Invasive Plants in Forests – Their Effects on Soil & Attempts to Control Them

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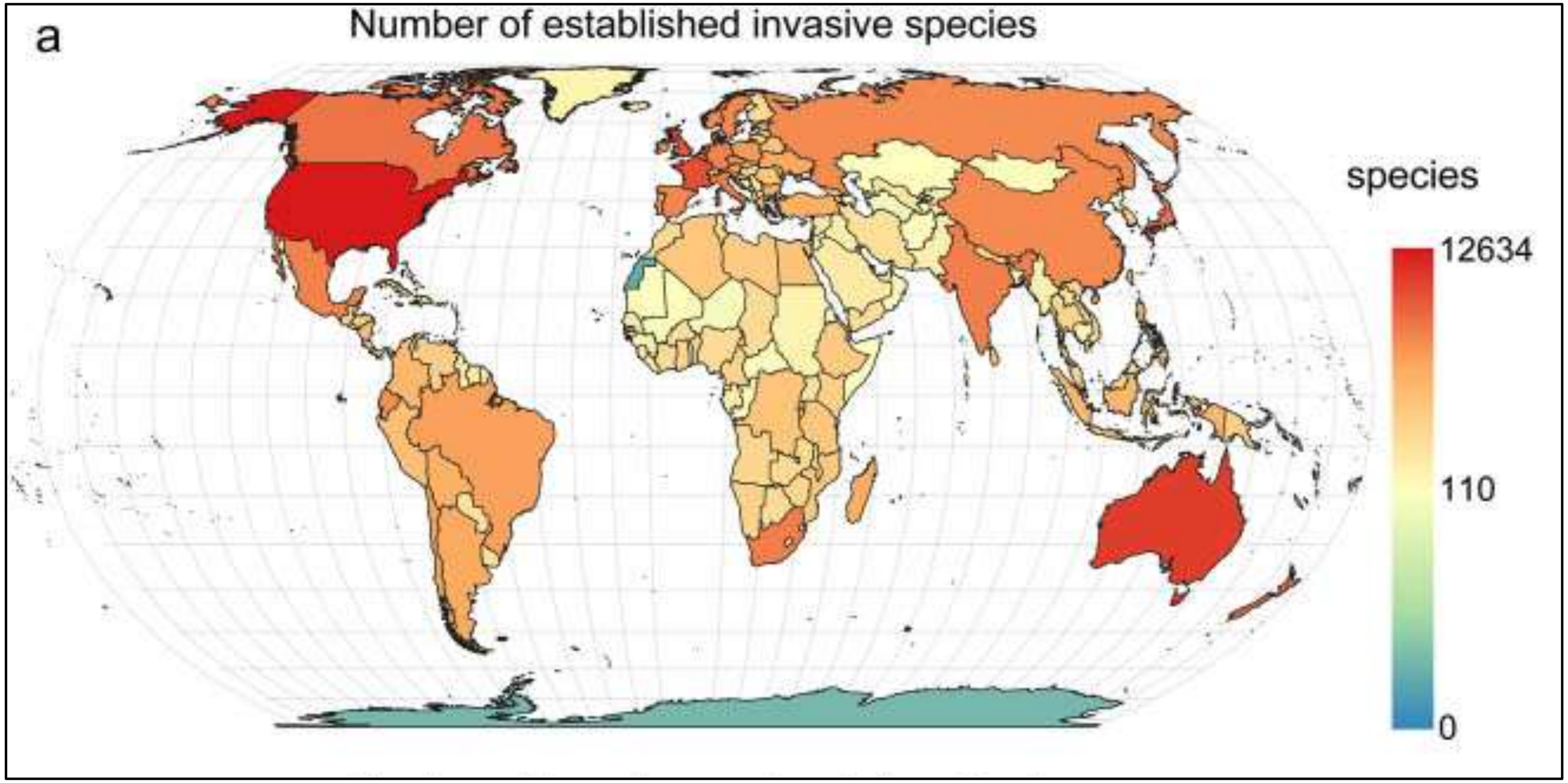
Global Invasive Problem



zebra mussel

tree-of-heaven

Tuberlin et al (2017) Global Ecol & Biogeo 26

Plant Invasives in Eastern Hardwood Forests

oriental bittersweet

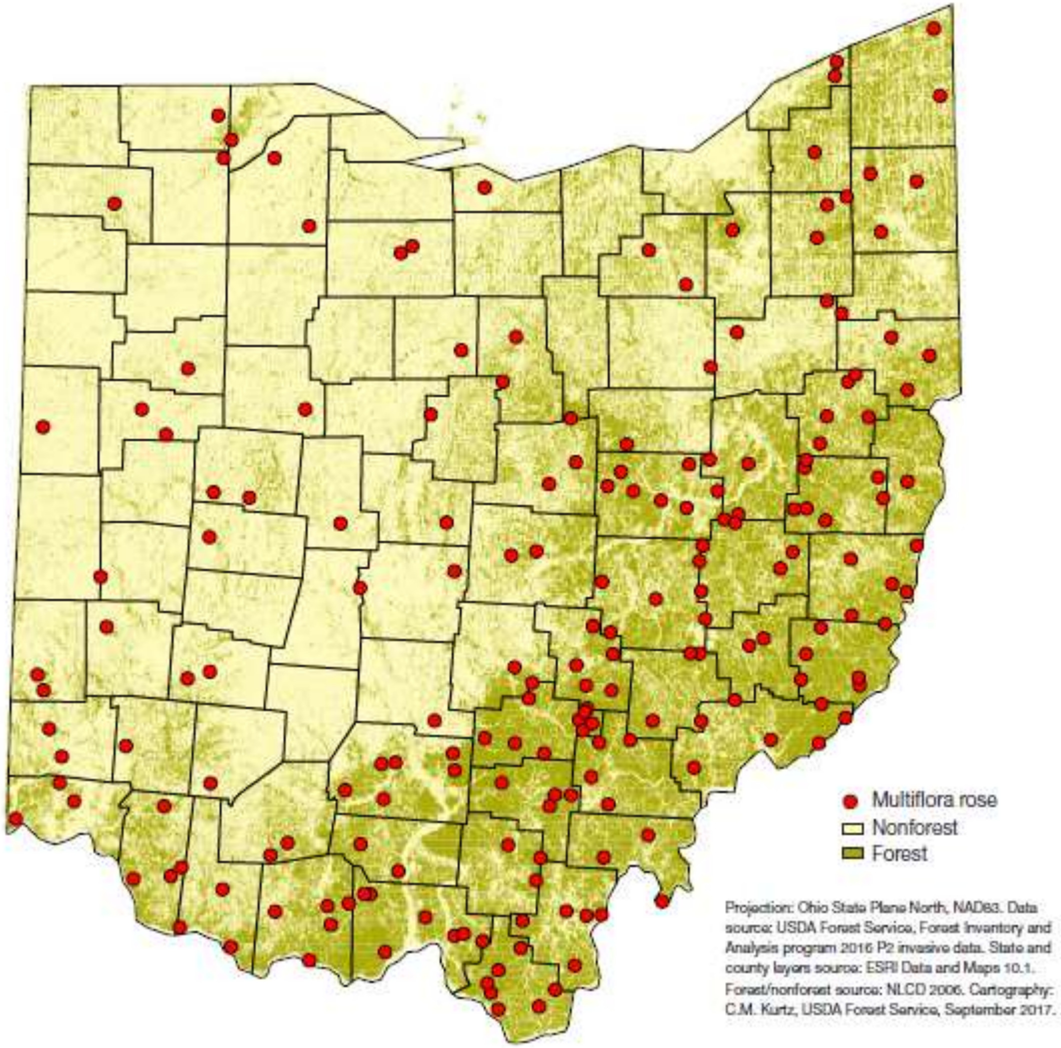
Amur honeysuckle

European privet

Japanese barberry

autumn olive

Invasives in Ohio

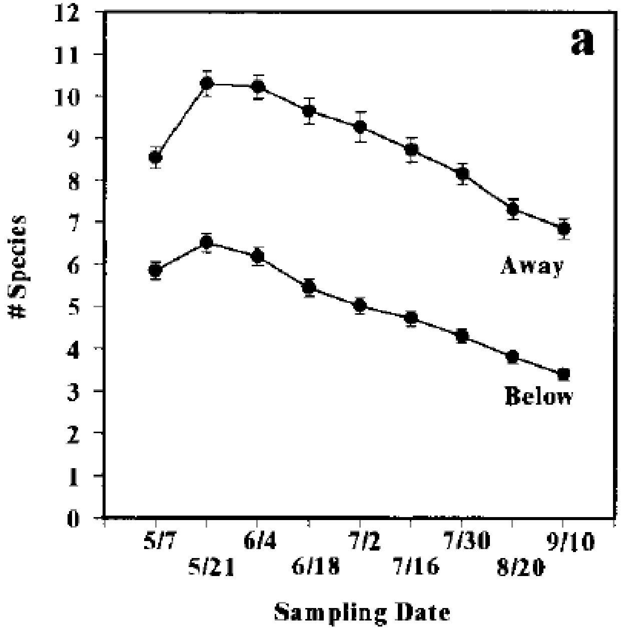


Multiflora rose in 88% of FIA plots.

Albright et al (2018) Ohio Forests 2016 NRS-118

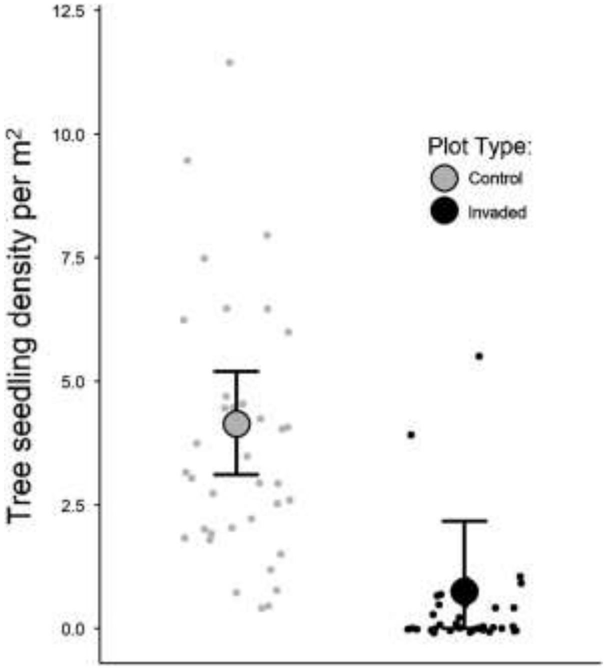
Impact of Invasives on Native Communities

Amur honeysuckle understory



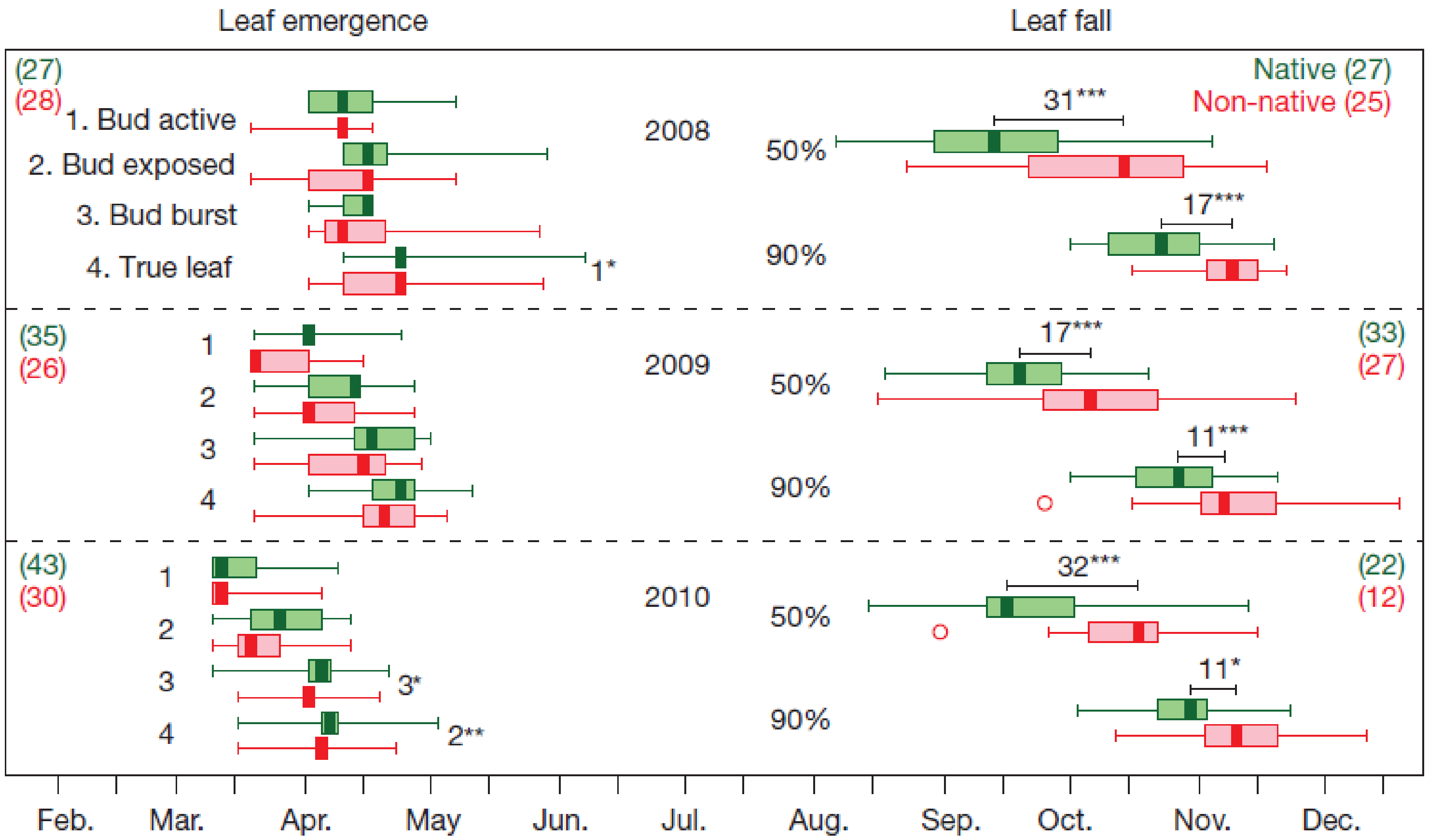
Collier et al (2002) Amer Midl Nat 147

Japanese barberry thicket



Link et al (2002) Inv Plant Sci Manag 26

Competitive Advantage of Invasives



Extended leaf phenology.

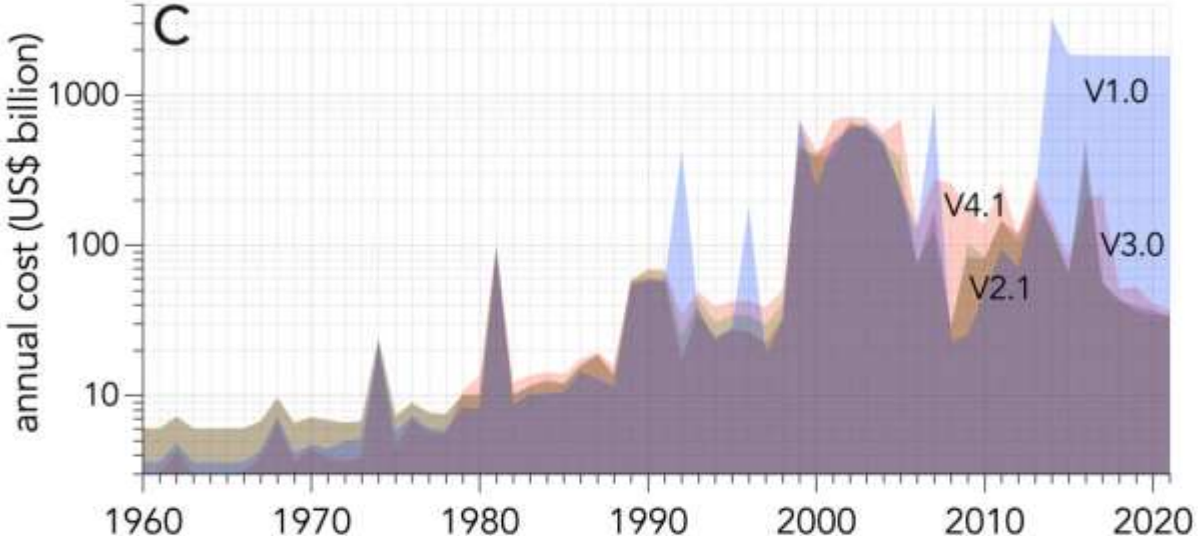
Amur honeysuckle canopy in late autumn.

Fridely (2012) Nature 485

Removing & Controlling Invasives

Mechanical clearing.

Herbicide application.



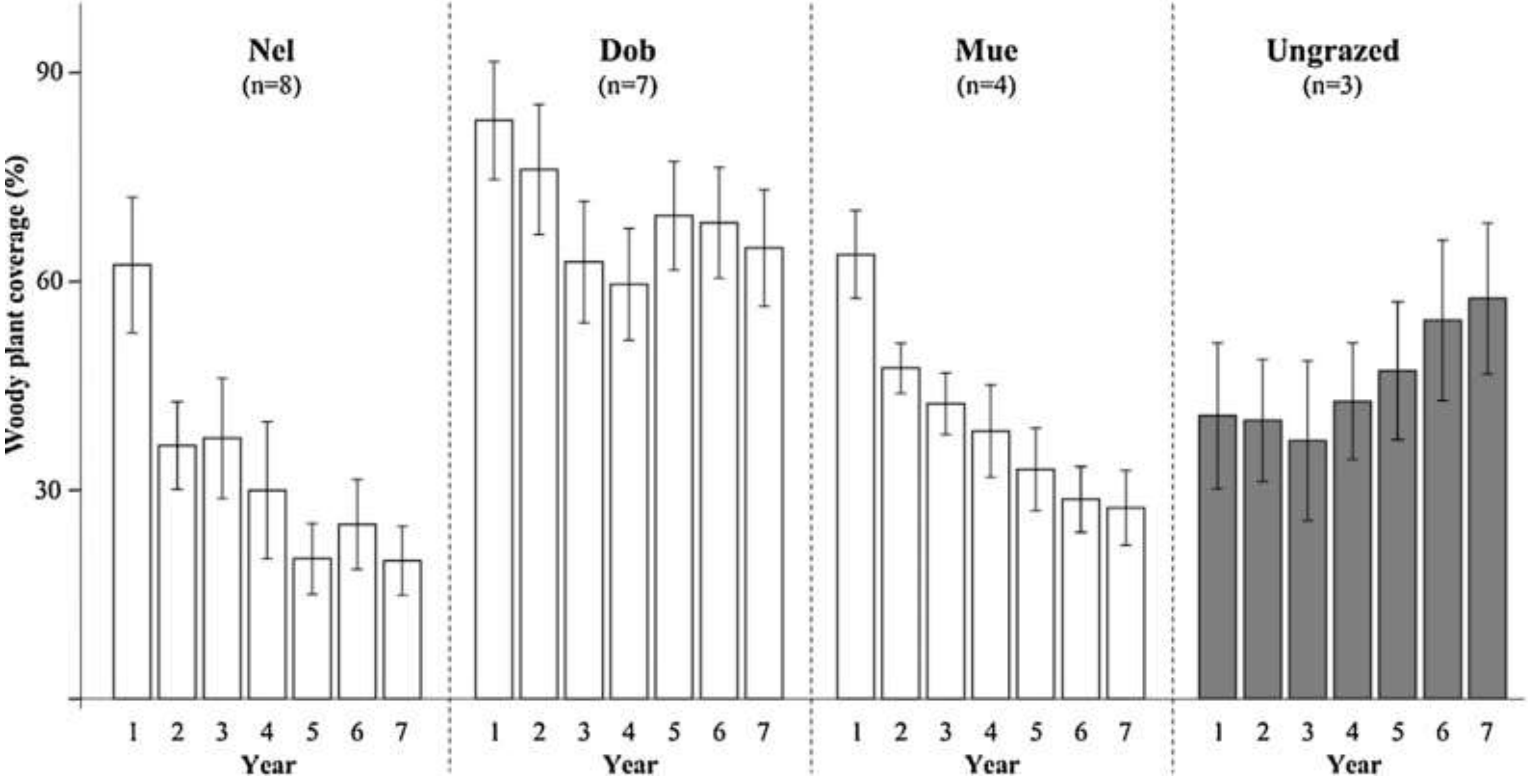
Enormous time & financial cost!

Tuberlin et al (2017) Global Ecol & Biogeo 26

Conservation Grazing

domestic goats

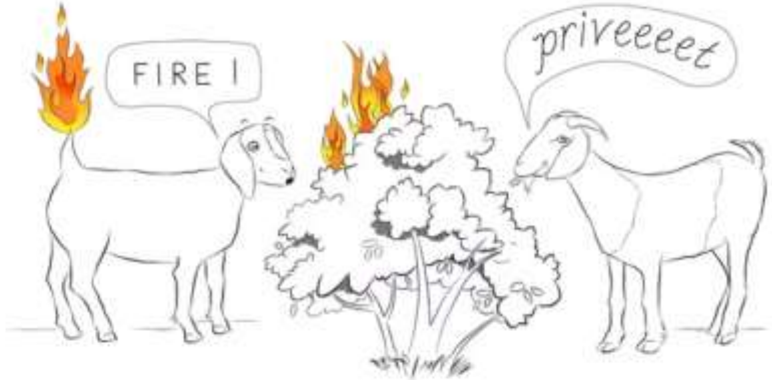
black locust



Elias & Tischew (2016) Ag, Ecosyst & Enviro 234

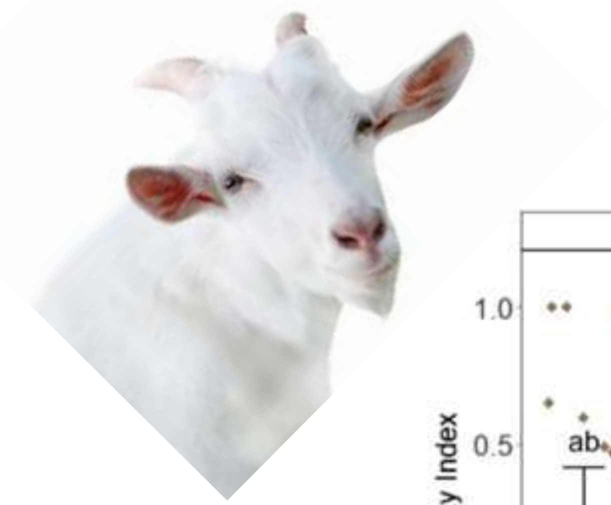
PyroGoat

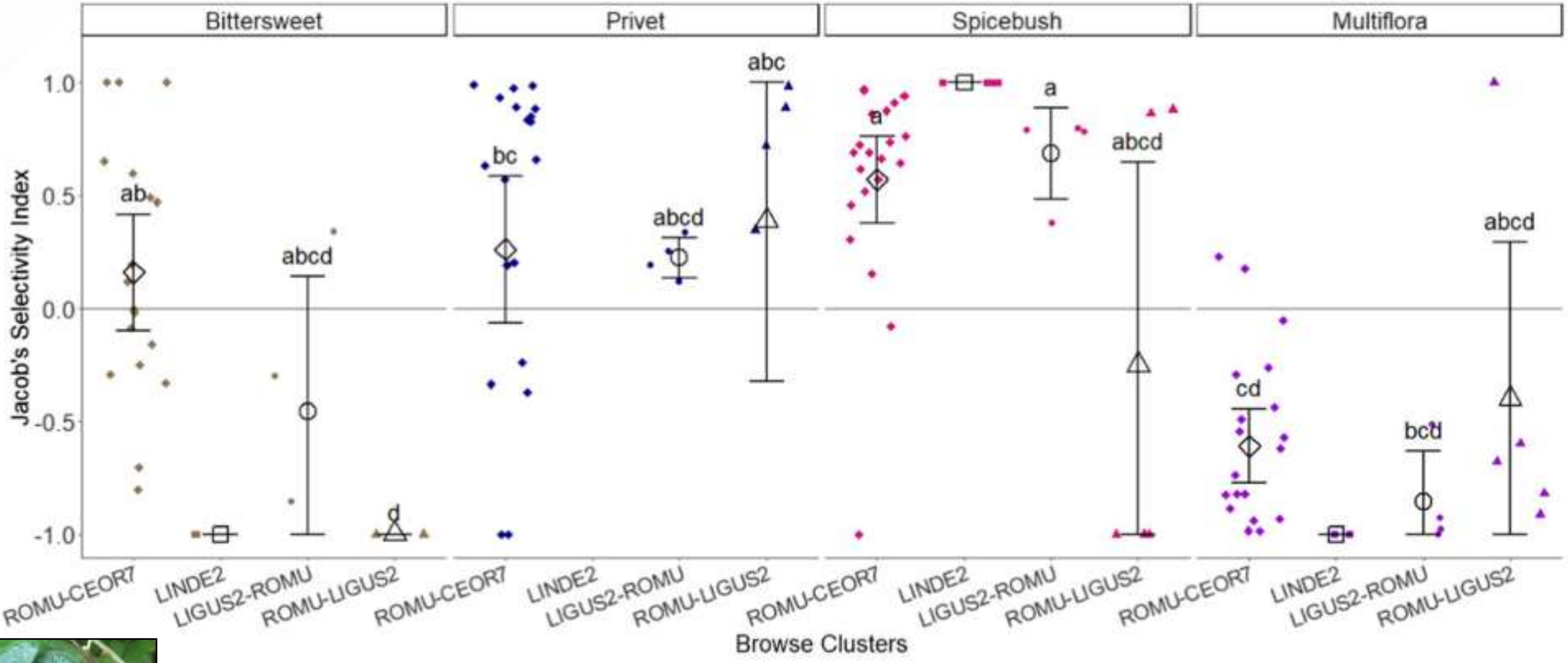
Experimental goat browsing enclosures.



PyroGoat plots distributed across the Pomerene site.

Browsing Preferences



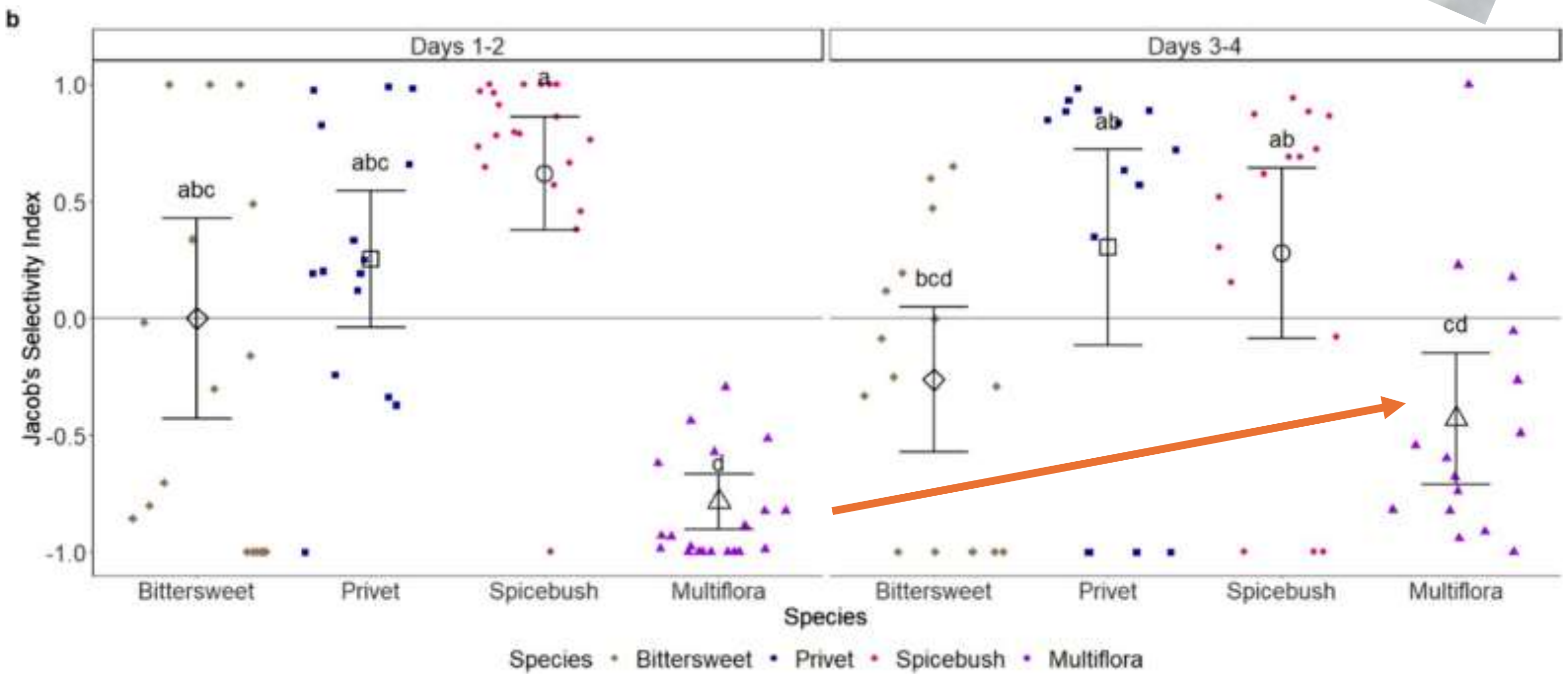


Goats tend to prefer natives. But....

Novais et al (2023) Agroforest Syst 94

Browsing Preferences

Goats are effective at removing invasives.

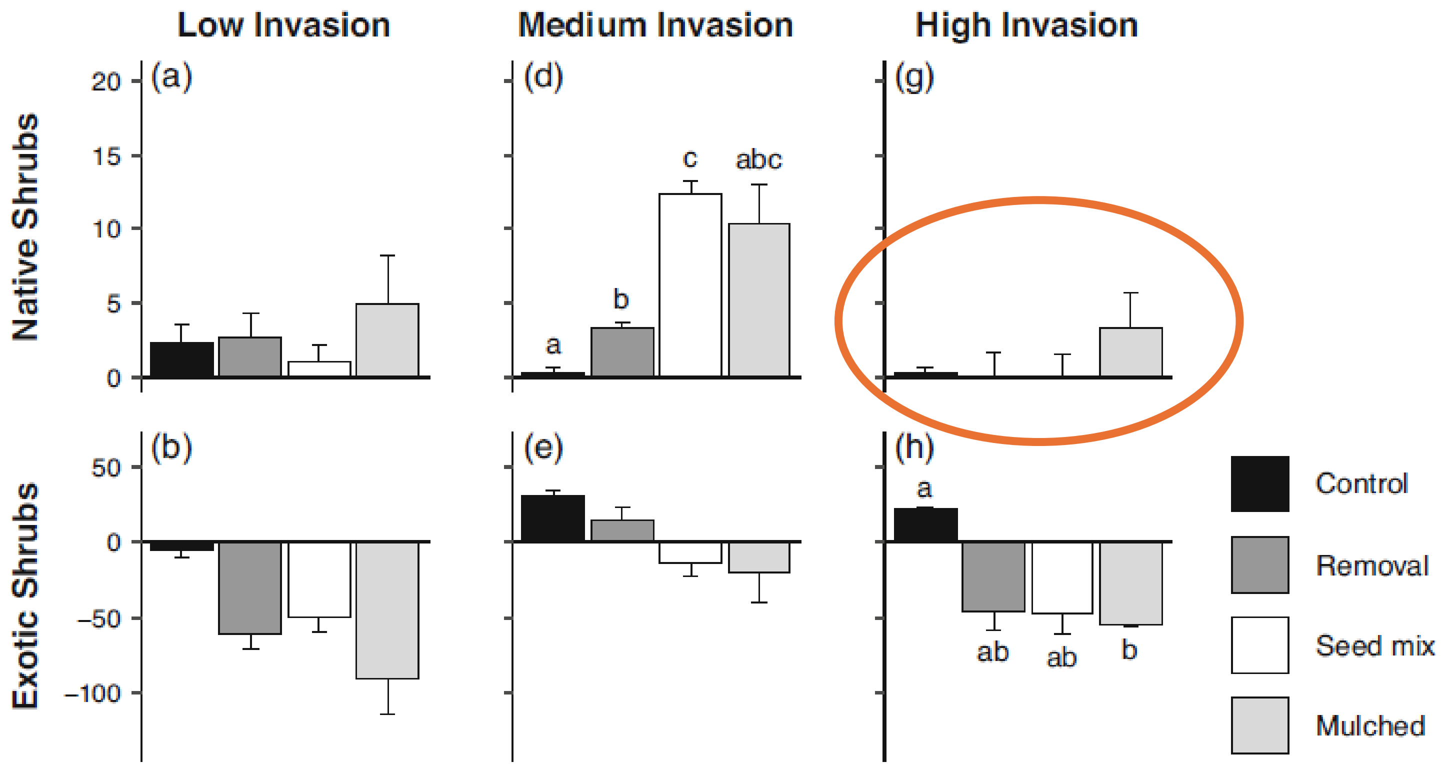


Given enough time they will turn to invasives!

Novais et al (2023) Agroforest Syst 94

Native Recovery Post-Invasives

multiflora rose

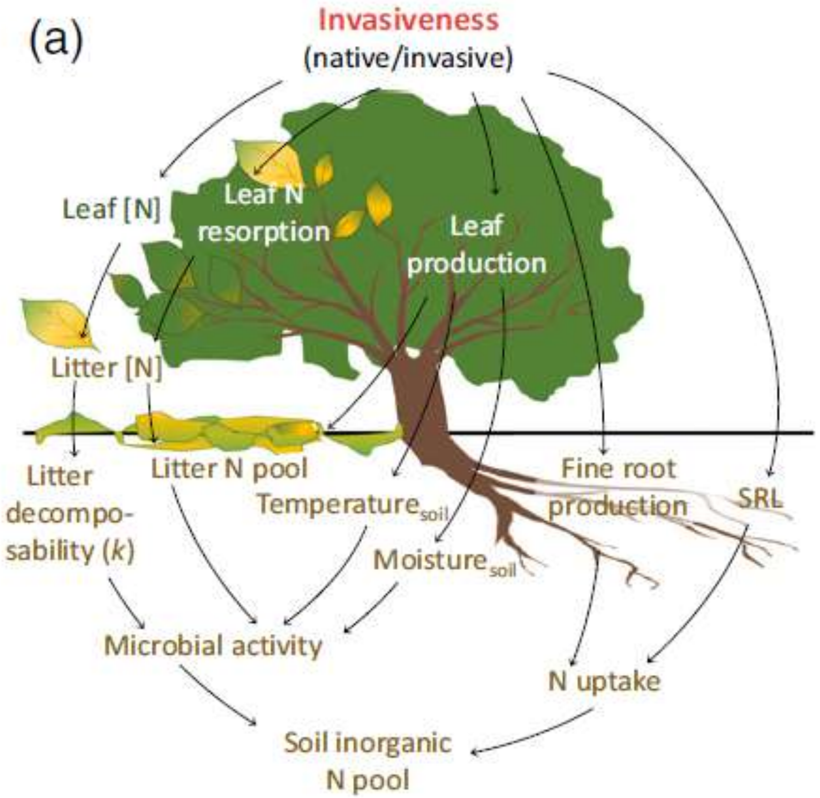


3 years post-invasive removal, native species struggle.

Moore et al (2022) Ecosphere 14

Long-term Effects of Invasives

Allelopathic effects.



Changes in soil nutrient composition.

Jo et al (2017) J Ecol 105

Litter Inputs

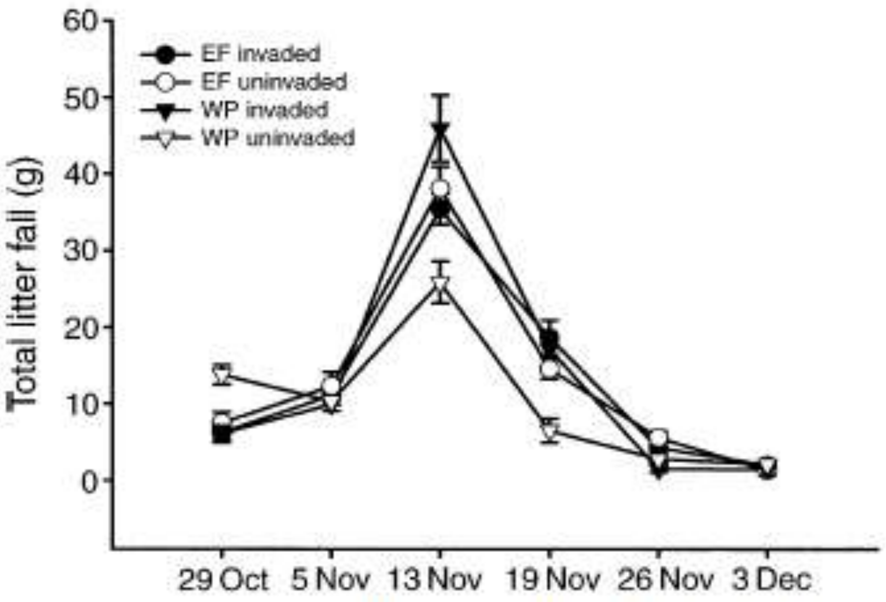


FIG. 1. Total litter fall and peak litter fall in invaded and uninvaded sites within East Farm (EF) and David Weld (WP) preserves during fall 2002. For each point n = 6 litter traps; error bars represent ±SE.

Higher litter inputs.

Table 1 Chemical composition of honeysuckle leaf litterfall and the combined leaf litterfall of all tree and shrub species (Mixed Litter; excluding honeysuckle litterfall) collected during autumn 2006

		Lignin (%)	N (%)	Lignin:N	Molar C:N
Honeysuckle leaf litterfall	HD mean (SE)	8.66	1.41	6.26	37.36
		(0.450)	(0.058)	(0.468)	(1.654)
	LD mean (SE)	6.90	1.31	6.45	41.13
		(0.632)	(0.105)	(0.344)	(2.838)
Combined tree and shrub leaf litterfall	HD mean (SE)	19.32	**1.49***	**13.28***	**37.52***
		(2.001)	(0.122)	(1.221)	(3.211)
	LD mean (SE)	17.80	**0.95***	**19.16***	**58.69***
		(0.690)	(0.056)	(1.234)	(3.452)

Higher quality litter.

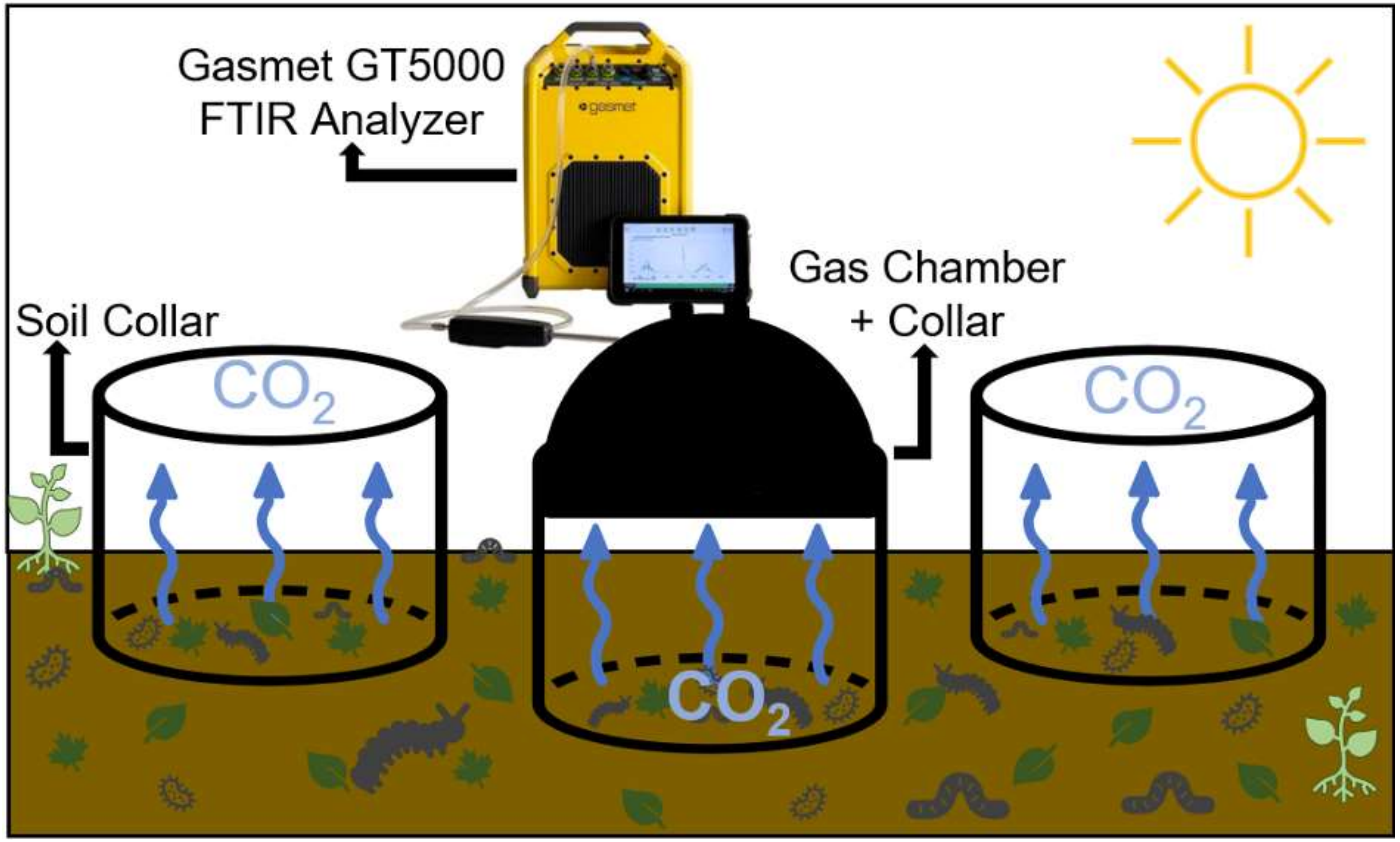
Effects on microbial activity & carbon fluxes?

Ashton et al (2005) Ecol Appl 15

Jo et al (2017) J Ecol 105

Invasive Removal & Soil CO_2 Fluxes

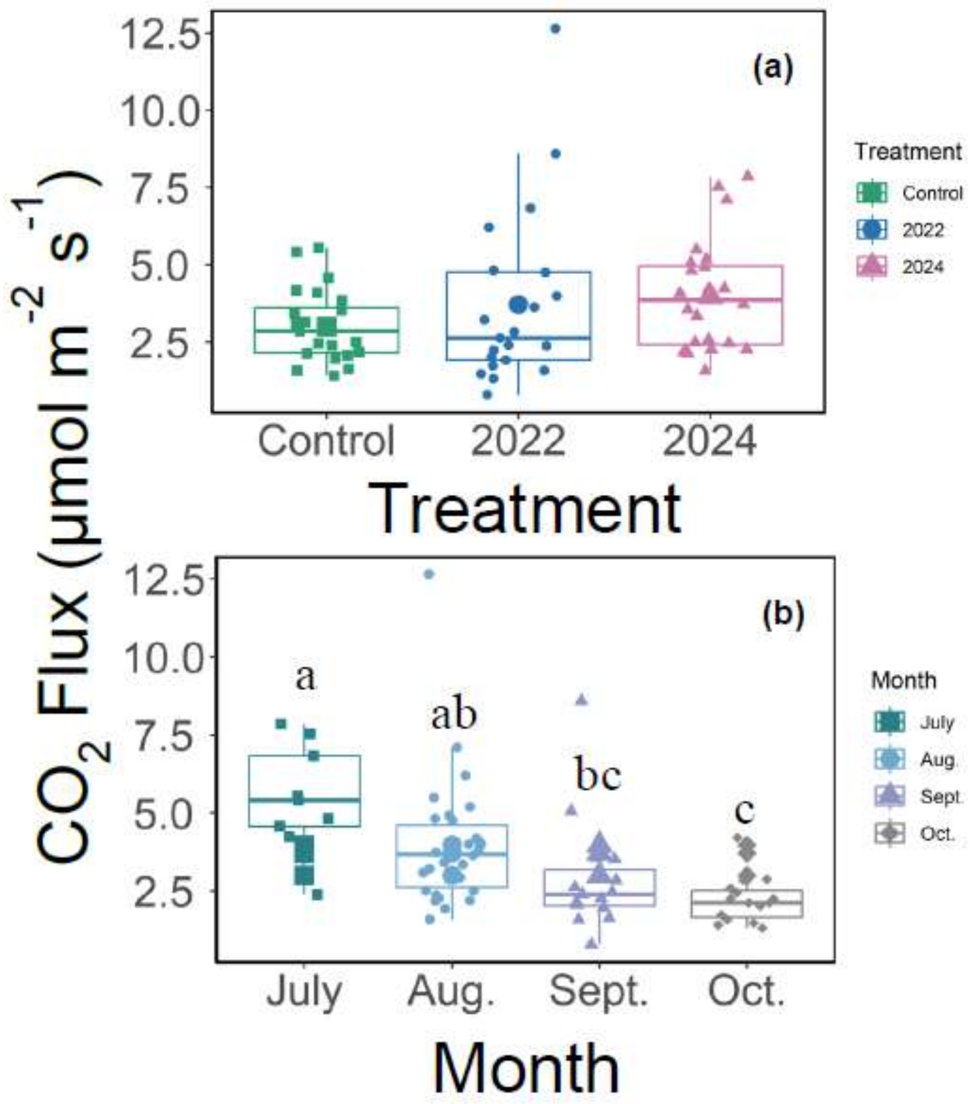
Experimental plot at Pomerene following invasive removal.

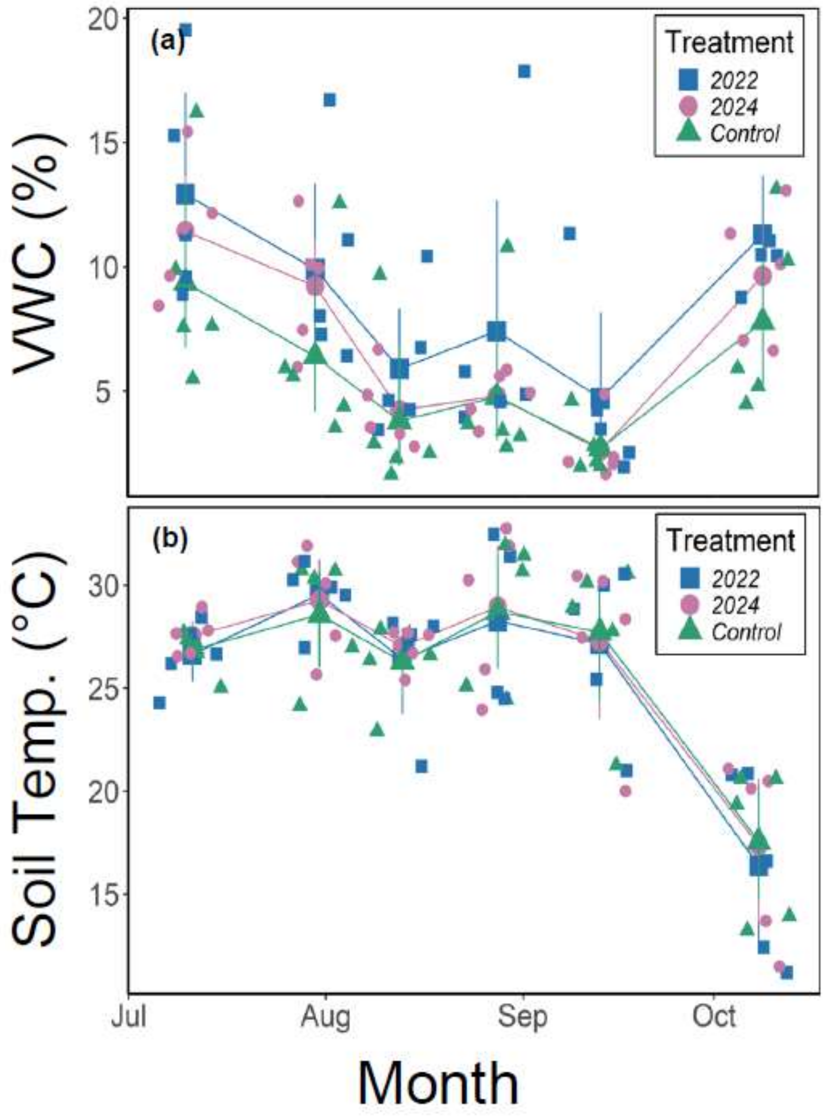


Quantifying soil CO_2 fluxes.

Dacres (2025) PhD Thesis

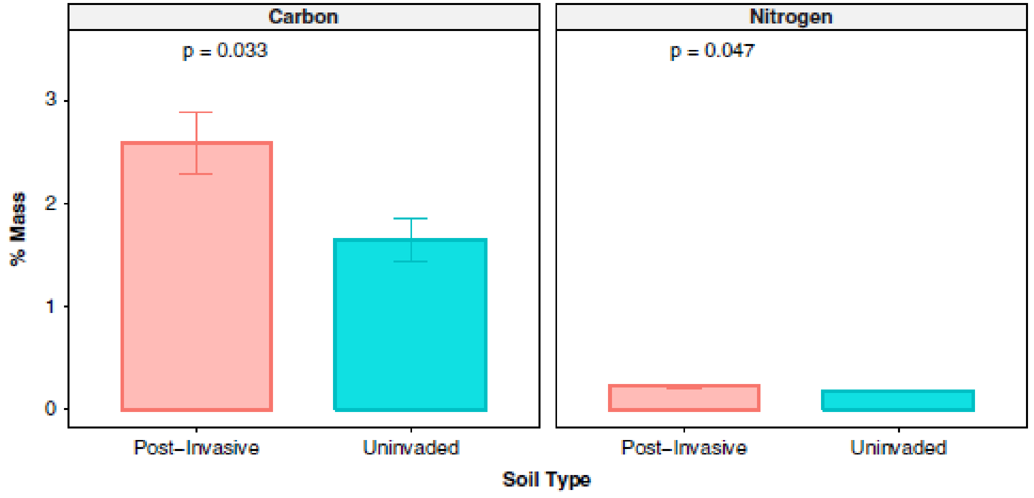
Invasive Removal & Soil CO_2 Fluxes



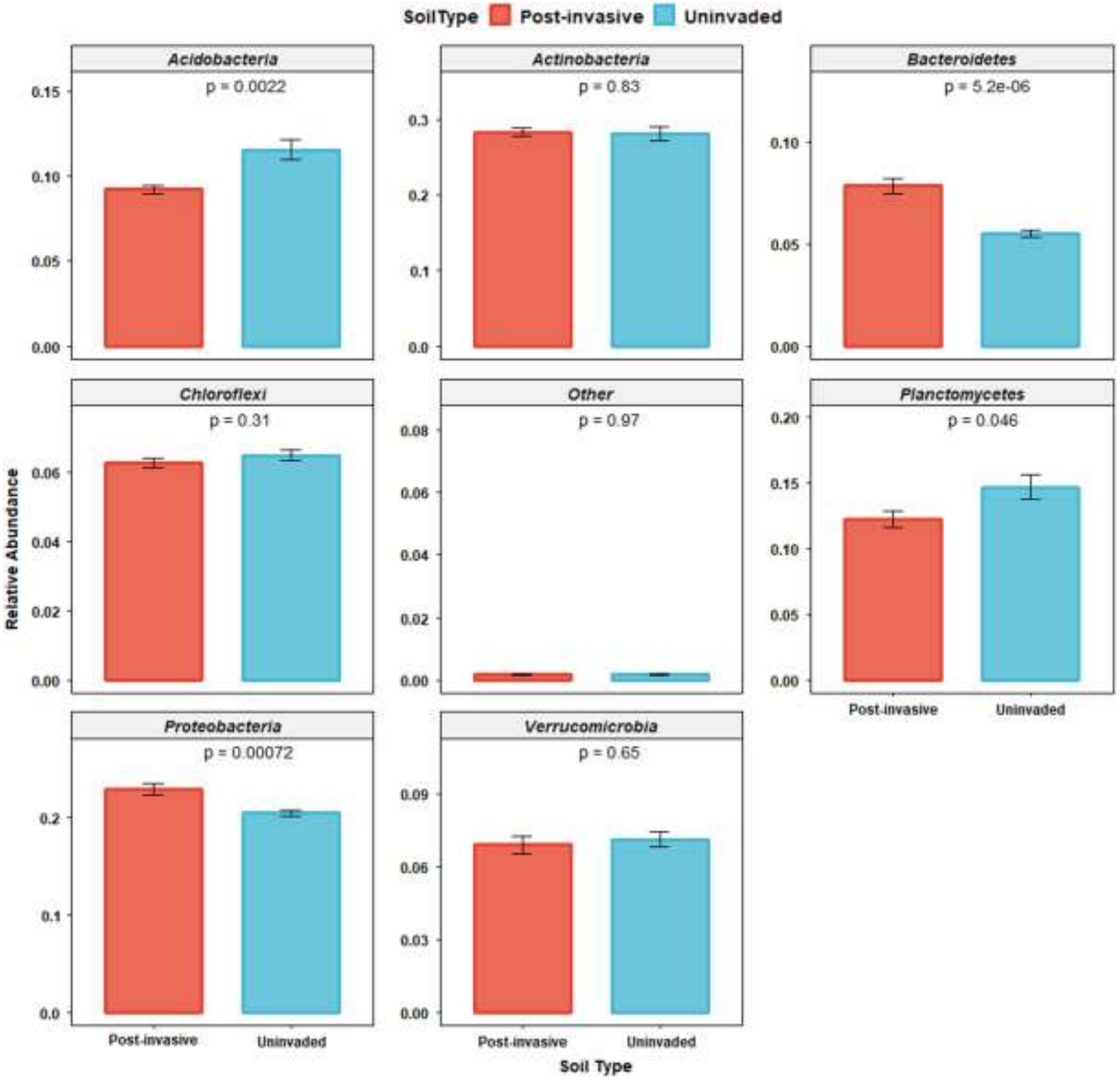


Dacres (2025) PhD Thesis

Invasive Legacy Effects



Persistent effects of invasives on soil nutrients & microbial communities.



Pickett et al (2018) Inv Plant Scie & Manag 12