



Investigating shifts in post-fire plant regeneration strategies and functional traits in Southern California shrublands

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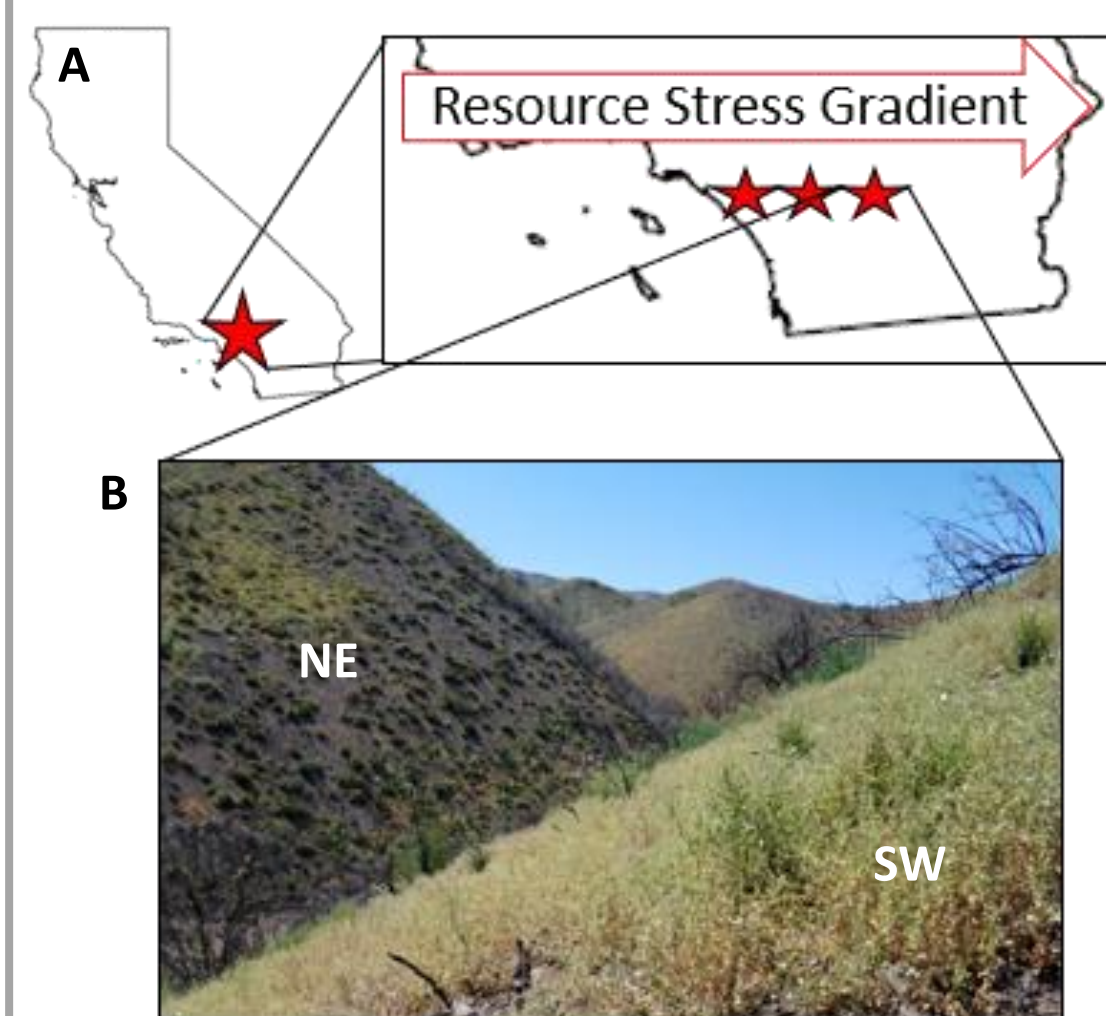
Introduction

- Environmental filters, such as topography, can create different communities that differ in their functional traits¹
- Within chaparral communities, topography interacts with post-fire regeneration strategies (resprouter or seeder) to create community assemblages that differ in their regeneration capacity
- Understanding how this local filter works across a regional resource gradient is key to guiding land management decisions within Southern California chaparral communities
- Understanding how environmental filters create trait variation is important for understanding community assembly and improving species selection for restoration
 - Interspecific trait variation shows abiotic vs biotic filtering and different growth strategies
 - Intraspecific trait variation shows a species ability to adapt to the environment
- Focus has been on adult traits, but increasing alterations to disturbance regimes, i.e. increased wildfires, creates need to study regeneration traits vital to recovery²
- Unclear how different spatial scales impact inter vs intraspecific trait variation - necessary for effective use of regeneration traits and post-fire recovery mechanisms in restoration

Questions

1. Are leaf traits ontogenetically conserved across regeneration strategies?
2. How do regional vs local resource gradients impact regeneration traits of different regeneration strategies?
3. How do regional vs local resource gradients impact inter and intraspecific trait variation of different regeneration strategies?

Methods



- Leaf collection for functional trait analysis:
- 3 burn scars (Aliso, Holy, and Cranston fires) across a regional resource stress gradient
 - Local scale NE and SW aspects
 - Burned and unburned sites
 - 10-15 species per burn scar
 - 5-10 leaves per species per aspect
 - Measured specific leaf area (SLA)

Statistics:

- Anova in R to test differences in mean SLA between life stage, spatial scales, and regeneration strategy
- Asymptotic test for the equality of interspecific coefficients of variation, linear model test for intraspecific coefficients of variation

Results

Q1: Regeneration traits are not ontogenetically conserved

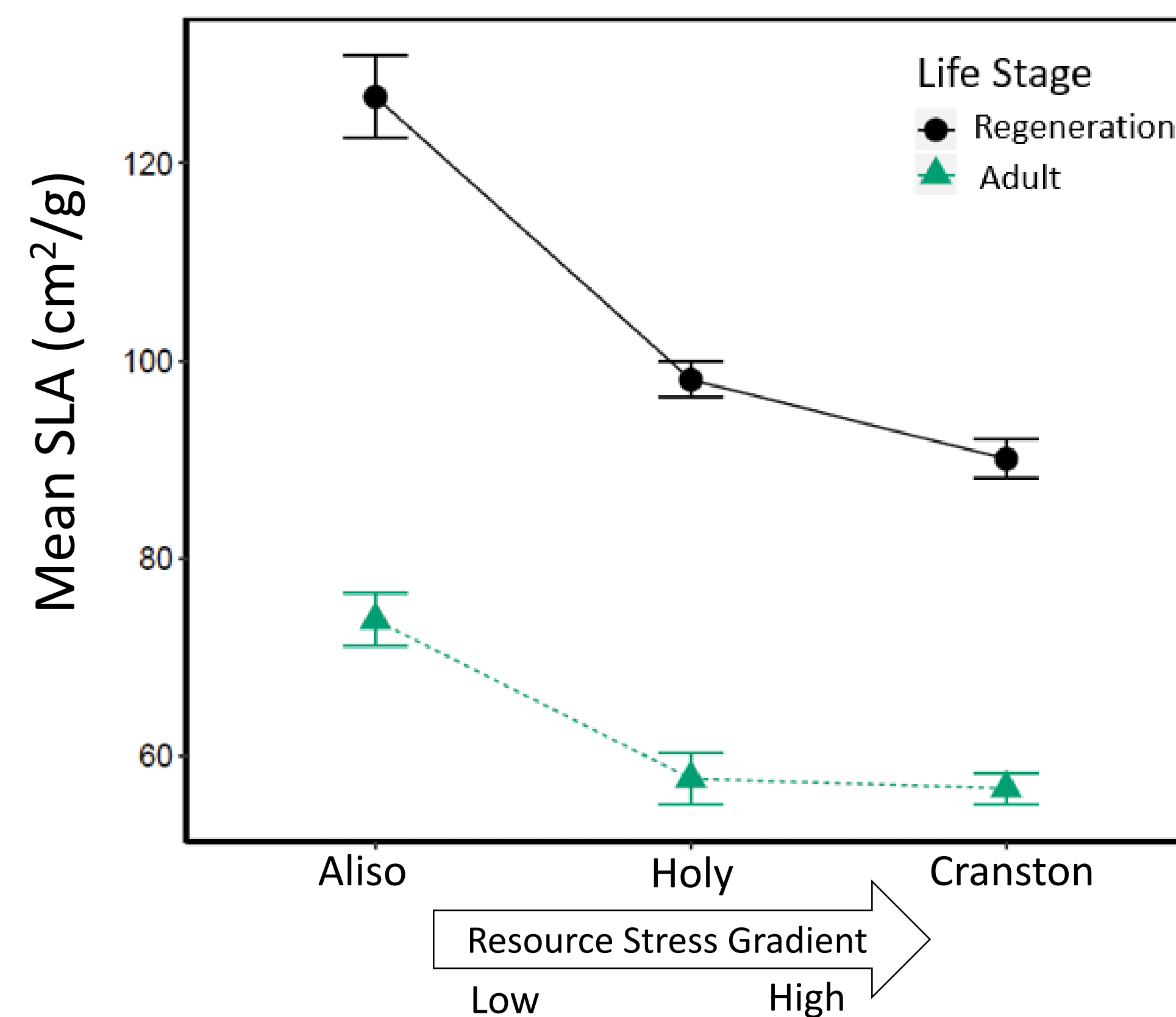


Figure 2. Mean SLA of regeneration and adult traits across a regional resource stress gradient. SLA was greater for regenerating individuals than adults (site: f -value=7.170 p -value= 0.00114, life stage: f -value=60.165 p -value=3.07⁻¹², error bars \pm standard error).

Q2: Regional scale impacts SLA for both regeneration strategies

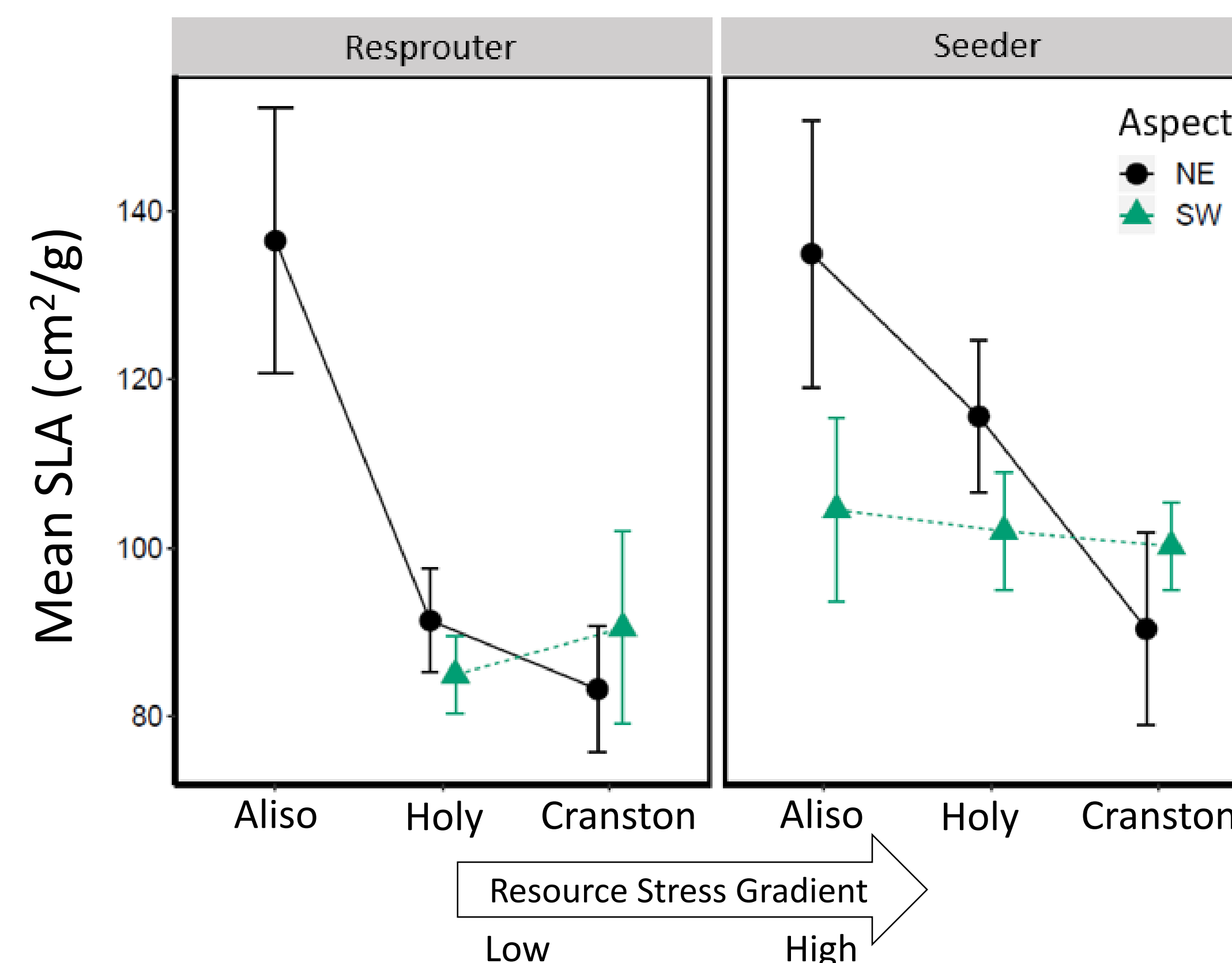


Figure 3. Mean SLA of different post-fire regeneration strategies across a resource stress gradient and aspect type. Regional scale impacts SLA across both regeneration strategies, where increasing resource stress decreases SLA (site: f -value=9.396 p -value= 0.00023). At low regional resource stress, local topography matters for seeders (site:aspect: f -value=3.706 p -value=0.02931, error bars \pm standard error).

Results

Q3: Regional and local spatial scales create more inter and intraspecific regeneration trait variation in seeder than resprouter strategy

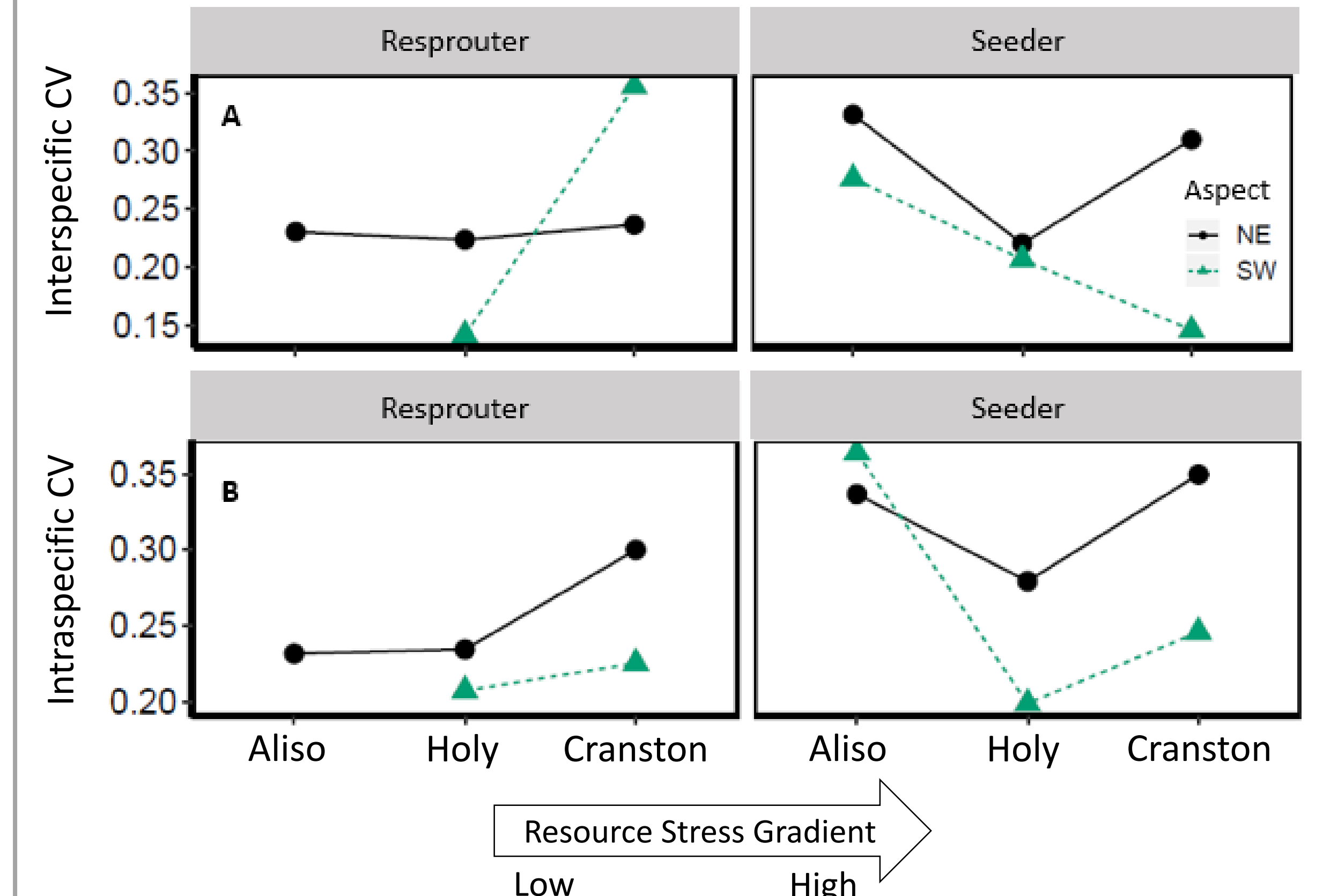


Figure 4. Inter (A) and intraspecific (B) coefficient of variation (CV) of SLA of different regeneration strategies across a resource stress gradient and aspect type. Trend of less inter and intraspecific variation in resprouters than seeders across regional and local scale. For seeders, trend of more trait variation from local topography at higher regional resource stress.

Discussion

- Regeneration traits are different from adults and need further study to understand post-fire recovery process
- Regional scale first needs to be considered, then local scale, for effective use of regeneration traits in management plans
- Regional scale impacts regeneration traits similarly but trait variation differently for different post-fire regeneration strategies
- Local topography has a less clear role, and a diversity of traits within the seeder strategy rather than across strategies should be selected for in management plans
- Future directions: identify limiting regional resources, link species' traits to community composition to infer beneficial traits in recovery process

Acknowledgements

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Literature Cited

- ¹Funk et al. (2008), *Trends in Ecology and Evolution*
²Larson and Funk (2016), *Journal of Ecology*