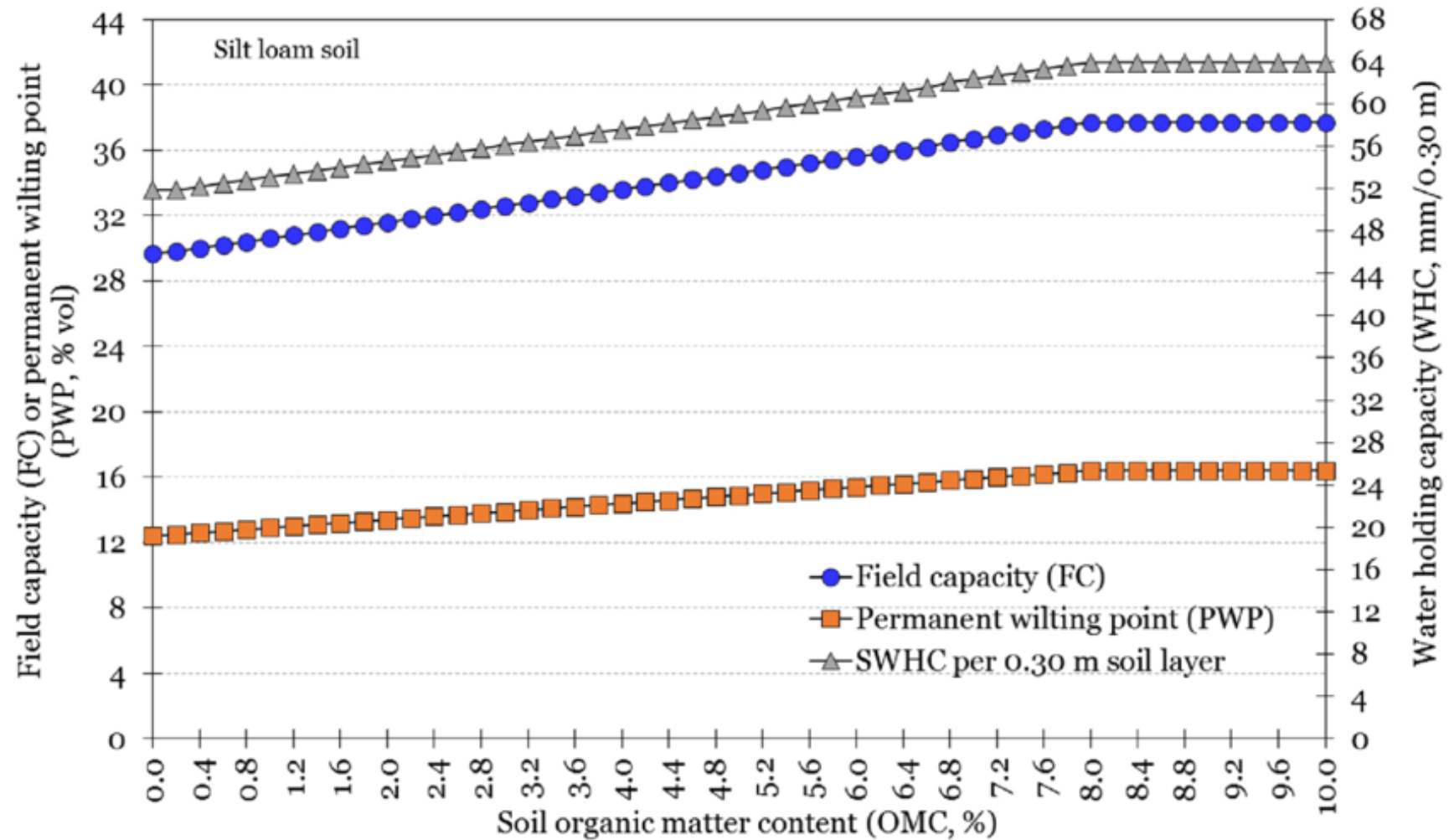


Can change your soil structure w/OM

Soil texture*	AWC increase per 1% OM increase (%)**	AWC increase per 1% OM increase (gal.)	Initial AWC (gal.)	AWC after 1% OM increase (gal.)
Loamy sand (0.5–3% OM)	1.13	3,666	32,583	36,249
Silt loam (3+% OM)	1.04	3,383	71,682	75,075
Clay loam (3+% OM)	0.82	2,665	55,391	58,056

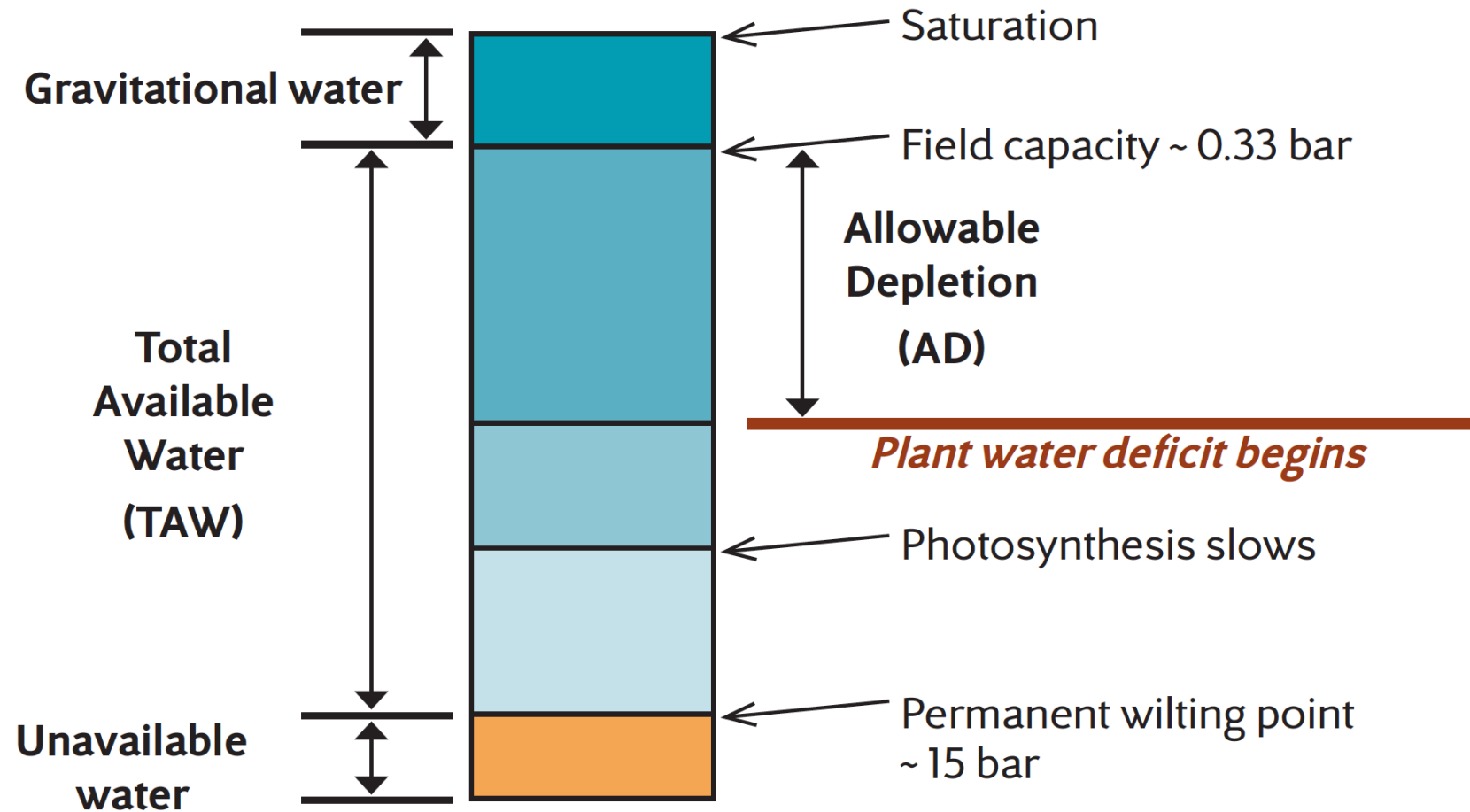


What if permanent wilting point also increases?



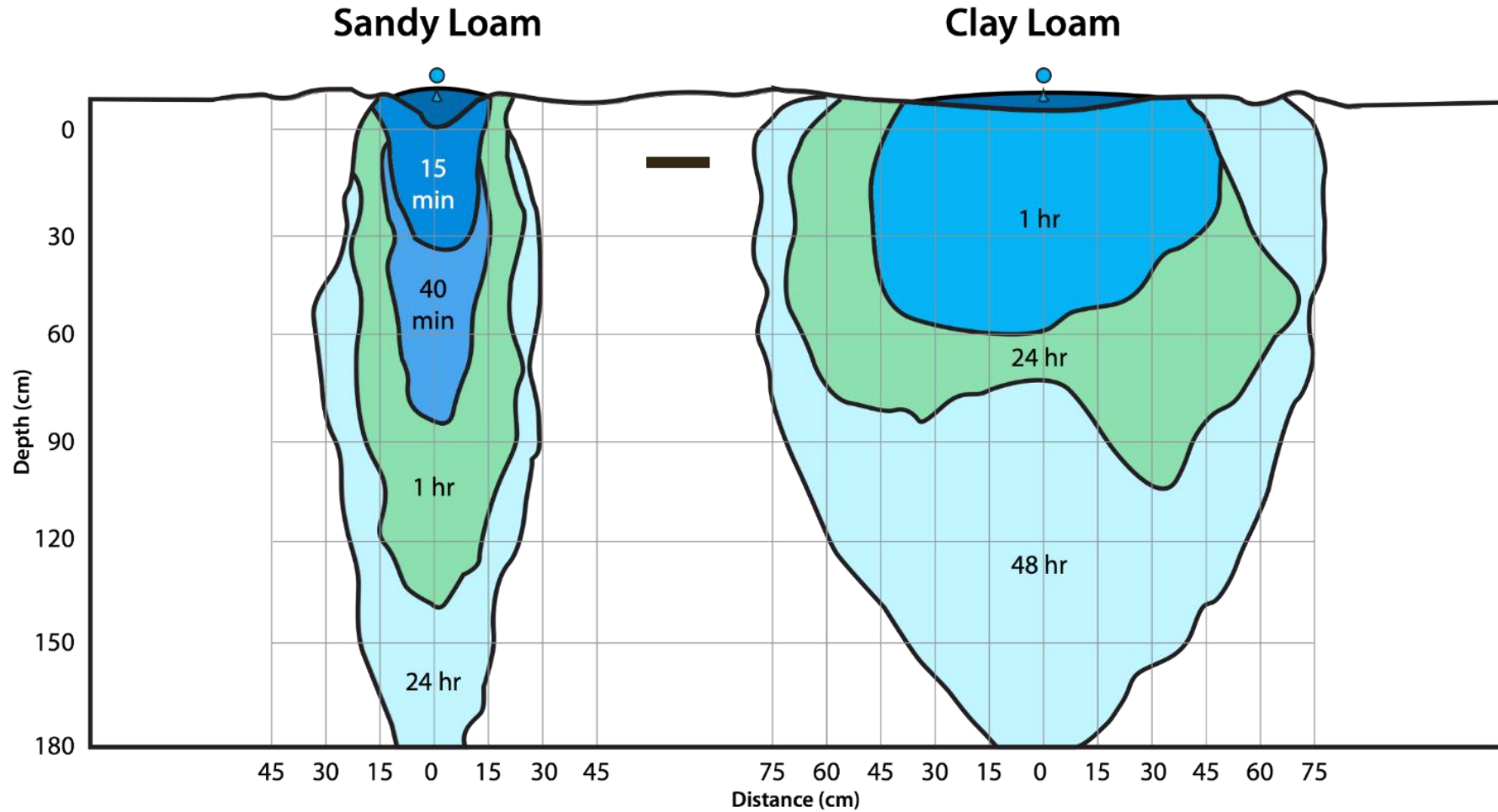


How to increase water capture?



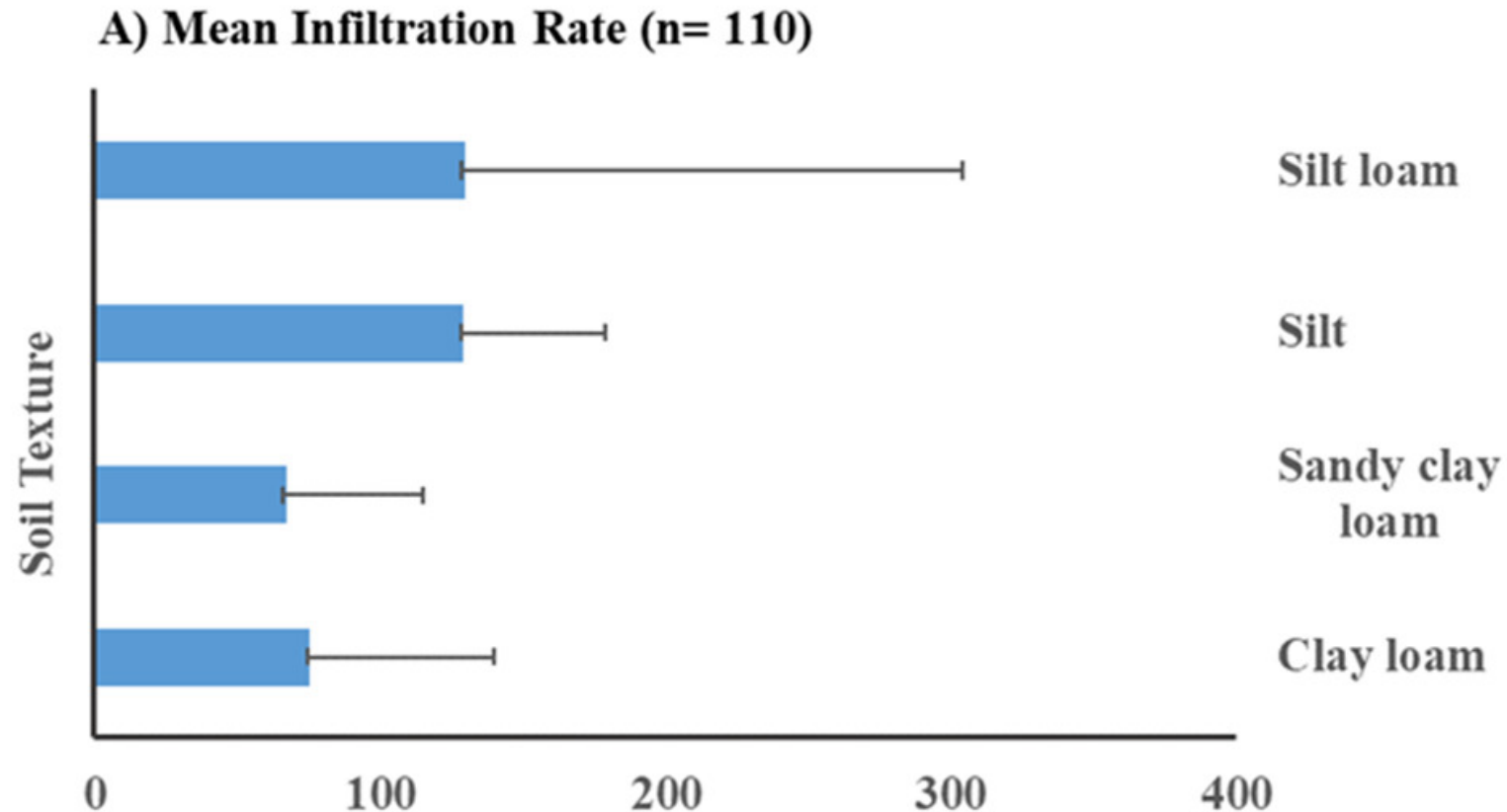


Maximizing infiltration—stuck w/soil texture



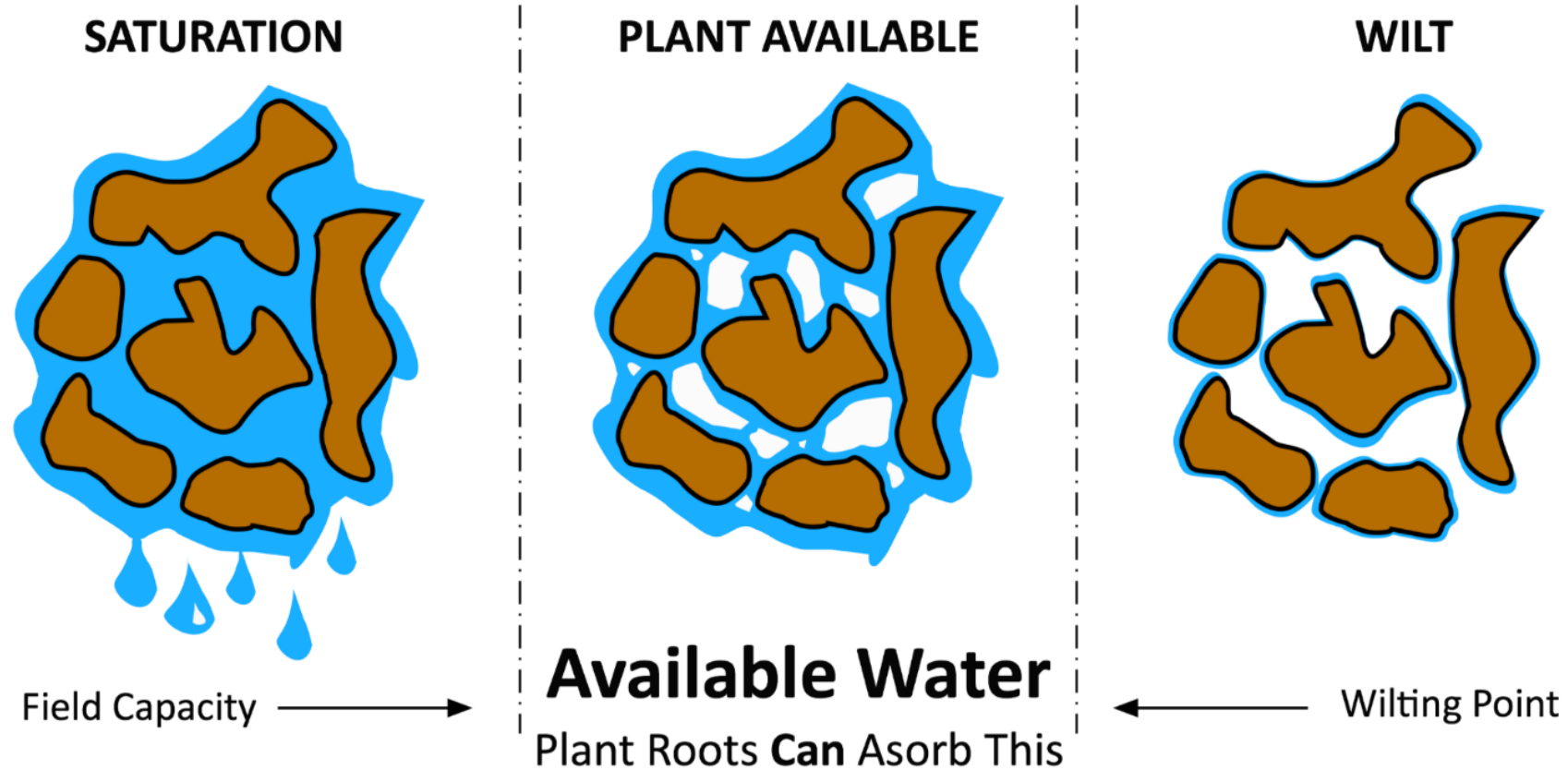


Maximizing water capture w/cover crops (global meta-analysis)





How can we optimize drainage in soils?



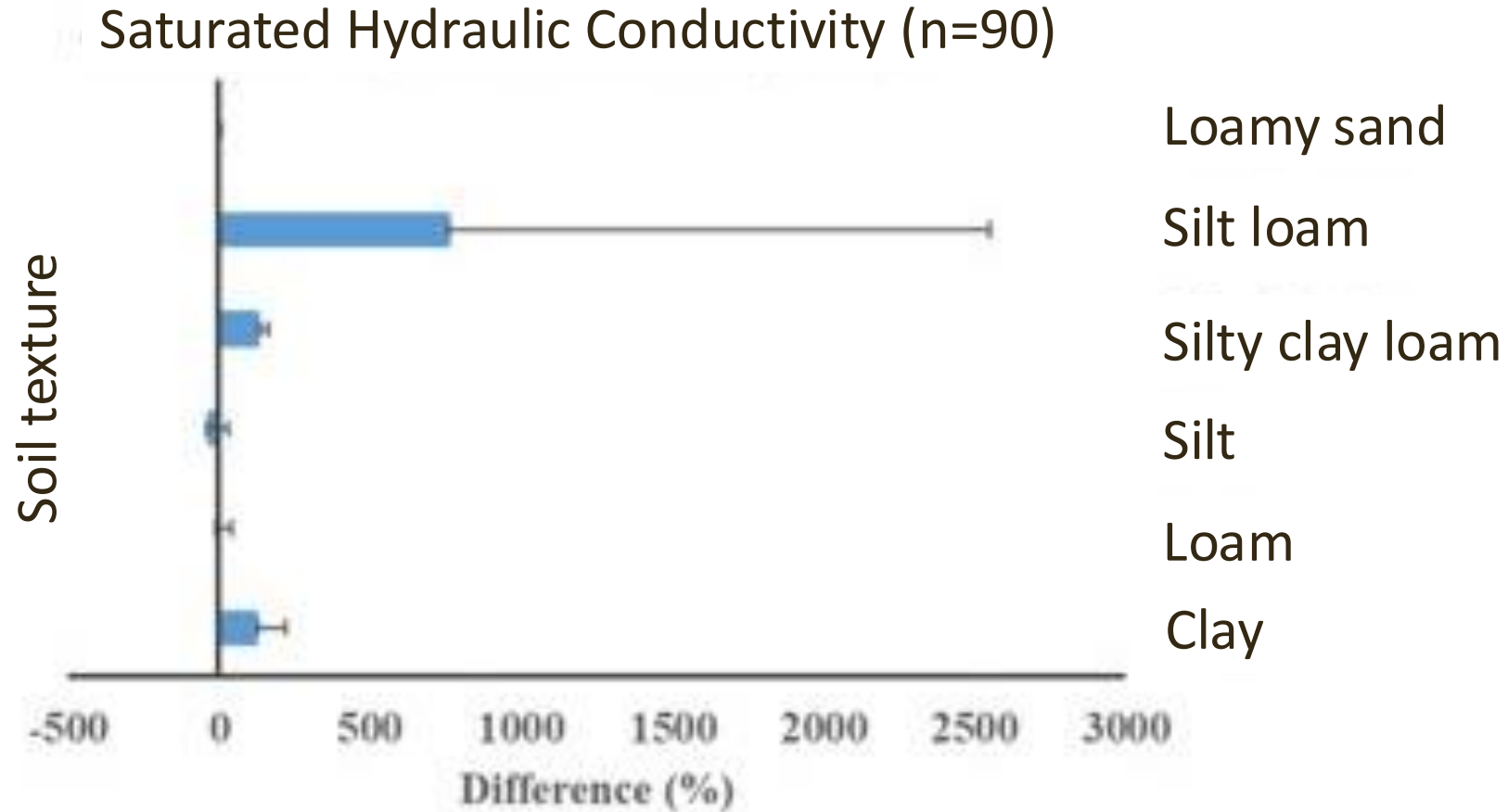


Maximizing saturated hydraulic conductivity— stuck w/soil texture

Hydrologic soil group [◆]	Representative soil texture [◆]	Saturated hydraulic conductivity (in/hr)		
		Compacted [◆]	Average ¹ [▼]	Loosened ² [◆]
A	sandy loam	0.50	0.90	2.20
B	loam	0.15	0.205	0.24
C	sandy clay loam	0.11	0.14	0.30
D	silty clay	N/A	0.06	N/A

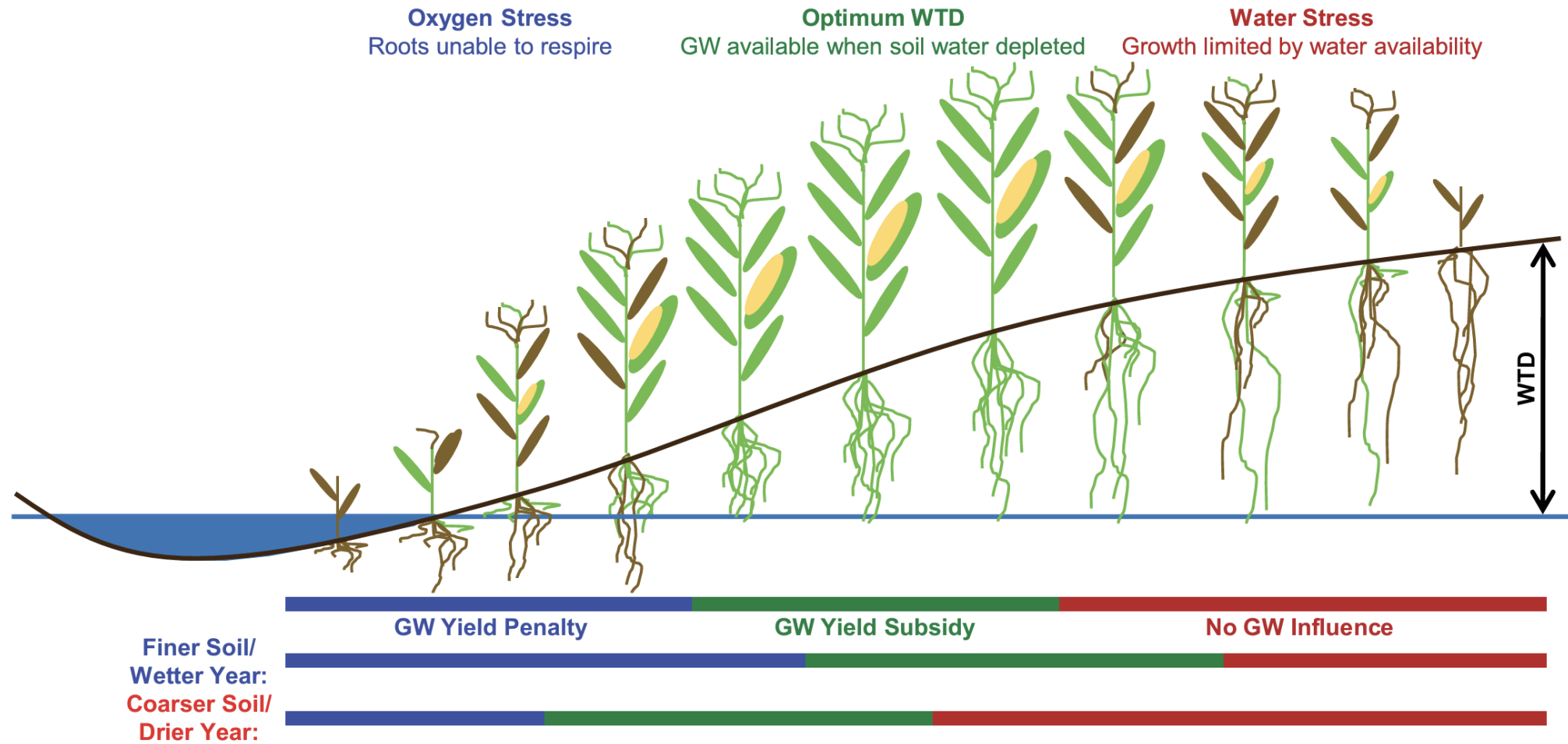


Maximizing saturated hydraulic conductivity w/cover crops (global meta-analysis)



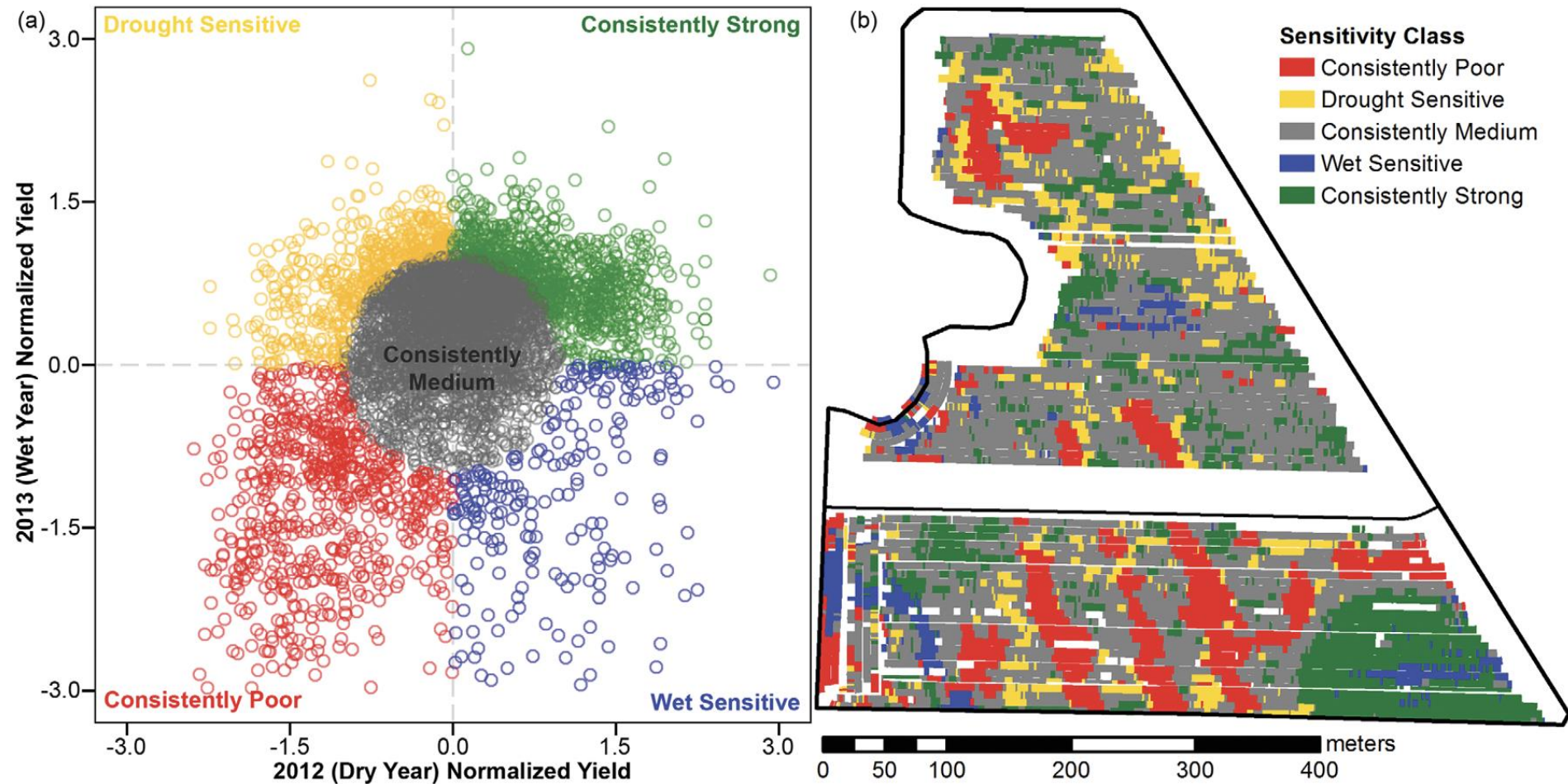


Groundwater subsidies and penalties





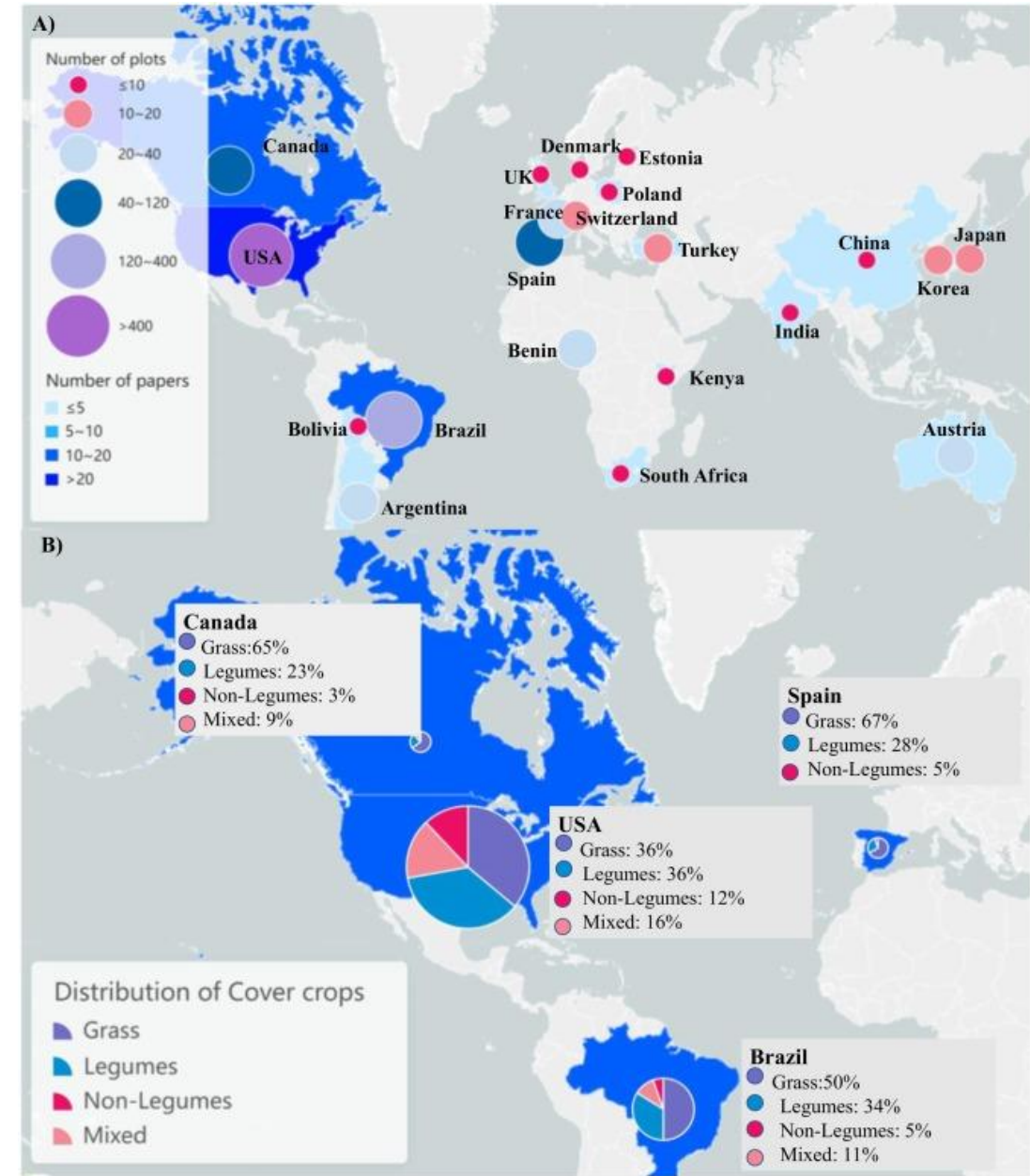
Groundwater subsidies and penalties





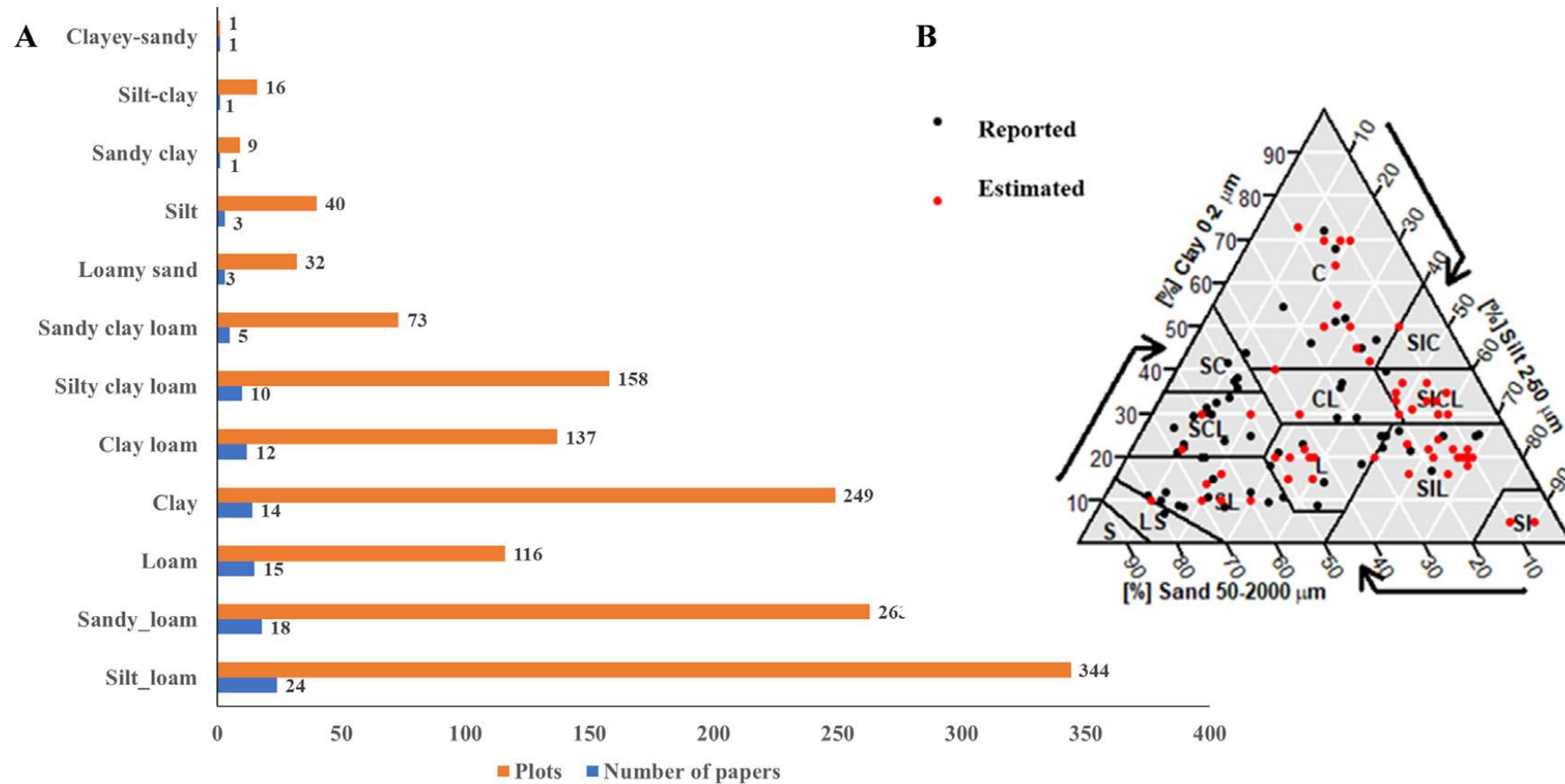
Cover crops (global meta-analysis)

***more local data needed on
drought/flood resilience.
Will work on this.**





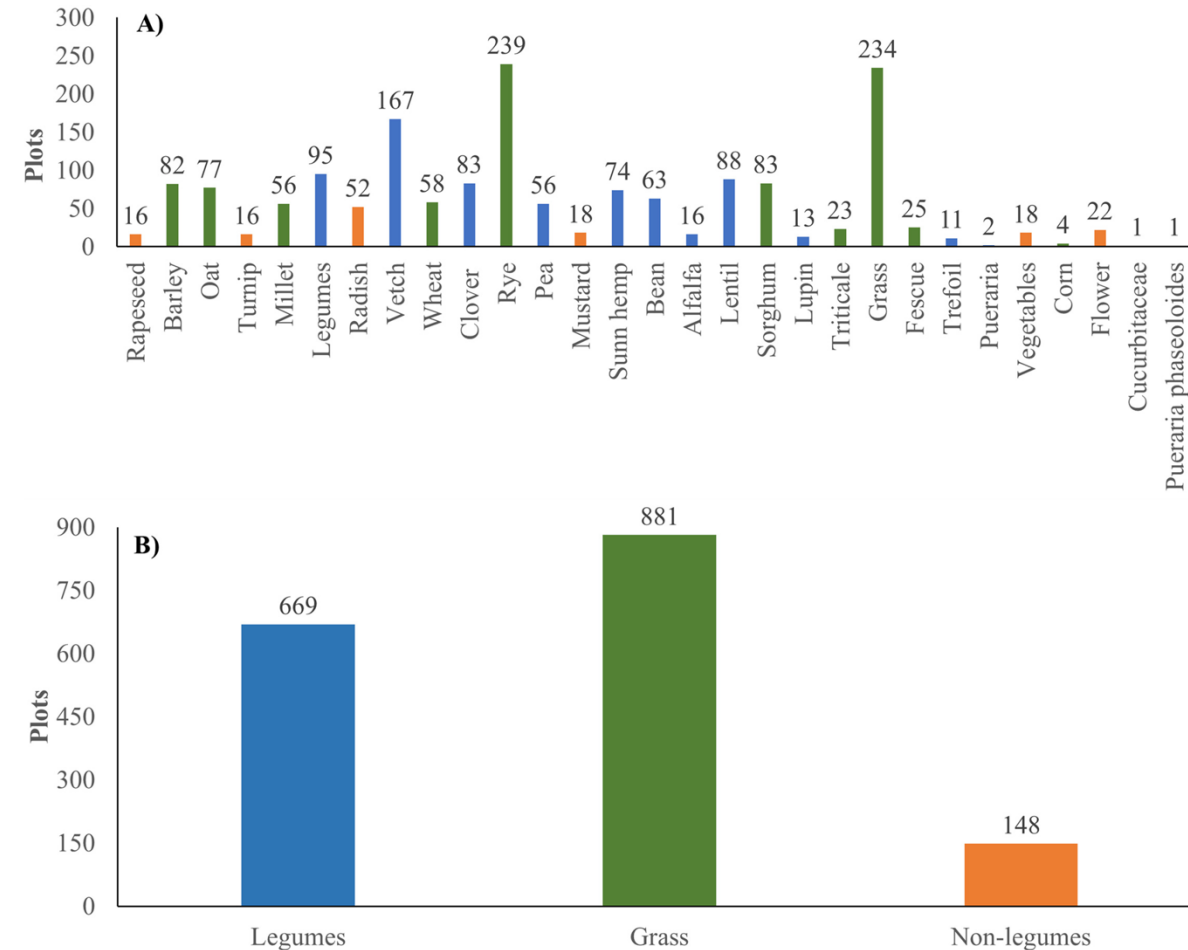
Cover crops (global meta-analysis)





Cover crops (global meta-analysis)

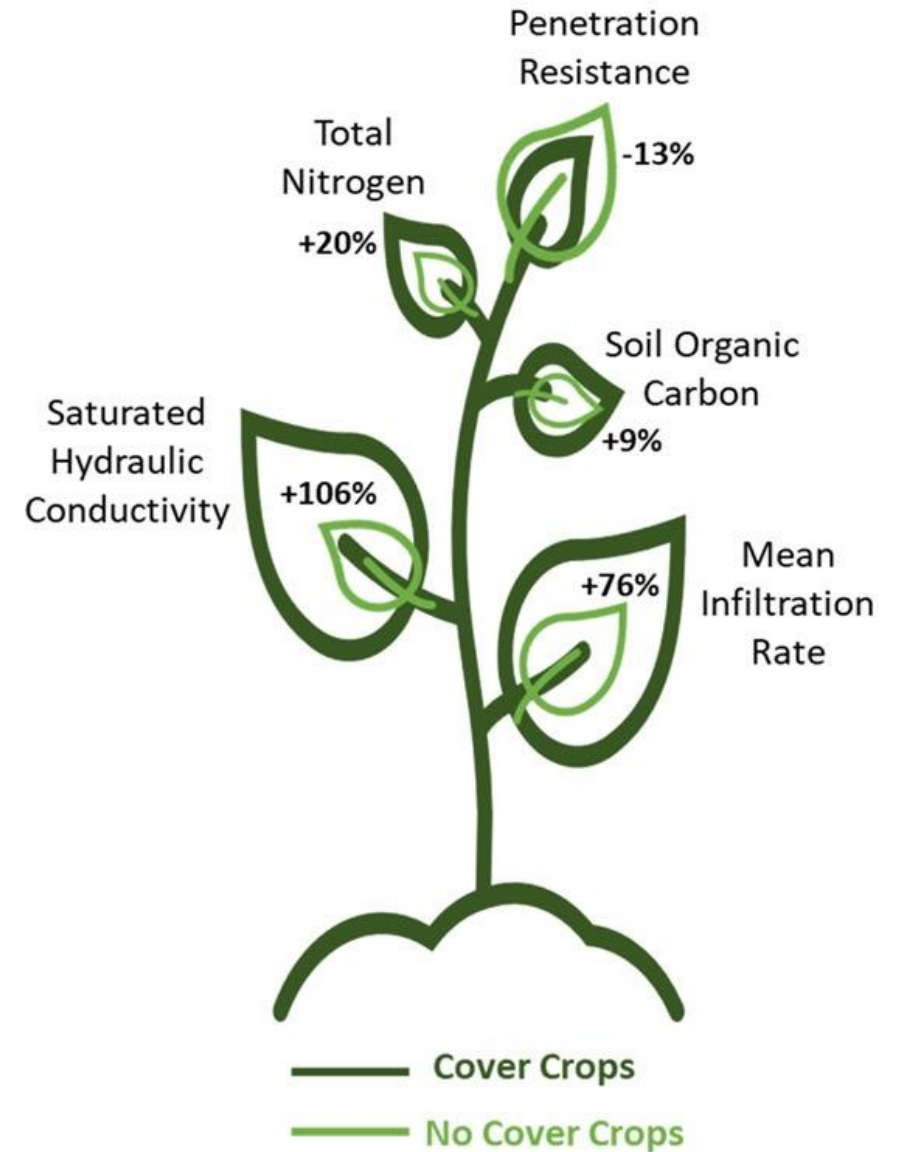
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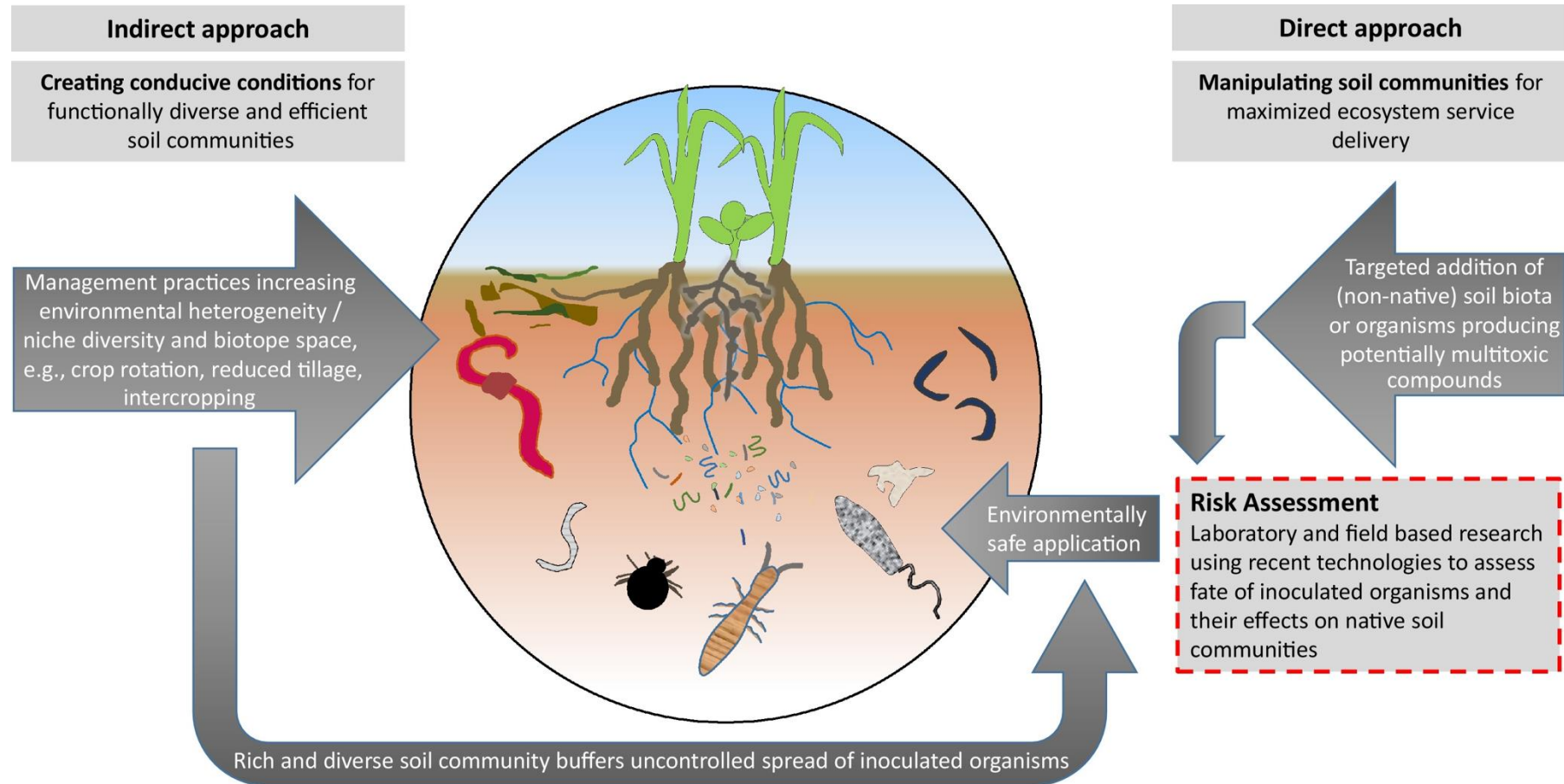
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Other practices?





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Are there tradeoffs between drought/flood resilience?



Thanks for listening!



I would love to hear from you if you have
questions or comments or ideas!



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