

# Trait evolution along a climate gradient in California wild radish

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Root:Shoot Allocation







Trade-off between growth rate and water use efficiency



(Huxman et al 2008; Huxman et al 2013)

# Species traits determines community composition



WUE

Huxman et al (2013)

In this study we ask how traits vary between populations of an invasive species.

# California Wild Radish

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Raphanus raphanistrum Jointed Charlock Pl. 20. Radis cultivé. Raphanus sativus L.

Raphanus sativus Crop Radish

# California Wild Radish



#### **Collection Locations**



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# Questions

- How do traits associated with adaptation to arid environments vary between populations of California Wild Radish along a climate gradient?
- How do traits within California wild radish compare with its crop progenitor?



#### Potted Plant Experiment



# Traits Measured

- Leaf Number
- Days to flowering
- SLA
- Root:shoot allocation
- Water-Use Efficiency
- Leaf N
- Leaf C



#### Days to Maturity



#### **Root:Shoot Allocation**



 $R^2 = 0.41 p = 1.53 x 10^{-10}$ 

# SLA by Region



 $R^2 = 0.09 p = 0.010$ 

#### Leaf Number 8 Weeks



 $R^2 = 0.27 p = 1.31 \times 10^{-5}$ 

# Traits Summary

Trait	Populations	Regions	Crop vs. Wild
Phenology	$\checkmark$	×	×
Root:Shoot	✓	1	$\checkmark$
SLA	×	×	$\checkmark$
Leaf Number	✓	×	×
Root number	1	×	✓
Leaf Carbon	×	×	×
Leaf Nitrogen	×	×	×
Water Use- Efficiency	×	×	×

# Summary

- Root:shoot allocation and phenology differ between populations along the climate gradient
- Root:shoot allocation is most strongly associated with climate
- Root:shoot allocation, SLA and Root number differ between crop and wild individuals



# Implication for Management

- How populations adapt can help us understand how invasive species ranges expand
- ??



# Thank you

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#### Leaf Number – 4 wks



 $R^2 = 0.14 p = 0.005$ 

#### Leaf Number – 6 wks



 $R^2 = 0.25 p = 3.22 x 10^{-5}$ 

#### Root Number



 $R^2 = 0.23 p = 3.98 \times 10^{-4}$ 

#### **Root: Shoot by Population**



 $R^2 = 0.41 p = 1.55 \times 10^{-8}$ 

# Leaf Nitrogen



#### Leaf Carbon



% Carbon

#### Water-Use Efficiency

