

# What to Plant and When to Plant- Restoring Damaged Habitat

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THE 3.2-TRILLION-CUBIC-FOOTPRINT.









Chevron Ave E

Chevron Ave F

Chevron Rd G

Chevron Ave H

Ranch Rd

Chevron Rd I

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Google earth

329

Imagery Date: 11/4/2012 31°25'02.24" N 102°19'14.95" W elev 2573 ft eye alt 13933 ft

Utility Rd

Tu Electric Rd

N Chevron Rd







# Goals for this presentation

- How do I decide what to do with damaged land?
  - Do I need to reseed?
    - Is the disturbance natural?
  - Relevance-lands impacted by oil and gas and energy exploration
    - Pipeline, flow line, and transmission line rights of way
    - Pad sites
    - Disturbed areas adjacent to pads, processing facilities, roads, etc.
- If I reseed, what seeds are best for South Texas?
  - Who's advice to follow?
  - Where do I get seed?
- When is the best time to plant native seed in South Texas?
  - And what do I do if I have no choice but to plant at another time?







# Perspective:

- >50 South Texas restoration plantings across 33 county project area
  - Vegetation sampled bi-annually for up to 6 years after seeding
  - Recommendations based on actual field data
  - Continue to collect data on >30 plantings
- Hundreds of written seed mix recommendations
  - Follow up site visits with many operators and landowners we help
- We don't work on commission or for the company trying to save money on the seeding project
- Care about the habitat first and foremost
  - Recommendations based on what is best for the resource





# Perspective

- Large-scale habitat disturbance is occurring in South Texas today
  - Our focus:
    - Cost effective restoration techniques (~\$100/acre)
    - Scale appropriate restoration techniques (applicable to 10,000s of thousands of acres)-impact that matters
    - Results oriented restoration techniques (successful stands, persistent stands, similar communities to reference sites, wildlife benefit)
- The causes
  - Eagle Ford Shale
  - Wind Energy
  - Energy transport
  - Transportation infrastructure
  - New fence lines
  - Historic energy production sites
  - Retired croplands
  - Land use changes









**WARNING**  
**HIGH PRESSURE**  
**PETROLEUM PIPELINE**  
DO NOT CROSS OR CLIMB OVER THIS PIPELINE  
HARVEST 1-713-209-2400  
PIPELINE (Houston, TX)



Before we begin:  
Some Cautionary Tales

...



# Don't be talked into planting exotic grasses

-----Original Message-----

Sent: Tue, Mar 29, 2011 8:50 am

Subject: Re: Grass seeds

NO, this is not what I want. I have repeatedly said that I want native grasses used. Klien grass is NOT acceptable.

-----Original Message-----

Sent: Tue, Mar 29, 2011 8:41 am

Subject: Grass seeds

Good morning ... , I hope your day is going good. You asked for some information about grass seeds. I hope this is what you wanted.

Klien 75

525 seeds per Lb

Purity 99.92%

Inert .07%

Other weed seed .01 %

93/50 Germination

Thank, let me know if you need anything.

**Stand your ground!**



# Be informed, persistent, and tenacious!

**From:**  
**To:** [Forrest S. Smith;](#)  
**Subject:** Fw: seed proposal from Geophysical company  
**Date:** Friday, February 10, 2012 4:52:35 PM

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Forrest, I am so sorry to be such a bother, but I am finally hearing from the Geophysical company on their proposal of seed to be planted throughout the ranch where they have checkerboarded the place with the bulldozed senderos we talked about. My rough calculations might be about 25-30 acres conservatively, although it appears to cover much more, because they all appear to be wider than 16 ft. which they contracted for. The guy I am dealing with is a total jerk in my opinion. The following is our conversations about it, after I forwarded, some time ago, your lists from your website concerning the Eagle Ford Mix. I think, if I am interpreting and ~~calculating his vague list, his percentages are not right.~~ The areas throughout the ranch, a little different from the pipeline area, are mostly Brystal fine sandy loam, Brundage fine sandy loam, some duval fine sandy loam, and Tela Sandy clay for the most part. Judging by his response, he does not want to give me much information. ~~Do you have any suggestions, or do I just take what I can get? If all else fails,~~ I will have to get our attorney involved. Thanks.

----- Forwarded Message -----

**Sent:** Friday, February 10, 2012 3:40 PM  
**Subject:** RE: seed

**Only about 50% of the seeds on your list are available.**

~~The pounds per acre are as follows~~

**La Salle .10, Dilley .12, Haskel 1.00, Van Horn 1.0,  
Alamo Sand Drop 1.0, Kinney .12 and Lavaca .66**

I hope this answers your question.

Thanks

*Not accurate*

*Correct!*



# Don't use grass seed from Oklahoma

----- Forwarded Message -----

**Sent:** Wednesday, March 7, 2012 9:01 AM

**Subject:** Seeding

After talking to salesmen he let us know there are some seeds unavailable because of the drought, using your list as a guide he suggested:

25% dilley germ slender gram

10% Arizona lasalle

20% Catarina blend bristle grass 10%Maverick germ pink pappus

20%cheyenne Indian grass

7.5% greensprangle top

7.5% sand drop seed

Hopefully this is to your satisfaction and with your approval we will get this ordered and planted.

Anxiously awaiting your reply,

Sent from my iPhone

*(Cheyenne  
Indiangrass is from  
OKLAHOMA)*



# Watch out for stupidity



# What do I do with:





# Or this:





Or this:





# #1: PROTECT THE TOPSOIL



# How?

- Create baseline conditions as a reference
  - Soil tests
  - Vegetation sampling
- Prevent spills
- Clean up the spills that happen
- Keep the stuff that happens on a pad site, on the pad site
- Keep soil layers separate
- Limit soil disturbance intensity and extent
- Use cover crops
- Prevent erosion/loss of soil microbes/ organic matter
  - Abhor bare ground
- Reseed if needed



# When to reseed?

Situation	Examples
Native seedbank absent	<ul style="list-style-type: none"><li>•Retired cropland</li><li>•Engineered soils</li><li>•Oil and gas production pads</li><li>•Less than 10-15% desired vegetation</li></ul>
Slow vegetation recovery	<ul style="list-style-type: none"><li>•Severely overgrazed rangelands</li><li>•After severe wildfire</li><li>•Following brush management</li></ul>
Prevent soil erosion	<ul style="list-style-type: none"><li>•Pond and tank embankments</li><li>•Watershed work</li><li>•Highway or energy right of ways</li></ul>
Limit weedy or invasive species establishment	<ul style="list-style-type: none"><li>•Brush control</li><li>•Pipeline, power line, or highway right of way installation</li></ul>
Improve plant diversity, structure, or composition	<ul style="list-style-type: none"><li>•Exotic grass pasture diversification</li><li>•Degraded rangeland improvement</li><li>•Wildlife habitat improvement</li></ul>



6 months after pipeline installation





1 year after pipeline installation





2 years after pipeline installation





# What to plant?

- Exotic vs. native?
- If native, which “natives”?
- How to chose a seed vendor
- How to chose a seed mix

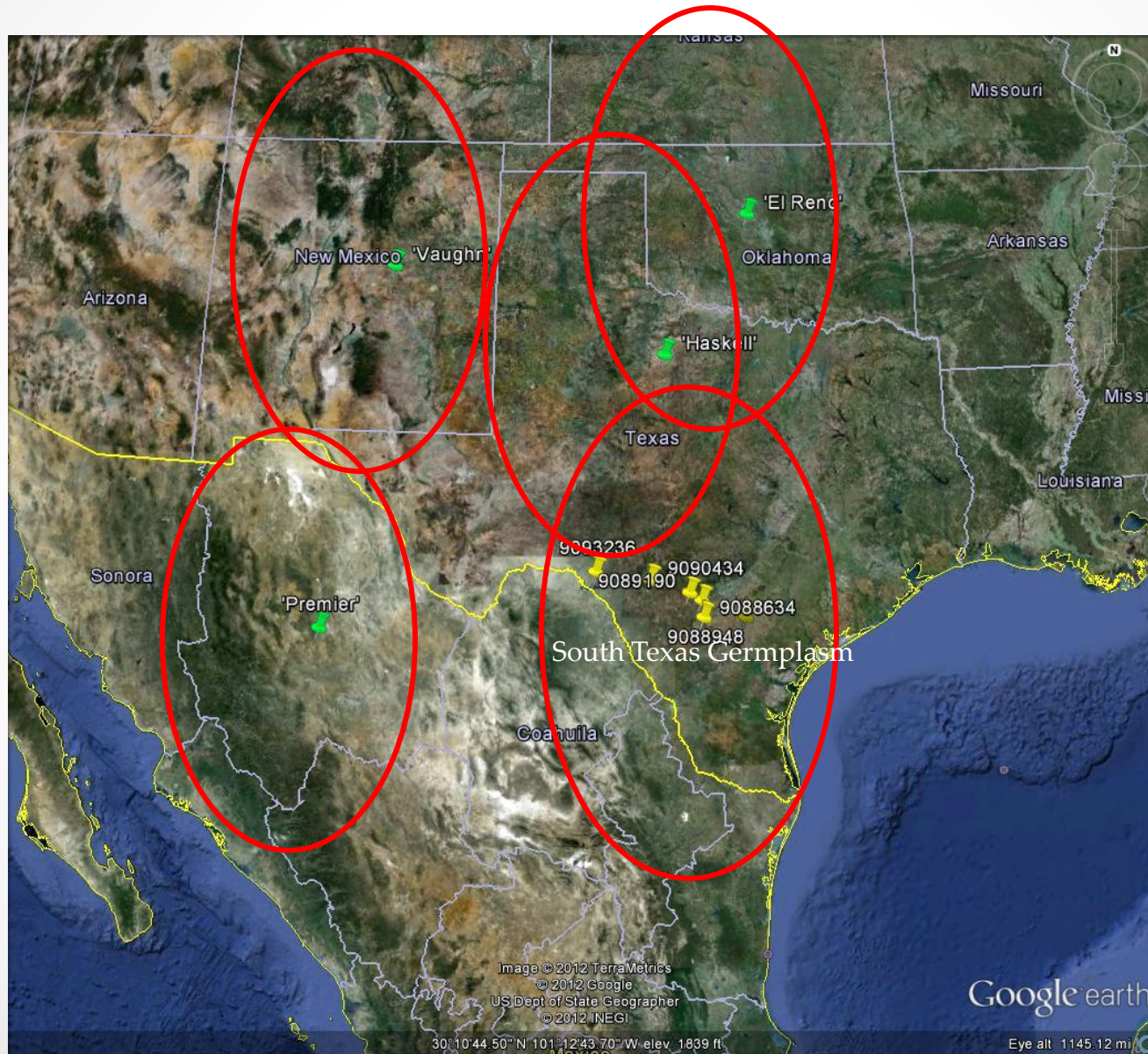
# What seed is it? Trickier than you think....

- Example: Sideoats grama
  - Caespitose form
  - Rhizomatous form
  - >20 commercial varieties, many from other areas of the country, or various locations in TX.
  - Success will be impacted by seed source choice
  - Community persistence and function will be impacted by seed source choice





## Available Sideoats grama seed varieties-and realistic areas of adaptation



# Where Seed CAME FROM is very important

- Local adaptation for “now” performance
- “Native” is relative
- Location of seed company *has nothing to do with where seed originated from*
- Ask seed companies for seed origin
  - Certification proves origin
  - Named varieties give assurances
  - If they don't know, don't use the seed





# What's in a bag of Seed?

- The seed you want, and?
- Beware of other crop seed?
  - Old World bluestem is "other crop seed "unless using seed with certification standards that prevent its inclusion
- For quality, % PLS is the standard measure
  - Beware of seed that is not sold by the PLS lb.
- Without PLS you can't:
  - Calculate a planting rate
  - Estimate value of purchase
  - Compare unit cost
  - Eliminate poor-quality seed or poor calibration as a limiting factor to success



# Seed Certification

- Texas Department of Agriculture Standards Certified Seed Growers
- Certified Seed sold on a lbs PLS basis
- Pedigree of seed being grown is documented
- Fields inspected pre-harvest
- Final product inspected/subject to inspection at all times
- Exotic grass seed inclusion is specifically prohibited in most certified native seed options





# “Wild harvest” and Cheap Seed Sources?

- Are cool until:
  - You accidentally plant spotted knapweed in Texas
  - You plant Khakiweed, and sedges on a right of way in a virgin prairie
  - You sell prairie mixes with seeds of plants that don't grow in the prairies you harvested from?

# Two weeks ago:

...Here is a bit of background on the spotted knapweed we found at Balcones this year. I would appreciate if you would forward this to spread the word that everyone needs to look for this plant on sites re-seeded with native grass seed in the last two years. And, it would be especially helpful if the source of this seed could be found to prevent future dissemination of the weed....

....To date, we have found and removed 17 total plants at 4 sites along the Post Oak Creek drainage of the refuge, all reseeded in 2013 by FWS or a contractor, but using two different batches of seed mix bought from the same supplier (one sold to us, one sold to the contractor). The seed mix contains Van Horn green sprangletop, Haskell sideoats grama, native little bluestem (???), Canada wildrye, and purpletop.

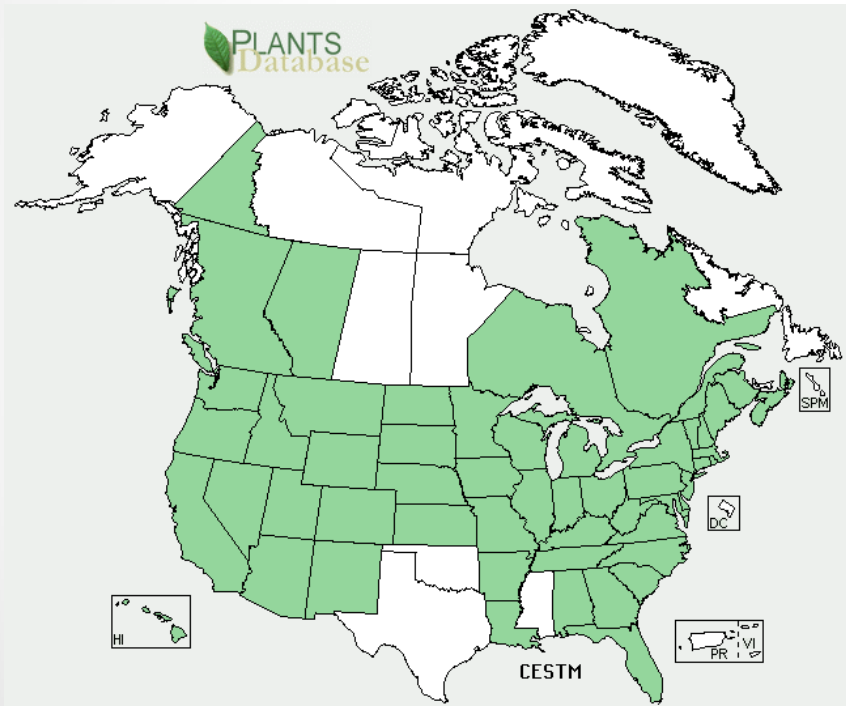
....We are continuing to monitor sites we reseeded and anticipate some additional plants may be found over the course of the next two years.

***USE OF CERTIFIED SEED WOULD HAVE PREVENTED THIS!***





# Spotted knapweed



# Read the fine print:

## Attachment B

### Coastal Prairie Mix Lot #280101090611

Kind	Variety	% of mix by wt	Test date	Germ	Dormant	Total Germ
Little Bluestem	Native	64.91%	5/13	86.00%	8.00%	94.00%

Species identified by certified lab: American Aloe, Aster, Balsamscale, Big Bluestem, Blazing Star, Blue Grama, Broomsedge Bluestem, Brownseed Paspalum, Bushy Bluestem, Common Ragweed, Common Sunflower, Coneflower, Croton, Crabgrass, Epazote, Field Paspalum, Florida Paspalum, Gayfeather, Giant Coneflower, Goldenrod, Hairawn Muhlygrass, Hidden Dropseed, Indiangrass, Khakiweed, Knotroot Bristlegrass, Lanceleaf Coreopsis, Longspike Tridens, Marsh Elder, Muhly Grass, Partridge Pea, Pineland Three-awn, Polygonum, Prairie Wildrye, Purple Prairieclover, Purpletop, Rattlesnake Master, Rough Buttonweed, Rough Sumpweed, Scratch Dropseed, Sedge, Short Beaksedge, Sideoats Grama, Slender Paspalum, Spikerush, Split Beard Bluestem, Switchgrass, Texas Cupgrass, Three Awn, Urochloa, Vervain, Woodland Flax.

Species comprising 5% or greater of the overall mixture are tested for germination.

Purity	64.91%	Weed	<u>1.02%</u>
Inert	<u>28.80%</u>	Noxious	None
Other	<u>5.27%</u>	Origin	TX



# Other?



There is no unidentified “other” in  
this native seed





# *What to plant?*

- Use certified native seeds that originated from the ecoregion you are planting in!
  - South Texas & Eagle Ford Shale region: South Texas Natives Program seeds are only sources that meet this criteria
  - “Native” seeds from distant regions do not persist
    - If this is o.k.-plant a cover crop instead, it is a lot cheaper!
  - Cover crops-keep it simple:
    - Warm season-millet
    - Cool season-small grains

Which native seeds to  
plant in South Texas?



## Atascosa

Germplasm Texas Grama  
*Bouteloua rigidiseti* Steud.



## Balli Germplasm

Prostrate Bundleflower  
*Desmanthus virgatus* (L.) Willd.  
var. *depressus* (Willd.) B.L. Turner



## USDA NRCS

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Natural Resources Conservation Service

## Catarina Blend Bristlegrass

*Setaria leucopalea*  
(Scribn. & Merr.) K. Schum.  
and  
*Setaria vulgaris*  
(Lam.) Roemer & J.A. Schultes



E. "Kika" de la Garza  
Plant Materials Center  
Kingsville, Texas



## Chaparral

Germplasm Hairy Grama  
*Bouteloua hirsuta* Lag. var. *hirsuta*



## Dilley

Germplasm Slender Grama  
*Bouteloua repens* (Kunth) Scribn. & Merr.



## Divot

Tallow Weed Blend  
*Plantago hookeriana* Fisch & Mey  
*Plantago rhodasperma* Dcne.



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## Falfurrias Germplasm

Big Sacaton  
*Sporobolus wrightii*  
Munro ex Scribn.



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## Goliad Germplasm

Orange Zexmenia  
*Wedelia texana* (A. Gray)  
B.L. Turner



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## Hidalgo Germplasm

Multiflower False  
Rhodes Grass  
*Trichloris pluriflora* Fourn.



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## Hoverson Germplasm

Deer pea vetch  
*Vicia ludoviciana* (Nutt.)



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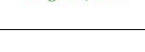
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## Kinney Germplasm

False Rhodes Grass  
*Trichloris crinita* (Lag.) Parodi



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## La Salle

Germplasm Arizona Cottontop  
*Digitaria californica* (Benth.) Henr.



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## Lavaca Germplasm

Canada Wildrye  
*Elymus canadensis* L.



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## Mariah Germplasm

Hooded Windmillgrass  
*Chloris cucullata* Bish.



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## Maverick

Germplasm Pink  
Pappusgrass  
*Pappophorum bicolor*  
E. Fourn.



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## Oso Germplasm

Hall's Panicum  
*Panicum halli* Vasey  
var. *flipes* (Scribn.) Walter

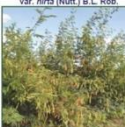


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## Rio Grande Germplasm

Prairie Acacia  
*Acacia angustissima* (Mill.) Kuntze  
var. *hirta* (Nutt.) B.L. Rob.



## South Texas Germplasm

Sideoats Grama  
*Bouteloua curtipendula* (Michx.)  
Torr. var. *caespitosa* Gould &  
Kapadia



## Venado Germplasm

Awless Bushsunflower  
*Simile calca*  
(Engelm. & A. Gray) A. Gray



## Webb

Germplasm Whiplash  
Pappusgrass  
*Pappophorum vaginatum*  
Buckley



## USDA NRCS

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Natural Resources Conservation Service

## Welder Germplasm

Shortspike Windmillgrass  
*Chloris » subulicostachya* Huell.  
(pro sp.) [cucullata » verticillata]



## Zapata

Germplasm Rio Grande  
Clammyweed  
*Polanisia dodecandra* (L.) DC.  
ssp. *rigrandensis*



# Where to buy seed?

- Primary vendor for releases made for South Texas is **Douglass King Seed Company**
- Other seed companies grow some acceptable varieties, or can obtain seed from King Seed Company
  - Pogue Agri Partners
  - Bamert Seed Company
- *Know what you want, and don't accept substitutions*
  - Email us for seed mix recommendations: [forrest.smith@tamuk.edu](mailto:forrest.smith@tamuk.edu)
    - GPS coordinate or location and soil series
  - Use website guidance for seed mix recommendations
    - Important considerations
      - Soils
      - Geographic location



# Cost of native seeds?

- A high quality seed mix of South Texas-adapted native seeds will cost **\$80-\$125/acre**
- Be suspect of mixes cheaper than this-they probably do not contain the right seeds
- Read the %'s PLS of the components in mixes offered to you-some companies offer small % composition of native seeds, mixed with “fillers” to make sales on price alone -feel free to send quotes to us to review

# How to select a seed mix?



# Know:

- Which species were present before, or are present on adjacent undisturbed sites?
- Soil type and soil series
  - Use Soil surveys
  - Get a soil test
  - Review Ecological site and Range Site descriptions available from NRCS
- Guidance provided in seed release documents/brochures
- Use historic plant distribution information
- Use seed mix selection tools on South Texas Natives Website
- Sometimes mixes must be adjusted for altered conditions
- We can help you

When to plant?



# *When to plant? Our observations: % success?*

- January:
- February: 50%
- March: 50%
- April: 66%
- May:
- June:
- July:
- August: 100%
- September: 88%
- October: 80%
- November:
- December:

# Our recommendations:

- August 15-October 15 is the ideal planting window in most of South Texas
  - The last week of August
- Secondary planting window is immediately following last freeze in February/March-April
- Conditions for germination of warm-season native plants that grow in South Texas will rarely occur from October 15-February 15, or May-August 15
  - But, yes it is possible to be successful during these windows



# What if you can't plant during the ideal time?

- Include a cover crop to provide some soil cover and protection of the site
  - Warm season: browntop millet
  - Cool season: oats
- Utilize mulches or other ground covers to moderate moisture limitations/temperature extremes
  - Hydromulches
  - Mats
  - Hay or straw (be sure it is clean)
- Do the best you can and be realistic
  - By 2 years after planting, planting date is largely irrelevant based our observations in head to head trials

# Other important considerations:

- Planting techniques
  - Various techniques can work well-native seed drills, broadcasting, hydroseeding are all effective in combination with seeds we have developed
  - Equipment should be calibrated carefully
- Seedbed preparation
  - Good seedbeds = success
  - Repeated seedbed preparation treatments are needed
    - Eliminate competition as much as practical
    - Create good environment for seed germination
      - Moisture retention =firm seedbeds, not freshly disked seedbeds
      - Seed to soil contact is important for germination
- Seed mix composition
  - Seed mix diversity correlates with success
    - Don't get too creative-adapted seed is still important
  - Early successional seed mix components are important













TEXAS NATIVE SEEDS

Questions?