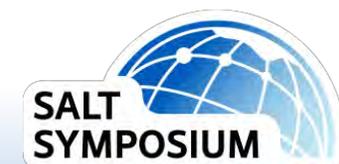


Andrea Renshaw

Virginia Tech

Afternoon Speaker August 1

*Halophytes for Mitigating Deicing Salt
Runoff Pollution*



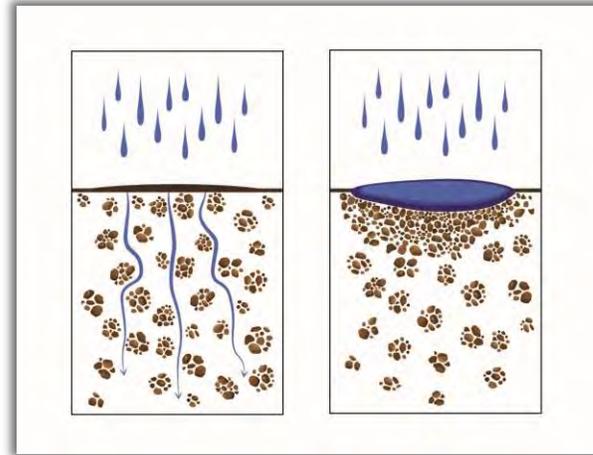
An Overview of Halophytes for Mitigating Deicing Salt Runoff Pollution

By Andrea Renshaw

Summary

- Salt runoff from roadside salt is causing impacts on human and environmental health
- We can address these impacts by using halophytes
- Using halophytes for your area
 - Bioregionally appropriate plants
 - Stratified systems
 - Limits of phytoremediation
 - Use of amendments
- Questions & further information

Salt Pollution Is Impacting Human and Environmental Health



The Washington Post
Democracy Dies in Darkness
Salt in water sources becoming worrisome
in D.C. region, experts warn

- Kills flora
- Destroys soil stability
- Damages water quality
 - Hurts humans

Definitions

Phytodesalination - the ability of some plants to extract pollutants such as salt ions from the environment and accumulate them into their biomass

Halophile - “salt-loving”; archaea, bacteria, and eukarya which require salt to live

Halophyte - plants which tolerate or require salt to live

Hyperaccumulator - halophytes which can accumulate amounts of salt ions (and often, other toxic metals) in amounts that would be considered to toxic to many other plants

Rhizosphere – The zone of chemical, biological, and physical influence of root growth and activity



Halophyte Environmental Spectrum

Obligate

- *Chenopodium album*

Facultative

- *Panicum virgatum*

Habitat-Indifferent

- *Salsola drummondii*

Dealing with Salt >>

Salt excluders

Rhizophora mangle



Salt excretors (aka
“Recretohalophytes”)

Distichlis spicata



Salt accumulators

Medicago sativa



So how do these different plant
types work?

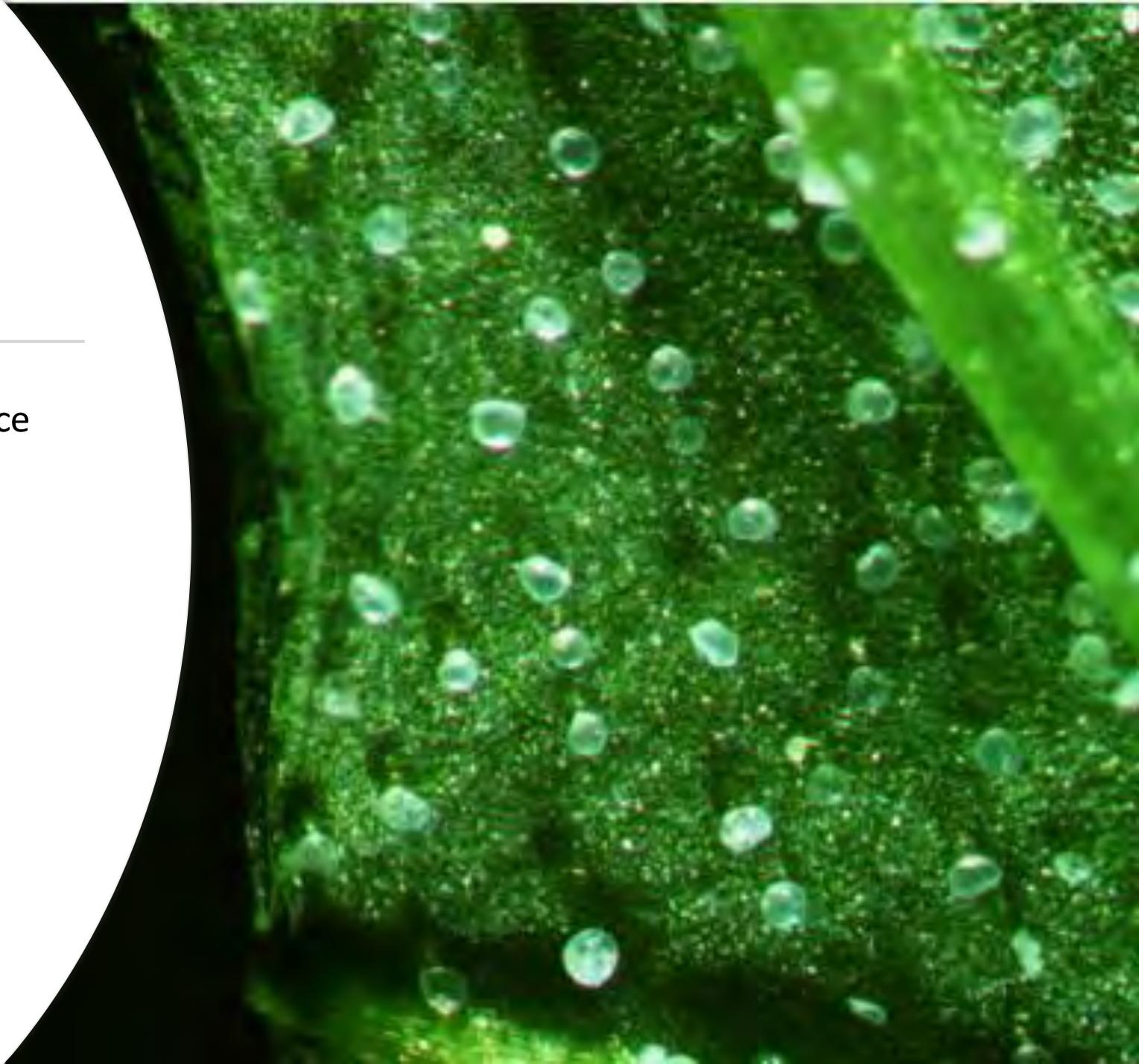
Salt Excretors / Recretohalophytes

- Haloconduction
- Trichomes
- Wind dispersal



Accumulators

- Uptake < excretors but held via succulence
- Compartmentalization
- Vacuoles
- Epidermal bladder cells (EBC)



Hyperaccumulators

- Misleading name
 - Accumulators OR excretors
- LARGE amounts of salt
- More studies are needed



Using Halophytes for Remediation

Bioregionally Appropriate Halophyte Candidates

Need to be:

Native or non-invasive

Low maintenance, low growing

Obligate or facultative

Perennial or good self-seeding annuals

Winter hardy, early spring germination

Drought resistant

Roadside stress resistant

Prolific biomass producers

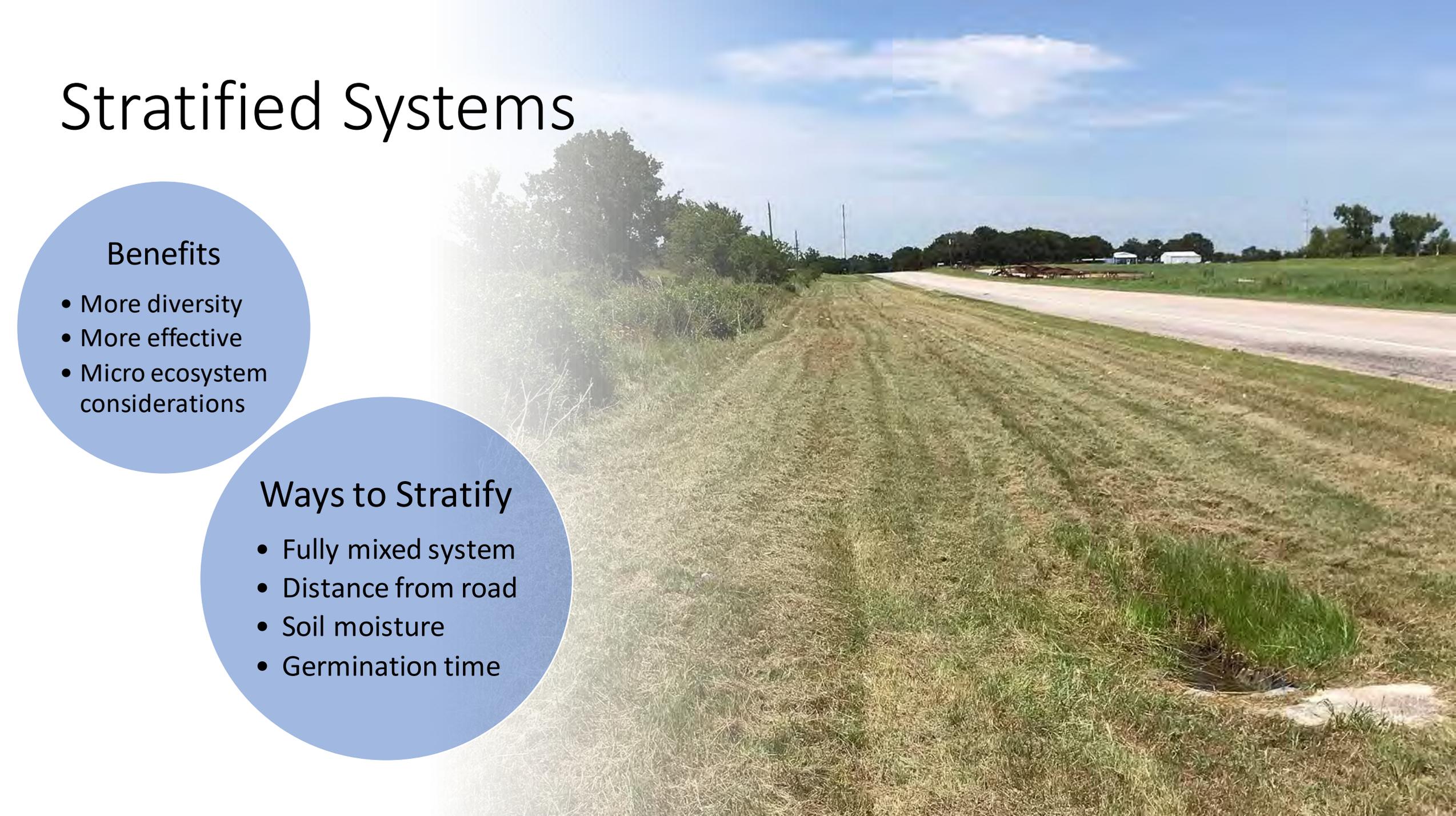
Easy to harvest

Secondary value

Very General Families:

- Acanthaceae
- Aizoaceae
- Asteraceae
- Brassicaceae
- Caryophalles
- Chenopodioideae
- Cyperaceae
- Oxalidaceae
- Plumbaginaceae
- Poaceae
- Rosid
- Tamariceae

Stratified Systems



Benefits

- More diversity
- More effective
- Micro ecosystem considerations

Ways to Stratify

- Fully mixed system
- Distance from road
- Soil moisture
- Germination time



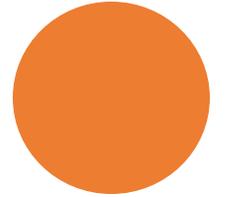
Limitations of Phytoremediation

- Seasonality
- Limited to rhizosphere
- Most effective
- Rough start, takes time



Soil Amendments

- Biochar
 - Cation exchange sites
 - Chelation of metals
- Gypsum – when to use



Thanks for listening!

Scan for thesis, image references, and contact information

