Evaluating the efficacy of management options for *Oncosiphon piluliferum (*Stinknet)

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INTRODUCTION

- *Oncosiphon piluliferum,* also known as Stinknet, is an herbaceous winter annual native to South Africa (2,3). Recently, Stinknet has been identified as an invader of concern in southern California due to its rapid expansion across the Southwestern United States (1,2).

- Stinknet seedlings can be inconspicuous during the early stages of the growing season which can make it difficult to detect and treat effectively (2).

- Stinknet forms dense thick patches, which is a pressing management concern as it invades critical habitat for the endangered Stephen's Kangaroo Rat.

- Our findings will be used to identify herbicide treatment recommendations for land managers to minimize the ecological impacts of Stinknet and control its spread.

Figure 1. Applying herbicides in an invaded field of Stinknet at the Motte Rimrock Reserve (left). Stinknet in flower (right).

AIMS & REASEARCH QUESTIONS

Aim 1. To evaluate herbicide management options for Stinknet

Question 1. Which herbicide strategy is most effective in reducing Stinknet cover?
- Pre-emergent would reduce *initial establishment* of Stinknet
- Post- emergent would reduce *seed production* of Stinknet

Question 2. Within a given herbicide strategy, which herbicide treatment is the most effective in reducing Stinknet cover?

Aim 2. To assess secondary herbicide impacts on community characteristics

Question 1. What is the effect of herbicide strategy on cover type?

Question 2. What is the effect of herbicide strategy on overall species richness?

RESULTS

Aim 1

Q1 — Pre-emergent strategy is the most effective at reducing Stinknet cover in 2018.

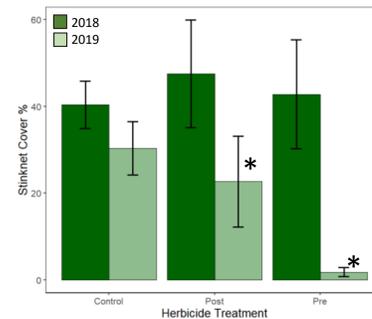Q2 — The most effective treatments per herbicide strategy are: *pre-emergent:* Esplanade *post-emergent:* Transline

Figure 3. Mean percent Stinknet cover per herbicide treatment by year. Error bars are one standard error. Asterisks indicate significance at p<0.05.

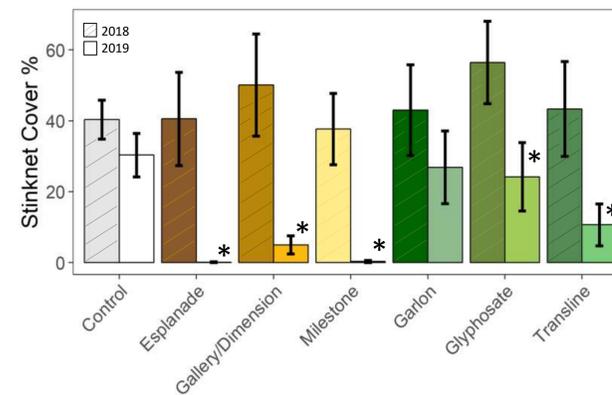Figure 4. Mean percent Stinknet cover per herbicide strategy by year. Error bars are one standard error. Asterisks* indicate significance at p<0.05.

Aim 2

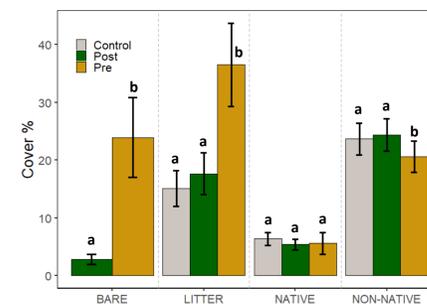Q1 — Pre-emergent herbicides reduced non-native cover and increased bare ground and litter cover.

Figure 5. Mean percent plot cover type by herbicide strategy in April 2019. Error bars are one standard error. Different letters indicate significant differences between groups within each cover type at p<0.05.

Q2 — Pre-emergent herbicides reduced overall species richness. Herbicide treatments did not influence the richness of either native or native species present in the plots.
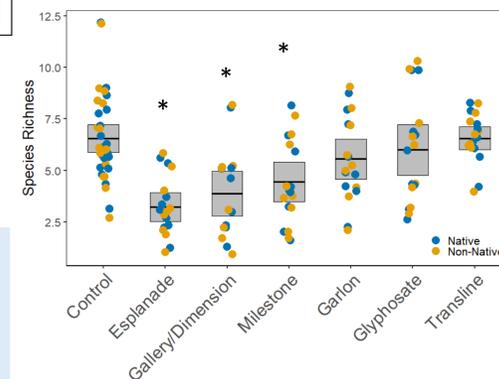

Figure 6. Mean species richness by herbicide treatment for plots in April 2019. Asterisks indicate significance of herbicide treatment on overall species richness at p<0.05 with 95% confidence intervals.

METHODS

- Herbicide trials were replicated at three sites within Riverside county: Lake Mathews Preserve, Lake Perris State Recreation Area and Motte Rimrock Reserve.

- We sampled Stinknet cover and overall species composition using a 1 x 1m quadrat in the spring following herbicide applications.

- Pre-emergent herbicides were applied in November 2018, and post-emergent herbicides were applied in March 2018. This was repeated in the following growing season.
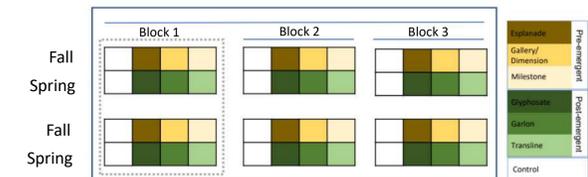

Figure 2. General experimental design of the herbicide trials. Colors represent herbicide strategies and specific treatments, randomization not shown here.

DISCUSSION

- Targeting the initial establishment of Stinknet was the most effective strategy for managing overall cover of the invasive species.
- However, pre-emergent strategies significantly altered cover type by providing more:
  A) Bare ground- which may be taken advantage of by non-native species in the seed bank
  B) Litter cover- which may reduce light availability for seedlings and inhibit their germination
- Non-native species dominated cover post herbicide treatment, suggesting that additional efforts may be necessary to promote native species recovery.

FUTURE DIRECTIONS

- Run germination trials on seeds that have been collected from post-emergent plots to assess their viability

- Assess how changes to cover type may influence recruitment for the following growing season

- Repeat efforts in the following growing season to compare interannual dynamics to learn more about the context dependency of the herbicide effects

Acknowledgments

LITERATURE CITED:
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2. McDonald, Christopher J. "Another Stinkn' Weed: Stinknet Expands in Southern California." *Dispatch*, pp. 6–7.
3. Sturla, Eugene. "Southwest Desert Flora." *Oncosiphon Piluliferum, Globe Chamomile*, Southwest Desert Flora, 2017.