

# Babies Having Babies: A Method of Mangrove Range Expansion

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Red mangrove  
(*Rhizophora mangle*)



Black mangrove  
(*Avicennia germinans*)



White mangrove  
(*Laguncularia racemosa*)



# Rapid changes in life history

Introduced ranges:

Increased growth, reproduction and dispersal



# Reproduction at a younger age



*Spartina alterniflora*  
Davis 2005



Vendace  
Amundsen et al. 2012



Mesquite  
Pasicznik et al. 2006



Cane toad  
Phillips et al. 2009

# Increased dispersal ability



Long winged conehead  
Thomas et al. 2001



Glanville fritillary  
Hanski et al. 2006



Western bluebird  
Duckworth 2008



Cane toad  
Phillips et al. 2006

*Hypothesis:* The expanding range edge of mangroves favors evolution of traits that increase reproduction and dispersal.



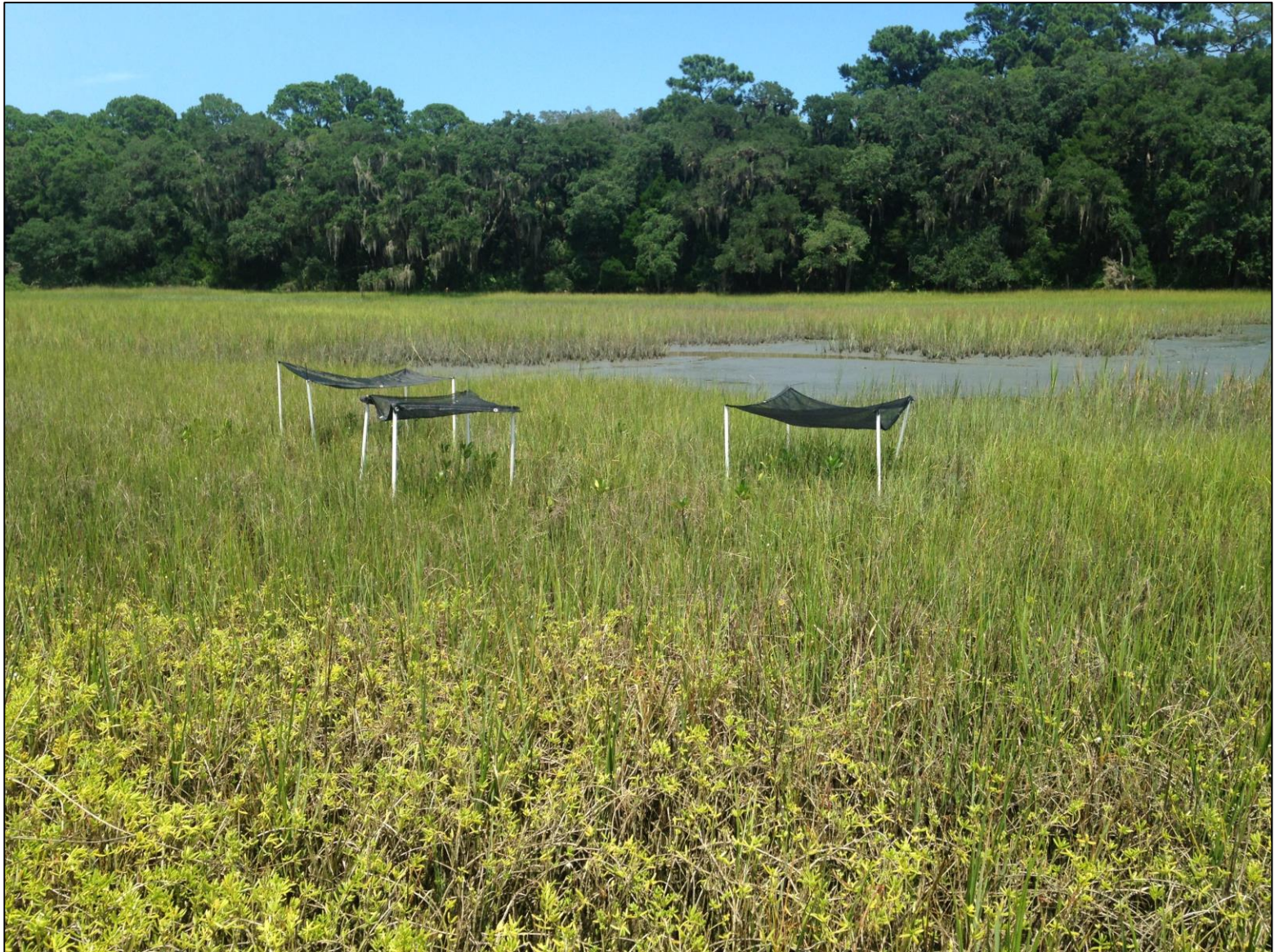
# Precocious reproduction

Red mangrove (*Rhizophora mangle*)

Black mangrove (*Avicennia germinans*)

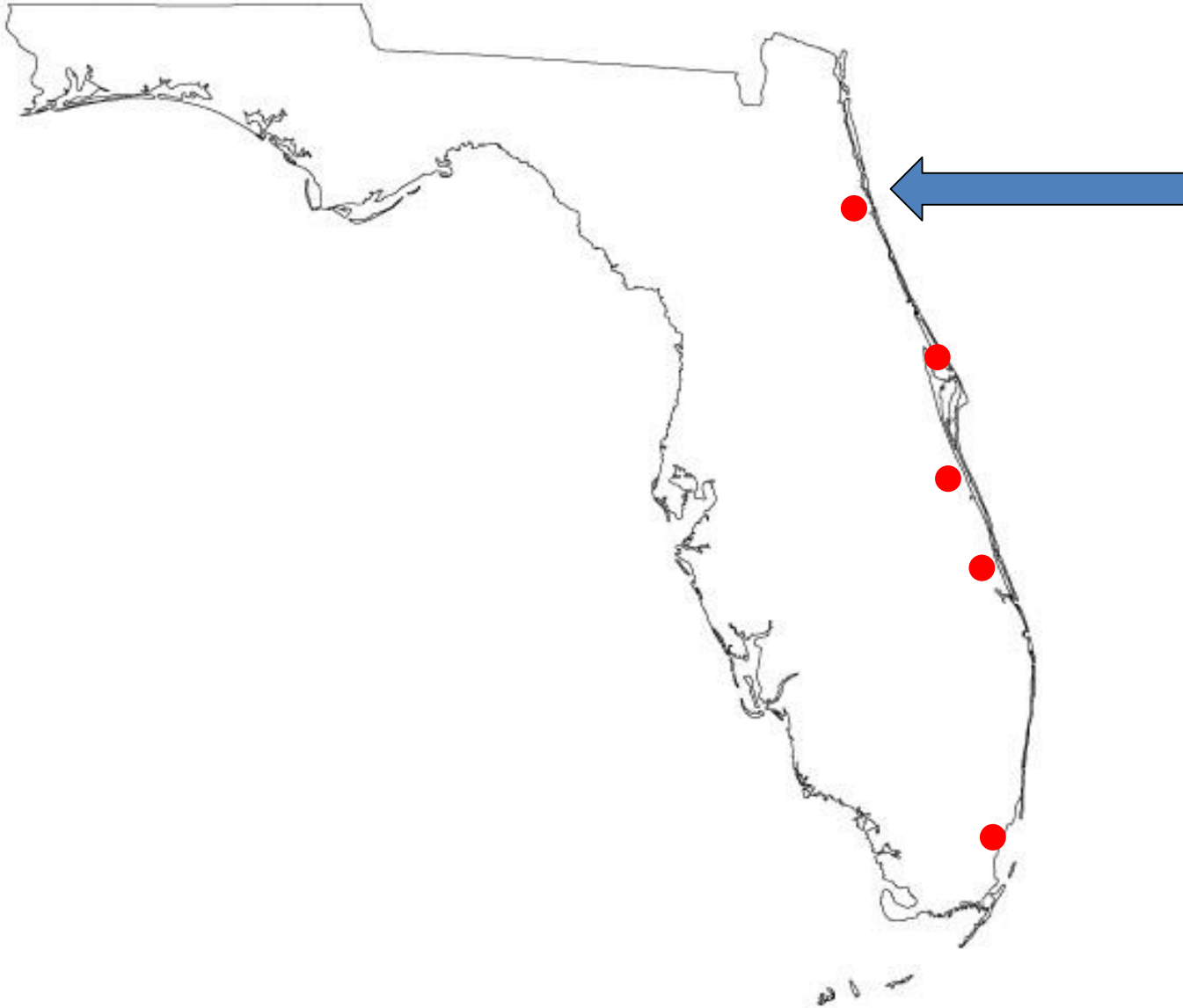


# Common garden at range edge



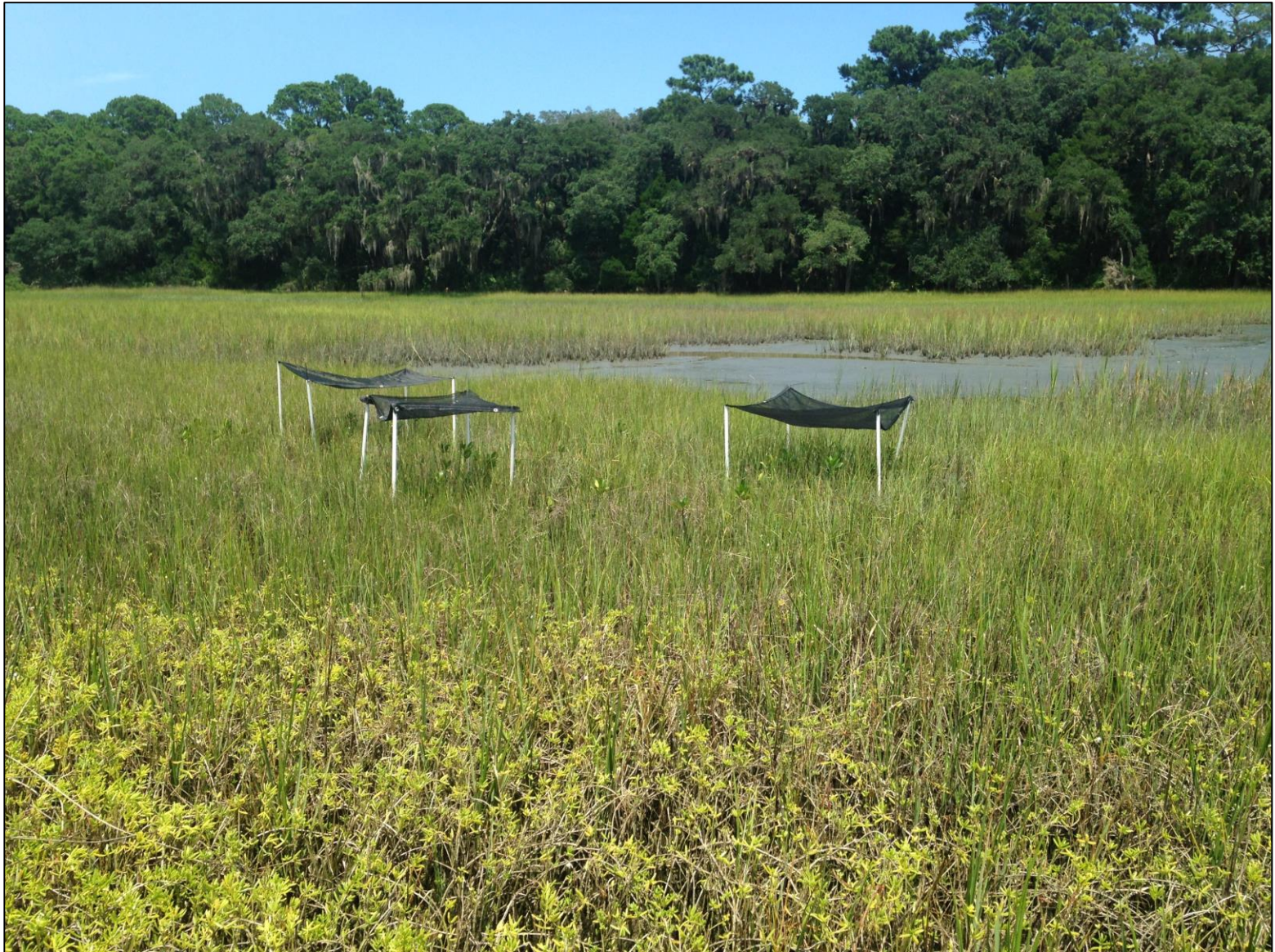


# Common garden at range edge

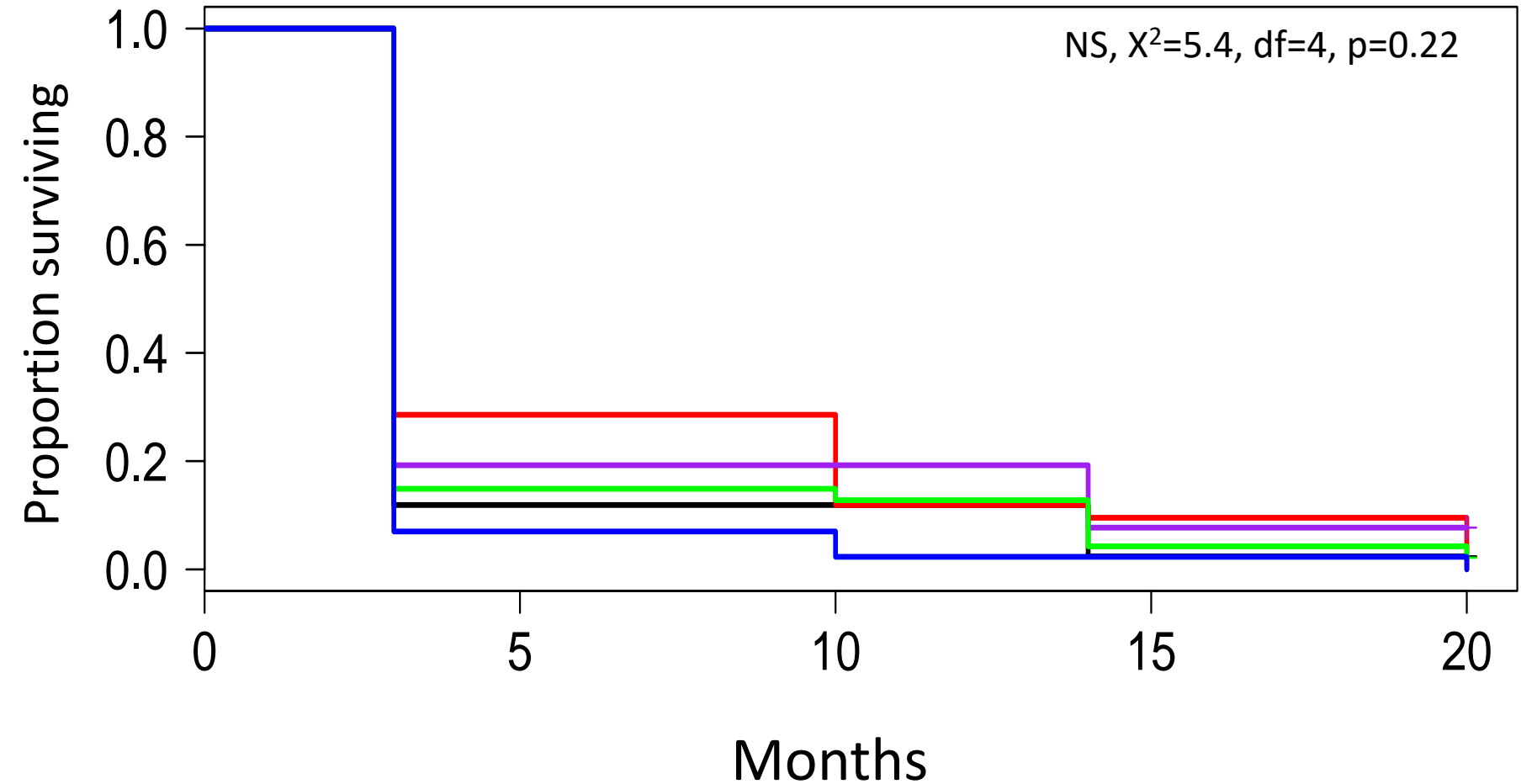




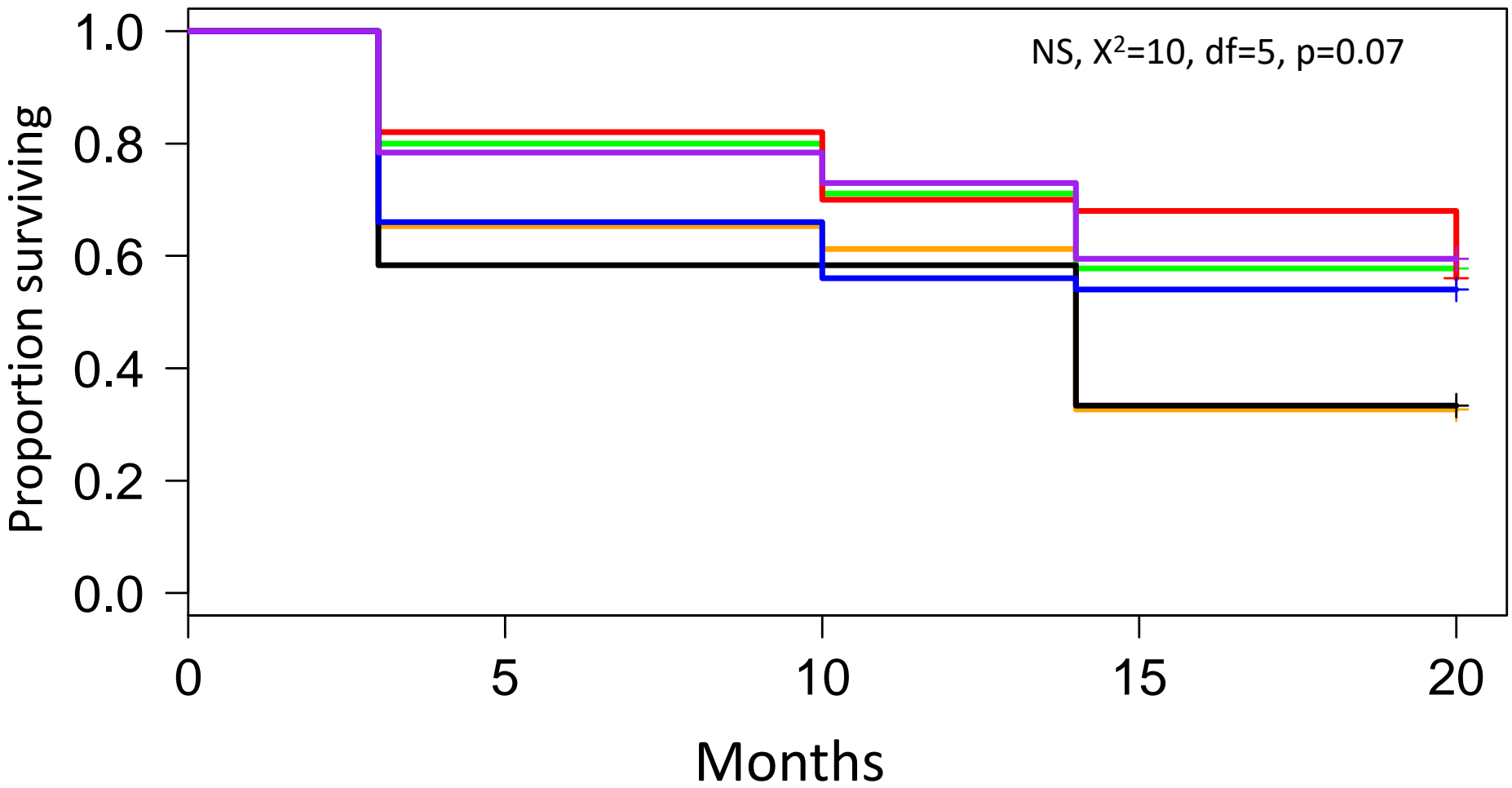
# Common garden at range edge



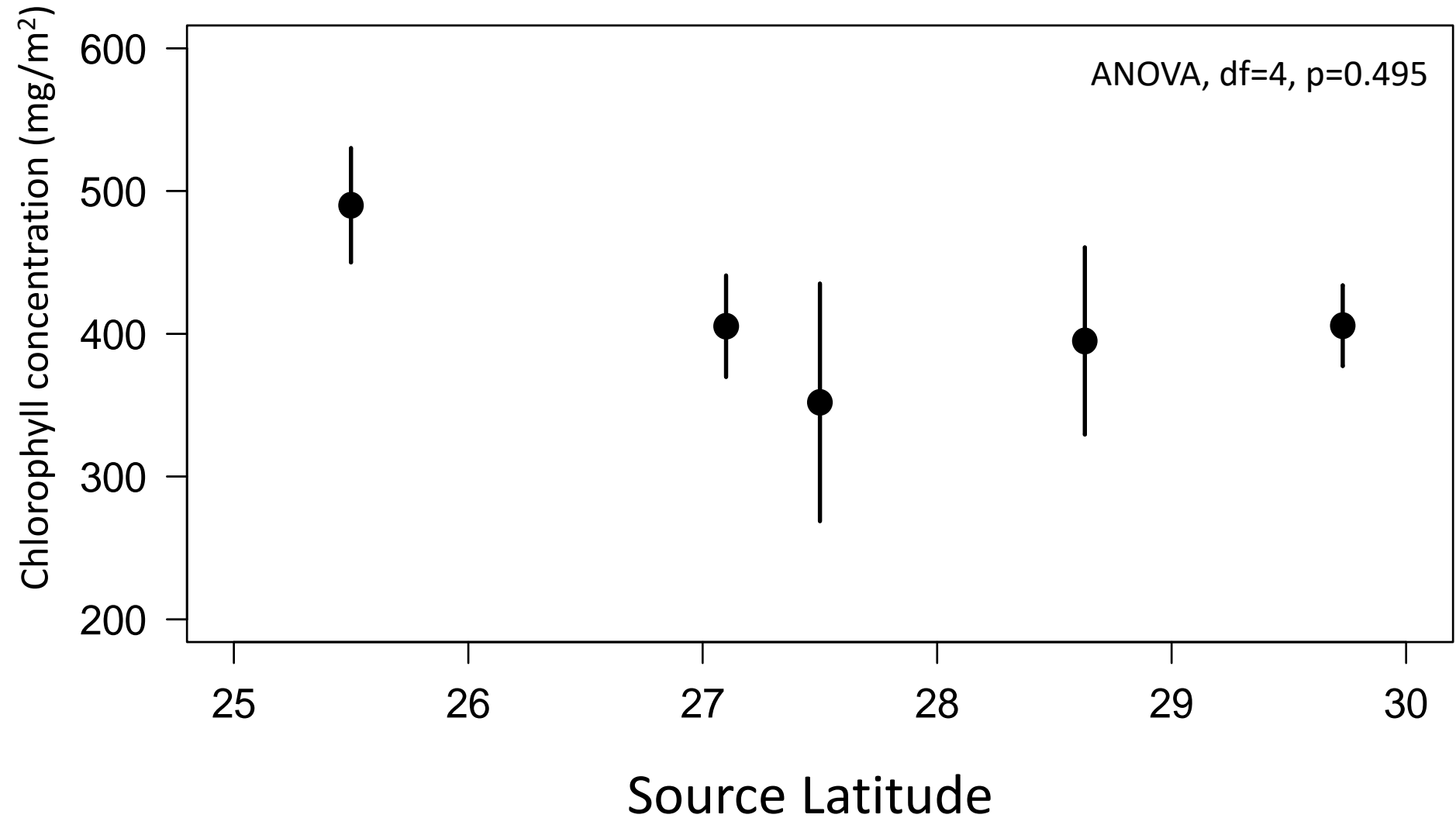
# Black mangrove seedling survival



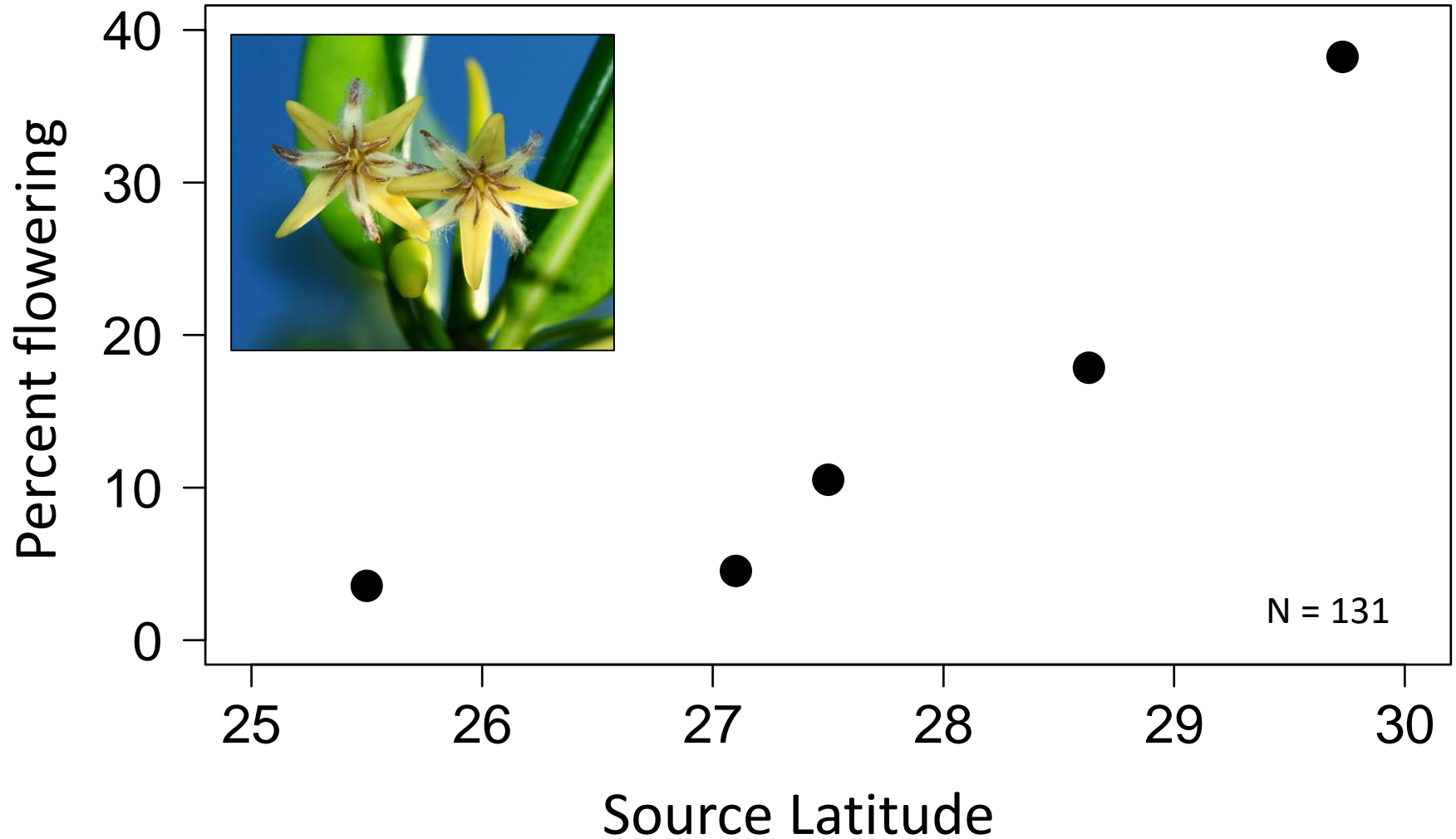
# Red mangrove seedling survival



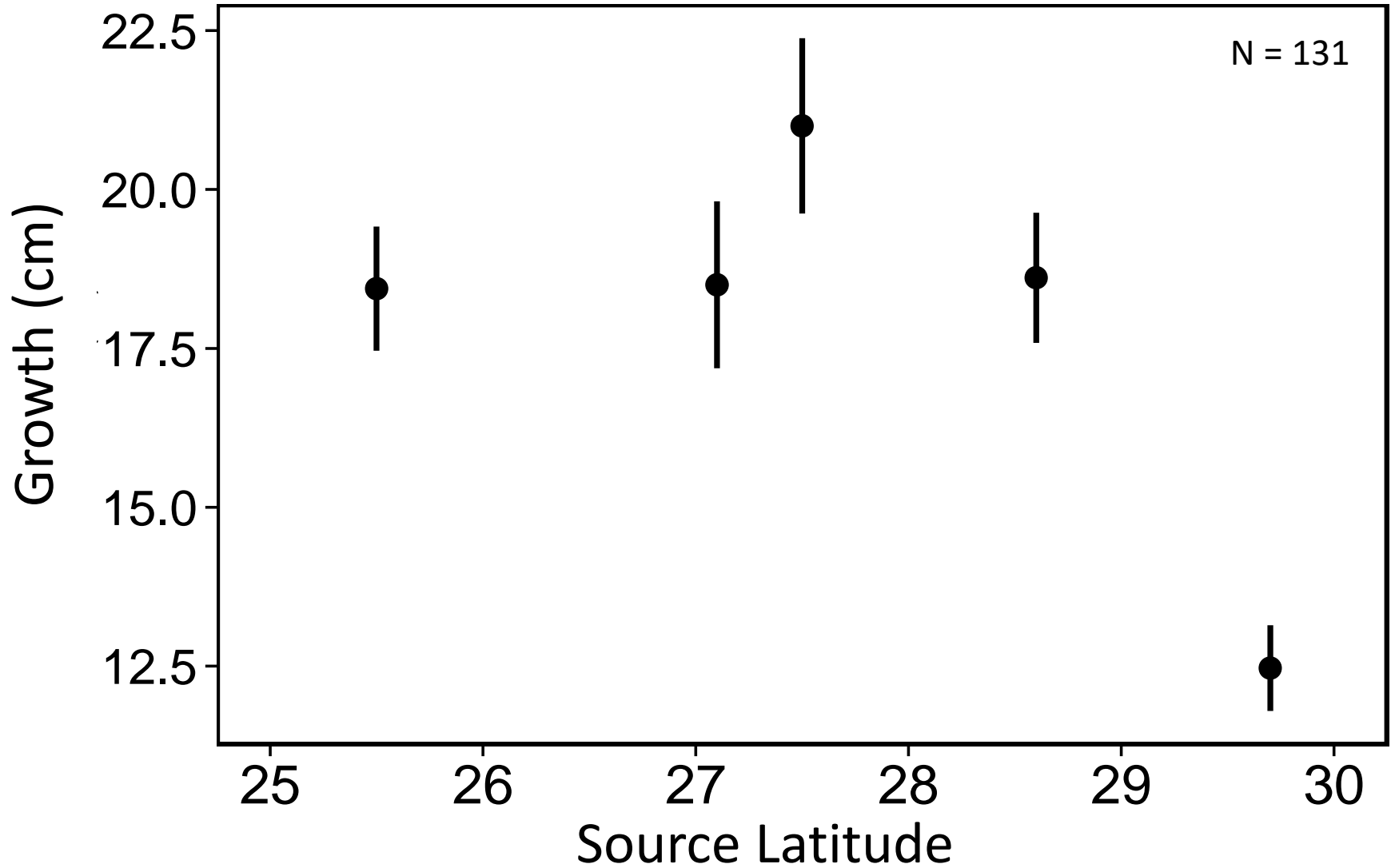
# Red mangrove chlorophyll



# Red mangrove seedling flowering



# Red mangrove seedling growth



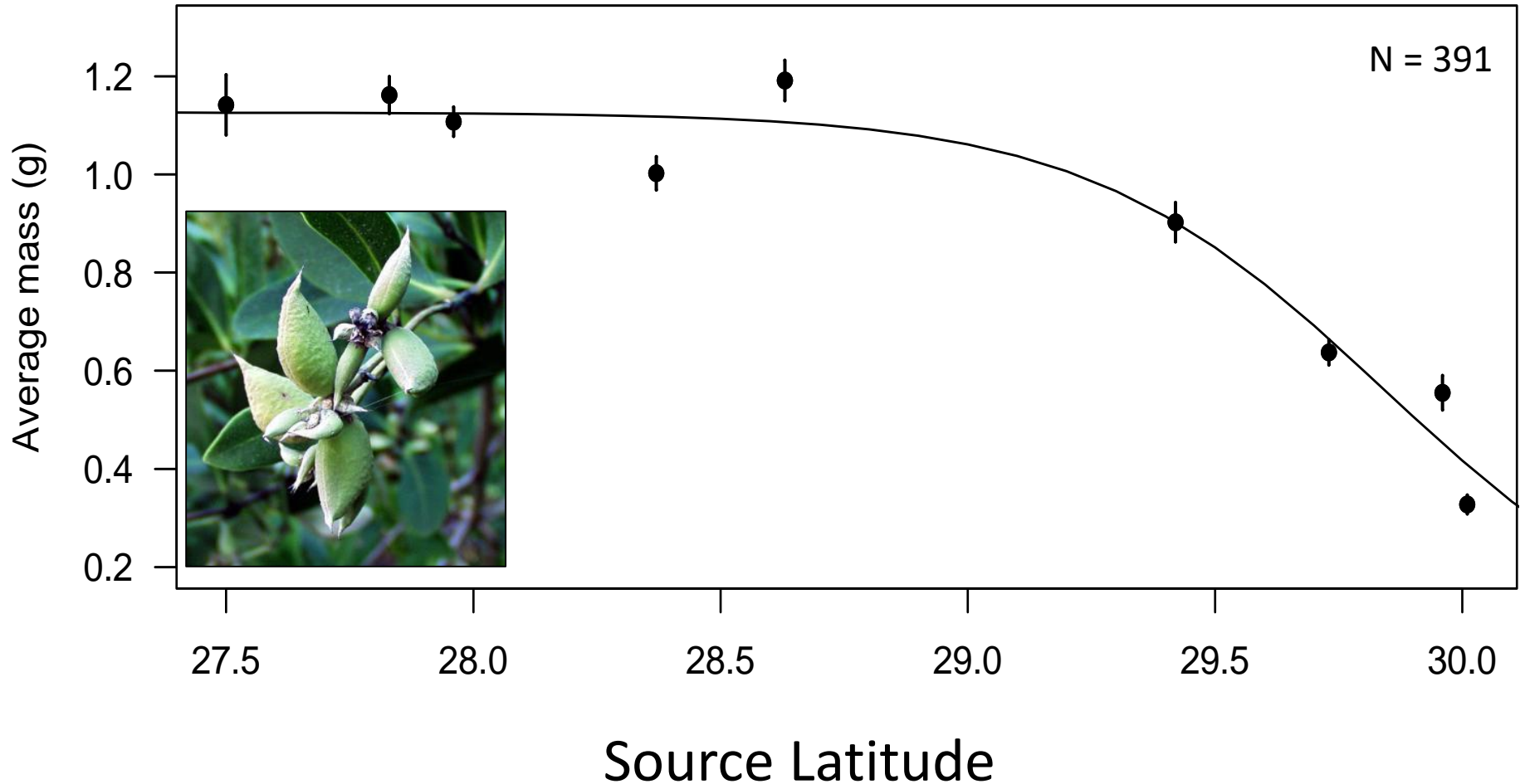


# Increased dispersal ability?



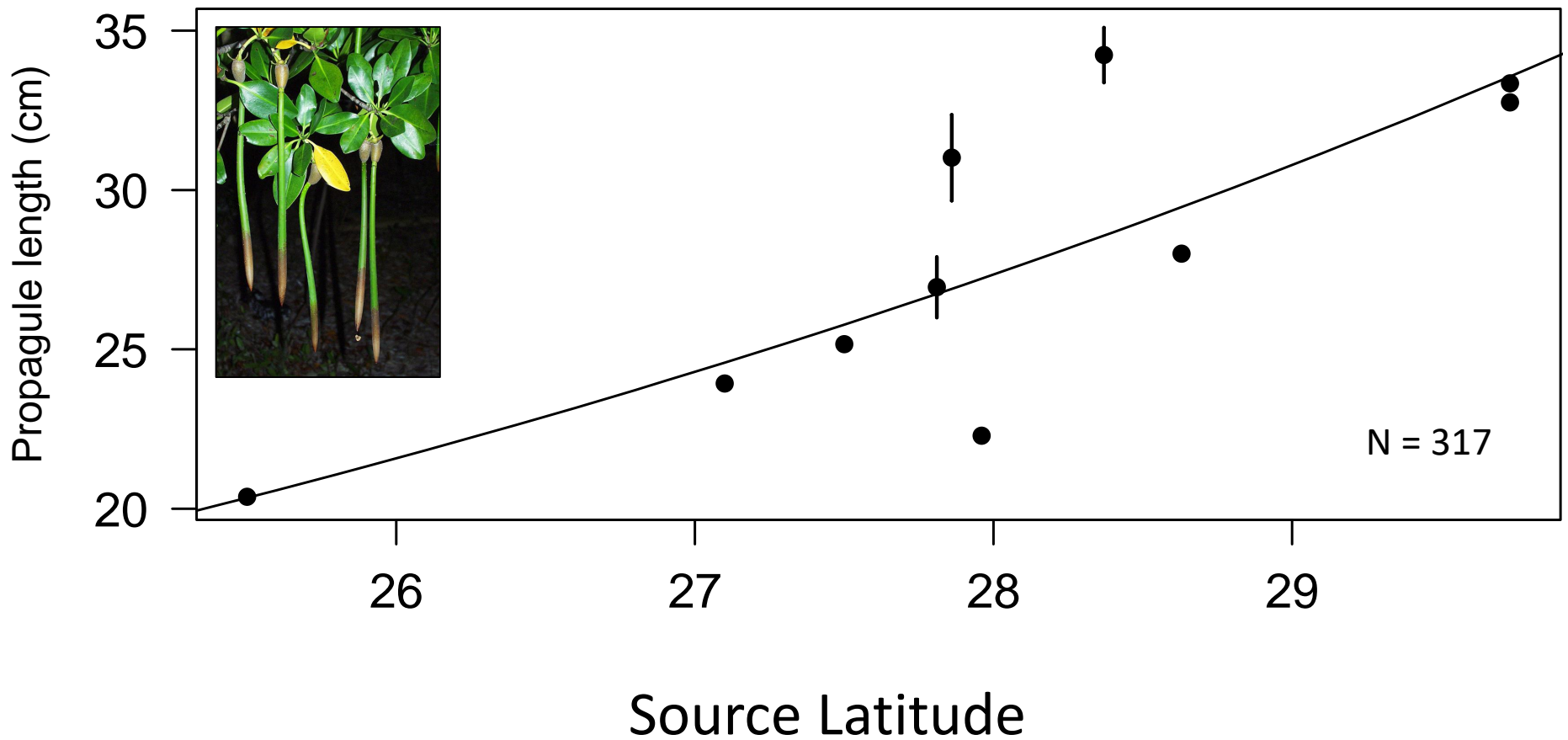
# Increased dispersal ability?

Black mangrove



# Increased dispersal ability?

Red mangrove

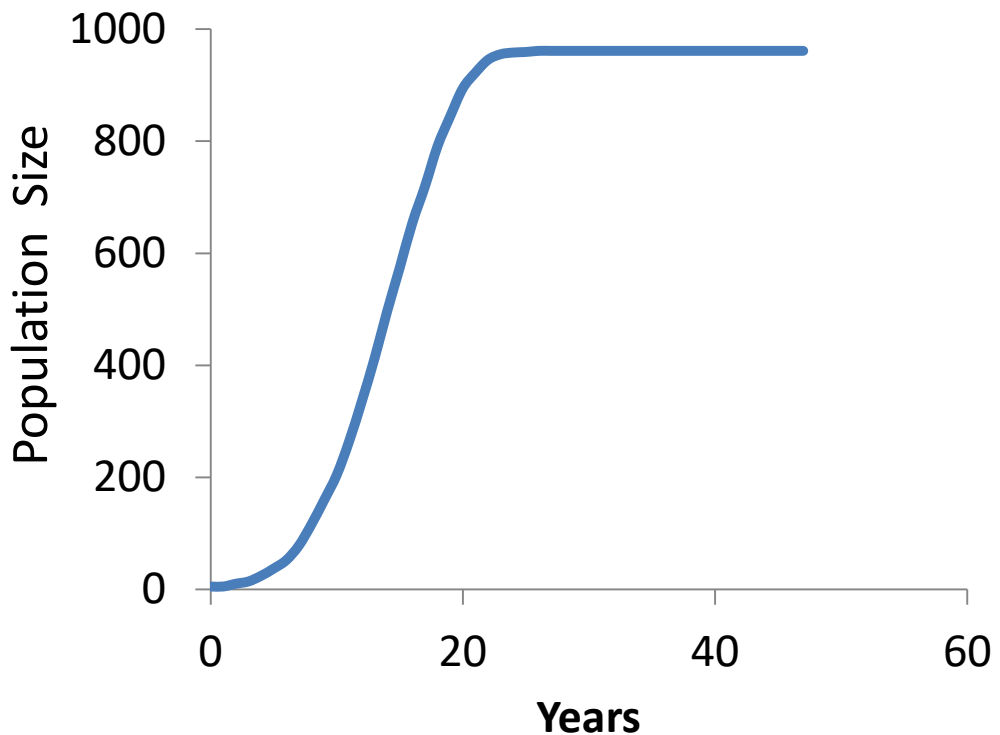


# Increased reproduction and dispersal

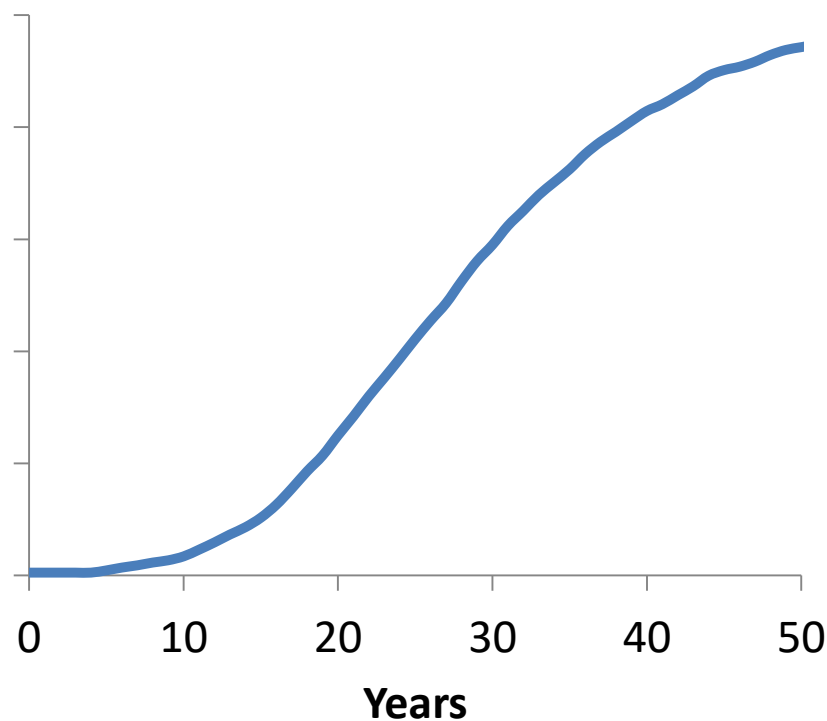
How does this increased reproductive effort and dispersal affect the mangrove range expansion?



**Reproduce at age 2**



**Reproduce at age 5**



# Individual based model



# Conclusions

- Increased reproduction and dispersal at range edge
- Babies having babies: increase rates of expansion?



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Questions?

