Roadside Maintenance Practices Influence Plant Migration along Freeways

Kristin J. Gade, Urban Ecology IGERT and School of Life Sciences, Arizona State University

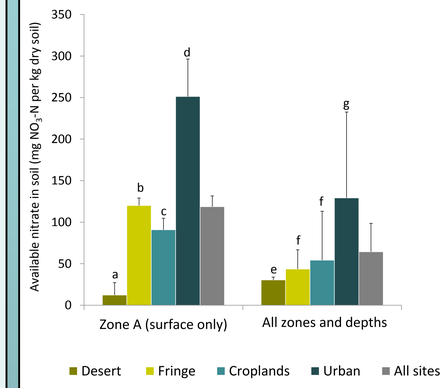
Plant Migration and Urban Areas

- Transportation corridors connect urban and undeveloped areas, providing relatively homogeneous conditions with elevated nitrate availability through the developed area
- Most seeds trapped at developed sites were adapted for wind dispersal
- Seed bank contents are similar while plant species composition varies significantly between landscaped and non-landscaped sites
- Maintenance practices in the Phoenix area favor disturbance-tolerant plants with small seeds
- Successful plants include both native and non-native species with similar characteristics

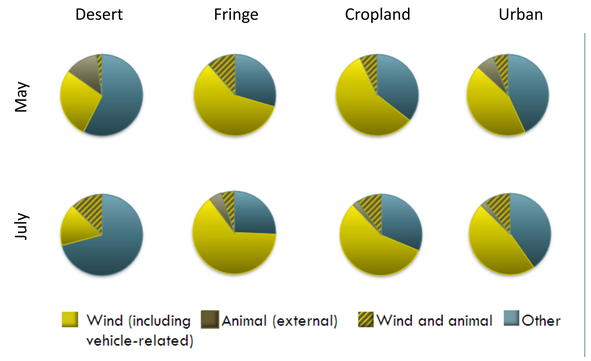
Stages of Plant Migration

Stage	Method
Dispersal	Seed trapping
Germination	Seed bank
Establishment and Reproduction	N availability, Plant surveys
Spread	Synthesis

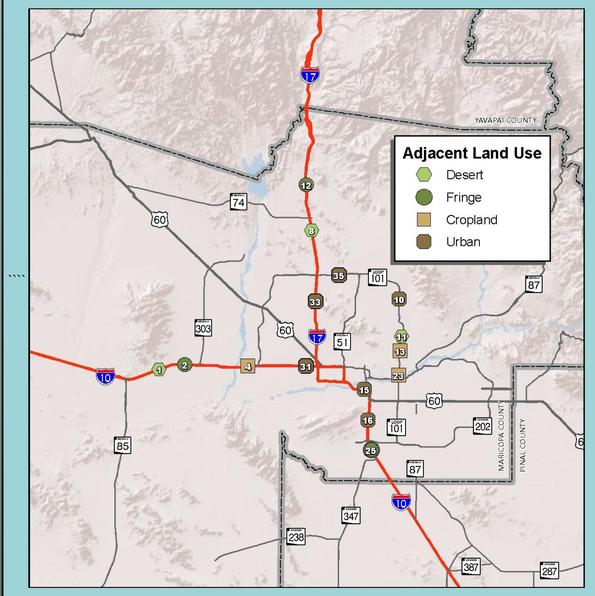
Nitrate availability



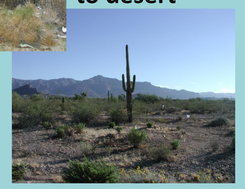
Seed Dispersal Traits



Study Sites



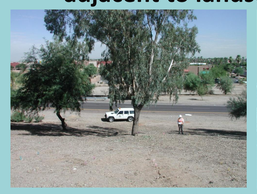
"Desert" sites: Non-landscaped verges, adjacent to desert



"Cropland" sites: Gravel verges adjacent to croplands

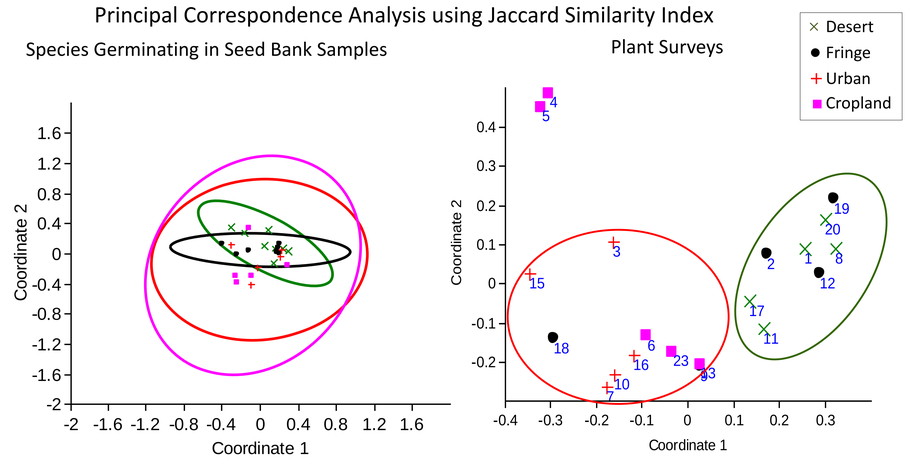
"Fringe" sites: Non-landscaped verges, adjacent to landscaped land

"Urban" sites: Gravel verges adjacent to landscaped land



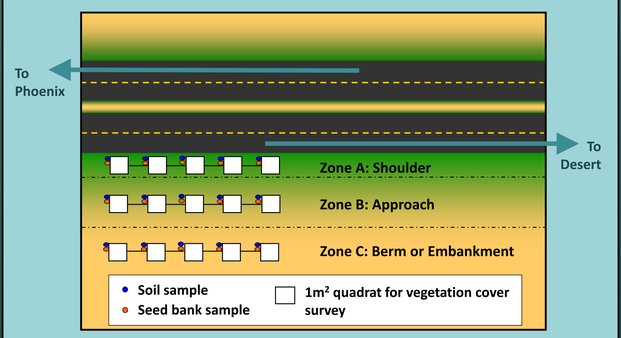
Land adjacent to "urban" sites had higher density development than land adjacent to "fringe" sites.

Seed Bank Germination and Plant Survey Results



- The seed bank contents were fairly similar, while the species composition of the plants growing at the landscaped and non-landscaped sites differed significantly

Sampling Design



Ecological Effects of Landscaping and Maintenance Practices

- Street sweeping: selective removal of seeds by size?

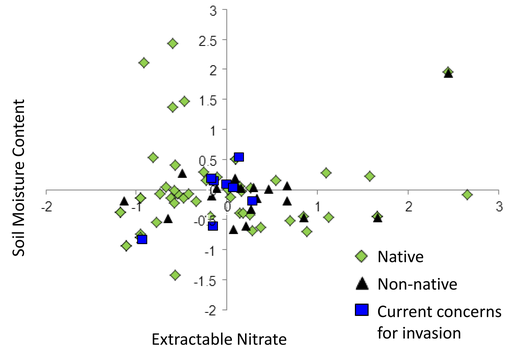
- Gravel mulch: traps seeds along the roadside

- Pre-emergent herbicide: prevents establishment of plants from the seed bank

- Drip irrigation with reclaimed water: adds nitrogen

- Pruning and removal of plant matter: removes nitrogen and carbon

Native vs. Non-native Species



- Plants occurring spontaneously at the sites included native and non-native species across a range of functional trait types (CCA results).

Acknowledgments

Funding:

- ASU's IGERT in Urban Ecology
- Central Arizona-Phoenix Long Term Ecological Research
- ASU Graduate and Professional Student Association

Field Site Access and Support:

Arizona Department of Transportation

Field and Lab Assistance:

Erin Adley, Monica Brennan, Tom Colella, Bethany Cutts, Carrie Durward, Tamara Harms, Maya Kapoor, Cathy Kochert, Libby Larson, Steve Swanson, Sandy Van Horne, Jason Walker, Joshua Watts