Biological control of *Arundo donax*

Sacramento and San Joaquin watersheds

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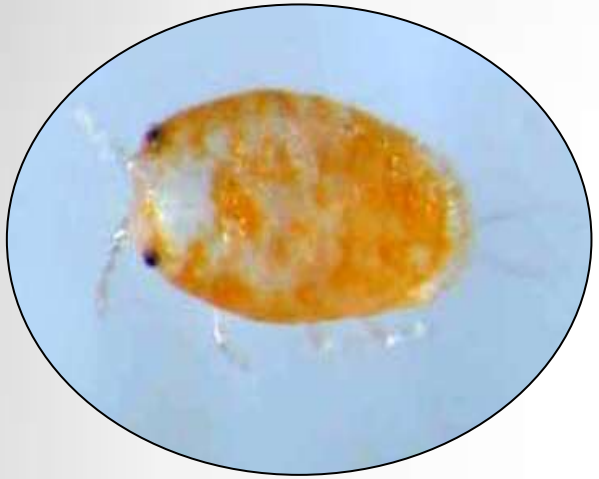
USDA
United States Department of Agriculture
Agricultural Research Service

Biological control: Arundo wasp

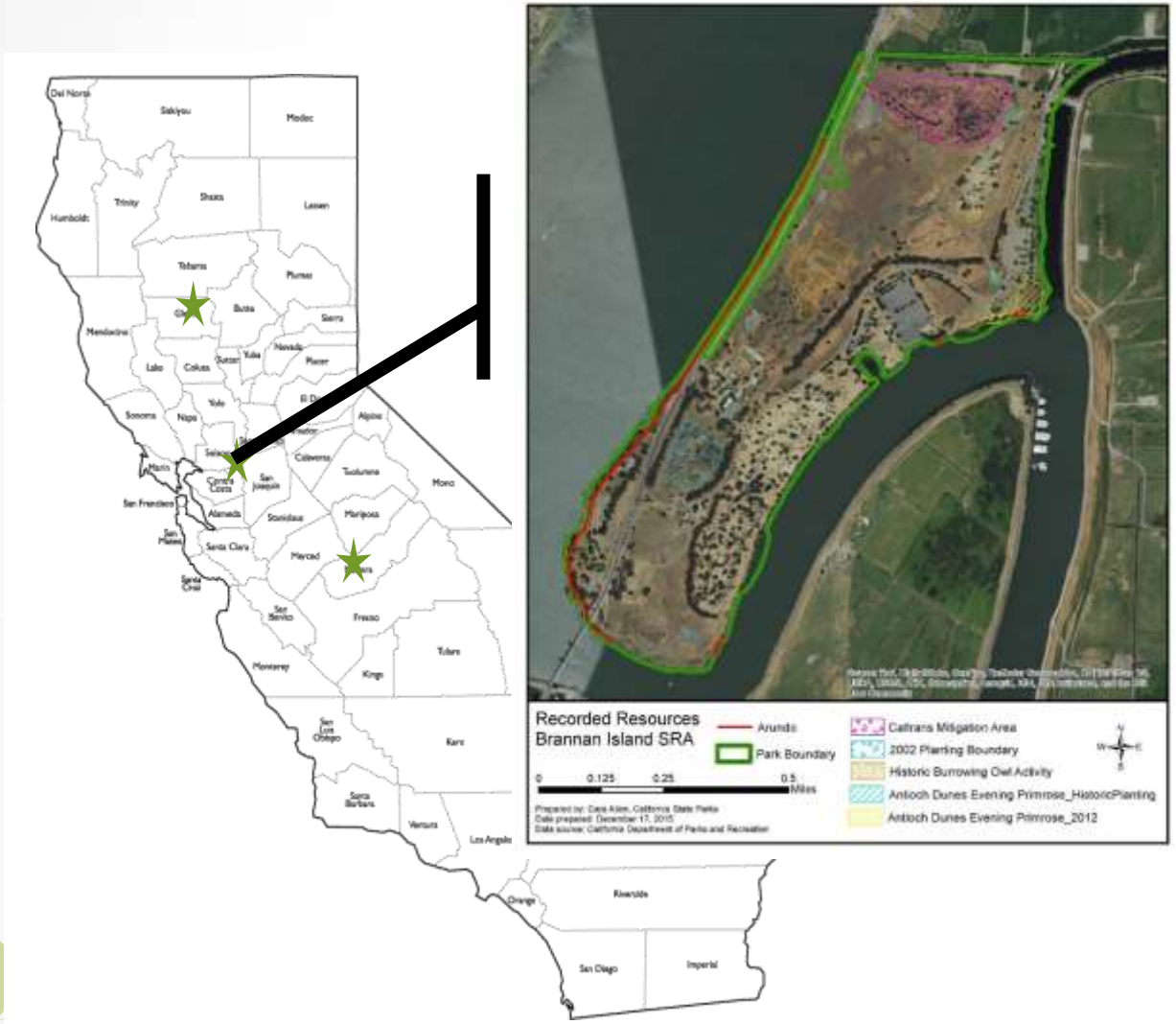
Tetramesa romana

Biological control: Arundo armored scale



Rhizaspidiotus donacis

Field sites



- 3 in Sacramento Valley
- 3 in the Delta
- 3 in Central Valley

How does mechanical treatment of arundo affect wasp/scale density?

Topped Plot

Cut to 1m in June 2017

6 week regrowth

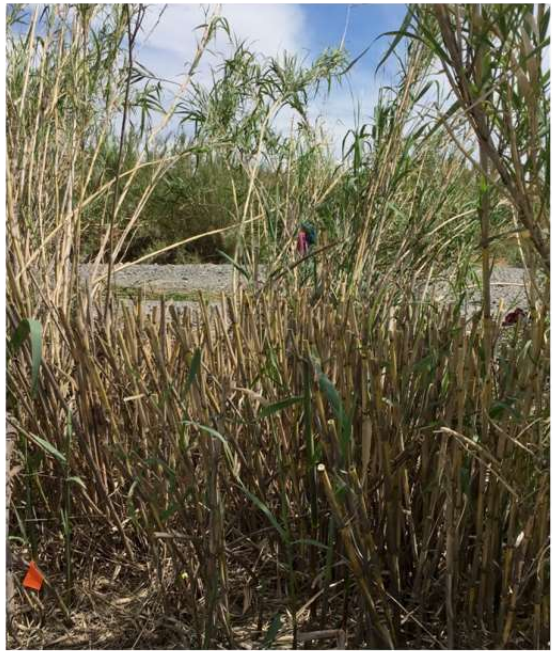
Ground cut

Cut to ground in June 2017

6 week regrowth

Control plot

Topped Plot



Cut to 1m in June 2017

6 week regrowth

Ground cut

Cut to ground in June 2017

6 week regrowth

Control plot

Experimental design

Site	Topped	Ground cut	Control	Wasp release	Scale release
1 (Northern CA)	3	3	3	July	October
2 (Northern CA)	3	3	3	August	November
3 (Northern CA)	3	3	3	September	December
4 (Central CA)	3	3	3	July	October
5 (Central CA)	3	3	3	August	November
6 (Central CA)	3	3	3	September	November

Results

Site 3 (Central CA)	
Site 5 (Northern CA)	

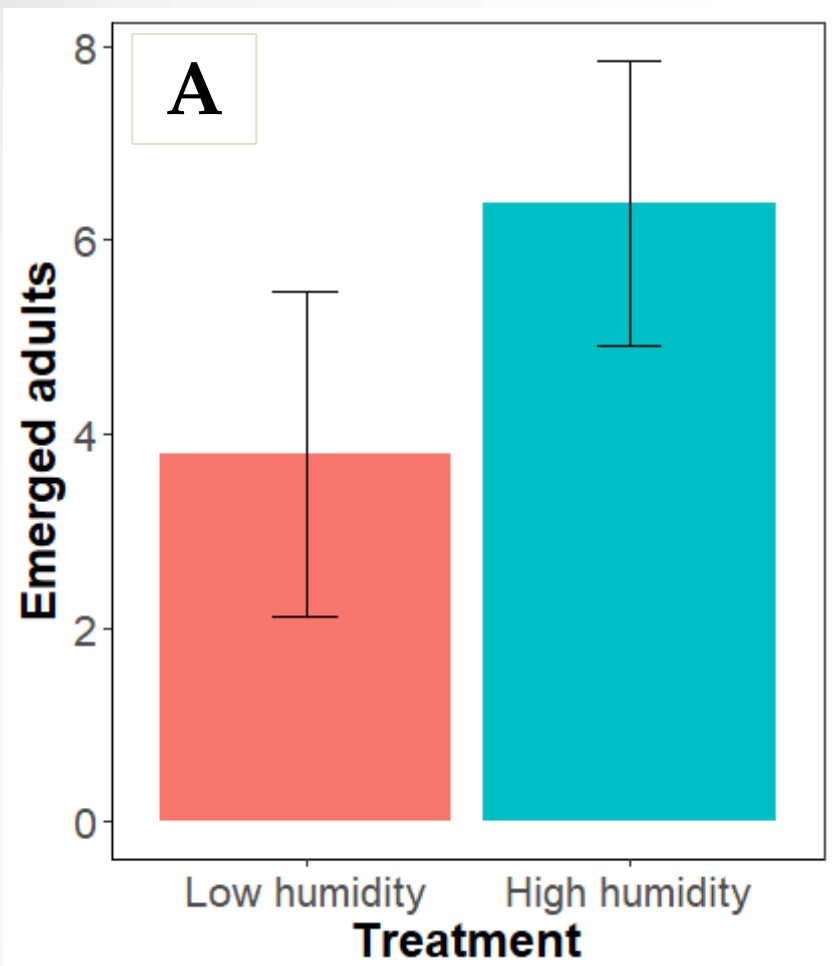
Anova: effect of treatment, P=0.003, $F_{2,9}$=12.26

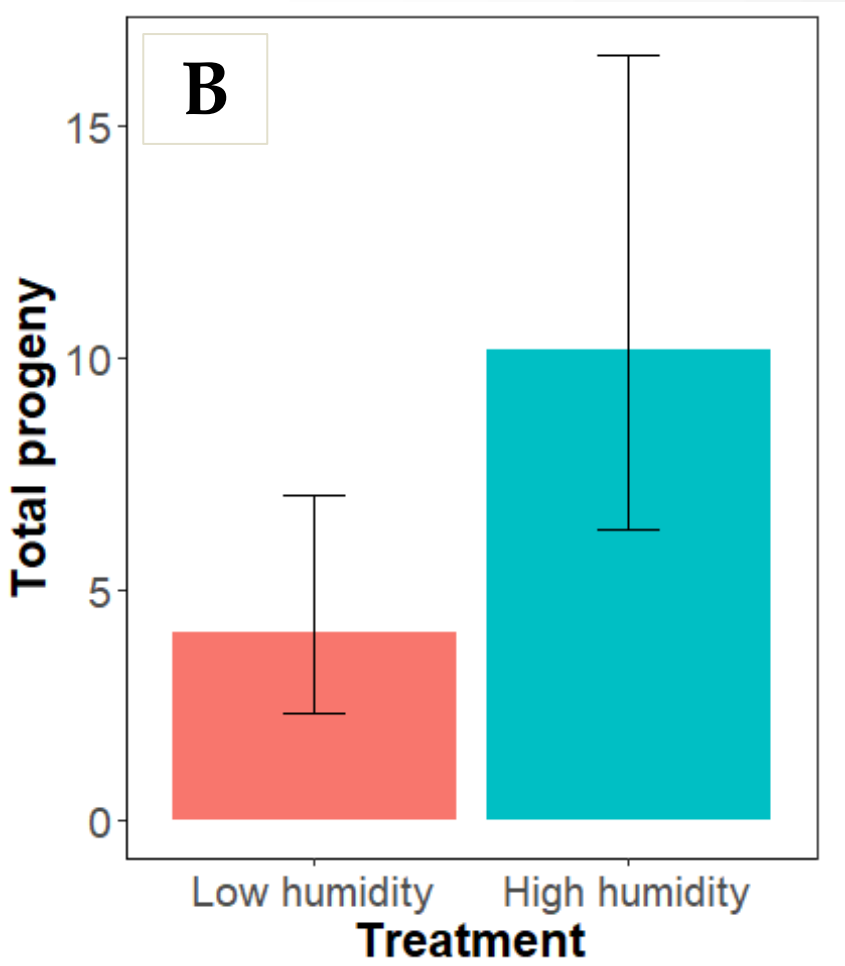
What factors are impeding wasp establishment?

Effect of **humidity** on wasp oviposition

- Cover half the cages in plastic to create high humidity conditions
- Release 10 wasps per cage and allow to oviposit for 5 days
- Quantify number of emerged adults and total progeny (including larvae)

Dry = 30% average humidity
Humid = 70% average humidity





A) Wasps produce significantly more adult progeny under higher humidity (N = 22, $F_{(1,21)} = 7.83$, p = 0.011). **B)** Wasps also produce significantly more total progeny under higher humidity (N = 22, $F_{(1,21)} = 6.799$, p = 0.016).

Conclusion

- Wasp establishment is possible in CA but will take more releases
- Ground cut seems preferable to wasp establishment, but…

- Low humidity in CA can affect wasp oviposition

Acknowledgements

- Patrick Moran
- Valle Rogers
- Irene Wibawa
- Scott Portman
- Marlee Little

USDA

Arundo donax

- Covers over 5,000 ha in CA
- Ecological transformer
- Drought tolerant
- Flood/Fire hazard
- Chemical/Mechanical control possible but $$

How does mechar arundo affect was

- August 2017: 7,680 wasps in 54 plots
- 100 per plot + 20
- Follow up monitoring
- Density of exit holes
- Plant biomass
- Destructive sampling