# Exploring Possible Benefits of Cover Crops— Southern High Plains

Calvin Trostle
Extension Agronomy
Texas A&M AgriLife, Lubbock
(806) 746-6101,
ctrostle@ag.tamu.edu

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# Where Will This Land be in Another 20 Years?

- If Dryland many producers in South Plains (sandier soils) believe they have to list their land to keep it from blowing
- Many remain with continuous cotton, which provides minimal residue
- Crop pricing, as well as crop insurance, landlord preferences, etc., contributes to cotton dominance—and indirectly affects cover crop options, considerations, etc.
  - Check with FSA to ensure you understand how a cover crop may impact your eligibility for coverage

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# Are we seeing any measurable improvement in the health of soils with cover crops?

- Texas High Plains: "Little data collected on any facet of cover cropping. Though I believe in time cover cropping will find a place in some cropping systems, the very real concern among producers and university staff is the use of moisture by the cover crop in the overall cropping system. Can we afford it?—whether we can or not (data needed!), we can not ignore it…"

# Are we seeing any measurable improvement in the health of soils with cover crops?

- "…An emerging consensus among farmers and Extension in the Texas South Plains is that initial focus on cover cropping is not immediately soil health (defined in several different ways), but protection of the soil surface. Desirable soil attributes include:
  - reduced erosion,
  - increased water infiltration rates and capacity,
  - soil aggregation,
  - increased biological activity in the soil, etc.
- "These will not occur until first the soil surface receives a **blanket** (residue, whether from your cash crop like wheat-grain sorghum-corn and/or a cover crop) likely coupled with greatly reduced tillage.

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# Background

- ~3 million acres of mostly bare ground in the TX-NM Southern High Plains, which is likely highly eroded—degraded! (though many don't realize it)
- Median rainfall, Lubbock, 17.5"; Plains, 15.8"; Clovis, 15.9"
- From Lubbock south and southwest, predominant soil type is Amarillo fine sandy loam and then Brownfield loamy sand
- Typical soil OM is 0.3% (~0.7% in native range)

# Lamesa, TX 2013



- Biomass from sorghum/ sudan > 2 tons DM/acre
- Soil protection assured, but how to manage for subsequent planting?

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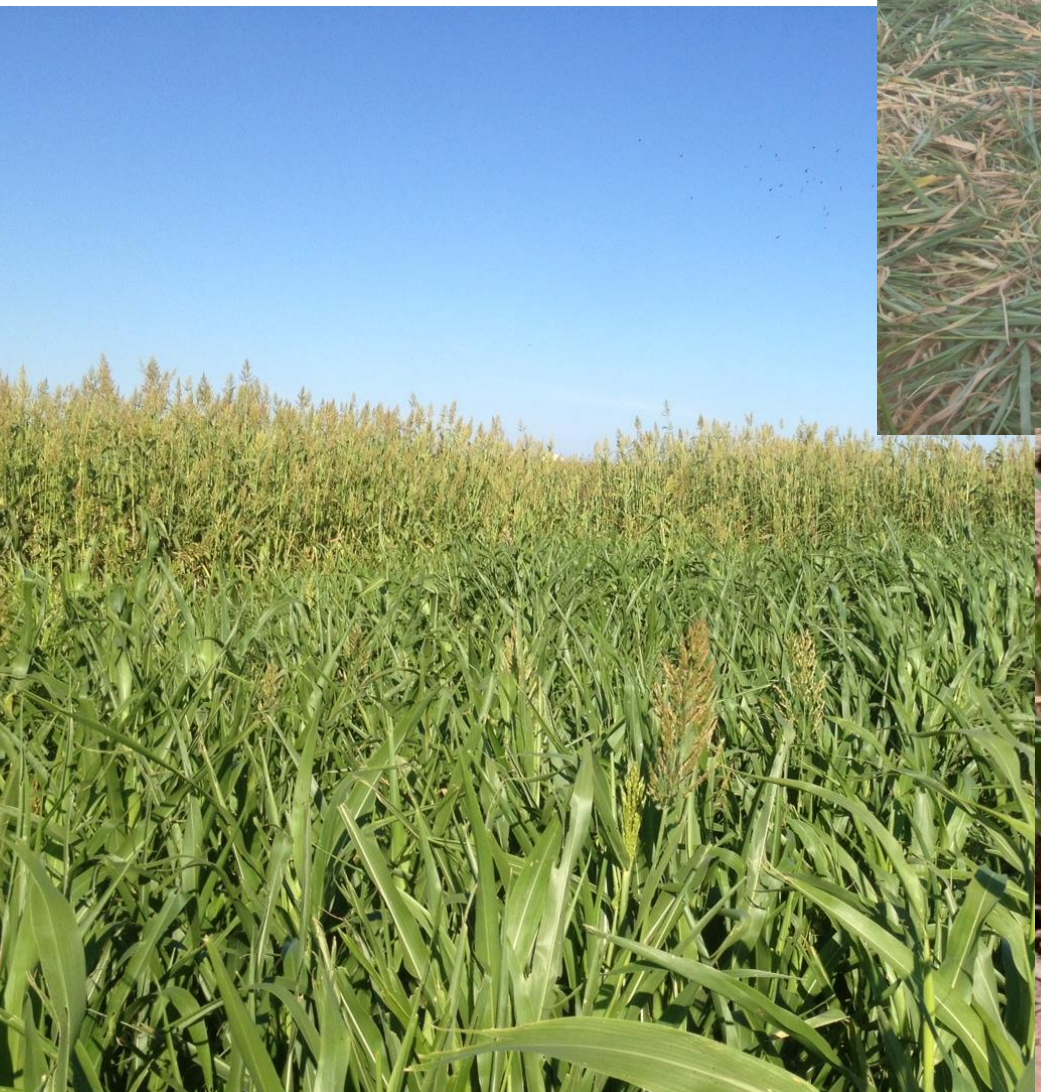
April 15, 2014
Will this hold the ground?
Can a farmer plant in this?


AGCARES, 2014
Cotton & Grain Sorghum
No wheat established in Fall 2013

# Hay Harvest & Regrowth



# Full-season & Regrowth Groundcover

- USDA-ARS work, Wellman, TX (loamy sand) with irrigated tillage systems (Ted Zobeck)
  - Only two systems increased soil organic matter:  1) intensive irrigated cropping with a crop in addition to cotton
  - 2) strict no tillage
  - BAD NEWS:  after ~8 years it took only one tillage operation to undo essentially all soil OM gains

# Lubbock Sorghum/ Sudan & Cotton w/ Late Germination

# Lamesa Sorghum/ Sudan after Freeze

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# Considerations

- No stubble incorporation of any kind
- High residue ‘cadillac’ treatment:
  - Cover the ground, protect the surface—the “Blanket”, capture all but the hardest of rains
  - One variation is mowing at about 60 days to put a mat of residue on the soil quicker
  - No income in Year 1 (am I nuts?)—a concept to explain, not advocate at this point
- Weed control will be a challenge
  - Losing options for incorporation

# What I am trying (cool-season)…

*Legume

- Small grains (wheat, rye, barley, triticale)
- Tillage radish (also other names, e.g. Daikon, Driller, Nitro), www.tillageradish.com
- Hairy vetch*
- Austrian winter peas*
- Clovers*—numerous species, many of which do not have high pH tolerance (yellow sweet clover does), others have unknown cold tolerance (e.g., rose, arrowleaf, etc.)
  - NMSU-Tucumcari's Leonard Lauriault
- Winter canola (rapeseed cousin; +/- weed issues)
- Mustards (Pacific Gold, Kodiak)
- Berseem and balansa clover*; Black medic

# Winter Cool-Season Legumes

- Is there a labeled species-specific *Rhizobium* inoculant available?
- If so, is it a seedbox powder?
- Or can you get a liquid and seed-apply it? (far more inoculant *Rhizobium* cells per cover crop seed)
- Will you get nodulation?

- "Build the soil…" meaning add nitrogen (NOT if you don't get nodulation)

# Tillage Radish

- Minimal stand of ‘Driller’ tillage radish at Lamesa, TX, Dec. 2013. Seeded dryland Fall 2012, this potential winter cover crop achieved approximately a minimal 5% stand on dryland, and due to drought and freeze essentially all plants died by April 1.

# Winter Canola

- Minimal stand of ‘Riley’ forage winter canola at Lamesa, TX, Dec. 2013. Seeded dryland Fall 2012, this winter canola achieved approximately a 5% stand on dryland, and due to drought and freeze essentially all plants died by April 1.

# Sesbania: a good potential cover crop in NM

***NMSU Las Cruces: Drs. K. Grover & John Idowu***


Excellent Biomass Production
Sesbania
Sorghum-sudan
Pearlmillet

# Wheat

- TAM 112 wheat late March 2013 at AgCares, Lamesa, TX. The wheat was drilled in late October but did not emerge until after January 15 due to lack of rainfall. Ground cover potential was minimal.

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# Taking Research Results or What Works from Other Areas and Applying it in the Southern High Plains…

- Is there research?  Can there be research?  What will it take?

- We err to suggest that what works in eastern Kansas or Tennessee or Oregon will be the best option here without thinking it through and testing

# Any Cover Crop Species & Weed Control

- Few labeled herbicides for most of the secondary potential covers like the clovers, peas, hairy vetch, etc.
- What did you have applied in the previous crop?
  - Don’t spend—waste—money on something that won’t grow
- If weeds get away from you then be prepared to spray, sacrificing some of your cover species

# Is there a risk of letting a cover crop go to seed?

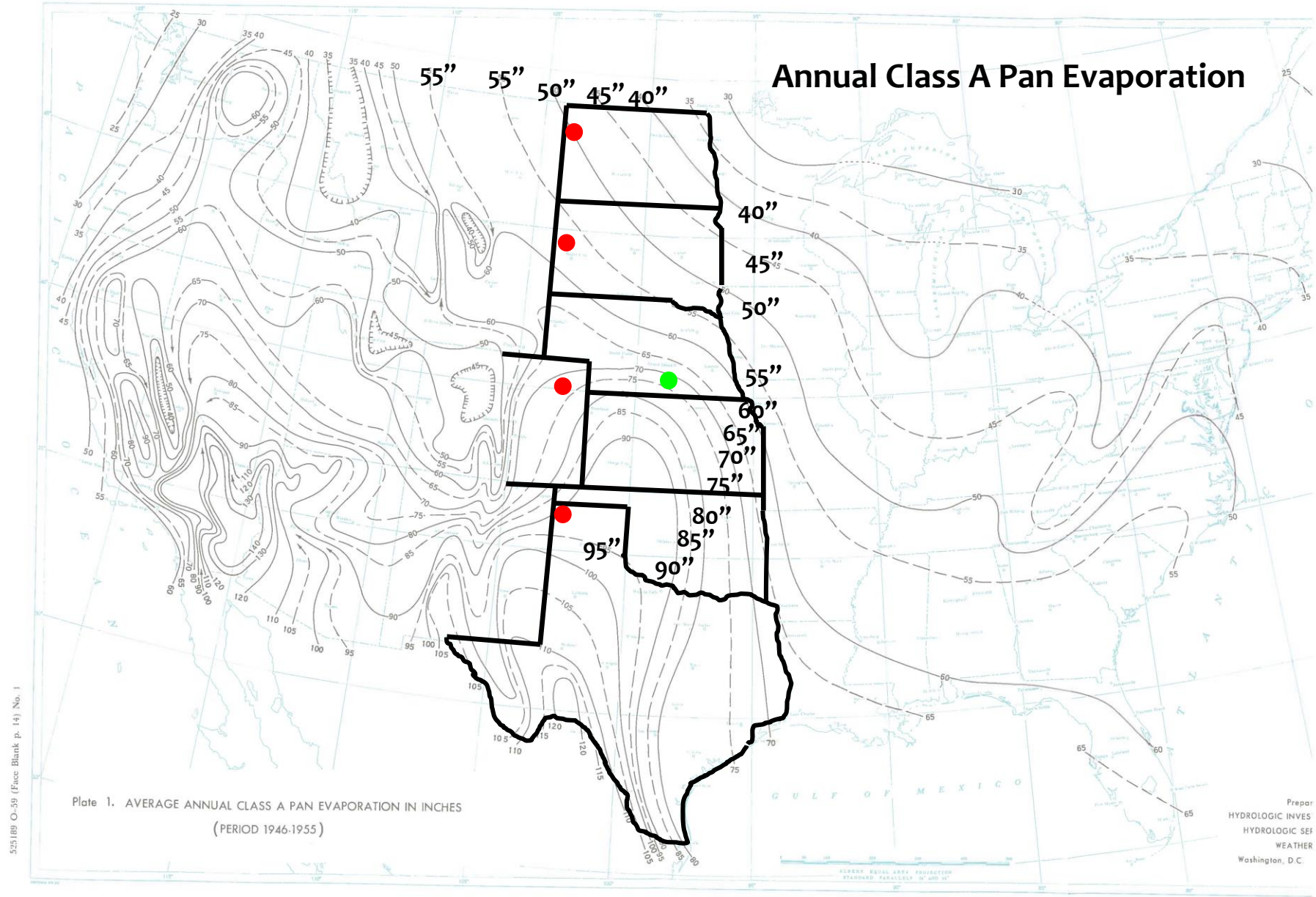
- Are you potentially planting your own weeds?

# Water Use & Cover Crops

- Can we afford to expend precious water resources on a cover crop?
  - Manage the stubble you generate from an economic crop
- Economic return may not occur right away?
- Does the cover use too much water to the detriment of the next agronomic crop?

- That beautiful video from Nebraska…
  - Similar rainfall to Clovis, Lubbock, Plains—it should work in your area, too!
  - What is the flaw—the fallacy—in this thinking?

# Annual Class A Pan Evaporation



# A Regional Organization…

- "Water is Our Future"

- **Is it?**

- Land resource preservation/restoration is our future, and that will help us with the water
  - *But that doesn't sound catchy!*

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# Common Objections to No-Till

- Farmers:  Any reduced- or no-till attempt in dryland leads to very hard ground; and it has to be broken up with tillage?
- "It won't work" (from a university researcher, who studied the topic, but conducted mostly a series of one-year studies)
- What about fallow?
- How can you convince producers to grow anything else (other than cotton)?  Or convince their landlords? Or their ag. finance officer?

# Objectives

- Demonstrate and test key reduced and no-tillage systems paired with cropping sequences to evaluate success in improving land, reducing erosion, and re-building soil quality (OM, biological diversity, soil physical properties like infiltration)
- Evaluate low water use winter cropping to potentially enhance initial ground cover
- Establish a dryland no-till producer working group

# Approach Beginning 2012

- Tillage
  - Conventional listing
  - Reduced tillage
  - No-till
- Cropping Sequence
  - Continuous dryland cotton—our base comparison
  - 1:1 grain sorghum-cotton (sorghum in 2012)
  - 1:1 wheat-cotton
  - Our residue centric treatment: Year 1 male sterile sorghum/sudan for maximum biomass, which will **not** be harvested or tilled; likely planted in grain sorghum in Year 2 for another round of residue

# Early Fall Seeding--Non-winter species

- Allow for early fall (September) establishment of a species that will grow off well then winter-kill
- Establishes cover and protect the soil surface though this does not stimulate the active biological community as much
- Is cover more important?
- Are prospective growers ready to plant this early?

# What do we need the most?

- Soil protection?—The “Blanket”
  - This does not necessarily contribute to soil organic matter buildup
- Increased soil biological activity?  Soil protection alone should enhance this some
- Winter vs. Summer cover
- When do you get the most rainfall?  Curry, Lubbock, Lea Counties, median is about 1.7-2.0” for Nov.-Feb.

# Cover Crop Seed Costs

***Single Species***

| *Species* | *$/lb* | Target Rate *lb/a* | *Total ($/a)* |
|---|---|---|---|
| Peas | $0.40 | 100 | $ 40.00 |
| Lentils | $0.65 | 50 | $ 32.50 |
| Vetch | $0.80 | 50 | $ 40.00 |
| Clover | $2.15 | 15 | $ 32.25 |
| Oats | $0.29 | 90 | $ 26.10 |
| Barley | $0.31 | 90 | $ 27.90 |
| Rapeseed | $1.00 | 6 | $ 6.00 |
| Flax | $0.65 | 35 | $ 22.75 |
| Safflower | $0.70 | 30 | $ 21.00 |
| Phacelia | $4.45 | 5 | $ 22.25 |

**Costs to plant the seed mixture at 52 lb/a**

**Seed $ 34.29/a**
**Mixing $ 2.60/a** *$0.05/lb*

**Total $ 36.89/a**

# “Five Keys to Soil Health”

## NRCS, Soil Health Advocates, Others

- Keep the soil covered
- Minimize soil disturbance
- Crop diversity
- Living roots in the soil at all times
- Integration of livestock with the land

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# Final Thoughts

**Cover Crops Can Do Some Good Things, But…**

# Final Thoughts

**Cover Crops in Mixtures Use Water Similarly to Single-Species Plantings**


Final Thoughts
Cover Crops Cost Money

# Final Thoughts

**Using Cover Crops for Direct Economic Benefit Is Not Really Cover Cropping**

# Final Thoughts

**Locally Conducted Replicated Field Trials of Cover Cropping Are Needed**

**Studies and Results From Other Regions May Not Apply Here**

# Cover Crop Conference--Lubbock

- **Friday, March 6th**
- Texas A&M AgriLife Research & Extension Center
- 1102 East FM 1294 (off I-27, just north of Lubbock airport)
- 8:30 AM--~2 PM
- Cropping systems, coupling with reduced-till/no-till, discussion of soil biology, what species (and if mixes are needed), water use…
- …and a visit with regional farmers that are trying cover crops, irrigated and dryland

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# Sources of Label Information
## & AgriLife Extension Weed Scientists

- Labels for herbicides, insecticides, fungicides, seed treatments, growth regulators, etc.—access through **http://www.cdms.net**, click ‘Services’ then ‘Labels’ then enter Brand name
  - After ‘Labels’ you can also search by active ingredient (looking for a generic?) through “Other Search Options” but will need to register for a free password

- Weather information: West Texas Mesonet (TTU), http://www.mesonet.ttu.edu
  - Temperature, wind, rainfall, soil temps, evaporation
  - Stations include Hobbs, Tatum, Dora

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