

## Seasonal herbicide management for invasive plant control: insights from stinknet

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<u>A) Reduce initial establishment of the invader</u>

\*Sprayed in the **Fall**, aimed at stopping the seedlings from germinating successfully



#### B) Reduce seed production of the invader



\*Sprayed in the **Spring**, aimed at killing actively growing plants prior to flowering



# When is the best time to apply herbicides?





\*Dormant propagules = potential for regeneration

### Quantifying Impacts of Management



Measuring treatment effectiveness through observing **Above ground plant composition** 



\*Dormant propagules = potential for regeneration

#### Quantifying Impacts of Management



Measuring treatment effectiveness through observing **Above ground plant composition** 



## **Research Question**

#### How does seasonal herbicide management influence...

(1) stinknet cover?



(2) stinknet density in the soil seed bank?



## Design

#### Conducted herbicide trials across three sites within Riverside county

- Lake Mathews Preserve
- Lake Perris State Recreation Area
- Motte Rimrock Reserve

#### Replicated trials in 2018 & 2019

#### **Number of repeated applications**: One vs. Two

**Timing of Herbicide application**: Fall: November Spring: <5% flowering (April/May)





#### **Vegetation Sampling:**



one year after treatment (1 YAT) within a 1 x 1 m quadrat, recorded:

- stinknet cover
- overall species composition & richness



#### Seed Bank Sampling:



Collected July, 2021

- 3 soil cores per plot
- 7-month Seedling emergence study



#### Stinknet Aboveground Cover 1 YAT

Year Treated: Not Significant # of applications: Not Significant Seasonal Management: <u>Significant</u>





Spring-applied did NOT differ compared to the control strategy

#### Stinknet Aboveground Cover 1 YAT

Year Treated: Not Significant # of applications: Not Significant Seasonal Management: <u>Significant</u>



Α В 40 20 Stinknet % cover а T 15 b Stinknet % cover Control indaziflam aminopyralid isoxaben + dithiopyr Herbicide Treatment a a a b Control Spring Fall glyphosate Season Managed Herbicide Treatment

Fall-applied reduced stinknet by 84% compared to the control strategy

#### Stinknet Soil Seed Bank Density

Year Treated X # of applications: <u>Significant</u> Seasonal Management: <u>Significant</u>





Spring-applied did NOT differ from control strategy

#### Stinknet Soil Seed Bank Density

Year Treated X # of applications: <u>Significant</u> Seasonal Management: <u>Significant</u>





Fall-applied reduced stinknet seed density by 58% compared to the control

#### Seed Bank Dominated by Non-native species







### Implications for Practice

Spring and Fall herbicide applications reduce invader cover



..but **Fall** applied *reduced seed density* & *overall invader abundance*  BOTH above & belowground dynamics offer valuable information on how to move forward strategically



### Implications for Practice

Persistent seed bank + High seed input = **multiple years of herbicide application** needed to deplete non-native seed bank

Native species may need **additional regeneration strategies** to overcome dispersal limitations and invasive-dominated seed banks in post-treated areas

Consider the residence time of herbicides before adding seeds

 Activated charcoal mixed into seed mix can limit residual herbicide impacts



## Thank You

Type your questions in the chat, contact me on whova or email me crodr087@ucr.edu

#### <u>Larios Lab</u>

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