



# Effects of renewable energy development on demography of *Brassica tournefortii*

*Karen E. Tanner, Kara A. Moore, Ingrid M. Parker, Rebecca R. Hernandez*



**ARIDLAB**  
energy | soils | aridlands

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Overarching questions:

How do solar panels affect the local microclimate?

How does change to natural light, soil temperature, and water runoff regimes affect invader performance?

**Do effects differ for aboveground vs. belowground performance?**





## Background

Site description  
Study design

## Microsite characterization

Photosynthetic radiation (PAR)  
Soil temperature  
Soil moisture

## Demographic work

Aboveground performance  
Seed bank effects



# Background

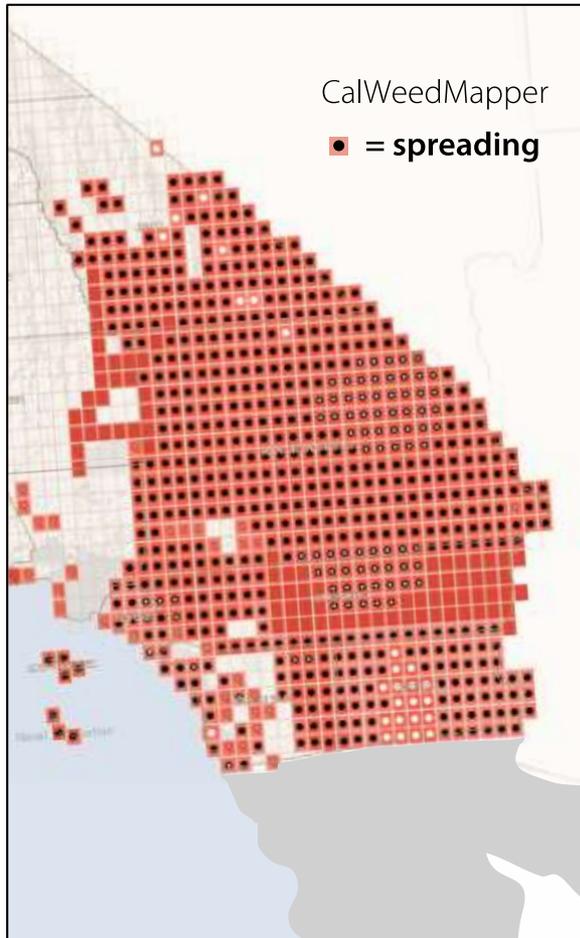
## Experimental array site

Desert Renewable Energy  
Conservation Plan Area



# Background

## Experimental array site



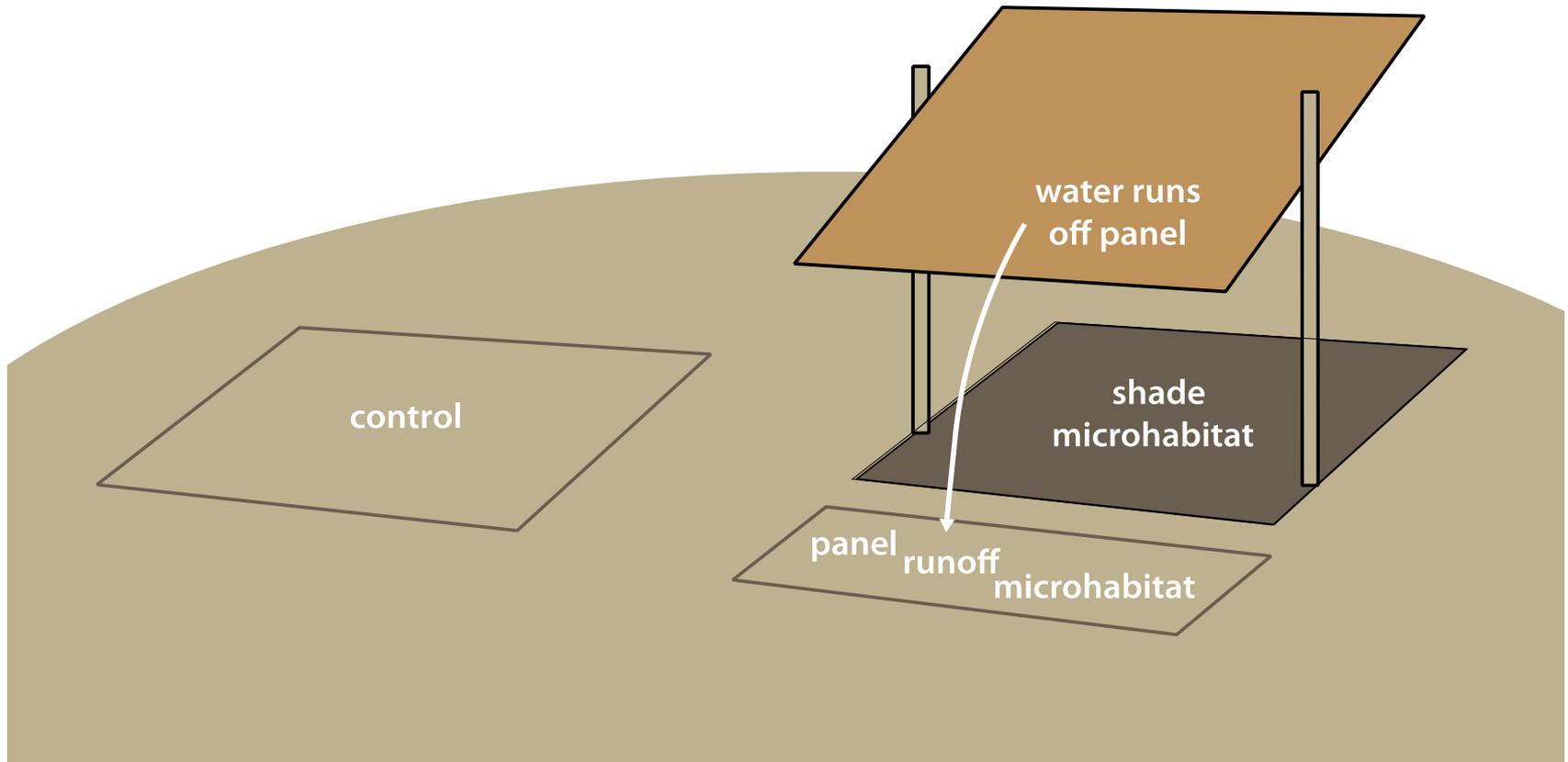
# Background

## Experimental array site



# Background

## Experimentally-created microhabitats at the array



# Microsite characterization

## Large effects of shading on PAR receipts



NW	N	NE
W	Ce	E
SW	S	SE

# Microsite characterization

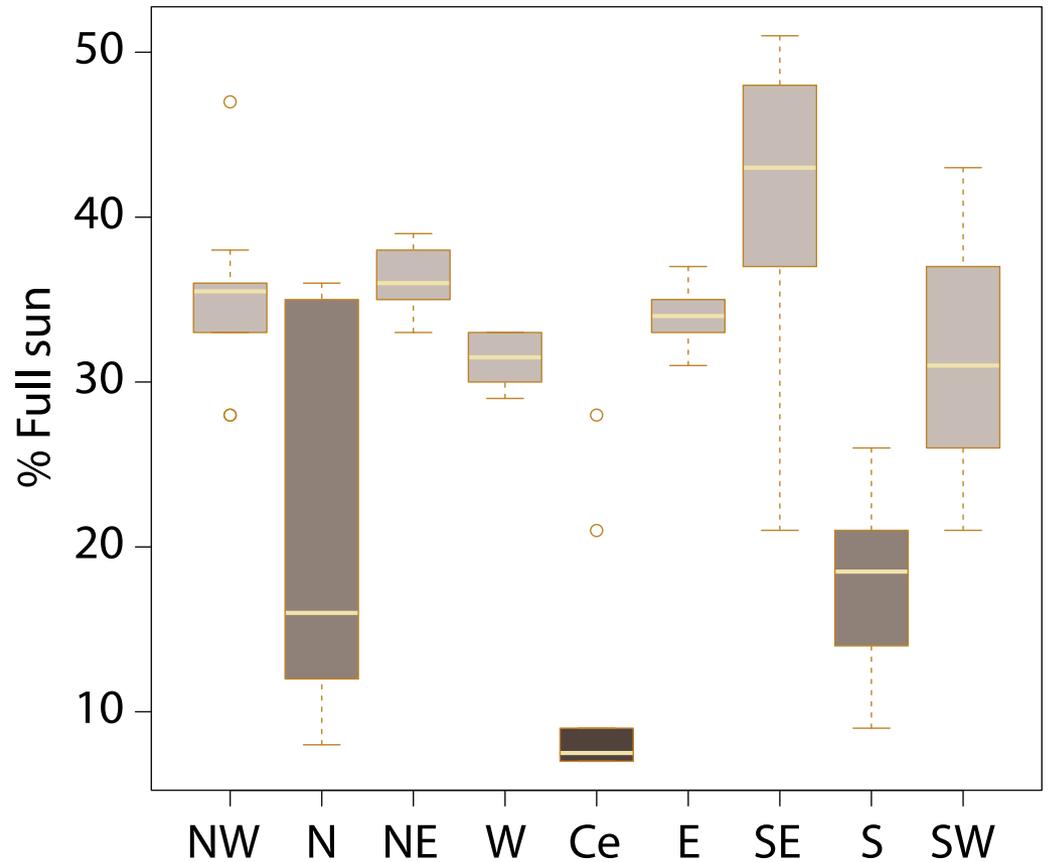
## Large effects of shading on PAR receipts



NW	N	NE
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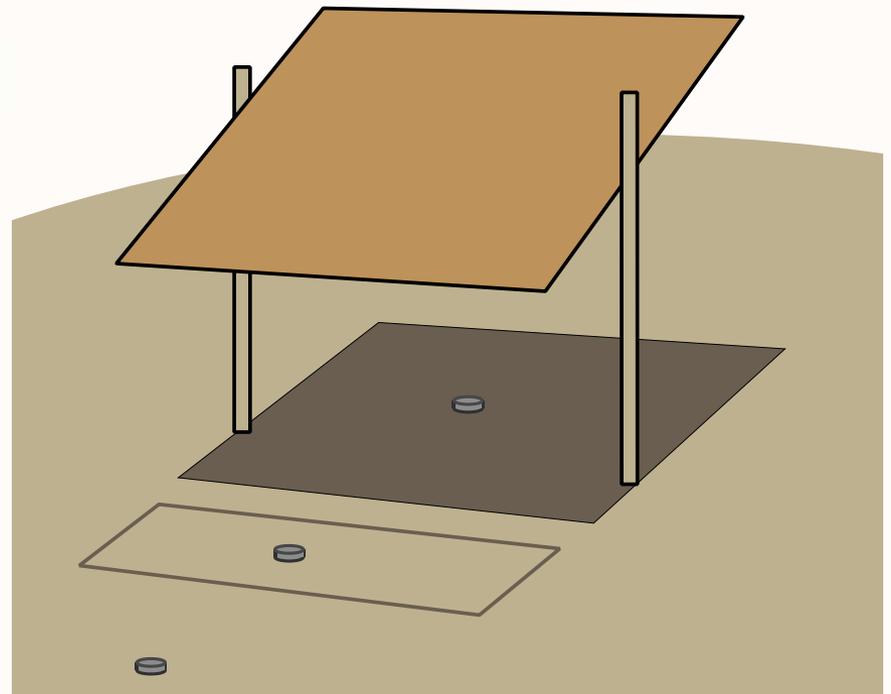
# Microsite characterization

## Large effects of shading on PAR receipts



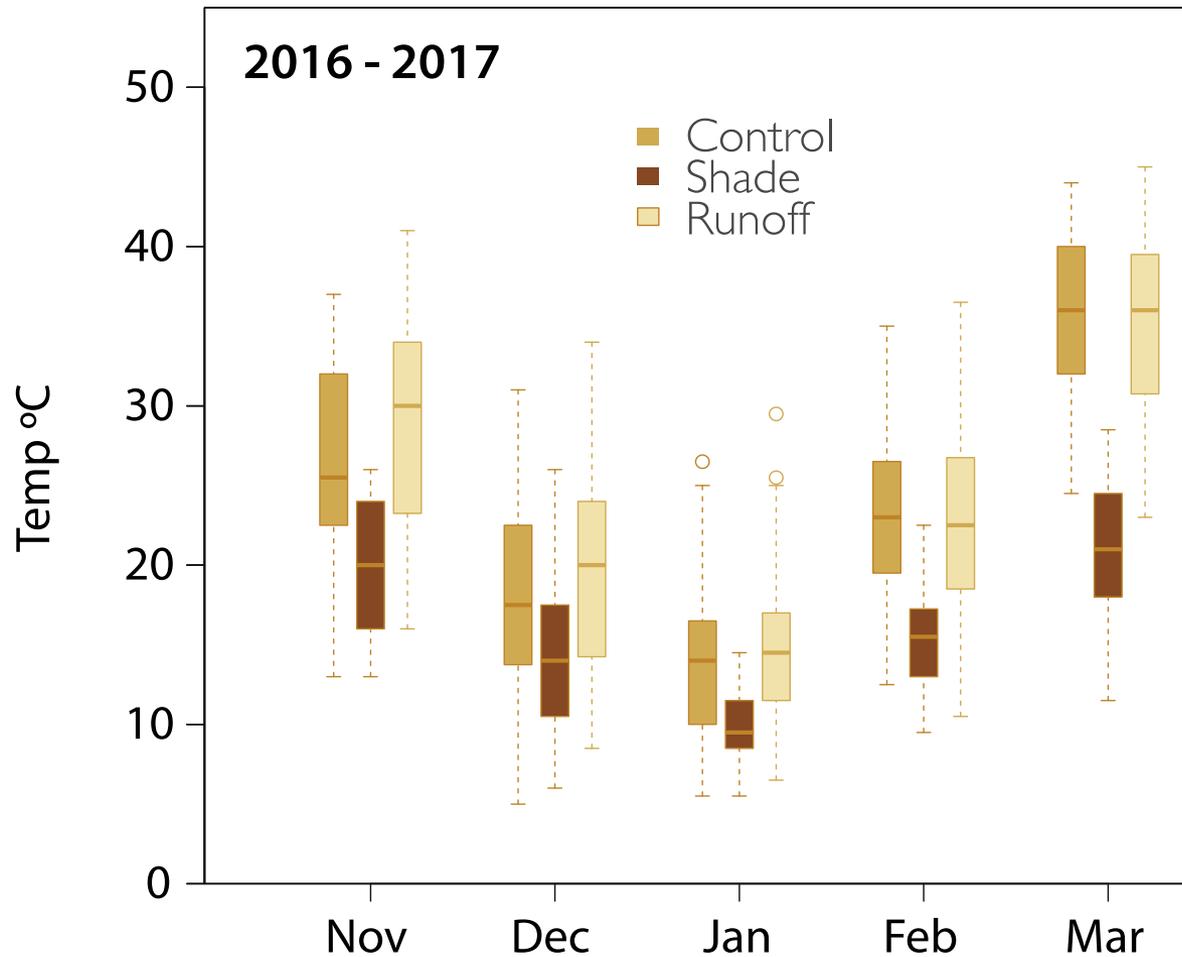
# Microsite characterization

## Effects on soil temperature



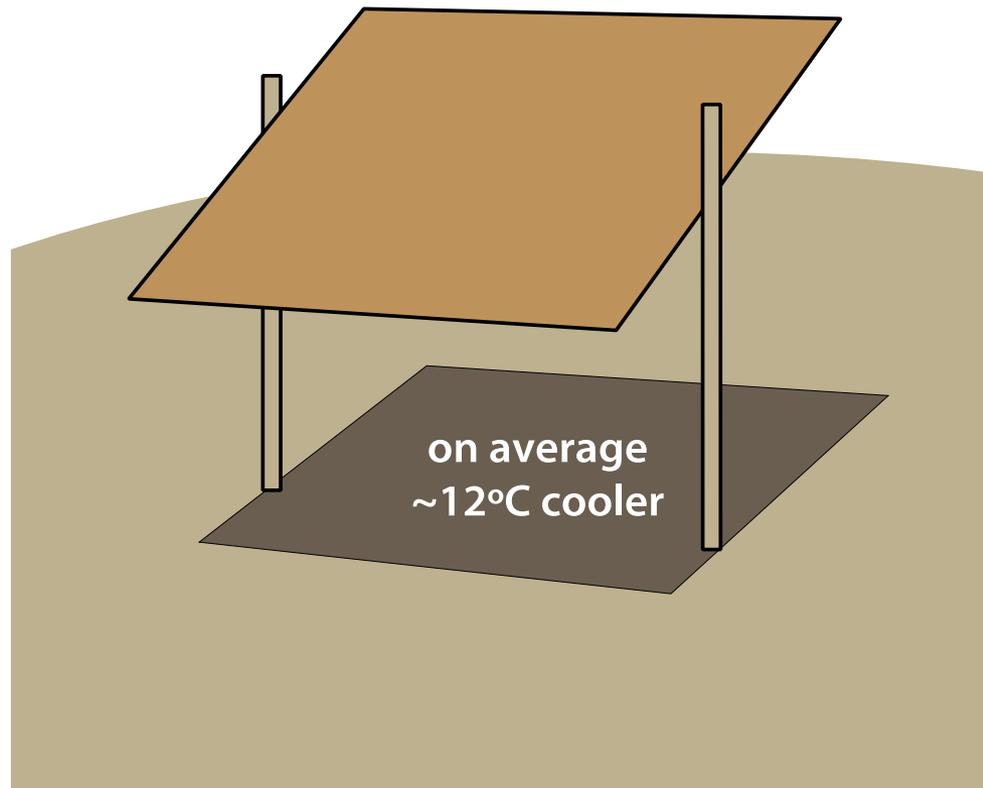
# Microsite characterization

## Large effects on soil temperature



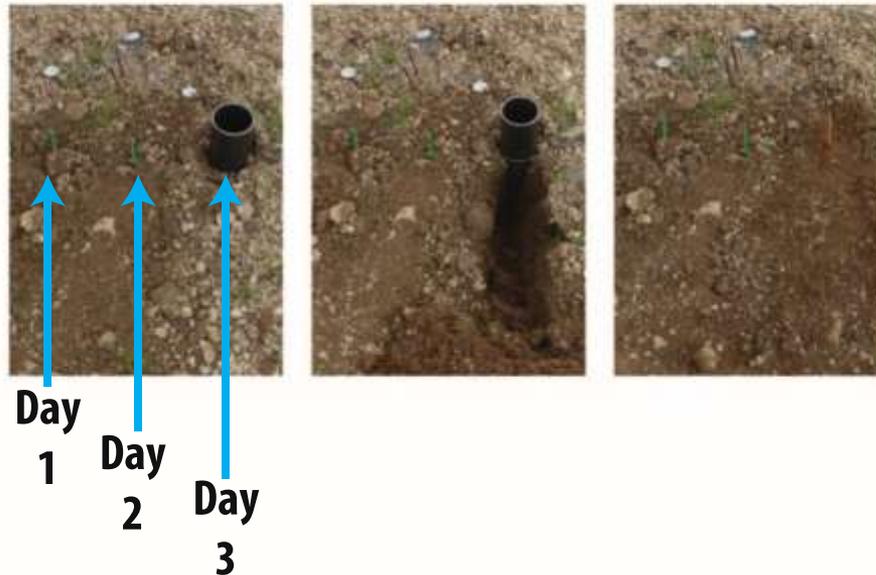
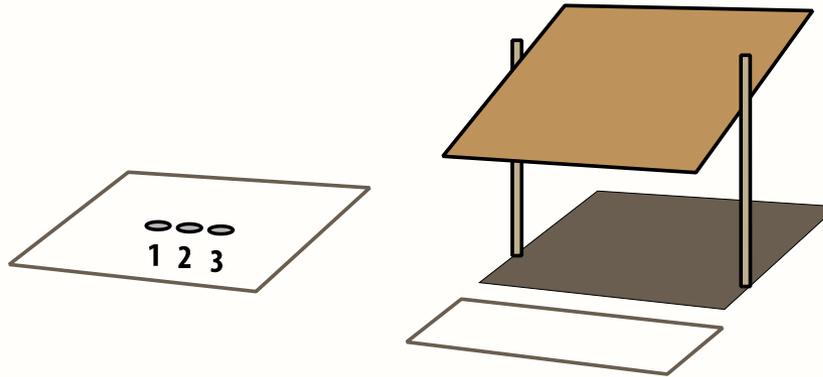
# Microsite characterization

**Large effects on soil temperature**



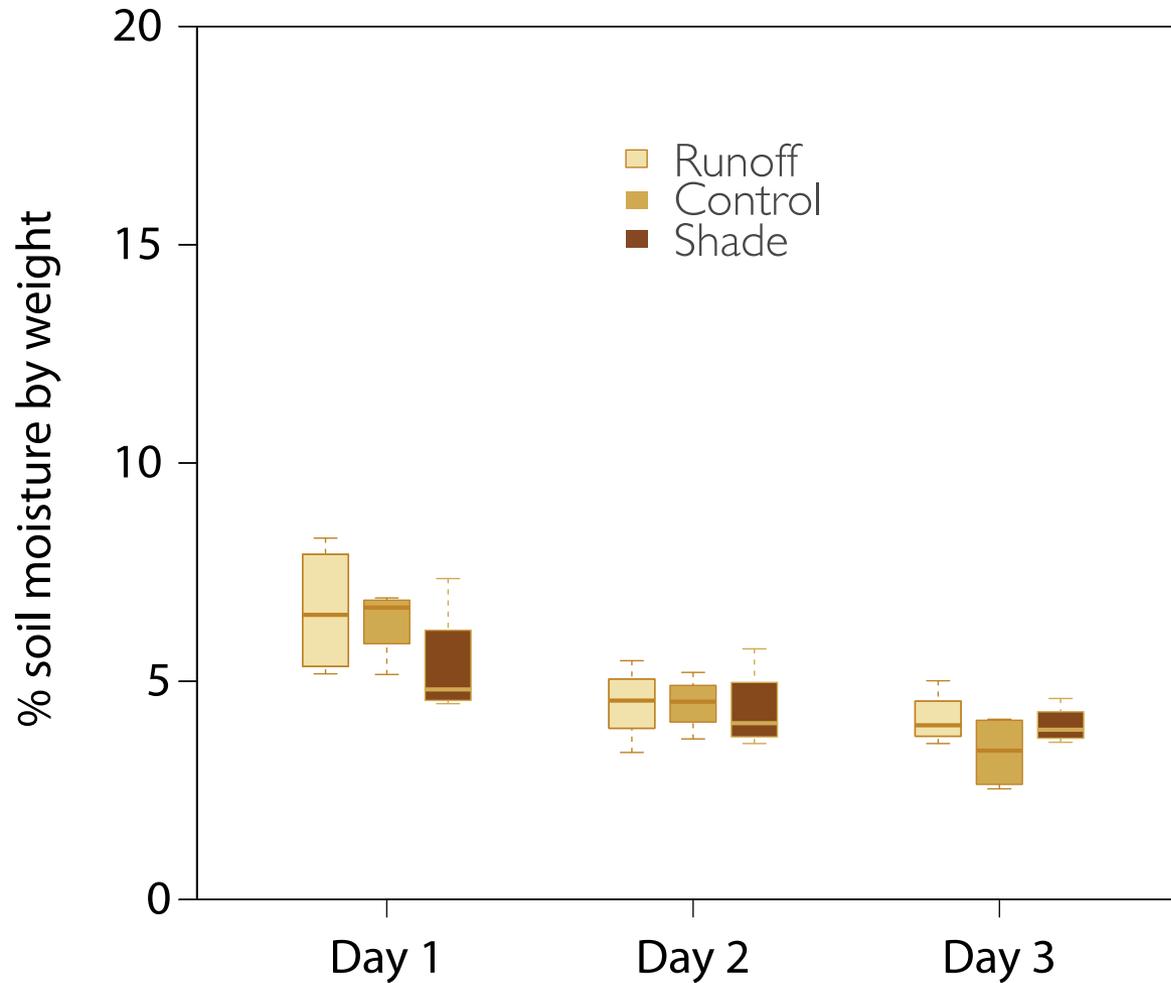
# Microsite characterization

## Effects on soil moisture

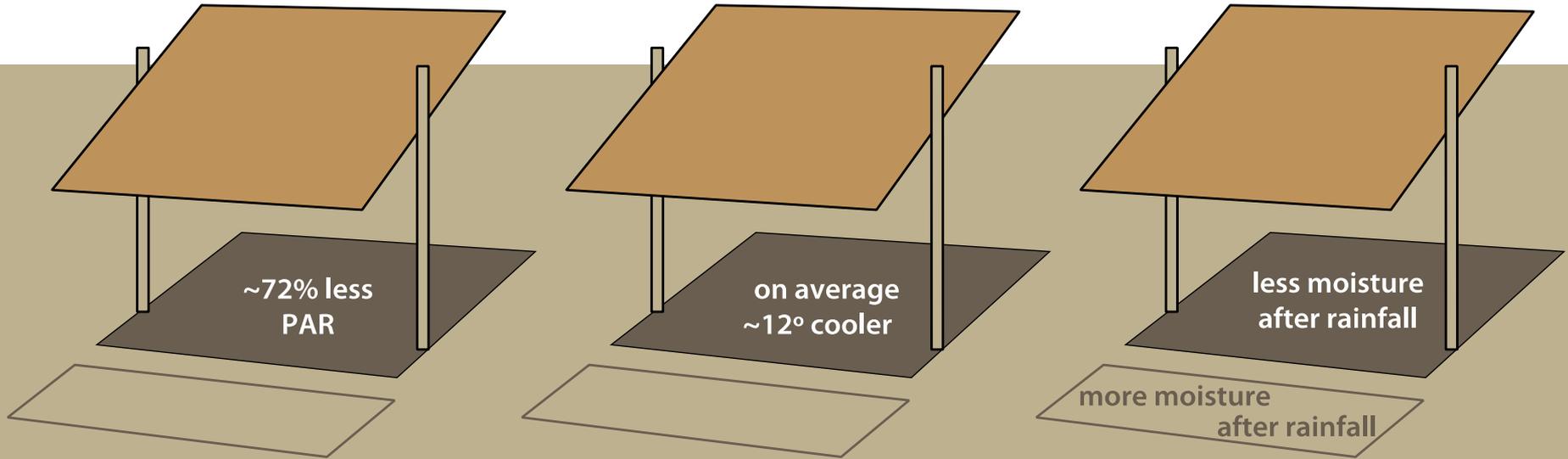


# Microsite characterization

## Effects on soil moisture



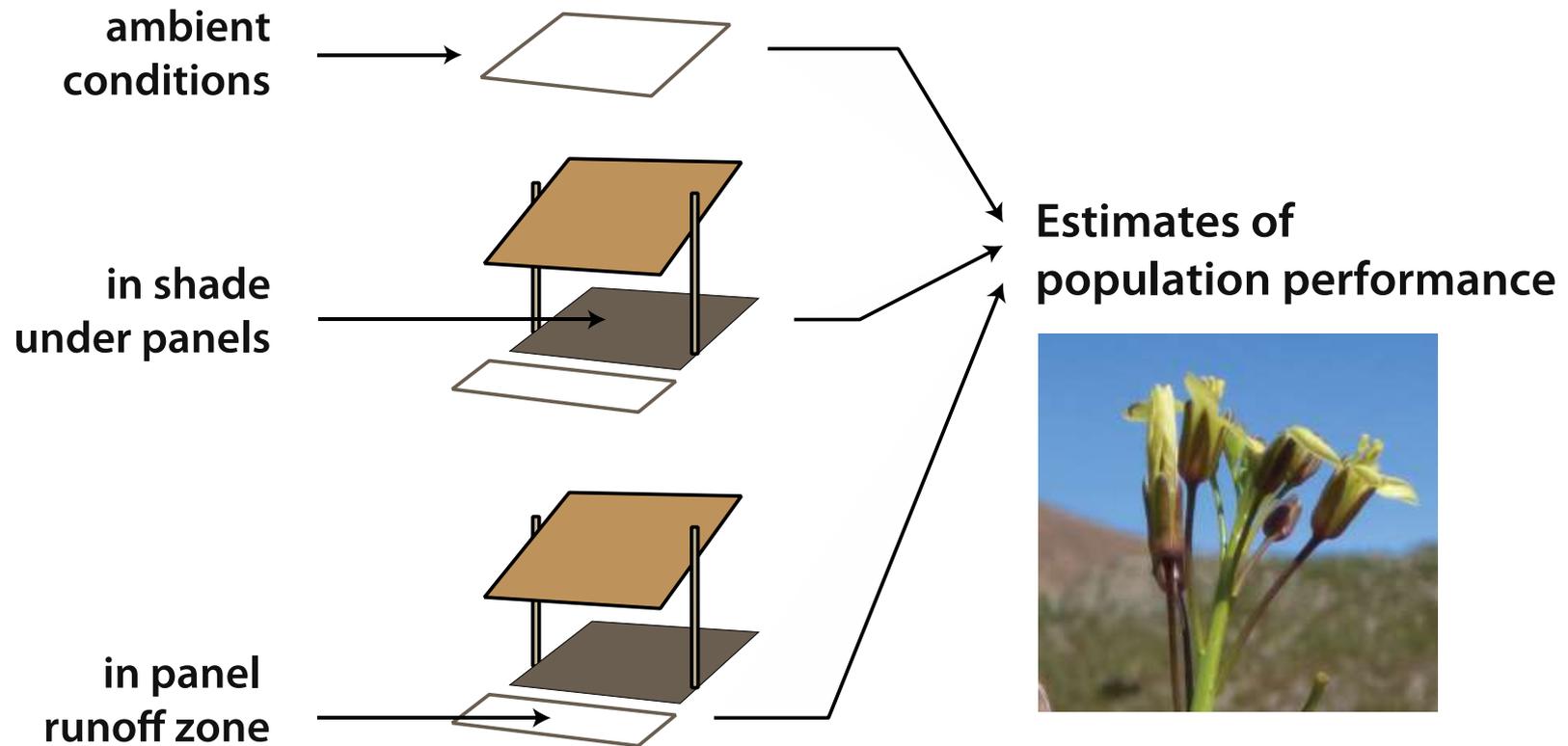
# Demographic work



# Demographic work

## Vital Rates

Seed survival in the seed bank  
Seed germination  
Seedling emergence  
Survivorship to maturity  
Reproductive output



# Demographic work

## Aboveground performance



Emergent



Juvenile



Bud



Flower

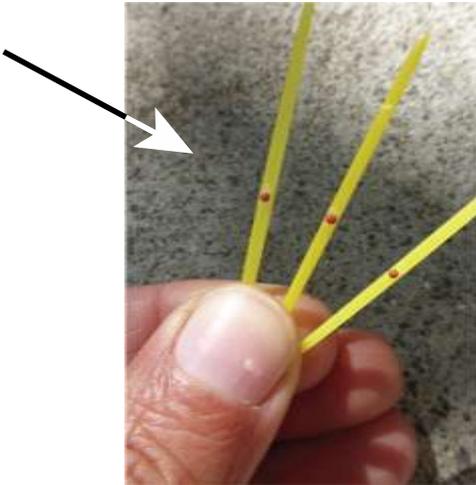


Fruit

# Demographic work

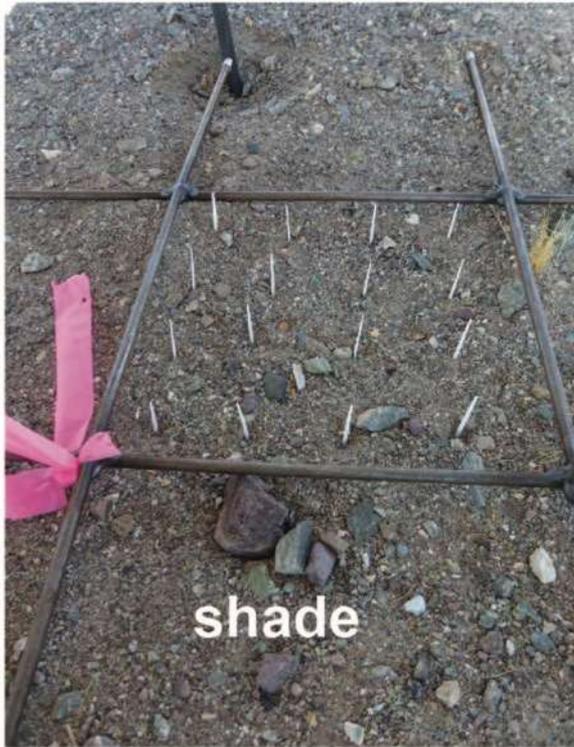
## Seedling emergence

Seed



# Demographic work

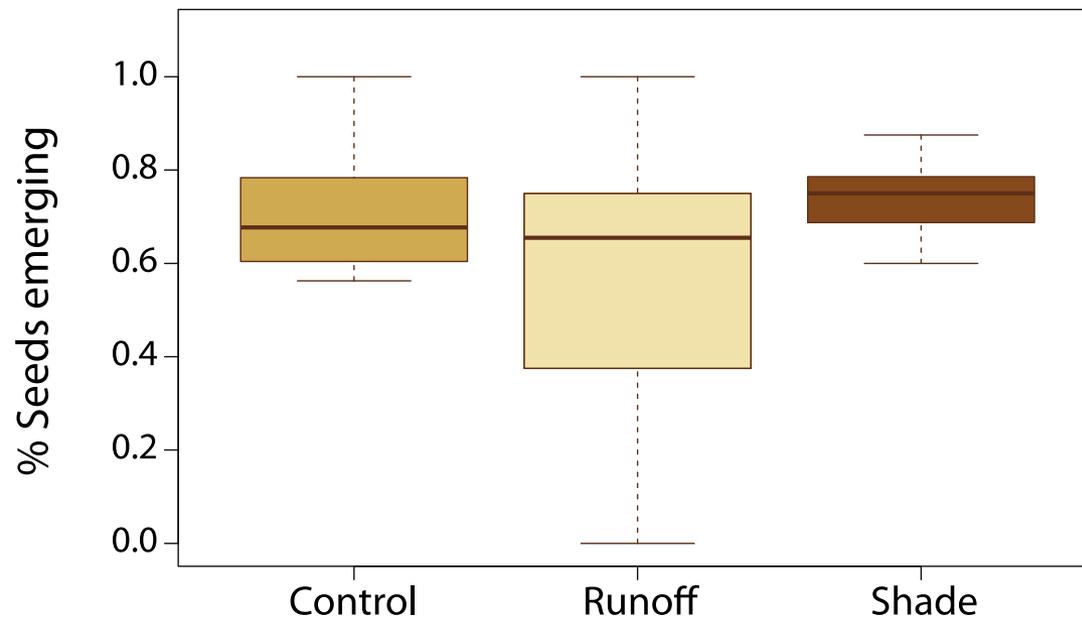
## Seedling emergence



# Demographic work

## Reduced emergence in water runoff zone

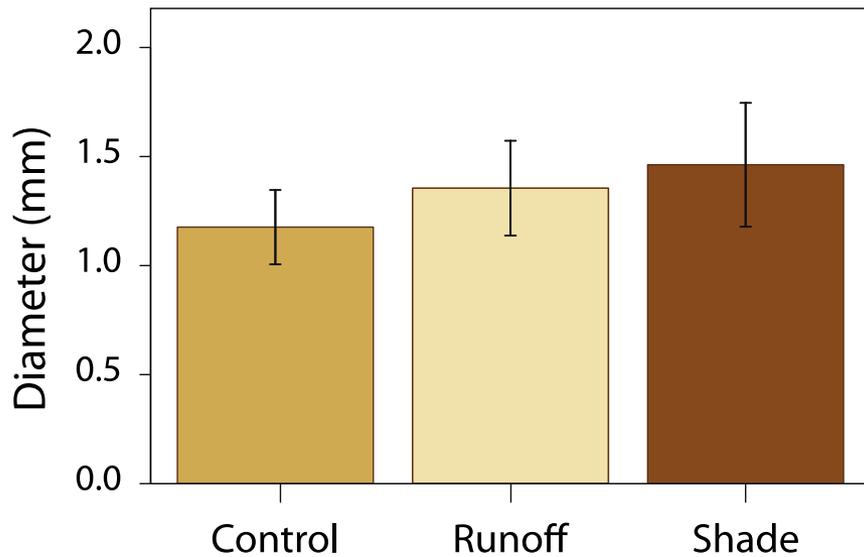
Seedlings emerging aboveground



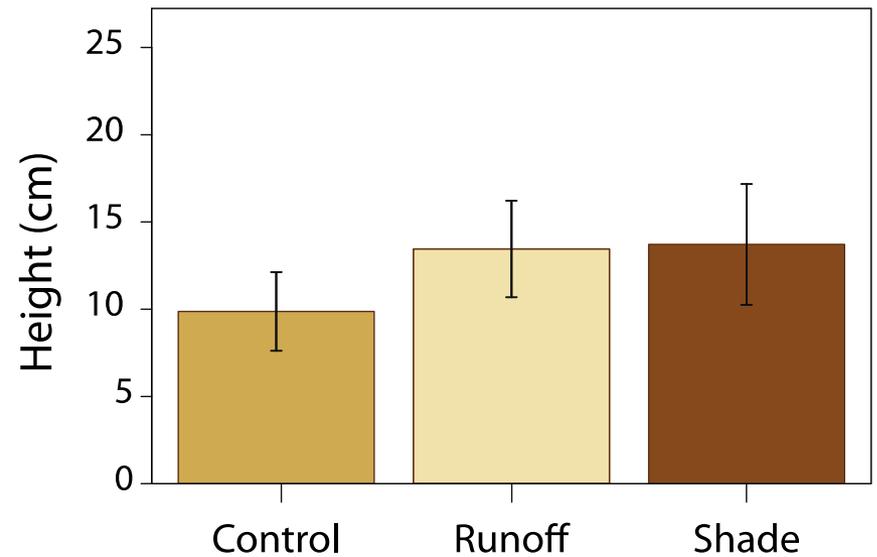
# Demographic work

**Sahara mustard is larger in shade and runoff zone**

Average stem diameter  
by location

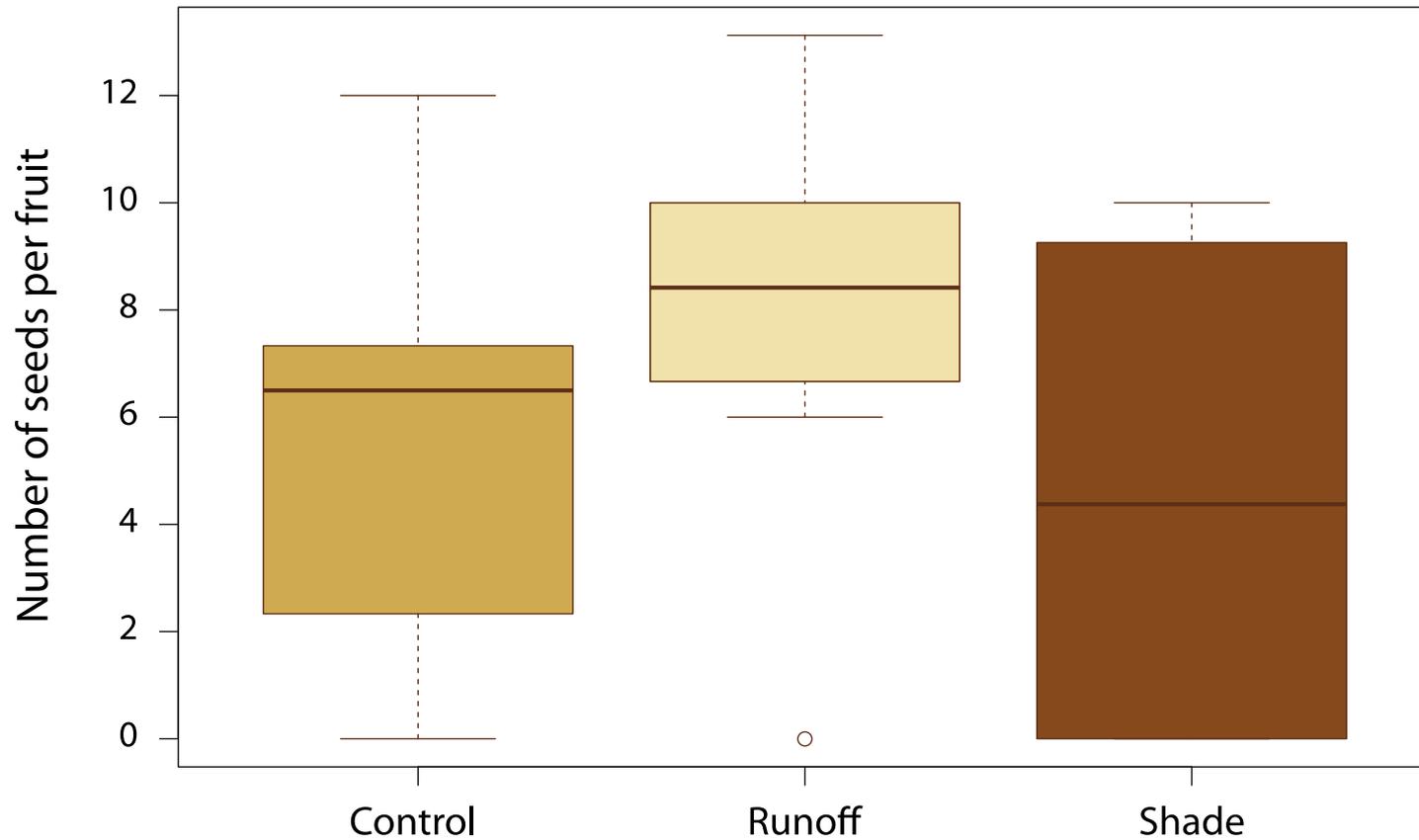


Average height by  
location



# Demographic work

**Increased seeds per fruit in water runoff zone**



# Demographic work

## Seed germination





Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

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Acta Oecologica 24 (2003) 255–263

ACTA  
OECOLOGICA  
INTERNATIONAL JOURNAL OF ECOLOGY

[www.elsevier.com/locate/actoec](http://www.elsevier.com/locate/actoec)

Original article

## The influence of soil moisture on losses of buried seeds to fungi

Michelle Schafer, Peter M. Kotanen \*

Plant Ecol (2012) 213:5  
DOI 10.1007/s11258-01

## Edaphic factors influence the longevity of seeds in the soil

Robin J. Pakeman · James L. Small ·  
Lynne Torvell

# Demographic work

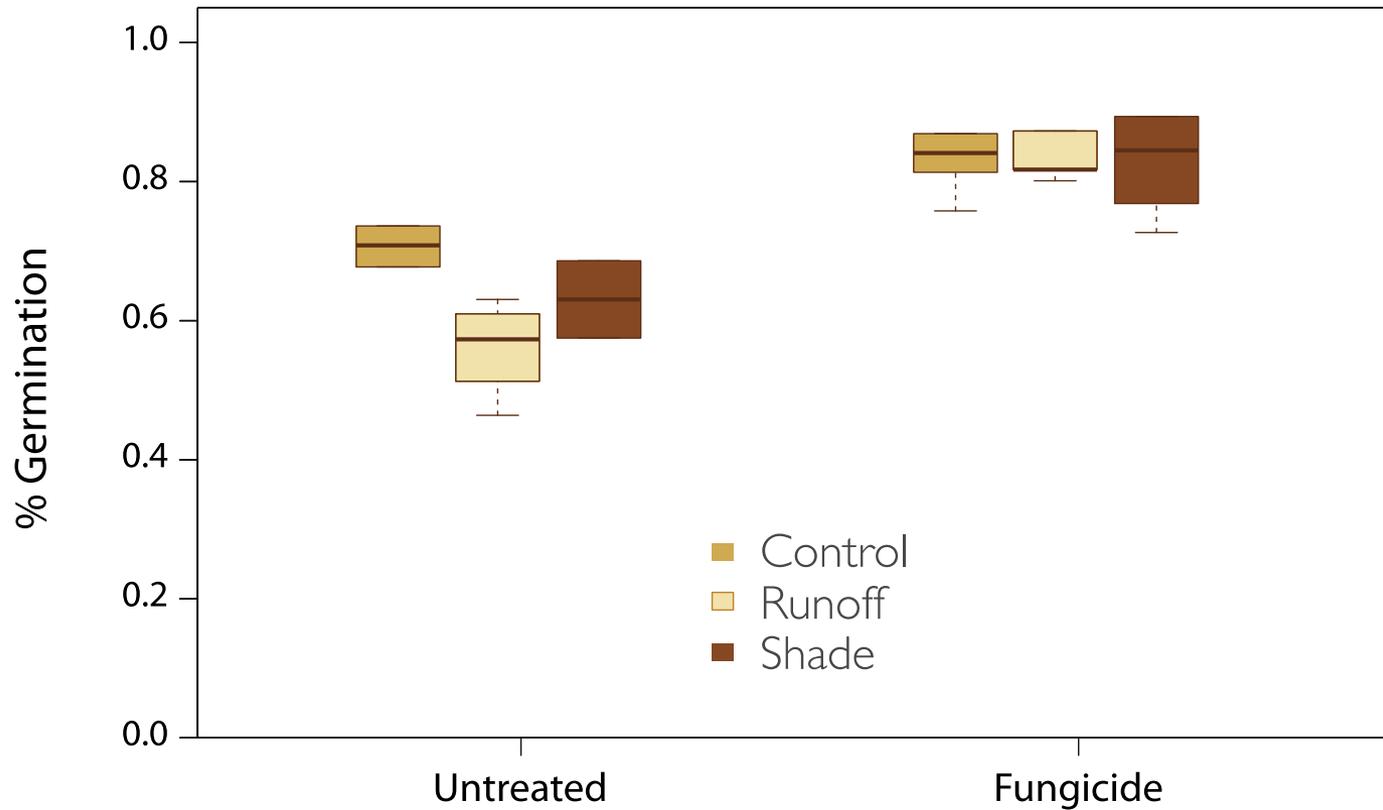
## Fungicide experiment

water control treatment



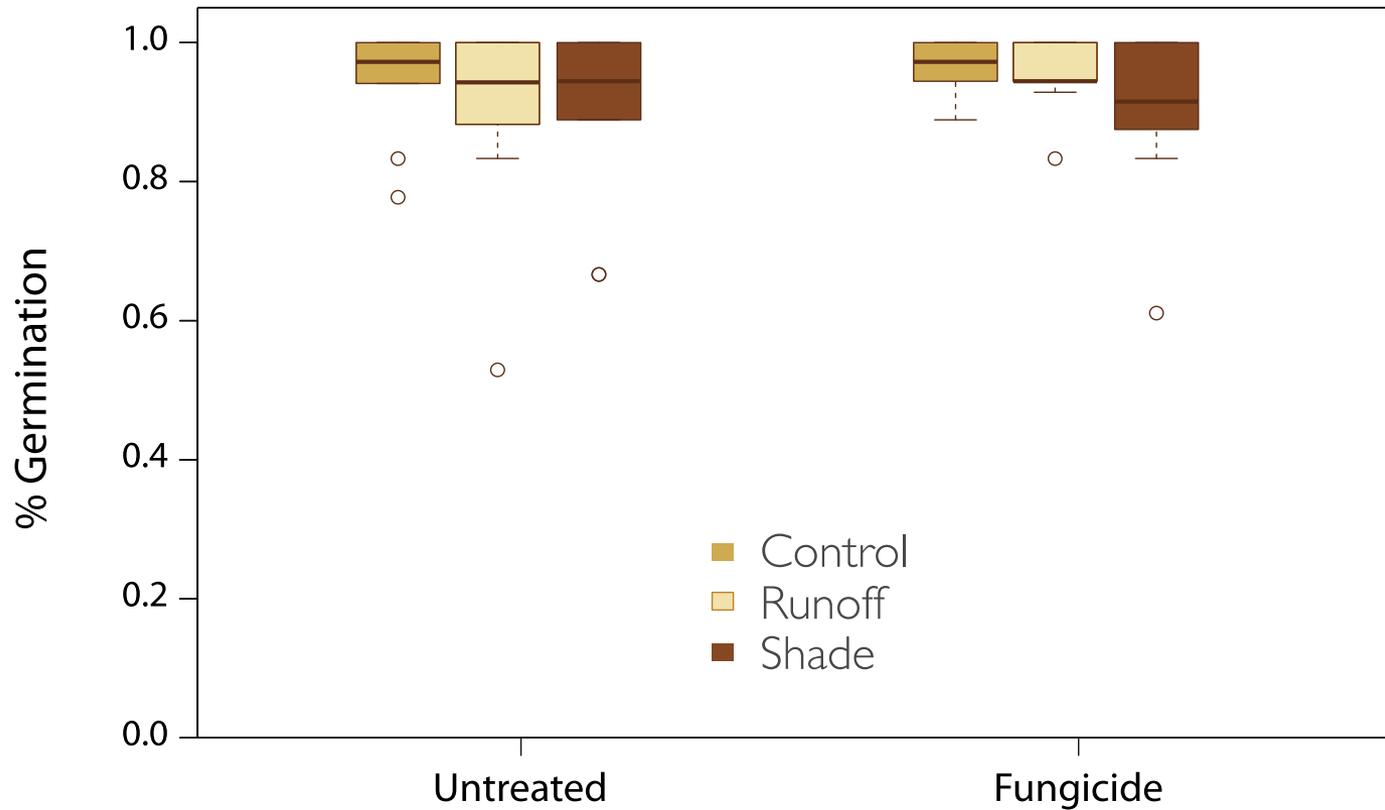
# Demographic work

**Possible result if pathogen activity is increased?**



# Demographic work

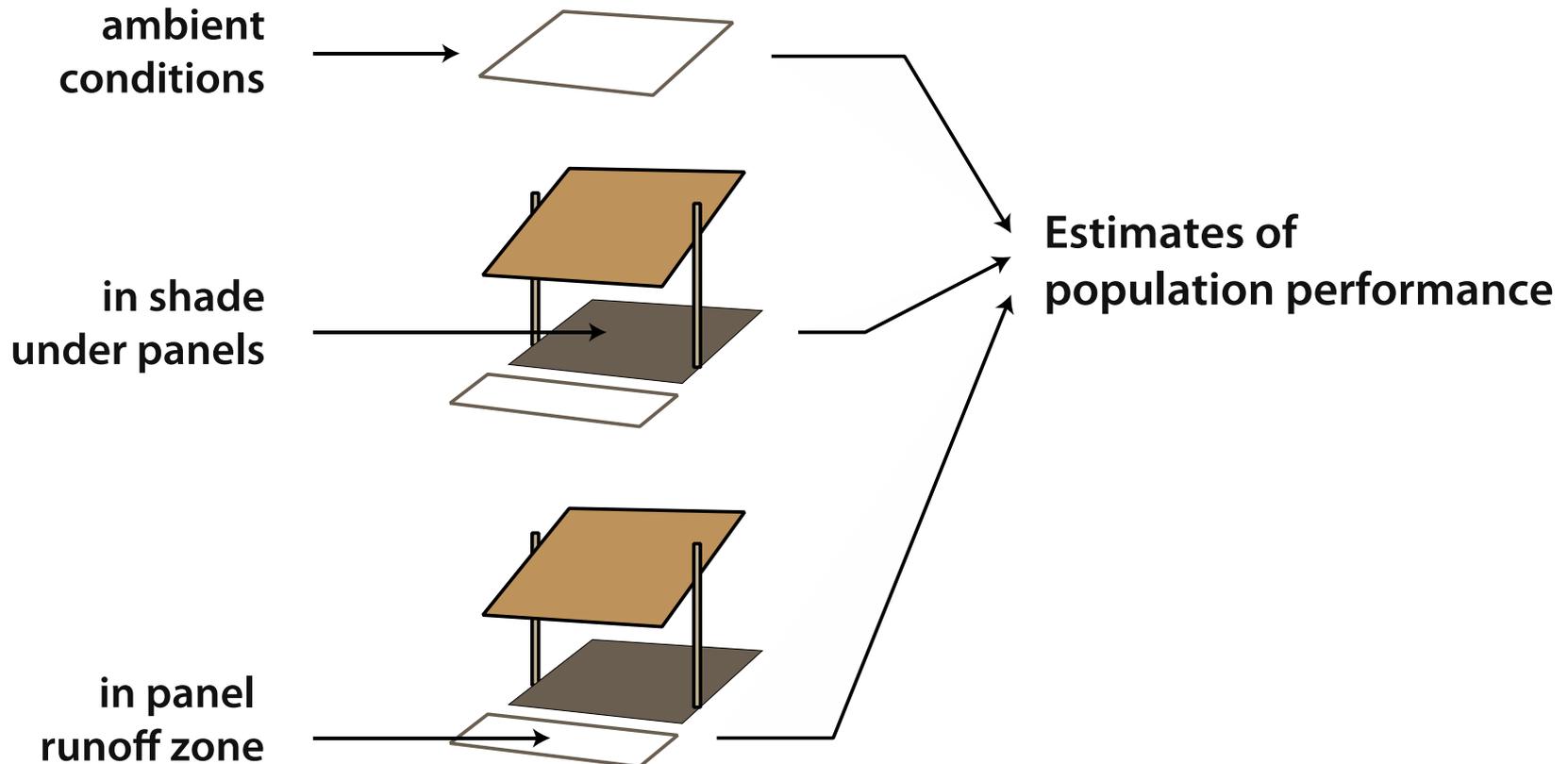
**No real effect of fungicide treatment**

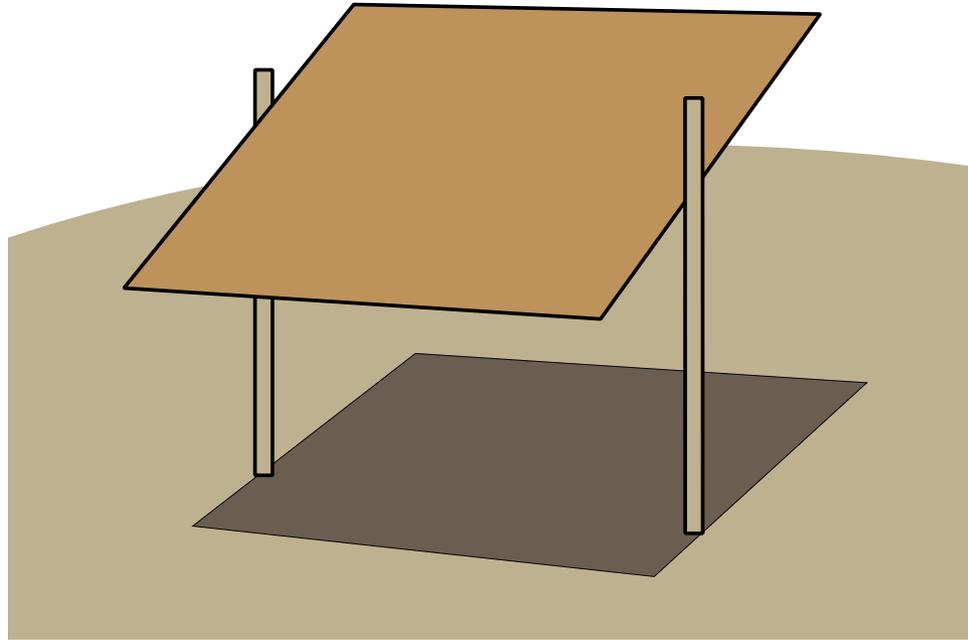


# Demographic work

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Seed germination  
Seedling emergence  
Survivorship to maturity  
Reproductive output





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...and the Jill Barrett Foundation

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