Assessing the impacts of drought and woody debris on *Pleuropogon hooverianus* development

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Background

- *Pleuropogon hooverianus* or North Coast Semaphore Grass is a perennial grass endemic to Northern California.
- The Mendocino County Resource Conservation District (MCRCD) is trying to mitigate future population loss
- Annual Biological monitoring reports from MCRCD noted that the woody debris could have altered the hydrology of the site and also served as a refuge against cattle grazing (Bradley et al 2021).
- Perennial grasses vary in their dehydration tolerance and growth rates and productivity, (Balachowski et al. 2016).

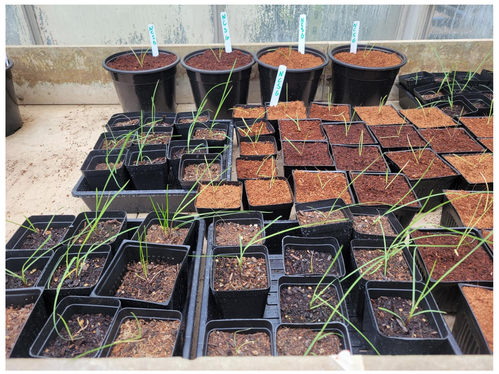

Figure 1. P. hooverianus seedlings in greenhouse.

Research Questions and Hypothesis

- As drought regimes become an increasing problem for California ecosystems, how will drought responses in endemic grass species inform land management decisions?
- Does woody debris mitigate the impacts of drought on *P. hooverianus?*
- We hypothesize that woody debris will mitigate the impacts of drought.

Methodology

- We used seeds from wild collected Pleuropogon hooverianus, from the MCRCD.
- Plants were grown in gallon pots (n=32) and divided into four treatments: 1) control, 2) woody debris, 3) drought, 4) woody debris × drought.
- Wooden dowels were used to simulate woody debris
- Following seven weeks of watering, an episodic drought procedure was adopted from Duan et. al (2014). Drought stress was induced by withholding water until a minimal stomatal conductance value was reached (Luong and Loik, 2022).
- Stomatal conductance was measured using a Licor device
- Functional traits measured includied plant height, biomass, specific leaf area (SLA), and leaf dry matter content (LDMC)
- Our work was approved through CDFW Permit No. 2081(a)-19-006-RP

Figure 2. Licor data collection and soil moisture measurements

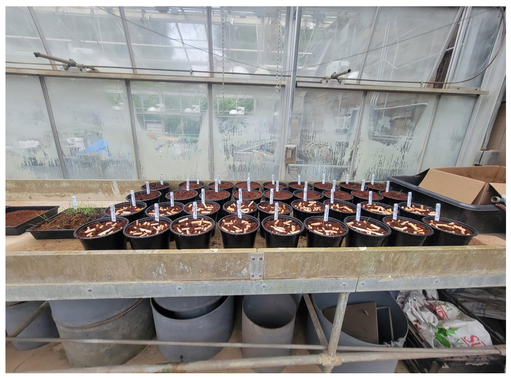

Figure 3. Plants with wooden dowels on surface used to emulate woody debris.

Results

Table 1. Results of Two-Way anova analysis

Trait	Treatment	f-value	p-value
Relative growth rate	Drought	7.81	**0.01**
	Woody Debris	0.09	0.77
	Drought X Woody Debris	0.03	0.85
Leaf dry matter content	Drought	1.21	0.28
	Woody Debris	0.00	0.96
	Drought X Woody Debris	10.59	**0.0036**
SLA	Drought	0.04	0.85
	Woody Debris	0.05	0.83
	Drought X Woody Debris	4.04	0.06
Lobedness	Drought	2.01	0.17
	Woody Debris	3.28	0.08
	Drought X Woody Debris	3.38	0.08
Live-green biomass	Drought	8.42	**0.01**
	Woody Debris	1.36	0.25
	Drought X Woody Debris	0.35	0.56
Standing dead biomass	Drought	6.69	**0.02**
	Woody Debris	1.44	0.24
	Drought X Woody Debris	0.23	0.64

- Woody debris did not affect *P. hooverianus* functional traits or biomass (Table 1).
- Plants in the drought treatment had lower relative growth rate and live-green biomass (Fig.5). They also had increased standing dead biomass (Fig. 6).
- The interaction between woody debris and drought resulted in lower leaf dry matter content (Fig. 4).

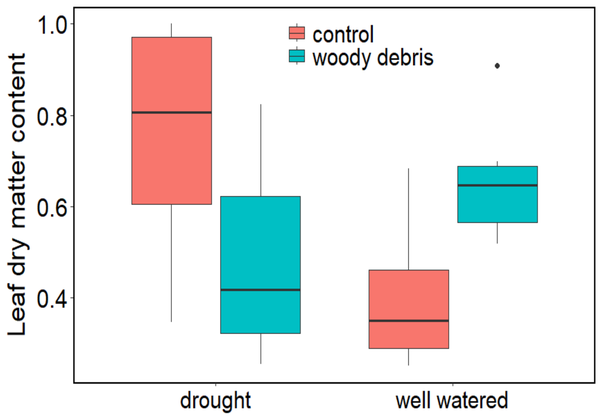

Figure 4. Functional trait - Leaf dry matter content

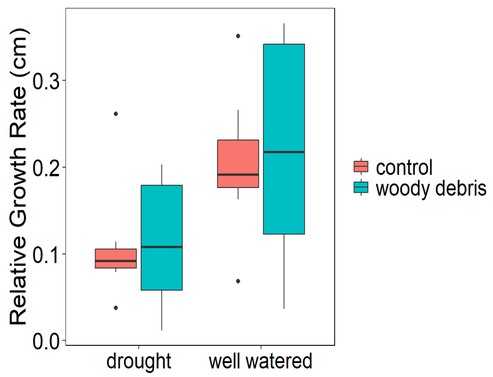

Figure 5. Functional trait - Relative Growth rate

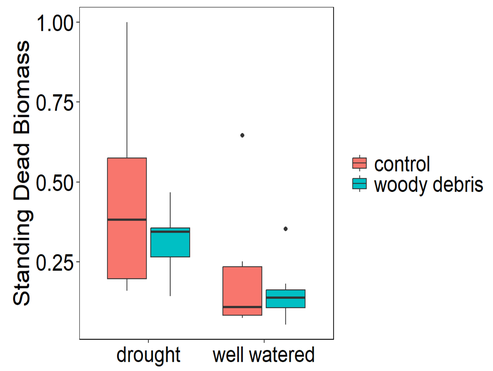

Figure 6. Functional Trait- Standing Dead Biomass

Implications

- Plants in the drought treatment exhibited traits consistent with drought adaptations.
- Woody debris alone did not impact the development of *P. hooverianus*
- The interaction of woody debris and drought suggests that plants in this treatment prioritized resource acquisition.
- Woody debris may initially buffer drought effects could reduce long-term drought resilience by altering resource use.

Acknowledgements

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