



The Logistics of Seed Production for South Texas Ecotypic Releases

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Overview

- Intro. to the PMC Program
- South Texas Natives
- Ecotypes
- Production Challenges



E. "Kika" de la Garza Plant Materials Center

- A Division of the Natural Resources Conservation Service
 - 27 centers across the US
 - Develop plant releases and technology to meet conservation needs
 - Work mostly with native plants



E. "Kika" de la Garza Plant Materials Center

- Our Program Emphasis
 - Rangeland Habitat
Restoration & Enhancement
 - Coastal Habitat
Restoration & Enhancement
 - Coastal Shoreline
Stability
 - Biofuels



South Texas Natives

- A Mutually Beneficial Partnership
 - Part of the Cesar Kleberg Wildlife Research Institute at TAMUK
 - Formed due to the lack of commercially available native materials adapted to South Texas
 - Brought in 1,728 collections since 2001
 - Numerous off-site evaluations & plantings



Ecotype Release vs. Cultivar

- **Ecotype Concept**
 - A mix of numerous collections of a species
 - A broad spectrum of the genetic makeup adapted to a specific ecoregion
 - Used to restore local habitat
 - Not an exact match, but closer than seed from out-of-region origins
- **Cultivar**
 - Usually bred and “improved” by selection
 - May be better for increased forage production or in highly disturbed sites with competition from numerous exotic species



Ecotype Release

- Process
 - Collect seed from natural populations within an ecoregion
 - Intention is to capture locally adapted genetics
 - Collections are compared for critical traits, and selections are made for a release
 - No breeding is done for “Natural Track” releases



Ecotype Release

- Genetic Pitfalls
 - Original samples must be representative and non-selective
 - How many collections are necessary to represent the genetics of the ecoregion?
 - Little information is available about the genetic diversity inherent within and between collections
 - In the past, it was a calculated guess
 - Now DNA technology can compare within and across populations, but seldom used



Ecotype Release

- Ploidy Pitfalls
 - Many plant species have multiple ploidy levels
 - Are you mixing ploidy levels of a cross breeding species that could produce sterile hybrids?
 - Sterility problems may not be seen until they are in the landowner's field
 - Generational field testing is necessary



Ploidy Example: Switchgrass

- $2n = 18, 21, 25, 30, 32, 36, 54, 70, 72, 90, 102$
 - Number of pairs of chromosomes
- Mating between 4x (usually lowland) and 8x (usually upland) resulted in high number of inviable seeds
 - From Table 10.4 - Region 2 native plant species that have variable ploidy levels. In: Genetically Appropriate Choices for Plant Materials to Maintain Biological Diversity, USDA Forest Service, 2004



Ploidy Examples: Grasses

- From Table 10.4 Region 2 native plant species that have variable ploidy levels.
 - In: Genetically Appropriate Choices for Plant Materials to Maintain Biological Diversity, USDA Forest Service, 2004
 - Big bluestem
 - Blue grama
 - Side-oats grama
 - Buffalo grass
 - Canada wildrye
 - Switchgrass



Ploidy Examples: Forbs

- From Table 10.4 Region 2 native plant species that have variable ploidy levels.
 - In: Genetically Appropriate Choices for Plant Materials to Maintain Biological Diversity, USDA Forest Service, 2004
 - Common Yarrow (2x, 7x, 9x)
 - Late goldenrod



Ecotype Release

- Why mix multiple accessions?
 - To represent populations throughout the ecoregion
 - To obtain desirable traits without breeding
 - Different collections may stand out in vigor, seed production, or active seed germination
 - It may be that no collection has all of the desirable traits
 - Lines can be produced separately, and seed can be blended before sale



Example: Arizona Cottontop

- 12 accessions
 - From across the Rio Grande Plain
 - Each breeder line produced separately
 - Blended before the seed producer
 - Reported to be apomictic (no mixing of genes)



Example: Orange Zexmenia

- 8 accessions
 - From across the Rio Grande Plain
 - 4 top performers on a clay site
 - Root rot resistance
 - 4 top performers on a sandy site
 - All 8 will be planted side-by-side and harvested for breeder seed
 - Isolated plots for replacement plants
 - Reduces the number of plots needed
 - Assures contribution from all lines



Ecotype Blend

- Why mix multiple species releases in a blend?
 - A blend of species within the same genus may be more practical to meet a vegetative need
 - If they all occur within the ecoregion of use, but on slightly different micro-sites
 - Avoids the necessity of choosing the correct species when seeding a site
 - 2+ are included and one or more should thrive

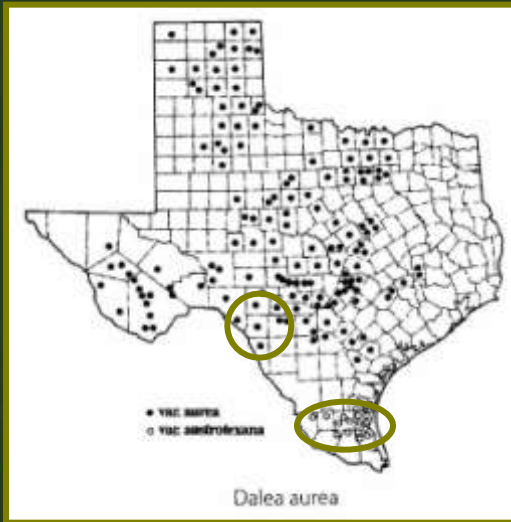


Example: Catarina Bristlegrass Blend

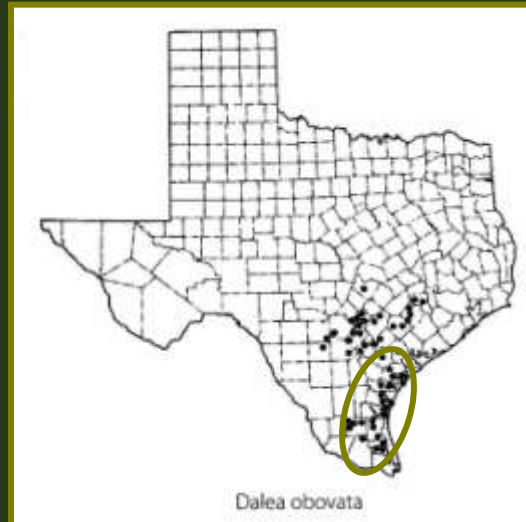
- *Seteria leucopila* & *S. vulpisetata*
 - A blend of 4 accessions, 2 species
 - 2 high active germination, but lower seed production
 - 2 high seed producers, but very high dormancy (<2% active germination)



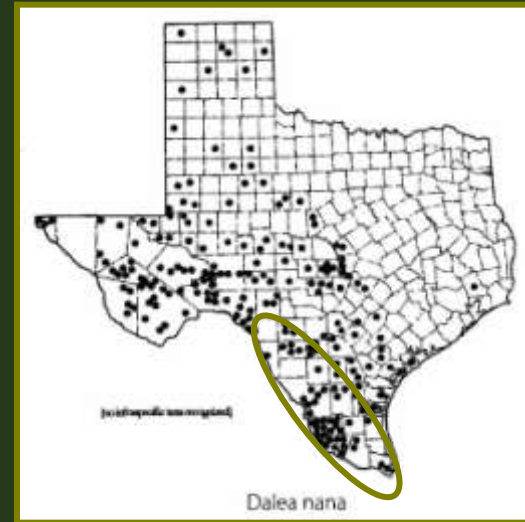
Example: Yellow Daleas



Dalea aurea



Dalea obovata



Dalea nana



Duration

- Annuals
 - Must be more conservative with original seed collections
 - Best to have all accessions grown for comparison in the same year
 - Each distinct line used must have breeder seed produced in isolation



Duration

- Perennials
 - Can have genetic drift in production plots
 - Volunteer seedlings in production plots
 - Die-off of plants
 - A reason to limit years of production for a plot
 - Some do not live > 1 year in cultivation



Root Rot

- Weed barrier on clay soils
 - Root rot in
 - Orange zexmenia
 - Awnless Bush-sunflower
 - Bristlegrass
- Reduced survival on clay
 - Even without weed barrier
 - Mexican hat
 - Indian blanket
 - Plains lovegrass
 - Hall's panicum



Growth Form

- There may be multiple growth forms within an ecoregion
 - Produce in separate lines
 - Or combine similar forms
- Example – Mexican Hat



Seed Maturity

- All accessions in a release may not be uniformly ripe
 - Another reason they may need to be produced in separate lines
 - Or combine lines that ripen together



Seed Storage

- Separate lines may mean
 - Separate harvests
 - More cleaning of equipment
 - Separate drying
 - Separate processing/ cleaning
 - More storage space until mixing



Seed Coating

- Now being tested for fluffy seeds and appendages
 - More uniform mixing
 - Better flow in seed drills
- May be useful to hold inoculants for legumes



Example: Arizona Cottontop



In Conclusion

- Ecotypes have a growing place in the seed market
- They also have unique challenges
 - Genetic
 - Cultural
- They have challenges common to any new species in production





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