

# Germination and growth traits of *Dittrichia graveolens* (stinkwort): A foundation for developing management strategies



Photo by J.M. DiTomaso

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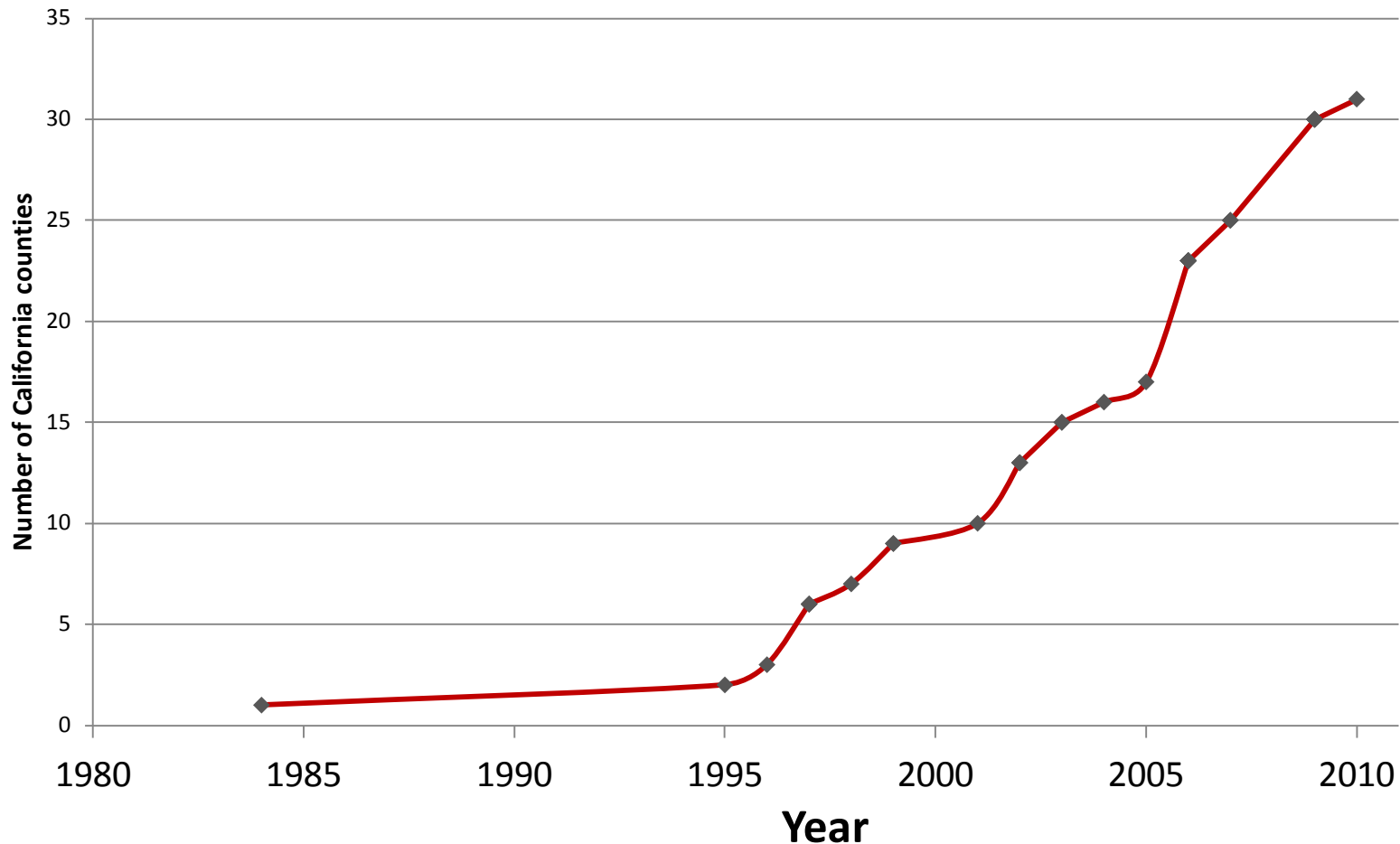
# Outline

- Why study *Dittrichia graveolens*?
- Research approach
- Experiments
- Results
- Conclusions
- Ongoing studies
- Management recommendations

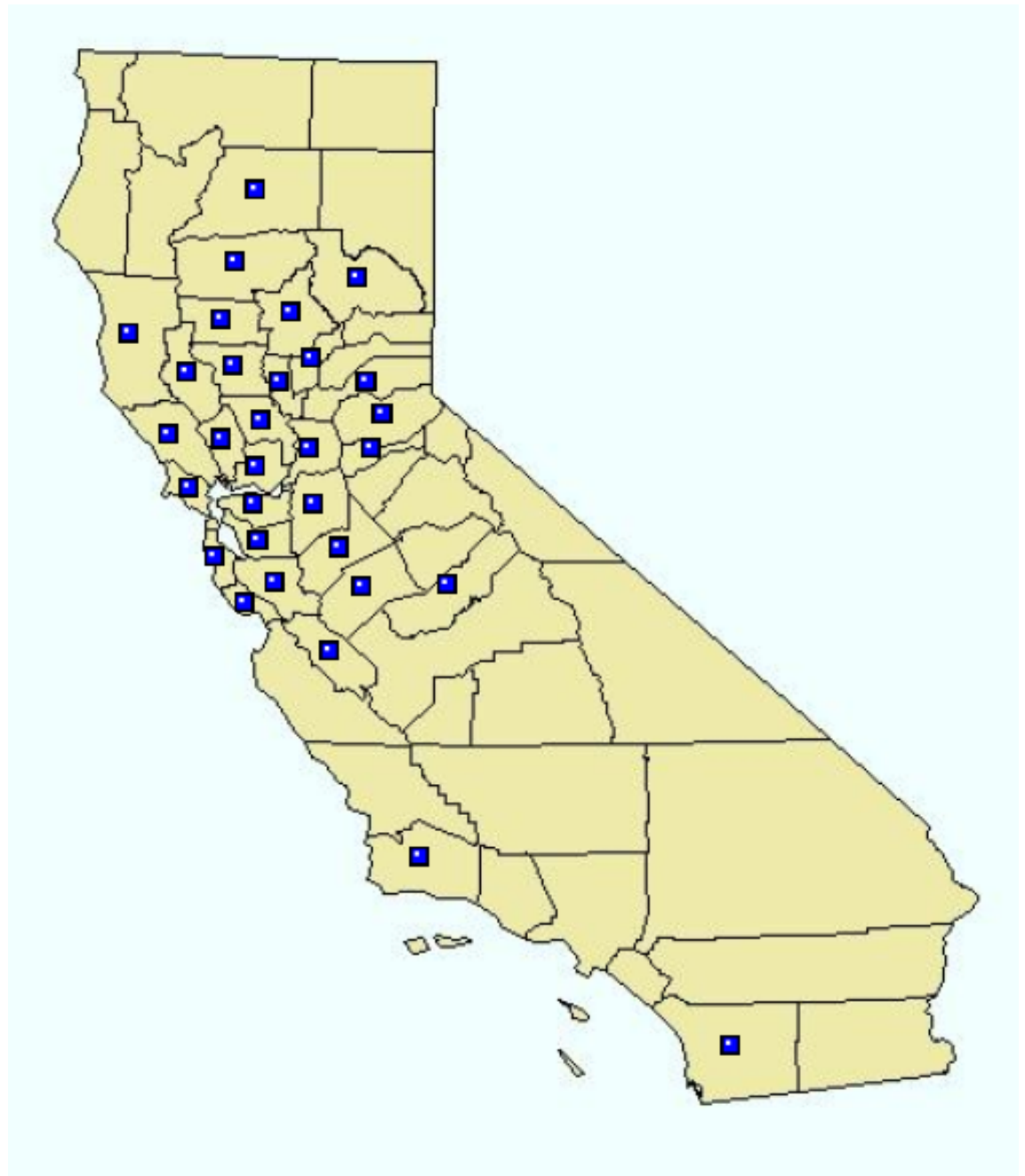


# Why study *Dittrichia graveolens*?

- Rapid rate of spread in California



California  
county  
distribution



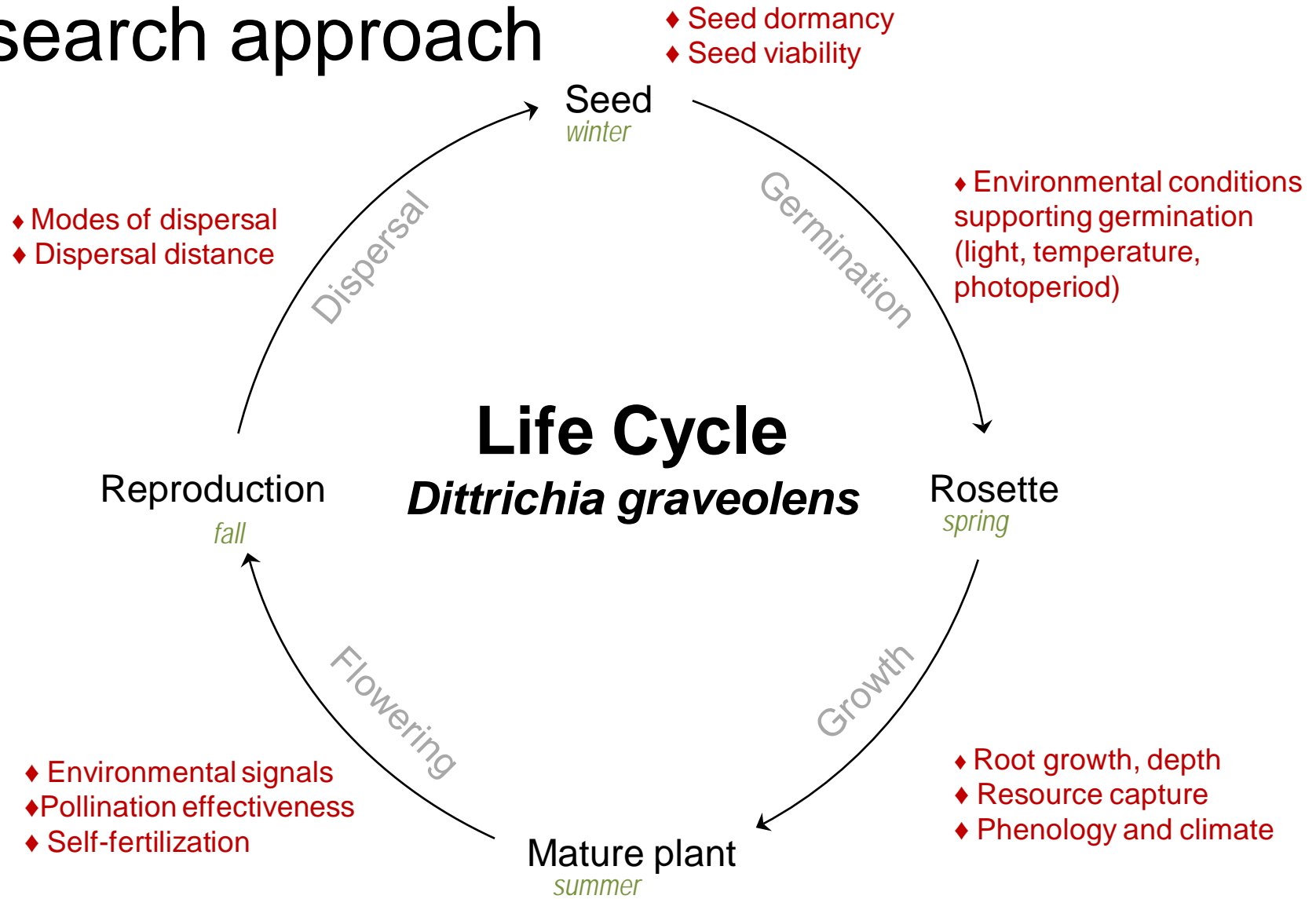
# Why study *Dittrichia graveolens*?

- Rapid rate of spread in California
- Unstudied (biology, ecology)
- Unique life history
- Invasive elsewhere

## Goal

- Understand biology and life history traits of *Dittrichia graveolens* to provide a foundation for developing management strategies

# Research approach





# Experiments 2010-2011

## Location

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### GERMINATION

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Temperature      Temperature table

Light              Greenhouse

Season             Field

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### GROWTH AND PHENOLOGY

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Light              Greenhouse

Season             Field



# Light



Germination



Growth



# Season



Germination

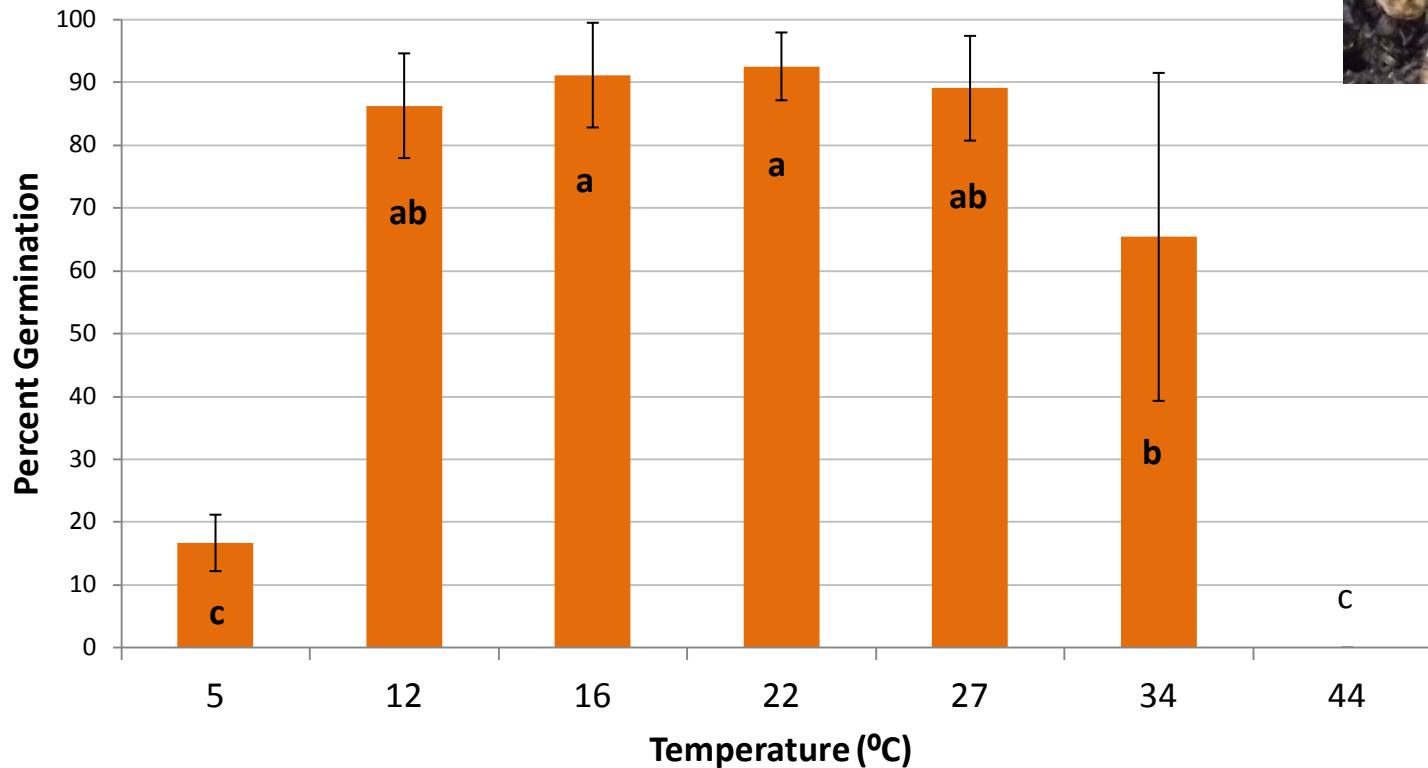
Growth



# Results

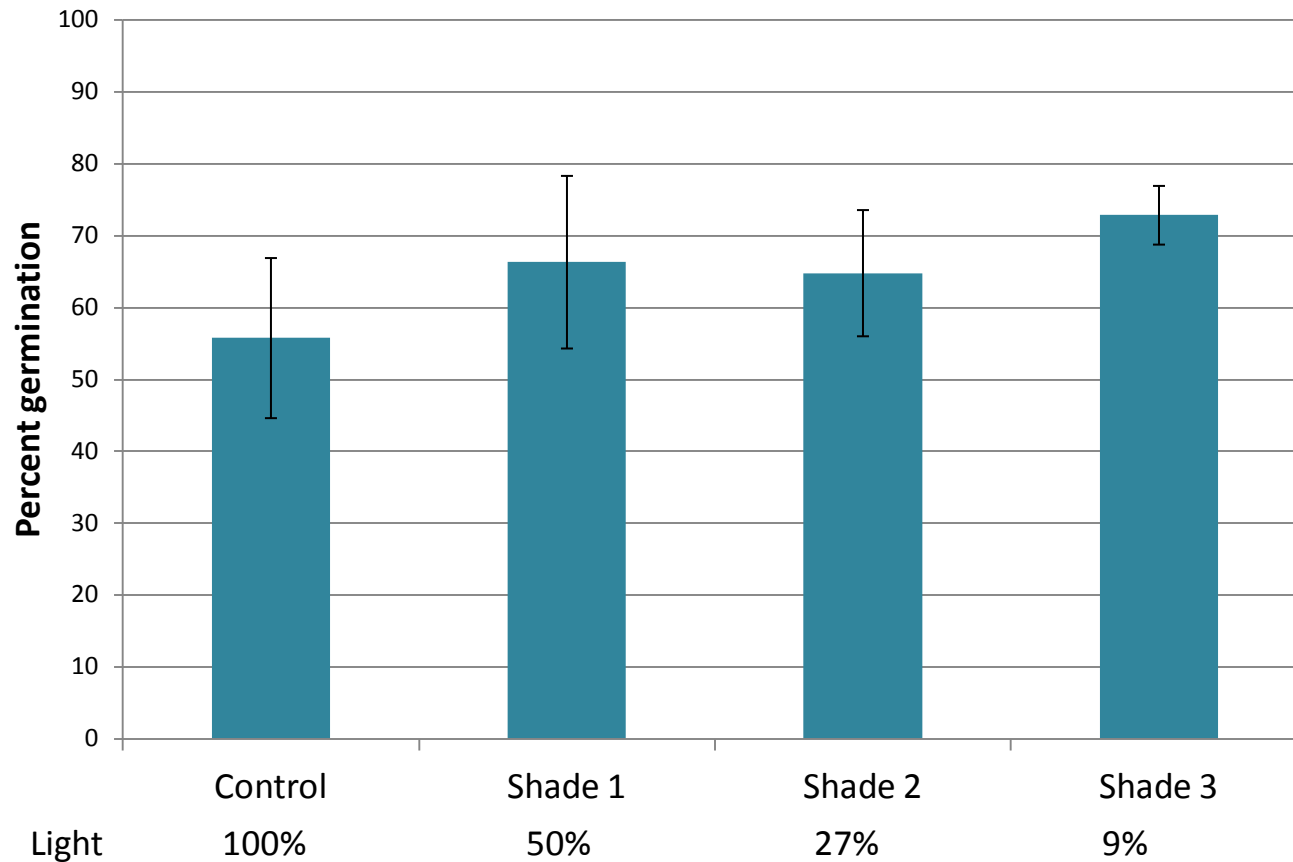
# Germination and Temperature

- Viability of mature, filled seeds collected in November 2010 is **96%**
- Seeds germinate quickly and total germination is high at a wide range of temperatures (12-34°C)
- No innate seed dormancy

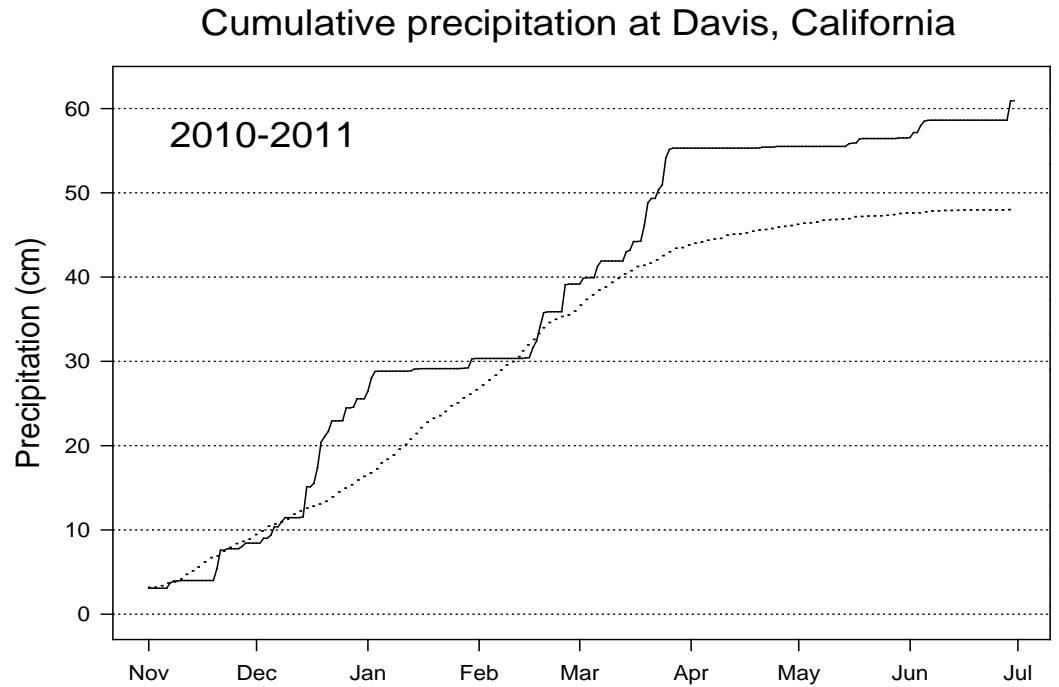
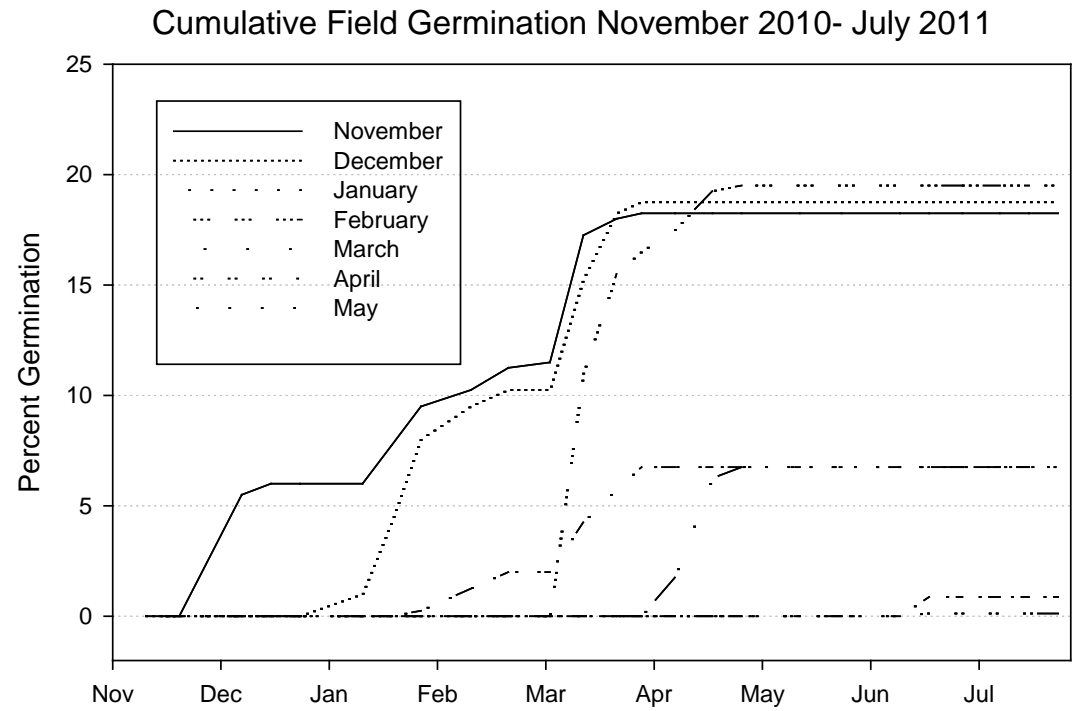


# Germination and Light

- No significant differences in cumulative germination between light treatment (ANOVA,  $\alpha=0.05$ )



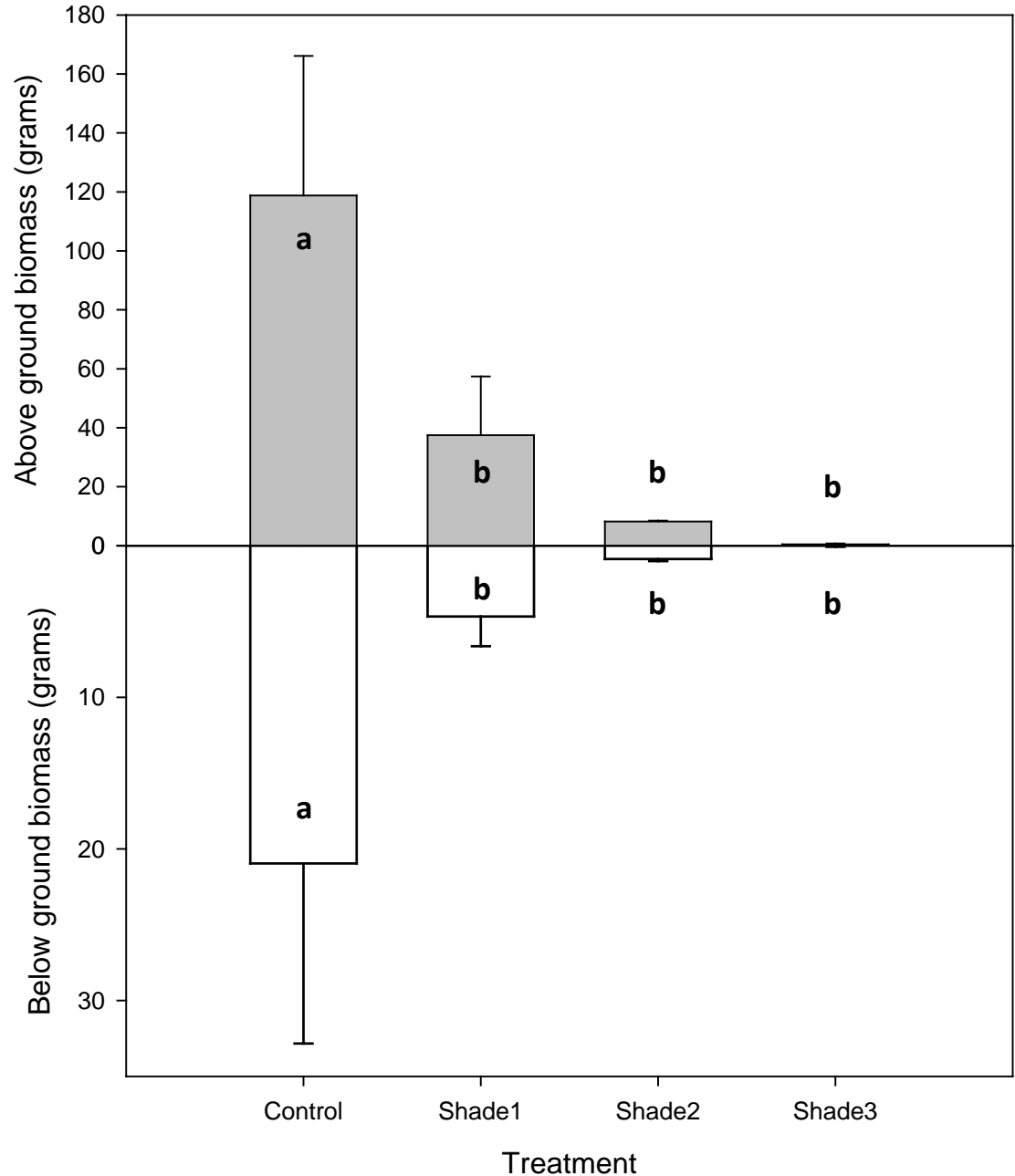
# Germination- Season





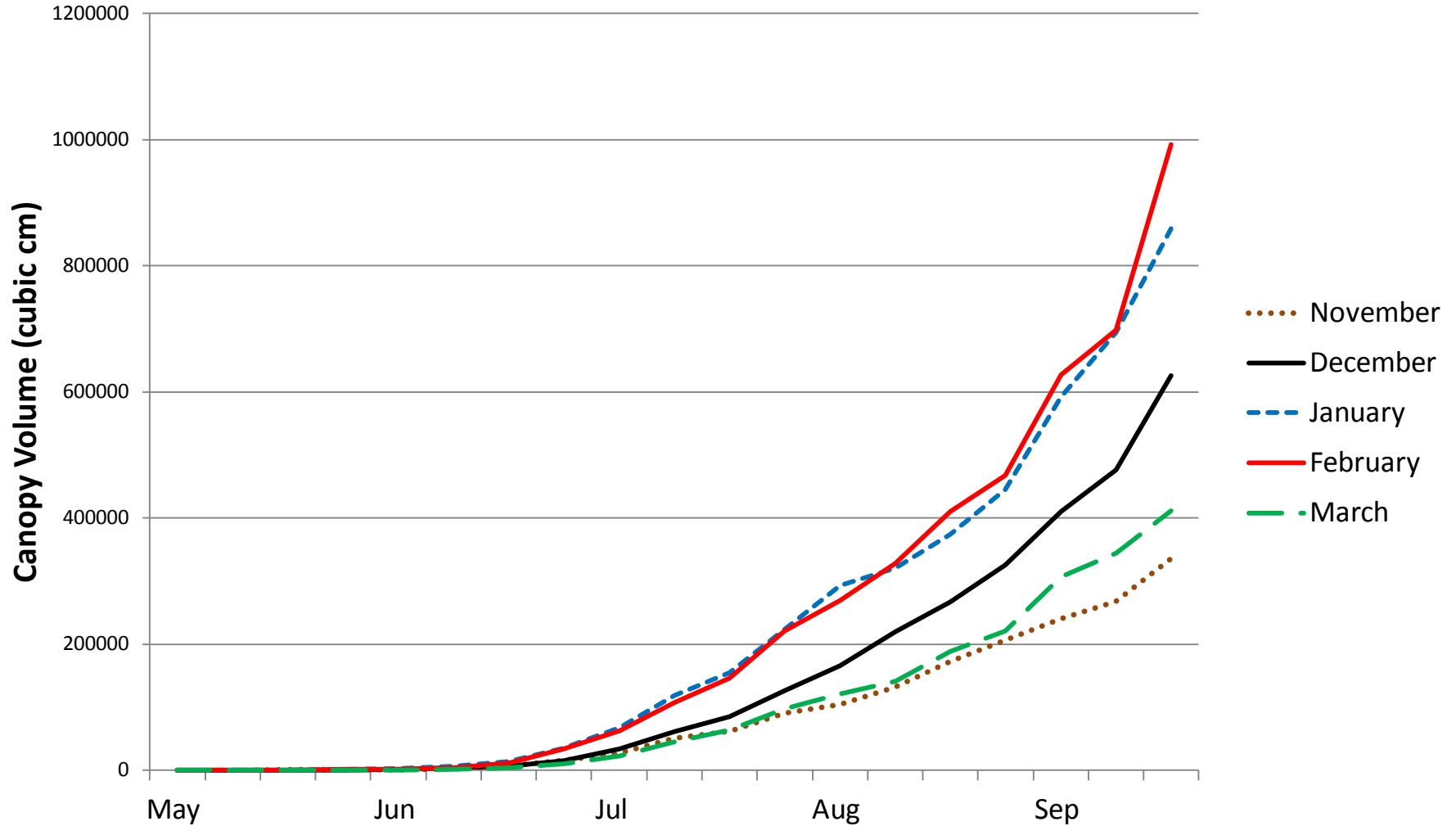
# Growth - Light

- Above and below ground growth are significantly reduced by shading (ANOVA  $\alpha=0.05$ )



# Growth- Season

Canopy growth over time (May-September 15, 2011)



# Flowering!

- Begins during the first two weeks of September = photoperiod
- Seed production: late September through November/December



Field



Greenhouse,  
9% light

# Conclusions

- Seed germination requires sufficient surface soil moisture
- Growth but not germination is greatly reduced by shade
- Seed longevity is likely low (no innate dormancy and small seeds)
- Plant growth is determined by seasonal factors not germination date
- Determinate, predictable flowering phase
- Effective miner of surface soil moisture?



# 2011-2012 *Dittrichia graveolens* studies

## Location

### GERMINATION

Temperature      Temperature table

Season      Field

### GROWTH AND PHENOLOGY

Season      Field

Root growth      Field (Minirhizotron)

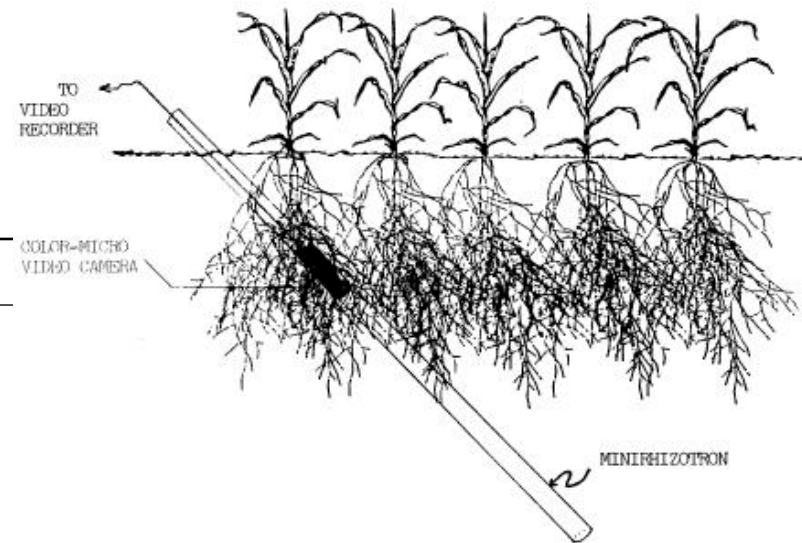


Image: [www.rootimage.msu.com](http://www.rootimage.msu.com)



# Management recommendations

- Pre-emergence chemical treatments should be applied early (November, December).
- Late season mowing may be effective, but should correspond with maximum above-ground growth (mid- late August) prior to flowering
- Preventing seed production for 1-2 years will likely deplete the seed bank and greatly reduce the population.
- Recontamination is highly probable. Continued monitoring to detect new populations is recommended.

# Thank you!

