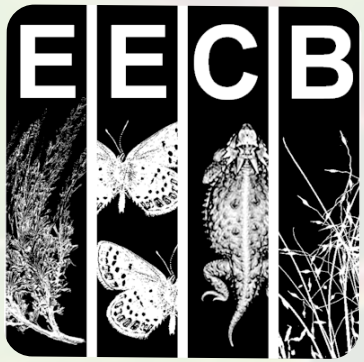
The little apple can fall far from the tree: Seed dispersal in greenleaf manzanita (*Arctostaphylos patula*)

Christopher Moore
and Steve Vander Wall

Program in Ecology, Evolution, and Conservation Biology
University of Nevada, Reno

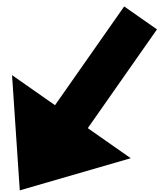


96th ESA Annual Meeting
10 August 2011
Austin, Texas

why disperse?

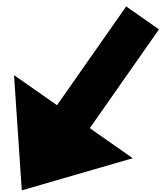
why disperse?

why disperse?



departure

why disperse?



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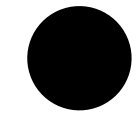

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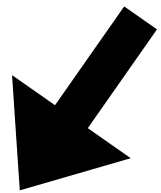
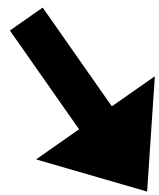




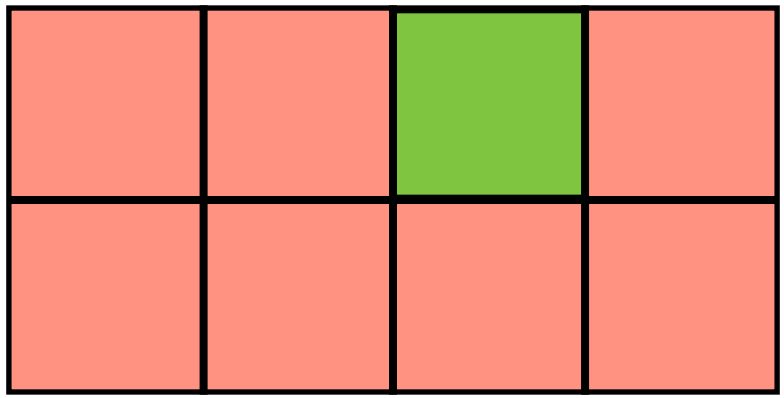
departure

arrival

why disperse?

departure

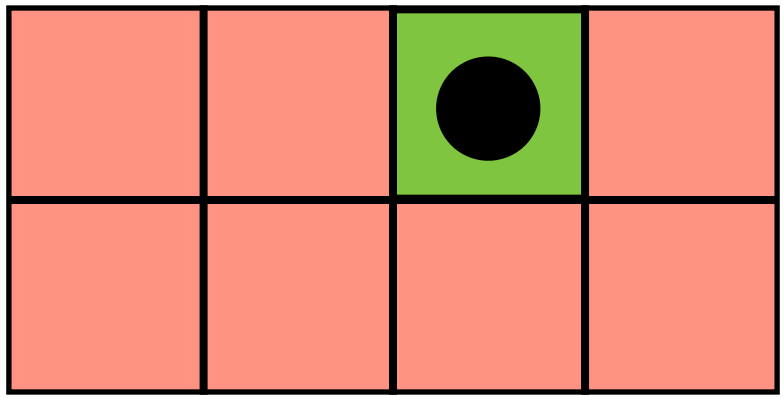
arrival

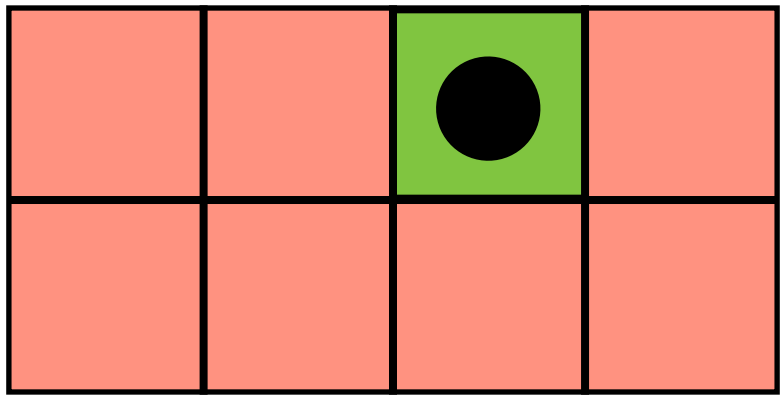


why disperse?

departure

arrival

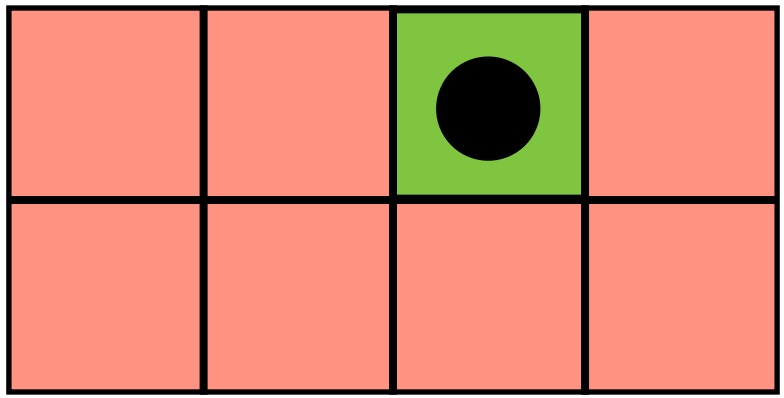




directed dispersal hypothesis

"... disproportionate arrival in sites especially favourable for survival."

(*Wenny, Evo. Eco. Research, 2001*)



manzanita:
a novel DDH example

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preliminary observations

1. seedlings emerge
   - after fire
   - in clumps
2. despite its name, seeds more nutty than fruity

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preliminary observations

1. seedlings emerge
   - after fire
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2. despite its name, seeds more nutty than fruity

literature findings

1. seeds are sensitive to heat
2. seeds need charate for germination

manzanita and DDH: the conceptual model

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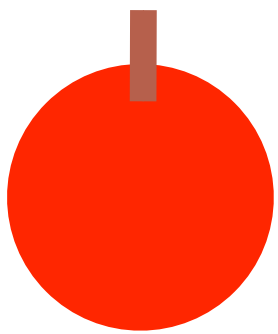
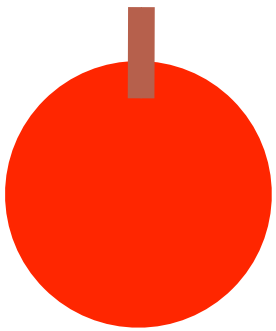
manzanita seeds



manzanita and DDH: the conceptual model

manzanita seeds → seed-caching animals



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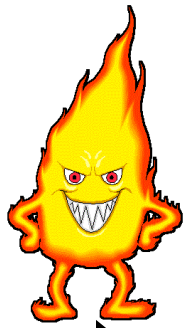

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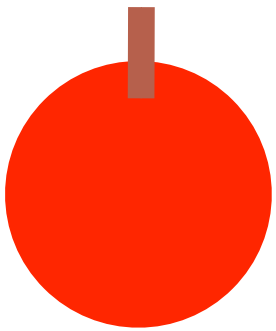

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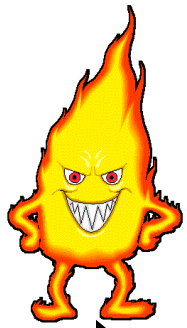
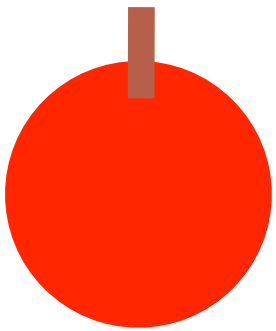
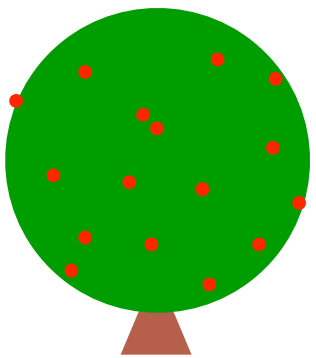


manzanita seeds → seed-caching animals → seedling recruitment





hypothesis

prediction

hypothesis

in fire-prone ecosystems, seed-caching animals are direct dispersers of seeds

prediction

hypothesis

in fire-prone ecosystems, seed-caching animals are direct dispersers of seeds

prediction

seed-caching animals disproportionally disperse manzanita seeds to safe microsites

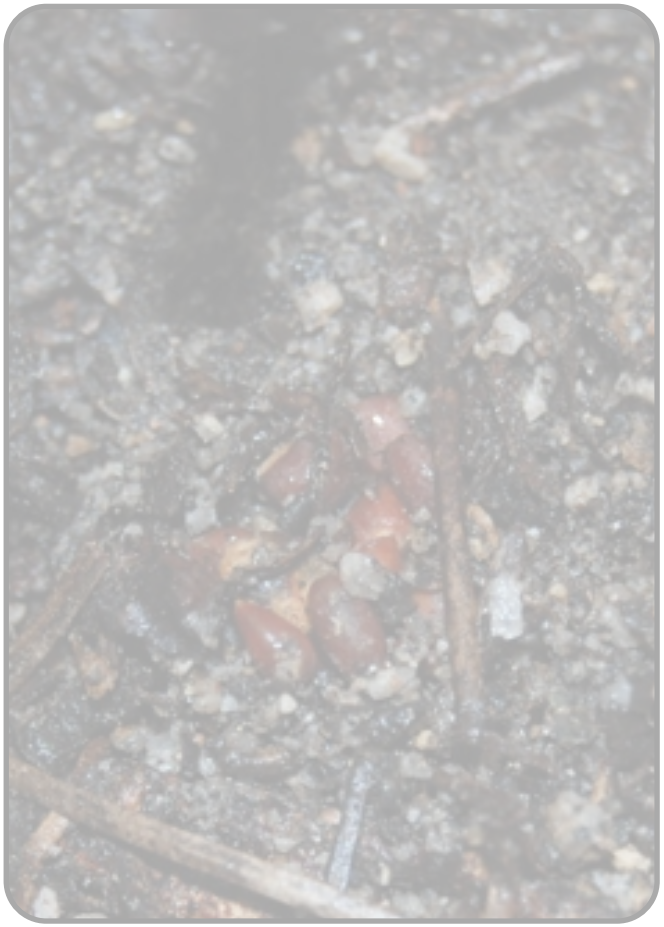
experiments

what?

where?

how?

experiments

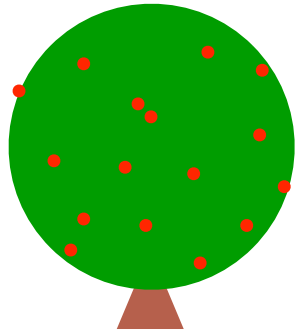


what?

where?

how?

what?

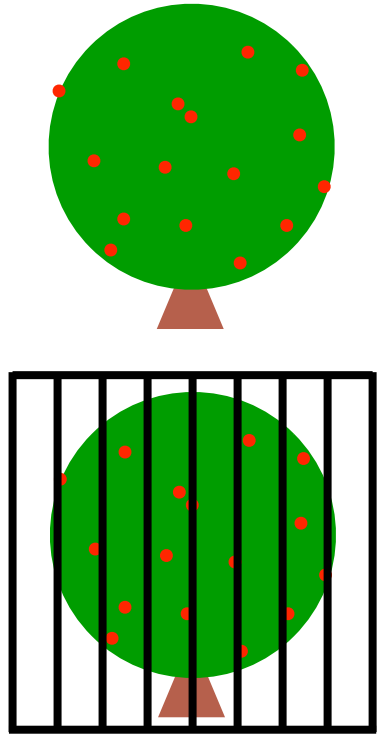


+ all

- none

what?

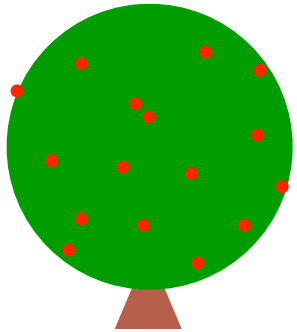
what?



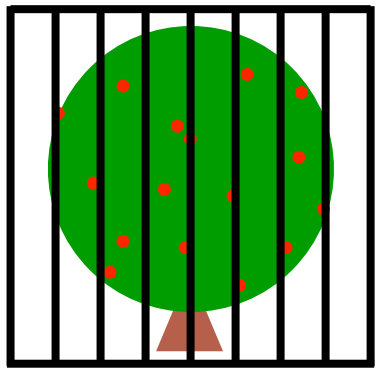
+ all
- none

+ invertebrates
- vertebrates

what?



+ all
- none



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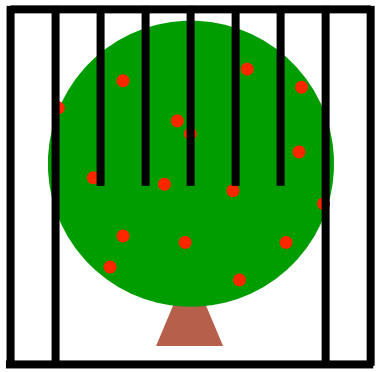
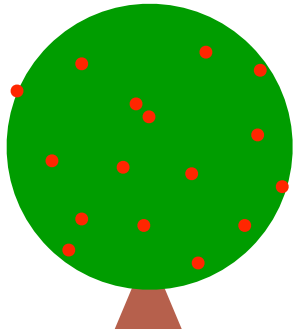
- vertebrates



+ rodents
- mammals and birds

what?



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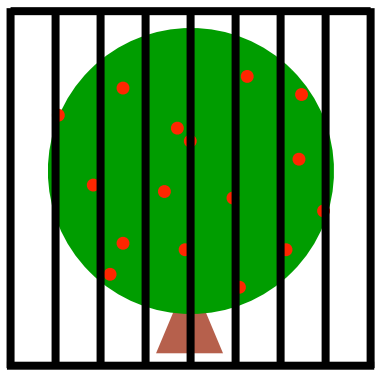
- none



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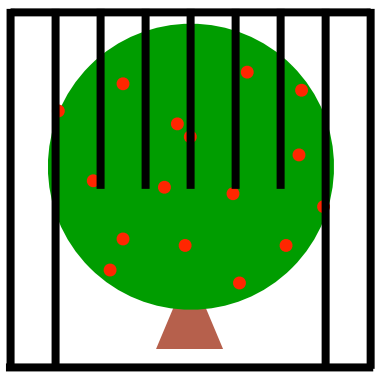
- vertebrates



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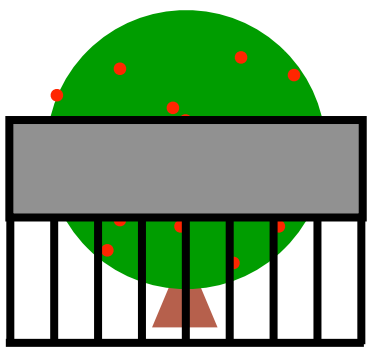
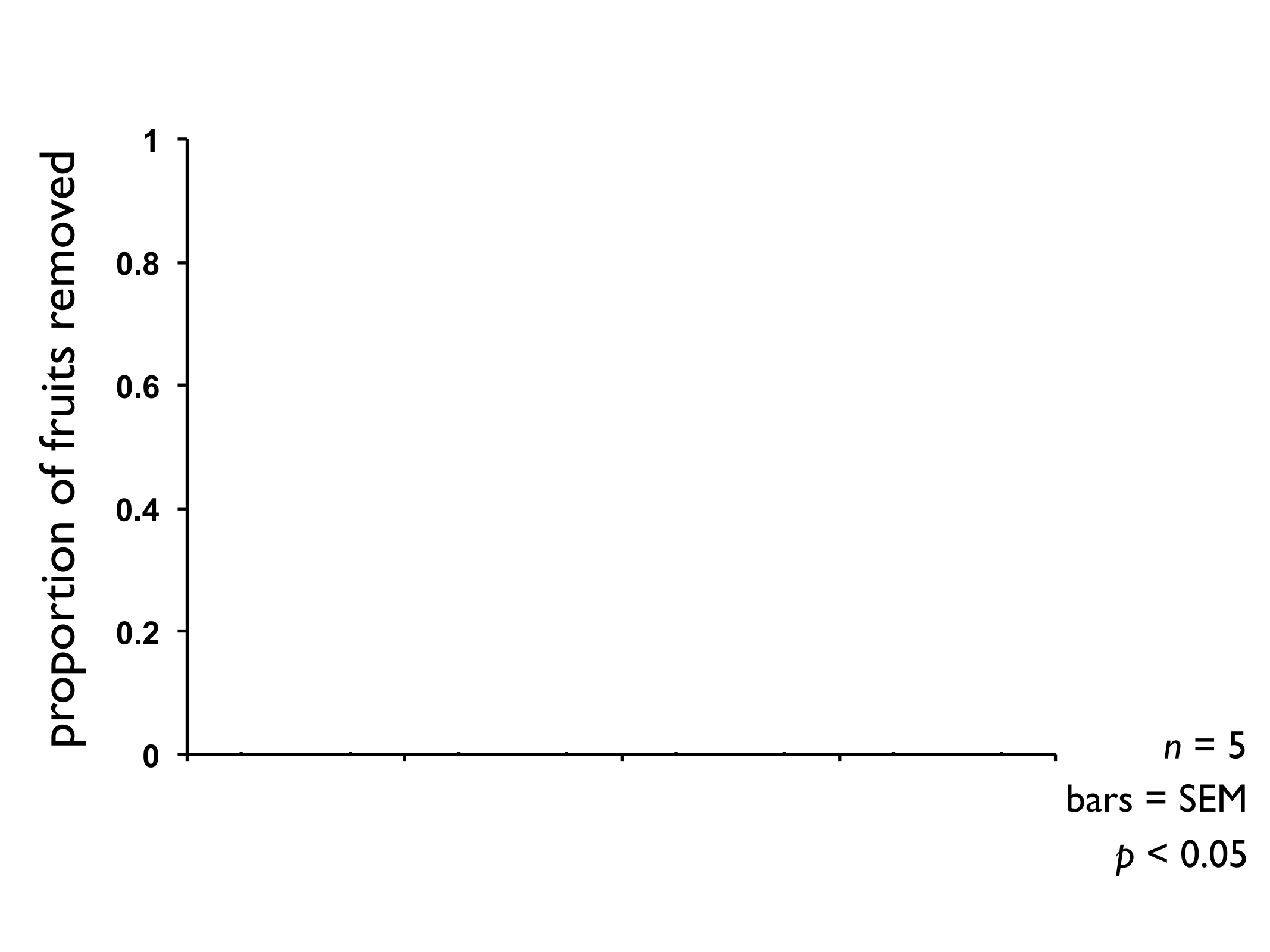
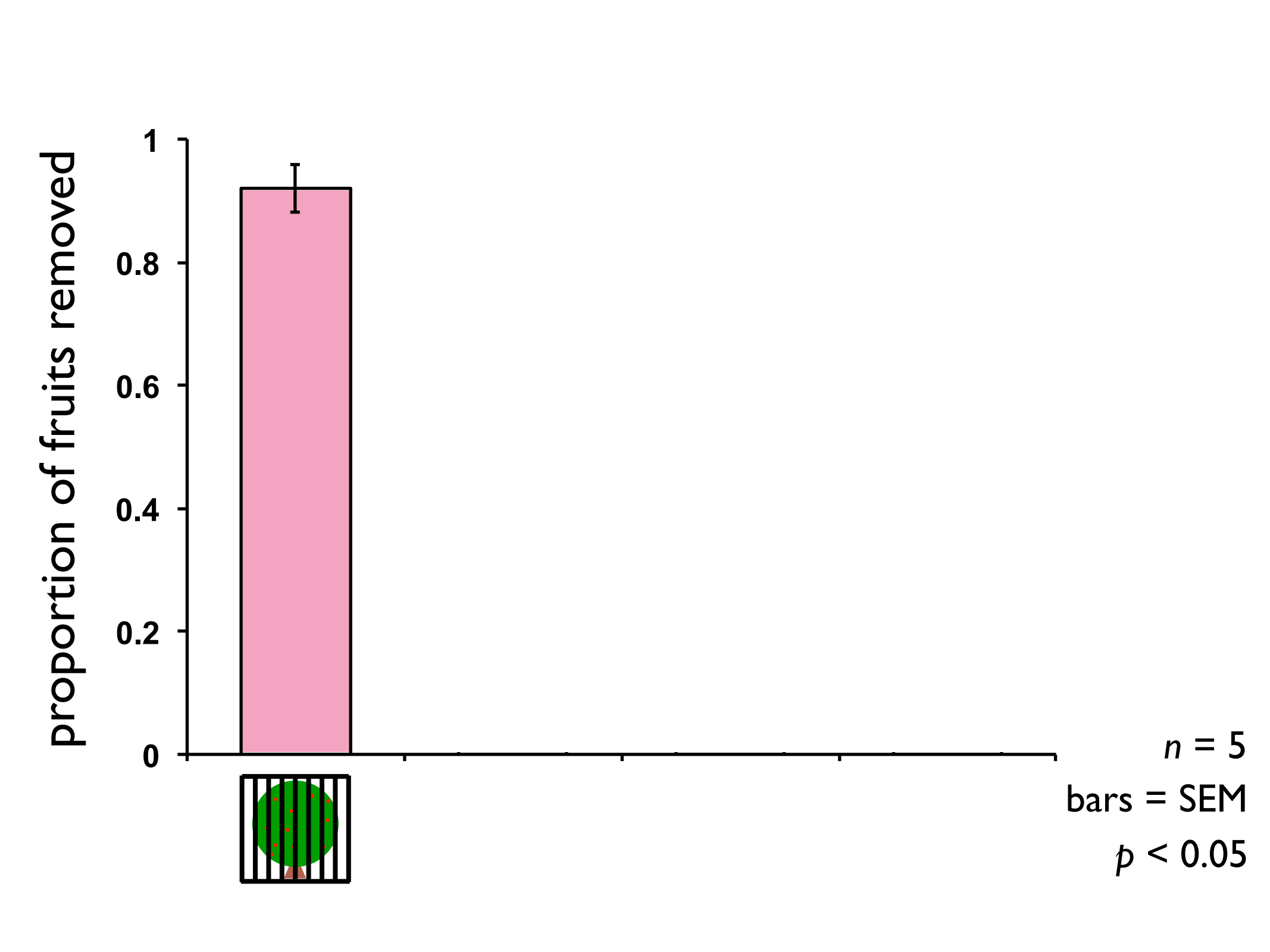


+ mammals and birds
- rodents


proportion of fruits removed
1
0.8
0.6
0.4
0.2
0
n = 5
bars = SEM
p < 0.05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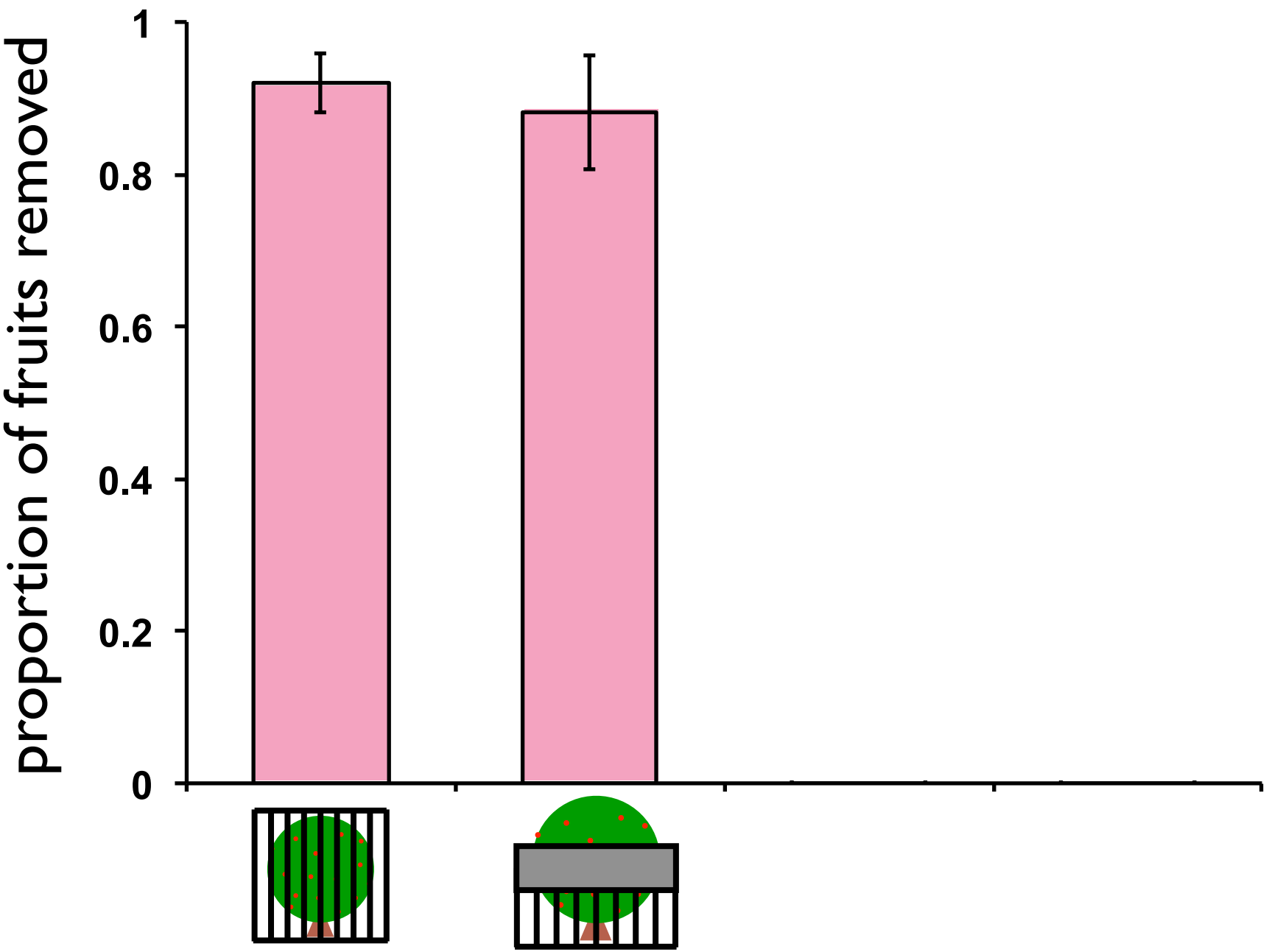
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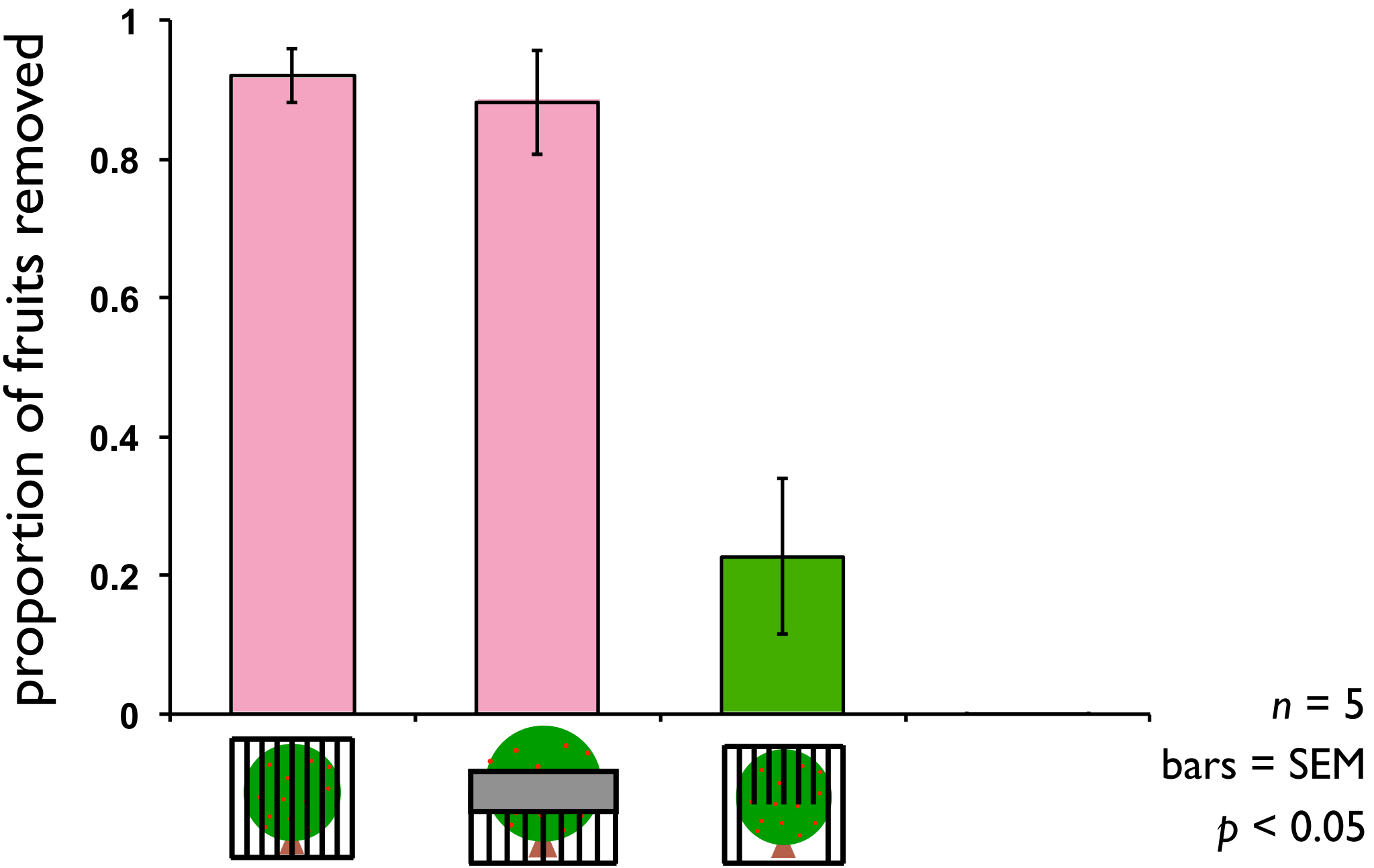
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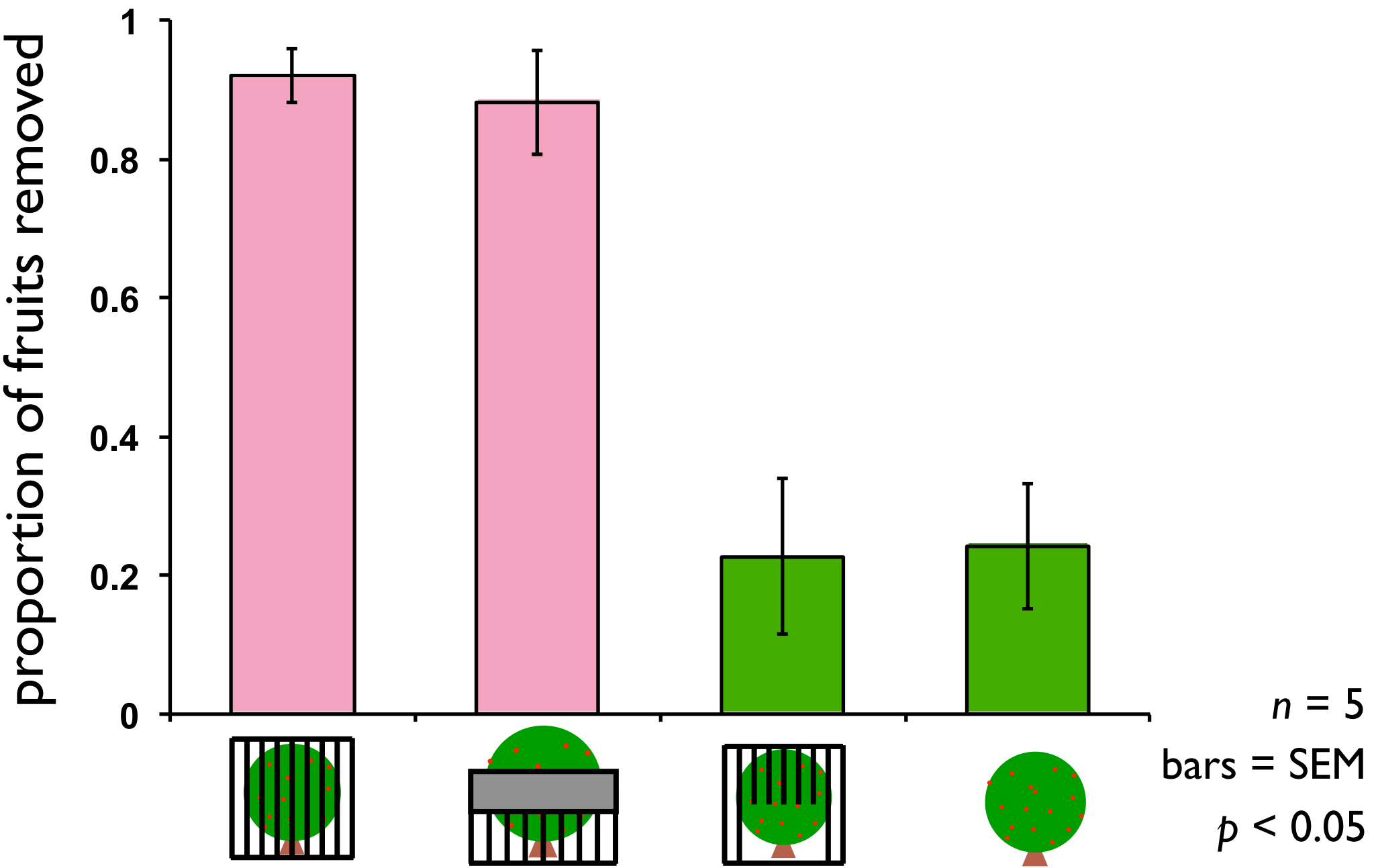
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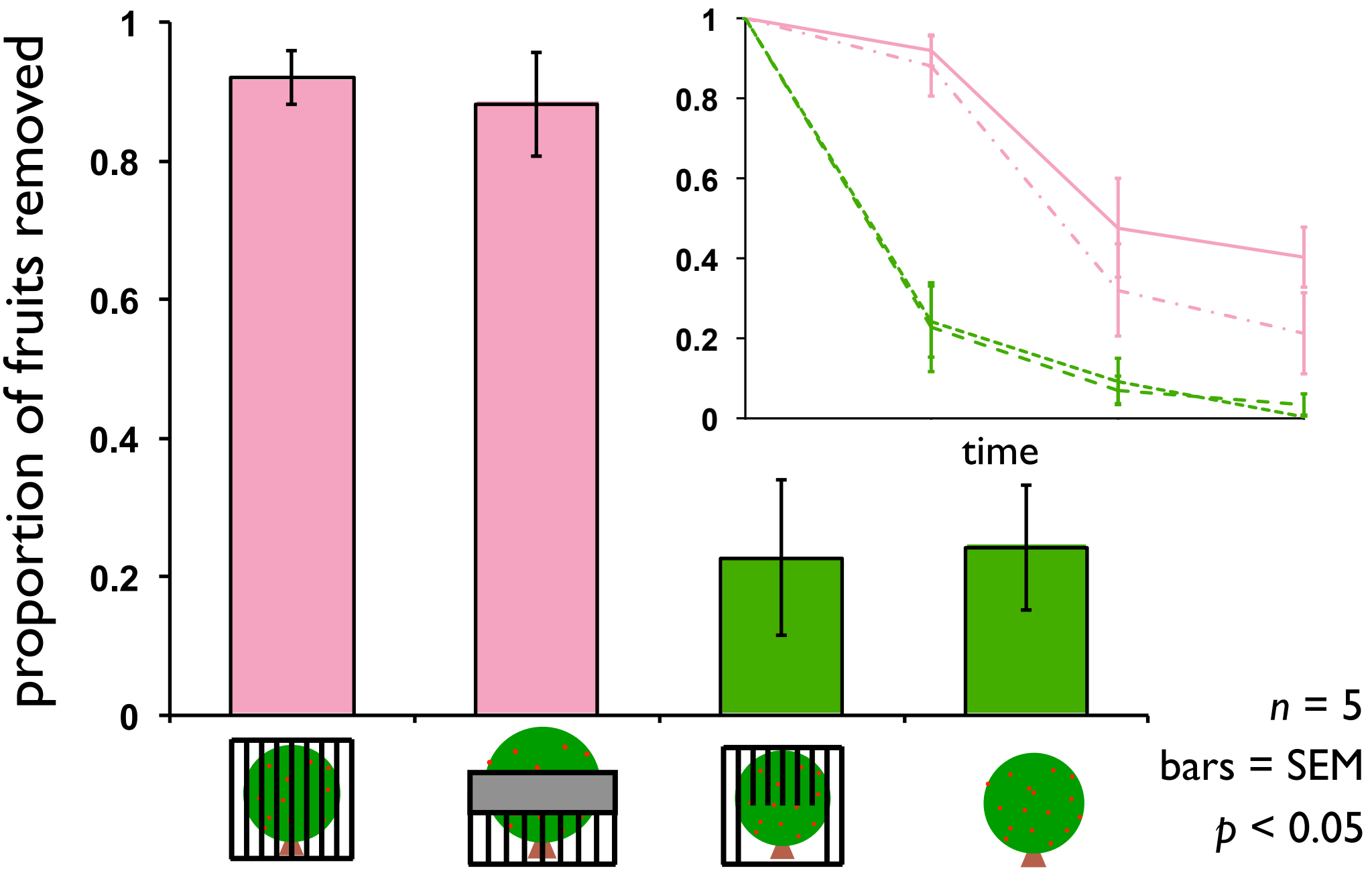

proportion of fruits removed
1
0.8
0.6
0.4
0.2
0
time
n = 5
bars = SEM
p < 0.05

experiments

what?

where?

how?

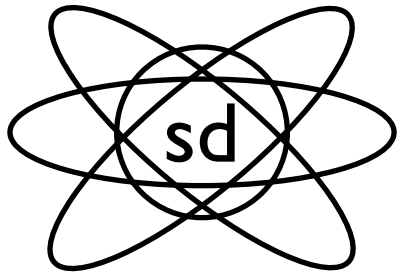
where?

where?

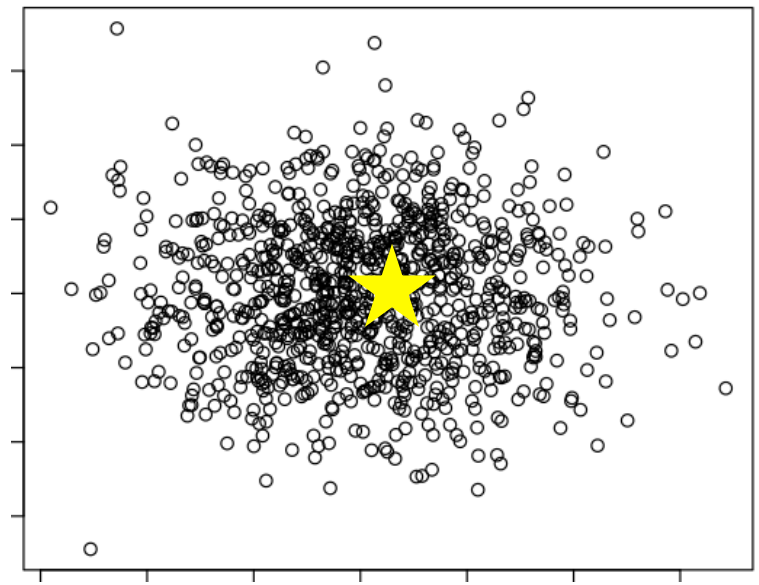
where?

where?

where?



where?



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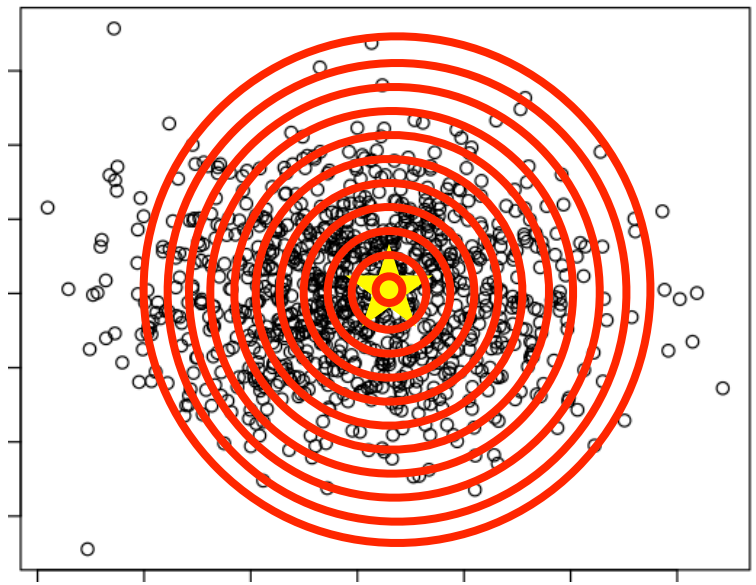

caches found: 139

seeds recovered: 1,896

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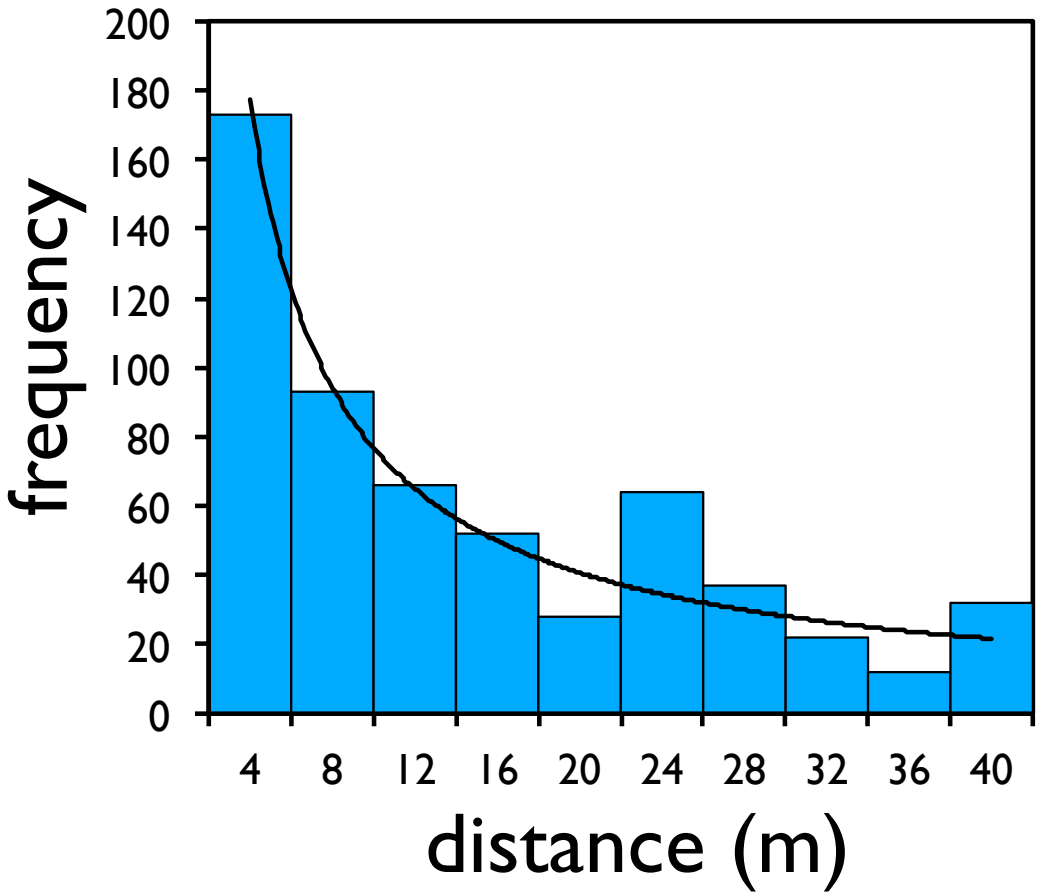

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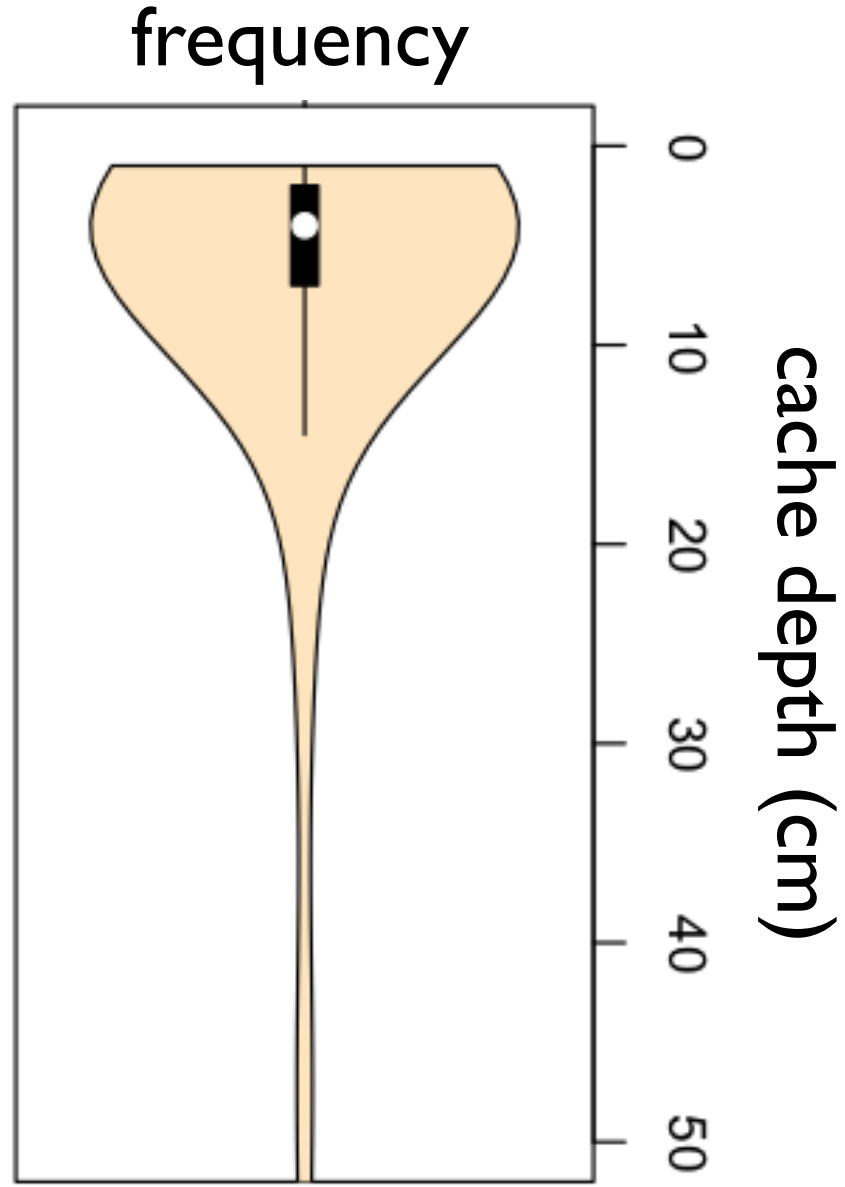
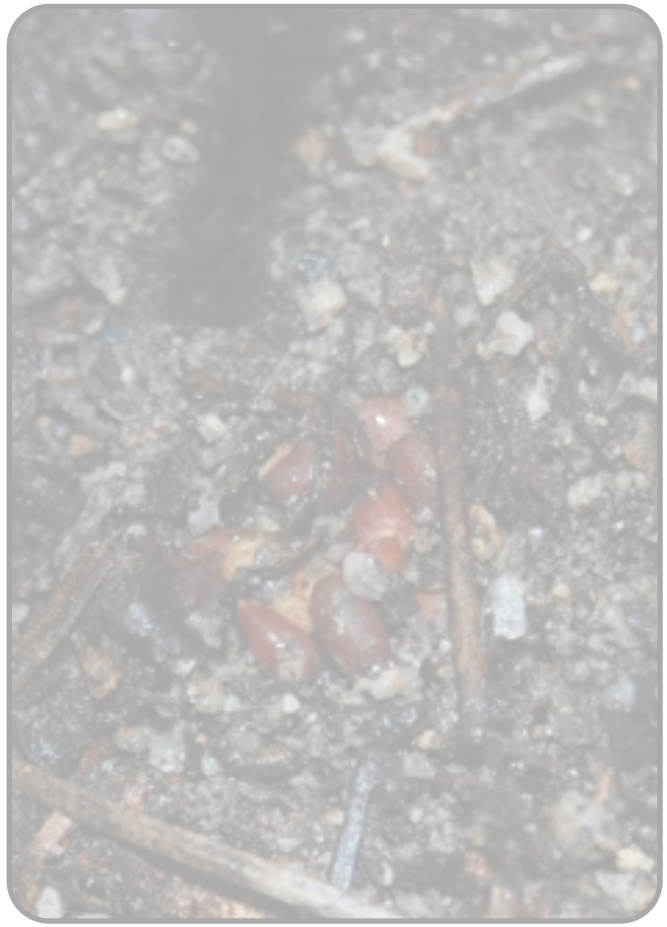


median = 4.0 cm

experiments

what?



where?

how?

how?

germination depth

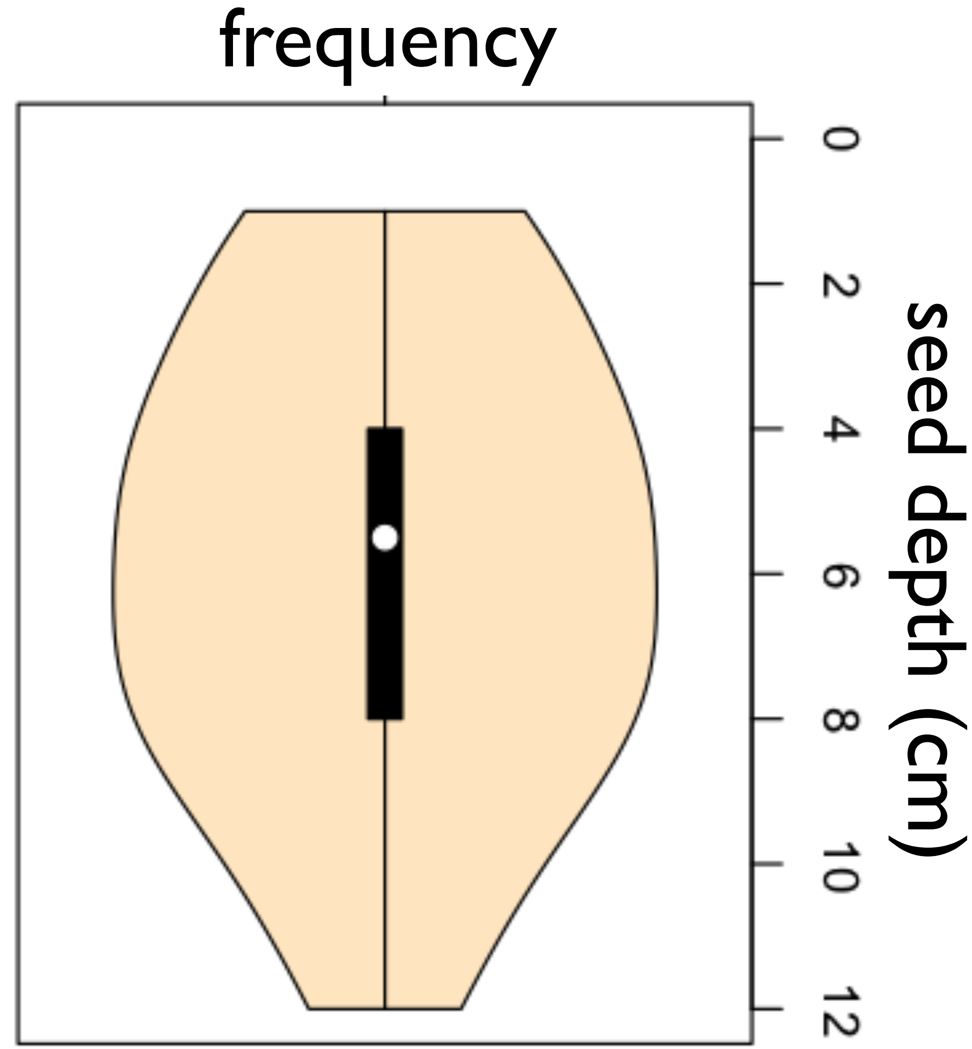
how?

germination depth

seedling survival

how?

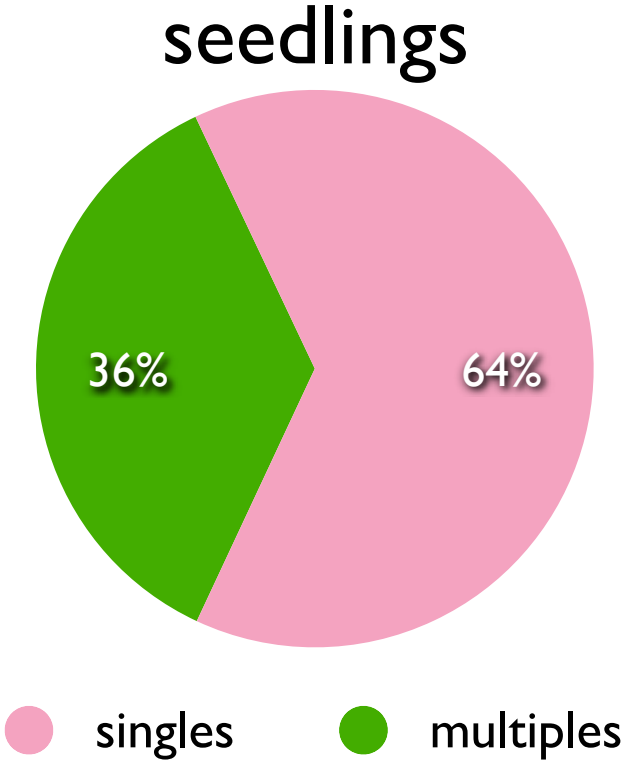
germination depth



median = 5.5 cm

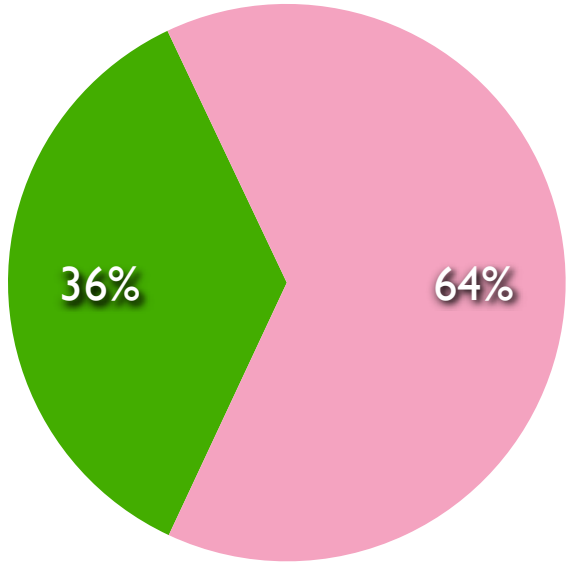
seedling survival

seedling survival



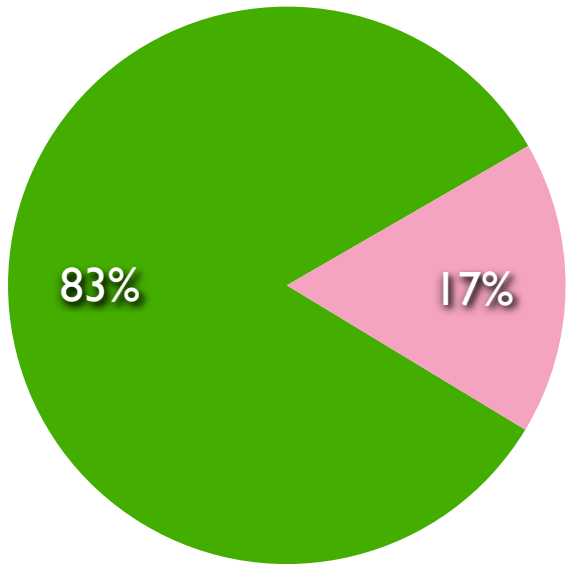
seedling survival

seedlings



singles multiples

seeds



hypothesis

prediction

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in fire-prone ecosystems, seed-caching animals are direct dispersers of seeds

prediction

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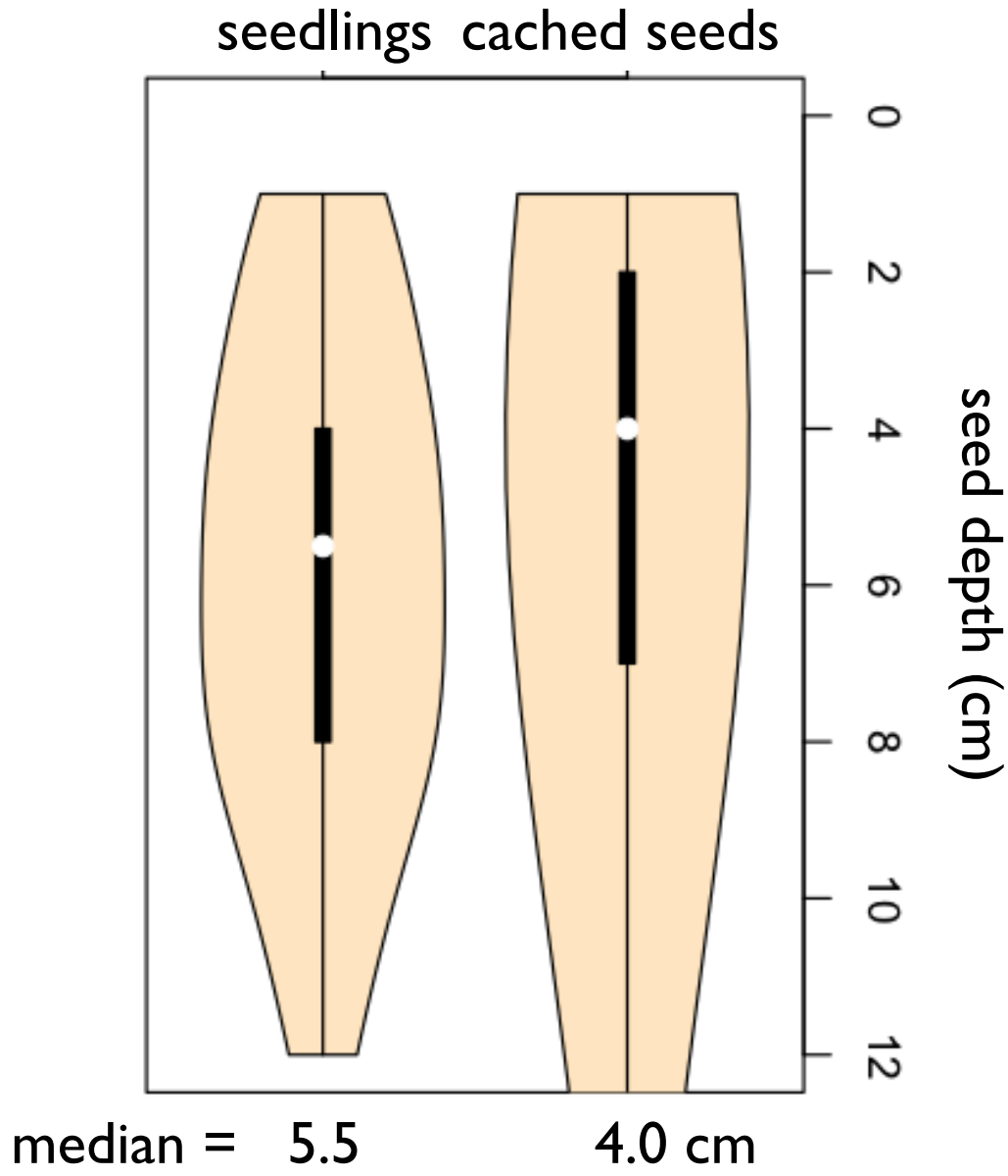
rodents as direct dispersers

rodents as direct dispersers

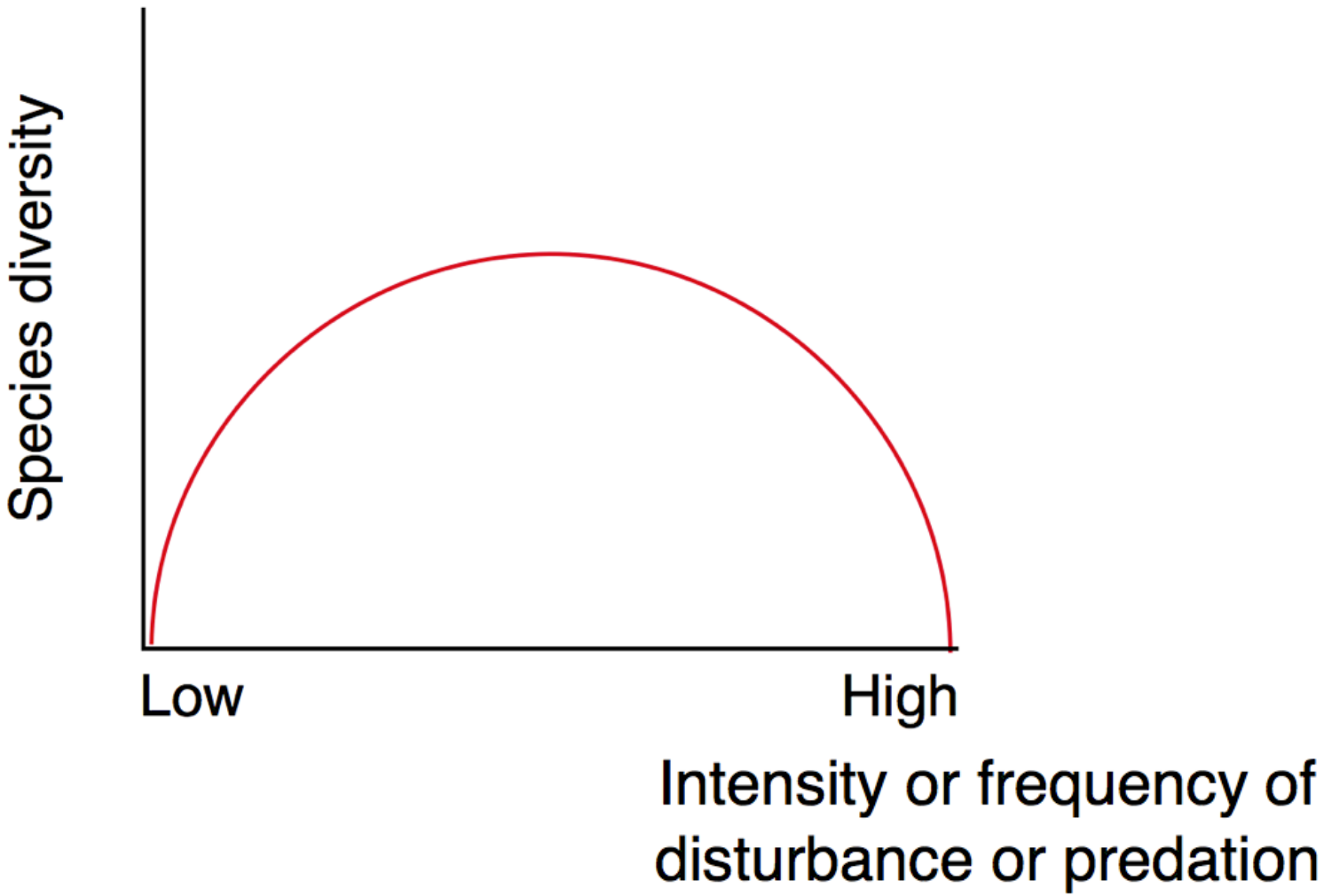
rodents as direct dispersers

rodents as direct dispersers



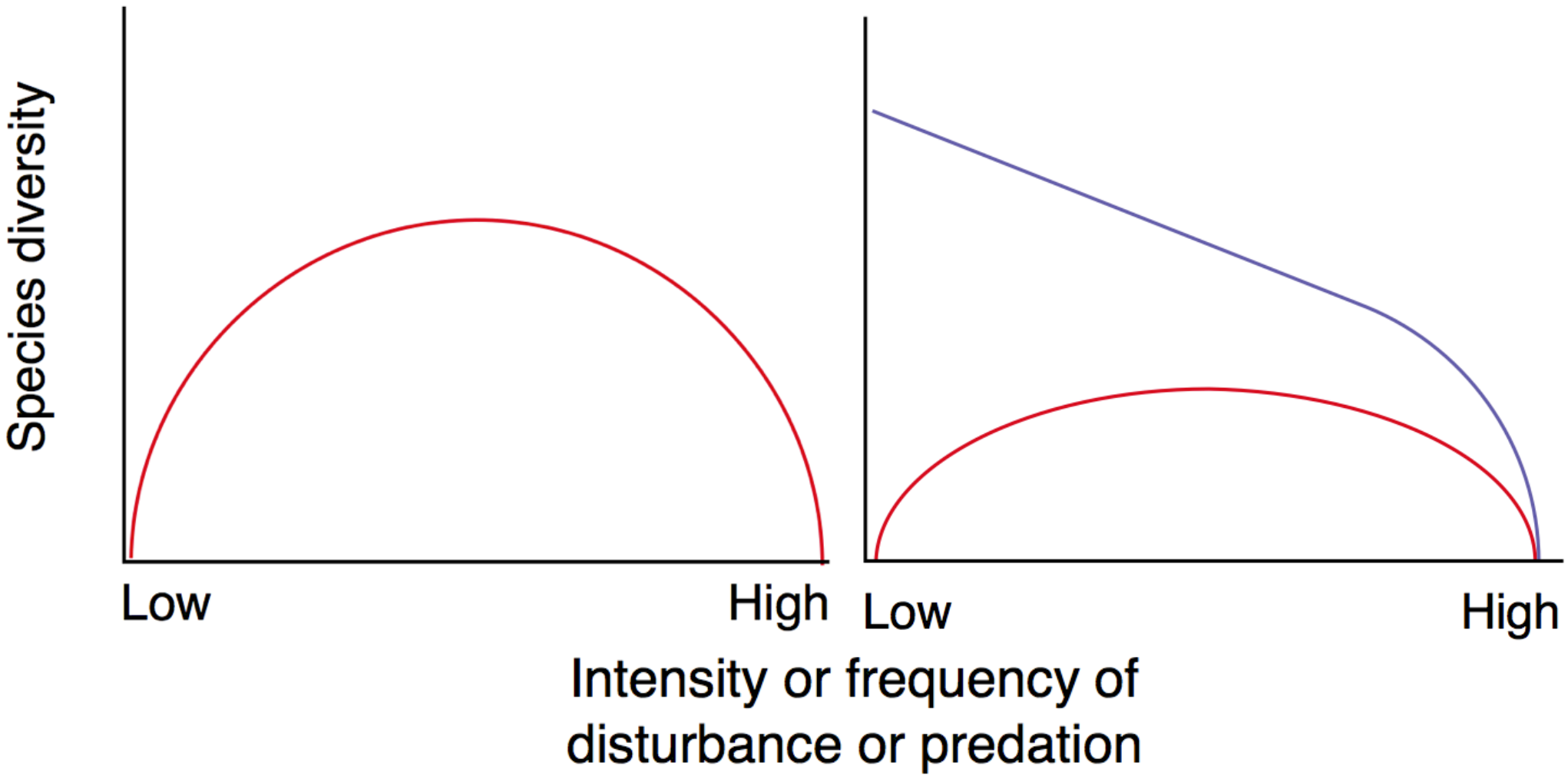
mutualism and facilitation

mutualism and facilitation



(*Bruno et al., TREE, 2003*)

mutualism and facilitation



(*Bruno et al., TREE, 2003*)

ubiquity

ubiquity

CFP

Manzanita (*Arctostaphylos* spp.)
Pines (*Pinus* spp.)
Oaks (*Quercus* spp.)
CA bay laurel (*Umbellularia californica*)
CA buckeye (*Aesculus californica*)
CA black walnut (*Juglans californica*)
Buckthorn (*Rhamnus* spp.)
Sumac (*Rhus* spp.)

ubiquity

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Mediterranean-type ecosystems

acknowledgements

<u>support</u>
Steve Vander Wall
Matt Forister
Guy Hoelzer
Jeanne Chambers
Scott Mensing
Sarah Barga
Amy Seaman
Kevin Burls
Angela Hornsby
Ben Waitman
Mark Enders
Ramon Perea
Mo Beck
Greg Lintz
EECB faculty
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PlantTalk group

<u>funding</u>
EECB
UNR GSA
mom and dad