

2013 Sorghum Texas South Plains:

**Agronomy, Hybrids,
Fertility, Weed Control,
and More**

Calvin Trostle., Ph.D.

Texas A&M AgriLife Extension Service--Lubbock

ctrostle@ag.tamu.edu, 806-746-6101

Using this PowerPoint...



- To the growers: This PowerPoint is large collection of the myriad of topics that I discuss on grain sorghum production. Parts of it are not relevant to your operation. Though I have not tried to discuss everything, I have many different topics on the slides, so I just keep them and use them occasionally.
- If you have questions please contact me.

Calvin L. Inostre



- Promotion, research, marketing
- Grower funded checkoff instituted in 2009, and approved by growers in 2011
- Already funded projects in West Texas
 - Trostle (5), Bean & Keeling, Peterson
- Rate of 0.6% or 5.4¢ for \$9.00/cwt sorghum
 - Each 1,000 lbs./A is \$0.54/A

Grain Sorghum Pocket Production Guides for Texas (region specific). Prepared by Texas A&M AgriLife, published by United Sorghum Checkoff Program. Call (806) 687-8727, or Laura@sorghumcheckoff.com, to get a copy.



With Cotton Prices Where They're At (Feb. 2013)...



- Stepping back from rotation..
 - Nematodes in your cotton
 - Verticillium wilt increasing as a problem
 - Long-term general cotton health
 - Yields after sorghum
 - The large difference in production costs (and being self-financed)
- A pathway to reduced tillage/no-till requires stubble and other residues left on the field

Sorghum & BioEnergy



- Recent energy bill mandates 36 billion gallons of renewable fuel/year by 2022
 - Corn ethanol capped at 15 billion gallons/year
 - Sorghum is “Other,” due to less water required to initiate grain production
- Will it last?—a public concern:
 - Futures price on corn is strong
 - Should we pump Ogallala water to grow fuel?

Sorghum & BioEnergy

Original Goals



- Ethanol in Hockley Co.—decision to use exclusively grain sorghum if possible
 - Would require 10 counties at 22,000 harvested acres each at ~3,500 lbs./acre
 - Split evenly between irrigated and dryland, harvest 80% of dryland
 - Operations have resumed after bankruptcy
- White Energy, Plainview & Hereford
 - Up to ~20% sorghum blended with corn
 - 106,000 harvested sorghum acres @ 4,000 lbs./A for each plant

Grain Sorghum as Advanced Biofuel



- Late 2012—EPA designation of grain sorghum as an advance biofuel is related to reduced carbon emissions, energy input/output, etc.
- Ethanol plants that have or can install the appropriate equipment will receive a valuable credit, that makes grain sorghum more economical than any other grain

Grain & Forage Sorghum Seed

January, 2013



- Forage sorghum and sorghum/sudan—seed is very tight/gone for all hybrids
- Grain sorghum, supply very short, and some hybrids/maturities are sold out
 - Contact preferred dealer now
 - \$105-125/bag for Concep III seed treatment for use with Dual herbicide
 - Gaucho seed treatment, add \$15-30/bag
 - CruiserMaxx, Poncho, ~\$50-60/bag

What Do You Want to Accomplish With Sorghum?



- Do we need to aim a little higher for what we expect sorghum to produce?
- Do you have previous grain sorghum growing experience?
- Or only grown sorghum occasionally?
- For any past sorghum producer, what do you think you could have **done better**?

What Do You Want to Accomplish With Sorghum?



- Difference between primary crop approach and catch crop or stepchild cropping?
- Hybrid selection?
- Seeding rate for drought potential; plant population?
- A little nitrogen fertilizer?

Asking About Past Sorghum

- It is not uncommon that producers tell me 'Sorghum hasn't done all that well' for several of their production years.
- I have learned to ask, "Tell me about your crop, what do you think you could have done better?"
- Answers...
 - "Well, I probably planted more seed than I should have" (and they are probably right)
 - "I probably didn't fertilize my grain sorghum the way I should have" (*which means in too many cases they never fertilized with any N at all*)

Key Point for Grain Sorghum

Disadvantage of planting GS on top of a listed bed

- Planting on top of bed is not favorable for grain sorghum compared to cotton
- Brace roots anchor & support the plant
- Versus furrow bottom (or flat) planting:
 - Top of the bed is warmer
 - Top of the bed is drier
 - Brace roots have more trouble getting into soil
 - Must throw soil 'uphill' to cover brace roots



■ “We need to stop trying to farm our sorghum like we farm our cotton.”

— D.P., Dawson Co.

■ “I’m not sure that getting away from using the buster planter for all my sorghum was the right thing to do.”

— D.C., Lubbock Co.

Gaines Co. Sorghum Comments



- “Never really done all that well here”
- Not dryland country
- “1 lb. of seed per acre for every 1,000 lbs. of yield per acre
- Very sandy ground with lower water holding capacity

What Do You Want to Accomplish With Sorghum?

- Good sorghum management doesn't mean you have to spend more \$ to grow the crop
- Hybrid yield trials often demonstrate yields that too many growers believe are not obtainable for dryland sorghum--Why?
- Producers view TX AgriLife yield trial results, especially dryland, and exclaim "No Way!"
 - AgriLife--Lubbock dryland, 2007: 3,868 lbs./A
 - Lubbock County average, 2007: ~2,200 lbs./A

3,868 lbs./A @ AgriLife-Lubbock



- Rainfall makes a lot of difference!
- Keys to agronomics:
 - ~32,000 seeds/A—many local producers are higher than this
 - 40 lbs. N per acre—many local producers may not fertilize
 - June 13 seeding
 - Propazine weed control

Typical Sorghum Hybrids: Approx. Days to Half-Bloom

Ratings may vary by a few days among companies.

Knowing maturity range & days to 1/2 bloom are key to effective sorghum management strategies.

Expected Mid-range

Maturity (Leaves)

Days to 1/2 Bloom

Early (15)

≤58

Medium-early

59-63

Medium (17)

64-68

Medium-long

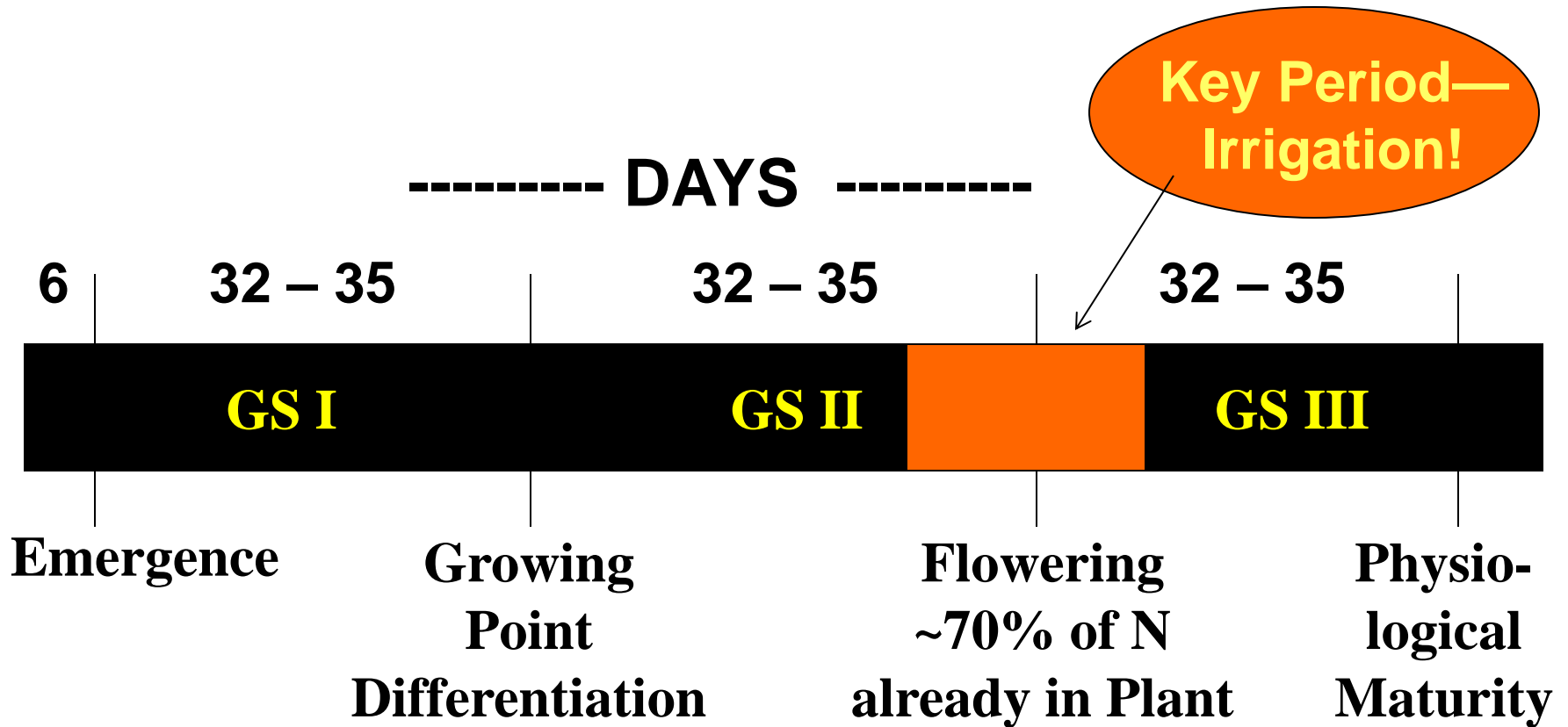
69-73

Long (19)

≥74

Development of Grain Sorghum

Medium Maturity Grain Sorghum, 17 leaves



Spikelets & Potential Seed Number Set from
GPD +10 Days for Each Head

Components of Sorghum Yield

- Irrigated and dryland—Contributions to Yield:
 - Seeds per head 63%
 - Heads per acre 30%
 - Seed size/test weight 7%
- Seeds/head makes a proportionally higher contribution in dryland

Management During Early Growth

- Panicle (growing point) differentiation corresponds to 7-8 leaf growth stage (~12-15" tall), and growing point is now above soil surface
- Herbicide labels and growth stage
 - 2,4-D, dicamba (e.g., Banvel, Clarity, etc.), etc. should not be applied without using drop nozzles after about 5-leaf stage (~8-10" tall; some labels say up to 15")
- Nitrogen sidedressing should be on by panicle differentiation





Growing point differentiation in wheat (like grain sorghum): a small head down in stem. Spikelet number & seeds per spikelet mostly already determined. If grazing and then going to grain cattle should have been off about 7-10 days ago.

Sorghum Growth/Development

- Not affected by photoperiod
- Driven by heat unit accumulation
- Base temperatures: 50 F with maximum at 100 F

- $HU = (Maximum + Minimum)/2 - 50$
- Flowering shows little effect of heat up to ~100 F

Sorghum--Early Planting



- This approach has some merit, particularly when certain conditions are met
- Sorghum midge has not been a significant problem in the South Plains for some time; early planting minimizes midge (sorghum safe if flowered by Aug. 1)

Sorghum—Early Planting

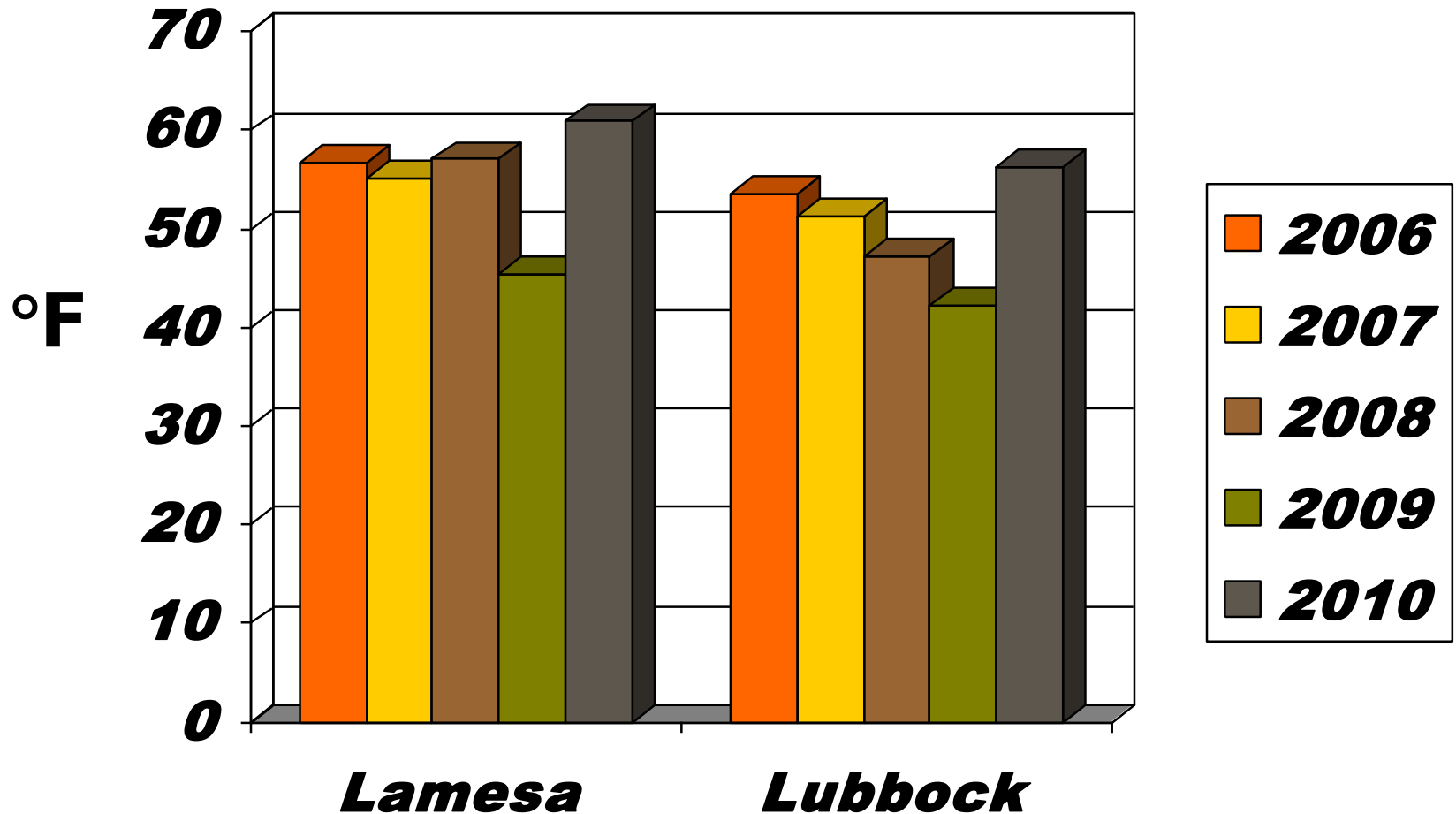
- Especially for the Lubbock area on south--
 - Check local average last freeze date (e.g., Snyder, 4/1; Lamesa, 4/3; Lubbock, 4/5; Plains, 4/6; Floydada, 4/8; Tulia, 4/14; Muleshoe, 4/17)
- Allow minimum two weeks **after** frost date for planting IF soil temperatures are up

Sorghum—Early Planting

- Sorghum: ideally 10-day avg. minimum soil temp @ 4" is 65 F (62 is lower limit)
- More practical consideration: 5-day average minimum temp. at 2" depth reaches 60 F
 - <http://txhighplainset.tamu.edu>
 - <http://www.mesonet.ttu.edu>
- Early planting is not worth sickly seedlings
- What's the forecast?
- Red grain sorghums have better cold germ tolerance (according to several seed industry sources)?

5-Day Average Minimum Soil Temp 2" depth

Soil Temperature @ 2" Depth



Sorghum--Early Planting

- For dryland, practicality is highly dependent on available soil water
- Good soil profile water ($>3''$, esp. $\geq 5''$, depending on location, plant April 20-May 1, 60+ F soil temp., moisture to carry crop during flowering
- **Medium-early hybrid** to flower within 60-62 days, before heat of July 5-August 15
- If dry, delay planting until at hopefully at least 3-4'' of moisture is present

Time & Hybrid Maturity

South Plains



- For early planting to make August delivery
- Medium-early by April 25 is probably a sure thing in just about all years
- Medium maturity by May 1 could be iffy some, even most years
- If looks like you are going to be tight, consider Roundup to hasten harvest ~7 days
- Have your harvest arrangements ready

Whitharral, Hockley Co.

- Irrigated field planted April 30 (45,000 seeds/A)
- Hybrid maturities (as rated by company—possible overlap might occur, but results are reported by actual maturity)
 - Early 5
 - Medium-early 6
 - Medium 8
 - Medium-late 5
- Measured days to half bloom, estimated the projected harvest date based on maturity, recorded yields & test weights

Results—Hybrid Maturity Group Yields with Early Planting

Maturity	Days to ½ Bloom	Estimated Days to Harvest	Projected Harvest Date	Test Wt. (lbs./bu)	Yield (lbs./A)
Early	61	113	8/22	57.2	3,712
Medium-early	67	119	8/28	58.4	4,539
Medium	72	125	9/2	58.3	4,748
Medium-long	78	131	9/8	58.1	4,573

Results



- Early maturity, as a class, yielded:
 - 18% less than medium-early maturity
 - 22% less than medium maturity
- First-year results—best guess is that target delivery dates might require use of Roundup to hasten harvest maturity
 - Would the cost and time be justified in order to hit a delivery target?

Thoughts for the Future



- Medium-early hybrids might be the best fit for early planting, however, the advantage of higher yield potential probably outweighs shortening maturity in order to achieve a delivery bonus
- Plant medium-early or medium maturity; if you make the bonus, great, but if not you have more yield



Early planting can increase the chances of multiple mid- and Late season tillers from upper nodes. Dilemma is to spray to dry down plants and harvest vs. wait out secondary tillers.

For Late Sorghum Plantings



- For catch crop or delayed planting--
- Check with your county Extension office or <http://lubbock.tamu.edu> for “Last Recommended Planting Date for Grain Sorghum Hybrids in the Texas South Plains”

Sorghum--Late Planting

- June 15 or later (June 25 or later in LRP)
- Medium maturity, flower in ~65-67 days, Aug. 20 or later (Sept. or later, LRP)
- Average killing frost
 - Muleshoe, 10/20; Dimmitt, 10/25; Plains, 10/31; Lubbock, 11/2; Lamesa, 11/4; Snyder, 11/5
- Cool fall temps more important than killing frost date
- September rains carry crop through grain fill after peak summer heat

Full Irrigation Planting



- Fit your production system
- Less concerned about flowering without any water available

Late Planting & Sorghum Midge Potential



- Midge an issue only once since 1999
- “Safe” if flowering by ~Aug. 1 in South Plains
- Later plantings, especially if there are earlier plantings or johnsongrass around, are more susceptible.

Updated Sorghum Insect Extension Publication



- “Managing Insects and Mite Pests of Texas Sorghum” (2007) is new
 - Contact county Extension offices
 - Visit <http://agriflifebookstore.org> (download or purchase)
- Numerous changes for thresholds on several insects have been made

Insects—Quick Note



- Greenbugs
 - Common biotype is now Biotype I (also some K)—some companies now have resistant hybrids
- Sorghum headworm (corn earworm, cotton bollworm)
- Sorghum midge—“Safe” if flower by August 1
 - Never an issue in 1999-2007
 - Later-planted fields hurt in 2008

Sorghum Hybrid Selection Criteria



Rule of Thumb for Selection



- Plant the latest-maturing hybrid available within the limitations of projected moisture availability, remaining average length of growing season, and crop sequence.

Hybrid Traits (1)



- Maturity
- Tillering—Extension prefers minimal tillering to add protection against drought
- Lodging—Potential varies by year
- Stay green—Fights for grain fill in dry conditions

Hybrid Traits (2)



- Greenbug tolerance—Few hybrids tolerant of current biotype (insecticide treatments widespread)
- Grain color/plant color
- Panicle (head) type—Open, loose, compact (open may reduce headworms)
- Plant disease resistance

Forthcoming Hybrid Traits (3)

- Herbicide tolerance (Non-GMO)—Though delayed...
- **ALS/sulfonyl urea for grasses and some broadleaves** (nicosulfuron, chlorsulfuron, rimsulfuron, e.g. Accent, Glean);
 - Dupont is developing “Inzen” herbicide
 - Hybrids (though without much yield trial testing), available 2014-2015
 - Texas A&M AgriLife staff are more excited about this technology of the two
- **ACC-ase, or “FOP” herbicides for grasses only** (quizalofop, e.g., Assure II; fluazifop, e.g. Fusilade)
 - Technology is currently on hold (Kansas State vs. Dupont)

Choosing Sorghums for Yield

- Understand how comparing yield data among different maturity group (e.g. Medium-Early to Long) should be factored into hybrid choice
 - A1) e.g., long maturity yield potential is higher, but long maturity is inappropriate for dryland production
- Stability--Select a hybrid with stable performance record over 4-5 years.

What About Tillering?

Good and Bad



- Low tillering hybrids depend more on establishing a good stand--then it helps you manage risk, especially on dryland, as you retain control of head number
- Caveat: a targeted low plant population tillers more, especially when cool early

Hybrid Selection



- Be willing to spend \$1-3 more per acre for a proven hybrid
- That's easier to do at the appropriate seeding rate—easier when planting ~2 lbs./A rather than 3 lbs./A in dryland
- Sorghum seed typically 14,000-16,000 seeds per pound, but range can be ~12,000-18,000
- Germination (%): usually low to high 90s

2012 Sorghum Hybrid Trials



- Texas High Plains irrigated and some dryland trials for 2012 (as well as past years) posted:
- <http://varietytesting.tamu.edu> then click on “Sorghum” and go to hybrid trials section

Hybrid Data High Plains

- Independent testing
- Note hybrids consistently in top 25% across years and locations
- AgriLife Research grain sorghum hybrid results
 - <http://varietytesting.tamu.edu>
- Irrigated sites: Hereford, Halfway, Panhandle
- Dryland sites: Lamesa, Lubbock, Bushland, Clovis, NM
- Yields could be increased 10% overnight with hybrid selection

Hybrid “Picks” Criteria



- Criteria--independent testing, with hybrids consistently in top 25% across years and locations
- Texas AgriLife grain sorghum hybrid results
 - <http://varietytesting.tamu.edu>
- Several other companies have good hybrids that could make the “Picks” list, but they are not entered in the independent Texas AgriLife trials

Dryland Hybrid Picks (AgriLife)

Lamesa & Lubbock Dryland Tests



- 2007-2010 Results
- DeKalb DKS 37-07
- DynaGro 762B
- NC+/ChannelBio 7C22 (now phased out; 7B11 appears comparable)
- Sorghum Partners NK5418
- Asgrow Pulsar as an 'early' hybrid
 - This hybrid once rated as 'early' but in fact is medium-early, but a good choice for a late planting.

Dryland Hybrid Picks (AgriLife)

- Mostly medium & medium-early maturity, 1997-1999, 2002-2003, 2007-2010 (SHP)
 - NC+ 7C22 (now ChannelBio)—replaced by 7B11, also 6B50
 - | Watching 7B30
 - Monsanto: DeKalb DKS 37-07; non-tillering DK-44 has been dropped, replaced by DKS-44-20, which is a tillering hybrid
 - | Watching DeKalb DKS 49-45
 - Sorghum Partners (Novartis) KS 585 (more recent yields less consistent), but consider NK4420, NK5418
 - Pioneer—several solid lines we are watching, but nothing seems to stand out (85G03, 85Y40, 85G85, 86G32)
 - Frontier 303

Irrigated Hybrid Picks (AgriLife)

- Dumas, Plainview, Perryton, Hereford, Lubbock, 1997-20112
- Pioneer 84G62, 84P80, 85Y40 (medium)
- Monsanto: DKS 54-00/53-67; Asgrow A571(?)
 - Latter line being phased out; used to give Pioneer 84G62 a run for the money over the years
- Crosbyton Seed 1489 (long, contact for dealers)
- Frontier 700E (long)

What is Different About Picks?



- For irrigated vs. dryland conditions...
- How many hybrids were on both lists!

What is Different About Picks?



- For irrigated vs. dryland conditions...
- How many hybrids were on both lists!

NONE!

Hockley Co. Irrigated, 2010



- Yields of maturity groups
- 'Early' maturity hybrids 18% less than mediums, 14% less than medium-early
- Might consider staying at medium-early unless planting very late

General Last Recommended Planting Date for Sorghum

- Safe dates--protect not just against fall frost, but general cool weather of late Sept. into Oct., which curtails grain fill
 - Parmer, Castro, Bailey, Lamb, Cochran: **long**, June 10; **medium**, June 25; **early**, July 5
 - Swisher, Briscoe, Hale, Floyd, Hockley to Crosby, Yoakum, Terry: **long**, June 15; **medium**, June 30; **early**, July 10
 - Lynn, Garza, Gaines to Scurry, Andrews to Mitchell: **long**, June 20; **medium**, July 5; **early**, July 15

General Last Recommended Planting Date for Sorghum

- **Planting date matters a lot**, much more than cool days in August or extensive cool nights in September
 - Just because these dates suggest you can plant this late doesn't mean you shouldn't get your sorghum in the field 5 days sooner if you can
- 2008: Planting delay of 5 days led to delayed crop maturity by 16 days pushing mid-October grain fill to a near standstill
- Avoid early maturity hybrids if you can; as a group they are the most prone to sucker heading
- Caveat: Using medium-early even in late plantings may be worth risk due to significantly higher yield potential than early

Reduced Seed Rate--Dryland

- What is the goal: “The goal is to make a crop, not a mistake” (e.g., too high seeding rate)
 - For example, make 1,200 lbs./A in a very dry year, but your neighbor is looking at hay
- Keeping that seeding rate down enables crop to handle drought (you nearly always have it), retain modest yield potential, and still take advantage of a good year.

SW South Plains...



- Have you heard this 'Rule of Thumb'—
"For every 1,000 lbs. of grain per acre you need 1 lb. of seed"
- Actually, this is a pretty good rule of thumb...

SW South Plains...




- Have you heard this 'Rule of Thumb'—
"For every 1,000 lbs. of grain per acre you
need 1 lb. of seed"
- Actually, this is a pretty good rule of
thumb... **UP TO ABOUT 2 LBS. PER
ACRE**

South Plains--Dryland

- Adjust to soil moisture condition
- **Seed drop** of **30,000-35,000** seeds/A to give 21,000 to 28,000 plants/A (~2 lbs./A), this is a general maximum
 - good results under a wide range of conditions
- High enough to not limit yield
- Low enough to significantly reduce potential to burn up during drought
- Adjust seed drop up only if you expect soil conditions will reduce stand establishment

Dryland Seeding Rate

- Low plant populations can retain good yield potential--a sorghum hybrid is capable of producing 1/10 lb. grain per head
- Using 1/10 lb. grain per head...
 - 3,000 lb. yield potential
 - Need ~30,000 heads per acre
 - 30,000 heads / 1.5 heads per plant = 20,000
 - 20,000 plants / 0.67 emergence = 30,000

- 
- For early July plantings with low available moisture, lower targeted plant population to about 18,000-20,000 seeds/A and plant medium-early to early, drought tolerant hybrid
 - On 40" rows as low as 1.5 seeds per foot
 - This would be about the lowest seeding rate you'd use under any circumstance

Dryland Sorghum Seed Rate, AGCARES, Lamesa, 2002+

- Fair planting moisture June 28th, overall subsoil moisture fair, but dry in top 1'
- 0.5 acre replicated plots: **26,000** vs. 51,500 seeds/A (1.6 lbs./A vs. 3.2 lbs./A)
- Yield results: a typical dryland example--
 - Low seeding rate, 1,806 lbs./A
 - High seeding rate, 1,540 lbs./A
 - Net difference, ~\$23/A (\$9.00/cwt)

Population Effect on Dryland Sorghum Yield—TX Panhandle

Yield, lbs./Acre

6000

4000

2000

10

20

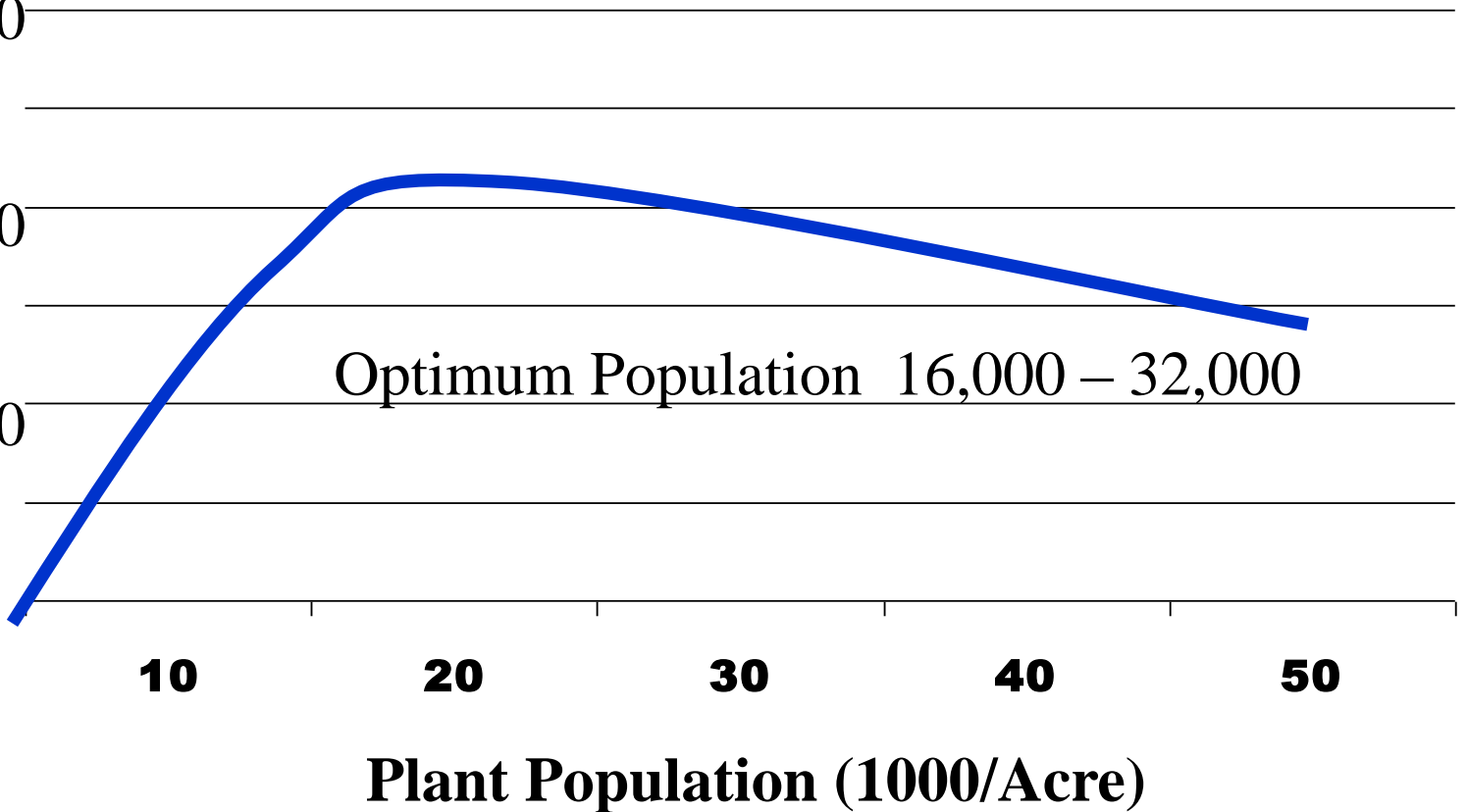
30

40

50

Optimum Population 16,000 – 32,000

Plant Population (1000/Acre)



Plant Population Effect on Sorghum—TX Panhandle

	Year 1		Year 2		Year 3	
Seed/Ac	32,000	64,000	32,000	64,000	32000	64000
Plants/Ac	20,000	32,000	21,000	41,000	21000	50000
Tillers/Plt	1.5	1.1	1.8	1.3	1.4	1.0
Heads@ Harvest	30,000	38,000	40,000	56,000	30000	43000
Lbs. Grain/Hd	0.166	0.13	0.11	0.076	0.10	0.064
Yield,lb/A	5,000	5,000	4,600	4,300	3,100	2,760

Dryland Seed Rate Summary



- Seeding to obtain a modest plant population is agronomically and economically less risky than seeding a higher plant population under droughty conditions

South Plains--Irrigated

- Again, consider soil moisture
- For limited irrigation (6-8"):
 - Good soil moisture (5-6"), target 50-55K seeds/A
 - Poor soil moisture (<2"), target 40-45K seeds/A
- Full irrigation (12-16"):
 - ***Up to 80,000-90,000 seeds/A
 - Late-season, up to 100-110K seeds/A for non-tillering hybrids or ~90K seeds/A for tillering hybrids

Hale Co. Irrig. Seeding Rate

Seed/ft.*	Seeds/A	Plants/A	Plants/Seeds	Yield (lbs./A)
1.50	26,000	21,300	82%	8,098
2.25	39,000	30,100	77%	8,644
3.00	52,000	42,600	82%	8,552
3.75	65,000	50,300	77%	8,560
4.50	78,000	56,400	72%	8,413
5.25	91,000	61,600	67%	8,101
6.00	105,000	65,300	62%	8,670
6.75	118,000	67,500	57%	8,293
7.50	130,000	74,300	57%	8,232

*Pioneer 84G62, 2008 & 2010, 30-inch rows

Trostle: “Never Seen a Sorghum Field That Was Too Thin”



- Thought I might finally have seen one in Bailey Co. in 2007
- 28,000 seeds/A under a pivot with irrigation goal of 6-8”
- Producer says “I’ve learned that is what works best for me.”
- 2007 Results: 6,000+ lbs./A
 - Gets ~4,500 lbs./A in more normal year

Calculating Seeds per Foot

- 40" rows—there is 13,068 feet of row in 1 acre
 - E.g., $32,000 \text{ seeds/A} \div 13,068 = 2.5 \text{ seeds/ft.}$
- 30" rows—17,424 feet of row in 1 acre
 - E.g., $32,000 \text{ seeds/A} \div 17,424 = 1.8 \text{ seeds/ft.}$

$43,560 \text{ square feet per acre} \div \text{width of row (in feet)}$
= feet of row per acre

Air-Vac Planter Accuracy?



- We check the planter book for settings that will achieve our target seed drop?
- Set the planter
- Are we done?

- Cotton, grain sorghum, etc., it is good to check to see if each planter row is accurate; we see variability.

Seeding Rate Formula-Irrigated

■ See handout—the example below:

■ Soil moisture = 3"

■ Median rainfall for 3 months (conservative) = 6"

■ Targeted irrigation level = 8"

■ Total water = 2 + 6 + 8 = 17"

■ Seeding rate

■ = 32,000 + (Total Water - 12")*2,000

E.g. 32,000 + (17" - 12")*3,000 = 47,000 seeds/A

Seeding Rate Formula-Dryland

- See handout—the example below:
 - Soil moisture = 3"
 - Median rainfall for 3 months (conservative) = 6"
 - Targeted irrigation level = 0"
 - Total water = 3 + 6 + 0 = 9"
- Seeding rate
- = 32,000 + (Total Water - 12")*2,000

E.g. $32,000 + (9'' - 12'') * 3,000 = 23,000$ seeds/A

In 2007, soil moisture at 5-6", hence ~32,000 seeds/A

Seeding on Narrow Rows?



- **Dryland**—Seed placement/stand establishment is most important
- Consider only if you have an inter-plant planter (can drop additional boxes) or a very good no-till drill (**plug** 1 of 2 or even 2 of 3 rows in order to keep seeding rate down
- Increase seeding rate only to the degree you anticipate reduced stand establishment (at most 20% if conditions look rough); otherwise do not increase seeding rate more than 10% and let plant distribution give you the benefit

Seeding on Narrow Rows?



- **Irrigated**—A reasonable choice, but do not increase seeding rate
- Tillering will increase heads/acre
- If narrow rows requires spray irrigation rather than staying with a properly managed LEPA irrigation system, then don't narrow from 30" rows (or even 40" rows)

Another way to look at it...



- Sorghum seeding rate: If you are having doubts about whether you should increase the sorghum seeding, rate **DON'T DO IT!**
- Another reminder for grain sorghum seeding rate in dry West Texas:
Less is More!

Nitrogen Fertility & Soil Testing

- You can't get something from nothing (at least not for very long)
- Sorghum N fertility, ~2 lbs. N per 100 lbs. of yield goal—combined source from soil **and** fertilizer N
 - Soil N value dependent upon depth of soil sample
 - Texas A&M lab calculation:
 - $N = (\text{yield goal} \times 2) - (2 \times \text{ppm N for 0-6"})$
 - $N = (\text{yield goal} \times 2) - (\text{all profile N, 24"}\text{deep or more})$



PROFILE SOIL SAMPLE INFORMATION FORM

Please submit this completed form and payment with samples. Mark each sample bag with your unique sample identification and ensure that it corresponds with the sample identification written on this form. *See sampling and mailing instructions on the back of this form.

(PLEASE DO NOT SEND CASH)

SUBMITTAL AND INVOICE INFORMATION: This information will be used for all official invoicing and communication.

Name _____ County where sampled _____

Address _____ Phone _____

City _____ State _____ Zip _____

CLIENT NAME: Client name will only be included with information above on result reports.

Name _____

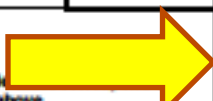
This form is only for paired (surface and subsurface) profile sample submittal. All subsurface samples must have a corresponding surface soil. If submitting non-profile samples, use form D-494.

Payment (DO NOT SEND CASH)

- Check
- Money Order (keep your M.O. receipt)
- Credit Card – requires additional form*

Amount Paid \$ _____

Make Checks Payable to: Soil Testing Laboratory
 *Credit card payment forms can be downloaded at <http://soiltesting.tamu.edu>

SAMPLE INFORMATION (Required)					(See options listed below)	
Laboratory # (For Lab Use)	Your Sample I.D.	Acreage Represented	Previous lime/fertilizer	What are you growing?	Requested analyses	How is forage used?
					<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10	<input type="checkbox"/> Grazing (G) <input type="checkbox"/> G&H <input type="checkbox"/> Hay (H) <input type="checkbox"/> **Min. requirement
	This subsurface sample surface sample listed above. 		Sampling Depth: <input type="checkbox"/> 6-12" <input type="checkbox"/> 6-18" <input type="checkbox"/> 6-24"		<input type="checkbox"/> 11	
					<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10	<input type="checkbox"/> Grazing (G) <input type="checkbox"/> G&H <input type="checkbox"/> Hay (H) <input type="checkbox"/> **Min. requirement

Timing of N for Grain Sorghum

- Older guidelines: Pre-plant/at-plant + 30-35 day sidedress, about 75% of needed N in the plant by heading
- Today's pivot or drip irrigation application: may consider delaying last 20% until after growing point differentiation
- Medium-early: last N 50 days after planting
- Medium-long: last N 60 days after planting

Sorghum & Phosphorus

- No simple rules of thumb. Texas A&M soil test for Mehlich-III has broad range of 'Medium' at 20-50 ppm
- West Texas research suggests crop response 'transition zone' at 30-40 ppm P
 - Inconsistent yield response in this range to added P
 - West Texas soil research suggests P fertilizer additions at this level of soil test P does not demonstrate measurable yield differences.
- What is your soil test recommendation philosophy?
 - 'Crop requirement' vs. 'Build and Maintain'

Crop N (Sorghum) & Phosphorus

- Observation, if soil test P is:
 - 'Very Low', 0-10 ppm, then P is 50% of N requirement
 - 'Low', 10-20 ppm, then P is 40% of N requirement
 - 'Medium', 20-50 ppm, then P is ~25% of N requirement (in range of 30-40 soil P)

Soil Sampling, Yield Goal, and Your Recommendations

- Does someone collect your soil samples, and provide your recommendations?
- If so, and you receive fertilizer recs. without having given a yield goal, you need to ask how the recs. were derived
- Do you know the soil test philosophy behind your recommendations?
- Did you receive a copy of the soil tests?

Sorghum--Common Mistakes


- Dryland flowering early-July to mid-August
 - incremental advantage to grain yield by reducing risk of flowering during peak average summer heat
 - A nice rain on June 5 poses the decision of whether to wait
- N fertility (lack of), ~2 lbs. N/100 lbs. of yield goal—source is soil and fertilizer N
 - For reference, P_2O_5 is low priority, ~0.50-0.75 lbs./cwt.)

Rotation Benefit to Cotton?—

Do you factor this in your budget?

- High Plains has measured a range in individual years of -5% to +21%
 - Why negative in an individual year?--Lots of trash on surface hitting soil and possibly tying up nitrogen to cotton
- Average is in 5-10% range—
 - Recent results, Hale Co. (6 year tests)
 - Irrigated, 2004-2009, 12% higher yield in cotton after sorghum vs. cotton after cotton
 - Dryland, 2004-2009, 9% higher yield after sorghum

Whenever You Have Grain Sorghum Stubble...



- What are you going to do with the stubble?
- Turning it under doesn't necessarily increase organic matter (but all the roots do)
- Mow it off?
- Plant cotton to the side or down the row?

Stubble Management



- Deep breaking stubble under will probably **not** increase soil Organic Matter
 - Instead root OM is disturbed
- Leave the stubble stand as long as possible
 - Don't mow stubble off
 - "Why are you doing that (leaving stubble standing)? Farmers don't do it that way."
- Use as next year's windbreak, especially where grain sorghum yields > 3,000 lbs./A

Sorghum--Common Mistakes



- Too high seeding rates, esp. on dryland, with no drought-tolerant hybrid
- Not planting for stand establishment, plant anchoring
- Lack of pre-emerge weed control and/or tackling pigweed if they infest stand
- Failure to control economic infestations of greenbug or late-season head insects

Sorghum Herbicides



- Two common herbicide problems in sorghum I hear about and see?
 - Causes a couple of phone calls a year--and I'm not the herbicide guy!
 - Maybe the most common problem--though we don't often hear about it
- **Hint:** It is not a weed problem.

First: 2,4-D Injury!

- Be really careful with
 - 2,4-D or any herbicide mixes containing these (Saber, Savage, Barrage, Shotgun, butyrac, etc.)
 - Dicamba in mixes as well
- Many farmers each year injure their crop! Yields are sometimes hurt even though plant did not appear injured.
- Sprayer equipment, applicators--even labels!--aren't perfect

2,4-D TIMING AFFECT ON SORGHUM YIELD

Treatment	Sorghum Height at Application (inches)	Yield Lb/Acre
Untreated	-----	8,432
2,4-D LV6	6	8,828
2,4-D LV6	10	5,885
2,4-D LV6	12	4,950
2,4-D LV6 was applied at a rate of 2/3 qt per acre		

2,4-D Injury



2nd--Hooded Sprayer Errors



- Using hooded sprayers in grain sorghum for:
 - Paraquat dichloride (Gramoxone Inteon/SL, Firestorm, many generics)
 - The family of glyphosate chemicals (Roundup, etc.)
 - 2,4-D
 - Dicamba

Anticipated Annual Problem



- How many calls will I get on this topic?
- Roundup drift from cotton on to grain sorghum
- A reminder to the neighbors—there is going to be more sorghum around in 2007

Cotton Herbicides to Avoid



- Staple—NEVER sorghum in hailout/replant! (only realistic option is STS-treated soybean)
- High risk to sorghum the next year, too—don't plant sorghum after Staple
- Even banded applications still present a major concern

Other Herbicides to Watch For

(In rotation to Grain Sorghum—Incomplete List)



- Cadre, 18 months (used in peanuts)
- Pursuit {imazethapyr}, 18 months (used in Clearfield corn, peanuts, soybean)

Other Herbicides to Watch For

(In rotation to Grain Sorghum—Incomplete List)



- Herbicides in wheat and other small grains, with **months rotation restriction** to grain sorghum:
 - Amber 75 DF {triasulfuron}, 14 months
 - Ally XP {metsulfuron methyl}, 10 months
 - Beyond (same as Raptor) {imazamox}, 9 mos.
 - Stinger {clopyralid}, 10.5
 - Finesse (Glean + Ally) {chlorsulfuron + metsulfuron methyl}, 14-26

Other Herbicides to Watch For

(In rotation to Grain Sorghum—Incomplete List)



- Herbicides in wheat and other small grains, with months rotation restriction to grain sorghum:
 - Glean {chlorsulfuron}, 14-25
 - Maverick Pro {sulfosulfuron}, 22
 - Olympus {propoxycarbazone-sodium}, 12
 - Olympus Flex, 9
 - Rave 59 WDG {triasulfuron + dicamba}, 14

Huskie Herbicide for G.S.



- 2012 should see increased use
- Effective control of pigweed in grain sorghum without injury potential
- Best results are pairing Huskie at reduced rates of atrazine
- No rotation concerns to cotton

Sorghum Herbicide Guide

Brent Bean, AgriLife, Amarillo



- No rotation to cotton in 2014: **Prosulfuron (Peak)**
- Atrazine--Be careful especially on sandy soils and/or <1% O.M. (that's most of West Texas!)
 - Rates ≤ 1 lb./A should be OK
 - For sandy loam (or loamy sand) reduce rates to ~ 0.75 lb./A (~ 0.6 lb./A)
- Watch for atrazine in metolachlor/alachlor mixed herbicides like Bicep II (Lite) Magnum, Cinch II (Lite), Bullet, Lariat

More on Atrazine



- From Wayne Keeling, TAES-Lubbock herbicide research
- For sandy soils, early POST may be slightly better than PRE, but weeds must be small
 - POST safer but still potential carryover issues
- Atrazine on sandy soils does present risks, however, due to possible injury to current-year sorghum and cotton or wheat in rotation

Propazine (Milo-Pro) for 2011

- Labeled for Texas in 2007 (Section 3), but about 2X cost of atrazine
- Label info. at <http://www.albaughinc.com>
- Key info: preplant (not labeled post-emerge), excellent on pigweed, some help with troublesome broadleaf weeds
 - Propazine must be pre-emerge to weeds; application to young sorghum probably not injurious
- Rotation flexibility for cotton or wheat
 - Tank mix with metolachlor, alachlor, dimethenamid, glyphosate

Propazine (Milo-Pro) for 2011

- Rotation restriction: 12 months to cotton & corn **IF** at full 1.2 qt./A rate
 - 120 days to wheat
- Labeled for sandy loam soils (atrazine is not)
 - Propazine not labeled for loamy sand, sands
 - Do not incorporate pre-plant appl. for sandy loams
- No organic matter restrictions (atrazine technically not labeled for soils <1% O.M.)
- Use at least 30 psi, change screens to 50 mesh (or take out), agitate, Agitate, AGITATE!

Propazine Experience

Wayne Keeling, Weed Control, Texas AgriLife Research, Lubbock

- 0.75-1.0 lbs./A (the quart rate) can be rotated to cotton
- 1.2 lbs./A probably no problem on heavier soils & irrigated sorghum
- Expect minimal grass activity at these rates
- Old A&M work (Wiese)—good barnyardgrass control @ 3.0
- Mixing with Dual a good idea, especially for irrigated sorghum, heavy pigweed pressure, and a wet year
- 0.75-1.2 lbs./A rates insufficient to control pigweed season-long under challenging conditions, and the addition of Dual could help
- Dryland—propazine alone probably OK. June sorghum—propazine out in late April-early May would help clean beds, reduce tillage
 - Label suggests applying no more than 28 days before planting

Common Question Since 2009



- Controlling volunteer wheat in sorghum
- Our herbicide scientists say:
 - Dual Magnum is best grass herbicide in sorghum, but it doesn't control wheat all that well; Propazine/atrazine are fair at best on grass control; consider both?
- Hoods are risky, sweeps don't get wheat in the row
- Irrigated—water once (now) to trigger germination of first (main) flush, then kill with Roundup or burndown in ~2 weeks, then plant



2013 Sorghum Pointers for use of Huskie Herbicide

Compiled by Calvin Trostle, Ph.D.

Texas A&M AgriLife Extension Service—Lubbock

ctrostle@ag.tamu.edu, 806-746-6101

February 2013

A photograph of a lush green field of grain sorghum. The plants are densely packed and have long, upright stalks with developing seed heads. The background shows a line of trees under a clear sky. Overlaid on the image is yellow text.

**Weed Management in Grain
Sorghum—New in 2012**

**Huskie Herbicide
Bayer Crop Science**

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
- **Texas High Plains**—Dr. Pete Dotray, Lubbock, (806) 746-6101, pdotray@ag.tamu.edu
- **Central & South Texas**—Dr. Paul Baumann, College Station, (979) 845-3041, pbaumann@ag.tamu.edu
- **North Texas**—Dr. Curtis Jones, Commerce, (903) 886-5354, curtis_jones@tamu-commerce.edu

Huskie Herbicide for GS (2013)



- Selective Post-emerge, including Palmer amaranth, redroot pigweed, kochia, species of morningglory, devil's claw, henbit, mareetail; partial control on bindweed, puncturevine
- Best weed control from label suggests spray by 4" tall weeds

Huskie in Cotton Production Regions

- Huskie appears to be a much better all around option than 2,4-D or dicamba in regions where cotton is grown, particularly where either chemical can severely injure cotton due to drift
 - Huskie does not volatilize, but must physically drift
 - 2,4-D amine is better for minimizing drift, but may give up to 10% less weed control than ester formulations (Brent Bean, TX AgriLife, Amarillo)
- Huskie cost relative to 2,4-D or dicamba may be a concern for some dryland farmers

Huskie Herbicide for GS (2013)

- Apply over-the-top, 3-leaf stage to 12" tall (likely 7-8 leaf stage, or ~4 weeks after planting)
- Pyrasulfotole + 2 active ingredients similar or same as Buctril (bromoxynil)
 - Buctril is already labeled in grain sorghum
- Many tank mix options, but for grain sorghum the key is **atrazine: 0.25-1.0 lbs. (0.5-2.0 pints) atrazine per acre** to 'strengthen and expand weed control' (from the label)
 - This atrazine is somewhat lower than for straight atrazine applications (~1/4 to 1/2 less)

Atrazine with Huskie #1

Especially in Sandy Soils



- Sandier soils especially Lubbock and south require reduced atrazine rates (1.0 to 1.5 pints/A), thus the strong suggestion to include atrazine with Huskie for improved control could elevate atrazine rates too much for sandier soils or raise concerns about rotation to cotton
- Some producers switch to propazine for Pre-plant or Pre-emerge (not labeled POST) due to coarse soil or potential carryover concerns (specifically cotton)

Atrazine with Huskie #2



- Should atrazine applied either pre-plant/pre-emerge be delayed to instead couple with Huskie?
- Probably not—It is always good to do what we can to minimize weeds from establishing in the first place (using PP, PRE), so maintaining early atrazine applications, if that has been your practice is advised (or see other options below, which may include mixes with reduced PP/PRE atrazine rates)

Atrazine with Huskie #3



- The time from early application (pre-plant or pre-emerge) to [Huskie + atrazine] POST applied at sorghum ~12" tall could be up to 4 weeks
- PP or PRE atrazine rates might be reduced to 0.5 lb./A (1 pint/A) in order to permit at least 0.25 lb./A (0.5 pint/A) to use with Huskie for synergism in control
- But other PP or PRE options may be more appropriate...

Atrazine with Huskie #4

Early Pre-plant or Pre-emerge options...

- Using other Pre-plant or Pre-emerge options (including propazine) may be better to provide **preventive weed control** and “save” atrazine for pairing with Huskie
- These options include:
 - ❖ Propazine (Milo-Pro) as PP or PRE
 - ❖ Individually, s-metolachlor (Dual Magnum), alachlor (Micro-Tech, Intro), or acetochlor (Warrant)
 - ❖ s-metolachlor or alachlor in combination with reduced rates of atrazine (e.g., Bicep II Magnum, Cinch ATZ, Bullet, Lariat, etc.)
 - ❖ Also dimethenamid (Outlook), possibly mixed with atrazine (Guardsman Max)
 - ❖ Saflufenacil (Sharpen), possibly mixed with dimethenamid or reduced atrazine rates

Current Bayer Suggestion

Texas High Plains; confirm in other Texas regions



- For optimization of control:
 - 1 pint/A (16 oz.) of Huskie
 - + 1 pint/A (16 oz.) of atrazine
 - + 1 lb./A of Ammonium Sulfate
- Growers on loamy and clayey soils with 2 pints/A rates of atrazine can split the atrazine into two 1 pint/A applications.

Huskie Herbicide for GS (2013)



- Other tank mixes for broadleaf control: includes Ally, dicamba, 2,4-D, Peak, Starane
- Label suggests spray grade ammonium sulfate (AMS) at 0.5-1.0 lbs./A
- NIS (non-ionic surfactant) if tank mix partner requires it
- TX AgriLife has noted only minor to ~15% leaf burn/injury at 4-leaf sorghum, essentially all disappears by 3 weeks; similar to none at 8-leaf stage
- No maturity delay or reduced yield due to Huskie has been observed in TX AgriLife trials, 2009-2011

Huskie Control of P. Amaranth

Hale County, Texas

A



B



Credit: Dr. Pete Dotray

(A) Non-treated control, and (B) good Palmer Amaranth control with Huskie + atrazine.

Huskie Herbicide for GS (2013)



- The overarching advantage of Huskie over 2,4-D or dicamba is reduced sorghum plant injury.
- 2,4-D or dicamba might be considered as a tank mix with Huskie in two possible circumstances:
 - Weeds have moved beyond the 4" tall growth stage (harder to control)
 - If you are dealing with triazine or glyphosate resistant weeds you may need to consider a stronger level of control to further minimize escapes and kill existing weeds

Huskie—TX AgriLife Results

Dr. Brent Bean, Bushland, TX (2009-2010)



- 91%+ control 7 & 42 DAT (days after treatment) of 3-4" Palmer amaranth when applied alone at 13-16 oz./A
- 95%+ Palmer amaranth control when applied with 0.5 lb. atrazine at 13 oz./A
- Adding 4 oz./A dicamba did not improve control
- 80% control on 18" tall pigweed (unlabeled for this late application to grain sorghum)

Huskie—TX AgriLife Results

Dr. Pete Dotray, Halfway, Hale Co. (2010-2011)

- 2010: Huskie + atrazine, 97% control of 2-4" Palmer amaranth at 41 DAT; 96% control of 6-8" weeds @ 37 DAT
- Slight sorghum injury for all POST treatments, but $\leq 5\%$ at 37-41 DAT unless 2,4-D included
- Tank mix with 2,4-D or dicamba reduced yield
- 2011: Huskie + atrazine controlled P. amaranth 94% or more at 21 DAT though control decreased with time (hot, hot year).

Huskie in Crop Rotations



- 1 month: Small grains
- 4 months: alfalfa, millet, grain sorghum, soybean
- 9 months: corn, sunflower
- Cotton? 18 months or field bioassay for reduced restriction
 - Texas A&M AgriLife & Bayer staff have not yet observed a problem rotating to cotton after a Huskie application; label considerations in future may reduce to 9 or 10 months

Huskie & Grain Sorghum Injury



- Sourced from Russ Perkins, Bayer CropScience, Lubbock:
 - Full label rate applications across several grain sorghum nurseries in the Texas High Plains in 2009-2010 noted up to 10% of sorghum lines that demonstrated slightly higher leaf phytotoxicity (injury) at 15-20%, but symptoms were largely gone in < 14 days
 - Breeding staff noted no apparent delay in maturity or reduced yield due to Huskie

Additional Huskie Pointers



- Do not apply Lorsban (chlorpyrifos) with Huskie as unacceptable injury may occur
- Baythroid is a acceptable tank mix insecticide partner
- Do not apply Huskie after mesotrione PRE herbicides (e.g. Callisto, Lumax, Lexar)
- Bayer & crop consultant observations suggest that iron chelate labeled for foliar use may reduce injury potential, particularly for high pH soils (1 lb. of iron chelate per 1 pint of Huskie)

Huskie & Sorghum Forages?

- Caution on sorghum/sudan, sorgo or sweet sorghum, sudangrass (forage sorghum not specifically noted)
- Some hybrid sensitivity? Label states 'not recommended' for use in above sorghum types (unless previously tested on a small area), so producer assumes risk of injury.
- Texas A&M AgriLife does not foresee major Huskie injury potential in any sorghum forage type.
- Bayer's Russ Perkins reports these forages have demonstrated higher leaf burn (20-30% in a few cases), but forage grew out of it.
- Note earlier comment on Fe chelate mix with Huskie

Huskie & Sorghum Seed Production?



- Huskie is acceptable for use in seed production
- This is in contrast to the restrictions for seed production using 2,4-D or dicamba, which can risk sharp reduction in seed production and seed viability

Problems with Huskie?



- Complaints and disappointment have been few
 - Most likely on dryland where weeds were hardened off
 - Weeds were already sizable and control was reduced
- “Best herbicide for grain sorghum in 30 years...”
 - Dr. Brent Bean, former Extension agronomist & weed scientist, Texas A&M AgriLife--Amarillo

Huskie & Weed Resistance

- +++ Glyphosate-resistant Palmer amaranth is here in the TX South Plains
 - Huskie will offer cotton producers a much needed means of diversifying chemistries
- - - - Kansas State reports (Jan. 2013) early Palmer amaranth resistance to Huskie (pyrasulfotole component) where mesotrione herbicides have been used in corn many years
 - HPPD inhibitors—mesotriones, pyrasulfotole
 - Resistance will be slower to develop where use is 1 year out of 3 or 4 years
 - Don't "abuse" the product or rely on it solely

A Final Thought

Huskie + Atrazine POST vs. Good PRE Program

- The advent of Huskie for Texas sorghum should not overshadow the fact that a farmer's weed control decision about sorghum pre-plant/pre-emergent weed control is more important than the option Huskie offers.
- **In fact, pre-emerge (or PRE) weed control is the most important weed control decision a farmer will make in grain sorghum production in Texas.**
- Dr. Wayne Keeling, AgriLife Research weed scientist, Lubbock, notes that although Huskie is a good asset, our priority effort should be focused on effective PRE weed control. **Our goal?**—Prevent weeds in the first place, especially during sorghum emergence and early growth. Then post-emergent (POST) weed control (Huskie, dicamba, Ally, Permit, 2,4-D, etc.) can focus on controlling escapes as needed. Furthermore, if PRE weed control is good, producers may be able to delay needed POST control by 1-3 weeks (if the label is extended past 12" tall) to provide a longer window of either direct control of existing weeds or extending residual control further into the growing season.

Future Huskie Label Consideration #1



- Rotation to cotton on the Huskie label remains at 18 months or field bio-assay.
- Texas A&M AgriLife and Bayer staff have not yet observed any significant rotation issues to cotton
- It is anticipated this rotation restriction may eventually be shortened.

Future Huskie Label Consideration #2

- There is consideration of expanding the Huskie label for applications up to flag leaf emergence. There are two potential uses of Huskie in this situation:
 - 1) Later-season rescue treatment: Though this may be appealing, view this only as a last resort and do not rely on late application if it should be made 1-3 weeks sooner. **Waiting until nearly flag leaf emergence means that pigweed and other problem weeds are larger and much harder to kill.** Weed control will more likely be incomplete and a new round of pigweed seed may be generated.
 - 2) If Pre-emerge weed control is good with only a few escapes, then a later mid-season application may be needed to clean these up. Good PRE weed control might provide the opportunity to delay mid-season Huskie or (Huskie + atrazine) applications past the 12" tall sorghum, which enables control of later emerged weeds and/or extend the opportunity for preventive weed control with atrazine.

Keys—Sorghum Weed Control

- **As a manager, keep tabs on your on-farm staff and their application success.**
 - Confirm & cross-check which chemicals being used
 - Ask questions to double check
 - Eliminate potential confusion about amount of chemical added to tanks, proper land speed
 - Ride the rig with your staff a couple of rounds
 - Communicate how important it is to fix plugged nozzles, other equipment issues
 - Teach your staff to CALL YOU if ground is too rough to maintain speed, hoods are hitting the ground, herbicide is drifting, etc.

Keys—Sorghum Weed Control



- SAFETY FIRST!!! at all times.
- Pay to have your supervised staff:
 - A) take the training for a pesticide applicator's license
 - B) study to get their own applicator's license
 - C) take the test
 - D) when they pass it give them a bonus (\$200?), which lets them know you value their new skills

***Sorghum & Water Relations

- Rain (and irrigation): **Catch it! Keep it! Reap it!**
- It takes 6-8" of available water to get a crop of typical sorghum plants to the point of grain production (Dan Krieg, Texas Tech)
 - ~5" for low plant population dryland sorghum
- Once met, additional moisture has large effect on yield, **350-425 lbs./A per 1"**

What About Furrow Diking?



- An “Old” technique
- Benefits are well documented in research
- Practice may be considered a nuisance, but it is still recommended

Full-Season Maturity...

Estimated Daily Water Use for Grain Sorghum

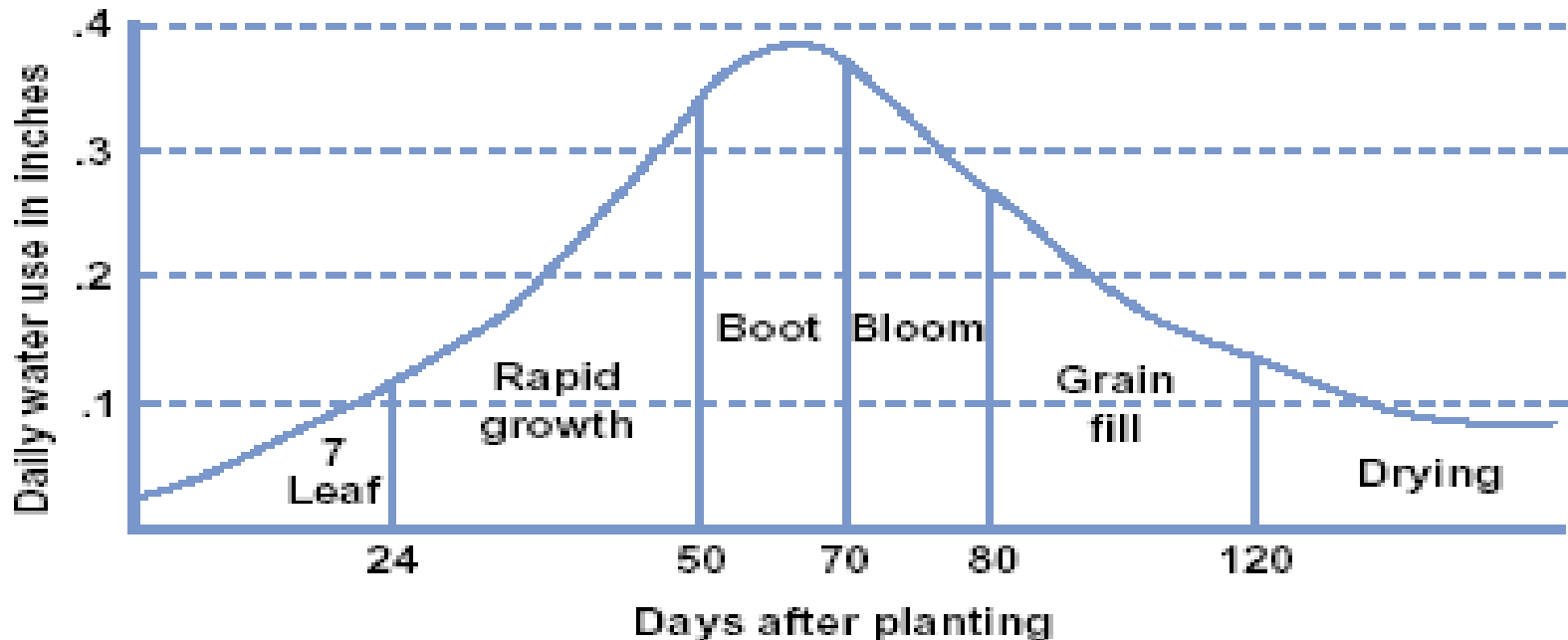


Figure 1. Water needs for sorghum rise sharply at the rapid growth stage, peak during the boot stage and then drop off afterward.

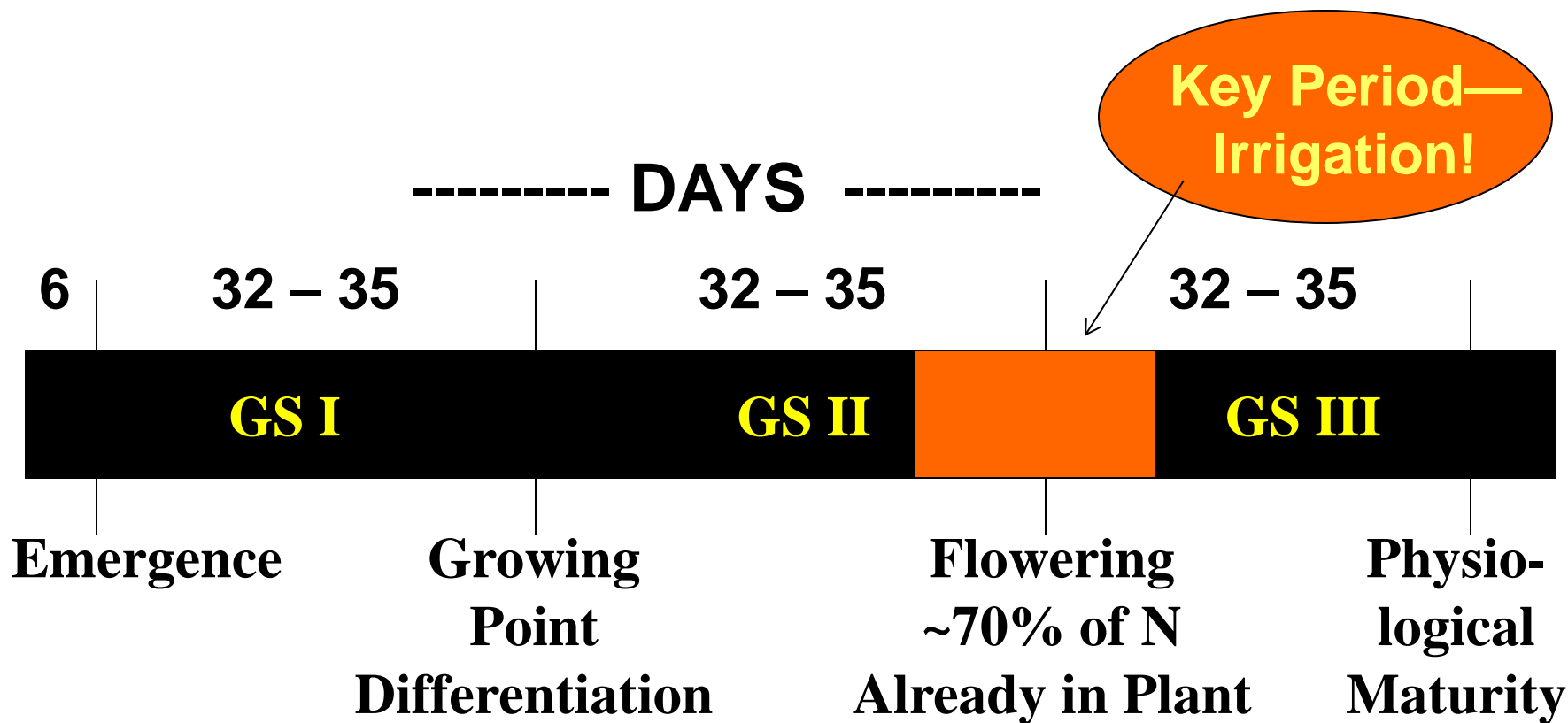
Full Irrigation



- Maximum yields at 3.5 to 4.5 gpm/A
 - Corn comparison would be ~5.0-6.0 gpm/A
- LEPA or low-set nozzles increase water efficiency
- Critical irrigations at mid-vegetative stage, boot, heading, flowering, grain fill

Development of Sorghum

Medium Maturity Grain Sorghum, 17 leaves



Spikelets & Potential Seed Number Set from
GPD +10 Days for Each Head

Limited Irrigation Sorghum

- Highest return usually occurs if sorghum is irrigated at **boot stage** (provided you can get to that point)
- Avoid moisture stress during the mid-vegetative stage (30-35 days after planting, i.e., growing point differentiation)

Sorghum growing point
or immature head





Similar to grain sorghum, growing point differentiation in wheat leads to small head down in stem—spikelet number and seeds per spikelet pretty much already determined. If grazing and then going to grain then cattle should have been off about 7-10 days prior.

9,600 lbs./A, Hale Co.



- 24" of water (irrig./rain) for grain yield
 - Add in 7" to get the crop to the point of grain yield (31" total)
- A more realistic goal: 6,000 lbs./A with medium or medium-long maturity
- 15" of water for grain yield
 - Add in 6" to reach point of grain yield (21")
 - 3" soil water, 6" rain, 12" irrigation

Irrigation Termination & Harvest

- Termination of irrigation: near soft dough, if good soil moisture is still present
- Physiological maturity is at black layer (~10-12 days after soft dough)
- Seed moisture at black layer is ~25-35%
- Harvest below 20% moisture with drying required
- Market price based on 14% grain moisture to avoid dockage (may depend on delivery point)

Sorghum Dry-Down Issues

- Problem of delayed harvest due to slow drydown of vegetation OR sucker head development
- Glyphosate sprayed at physiological maturity kills the plant
 - Threshes more easily, “schedules” harvest at 7-9 days, and you get to “sell” some water
 - Could impair standability if harvest is delayed as plants are dead
- Gramoxone (not labeled), sodium chlorate
 - More burn down action, plants may grow through desiccated vegetation

Sorghum Irrig. on Split Pivot

- Farmer consideration--splitting pivot with different crops requiring water at different times to reduce total irrigated acres at one time
- Which crop has main emphasis?
 - Cotton or corn production, give it all you can?
 - Sorghum—you signed a pounds contract?—you have to spread your crop loss/low yield risk to ensure delivery of pounds of grain

Sorghum Irrig. on Split Pivot

- Two-crop/two planting date/split pivot scenarios
 - Early cotton, late June sorghum
 - Early sorghum, delayed cotton
 - Early sorghum, late sorghum same pivot
- The goal is to minimize or even eliminate the overlap of peak irrigation
 - Much if not most of the time you are only watering a half circle
- Check with Extension (Troastle) for an explanation of possible scenarios for your farm

Shifts in Projected Dates



- A specific planting date for either cotton or grain sorghum does not mean cut-out or flowering will occur on a certain day or within a few days
- Heat unit accumulation drives physiological growth—it is potentially driven faster by heat
 - The same hybrid planted in late April will probably take 5-7 days longer to reach half bloom vs. plantings in June
 - But grain filling and maturation will likely then be quicker for the early planted grain sorghum

Shifts in Projected Dates



- Early cool fall temps. can greatly slow growth
- It is not worth sickly or slow emergence on cotton or sorghum if it means you need to wait 5 days to early plant
 - The potential damage in a start in cold conditions is a greater risk than if irrigation or heat during flowering hit crop later
 - If temperatures are reasonable is there a major cold front in the next 5-7 days?

Scurry/Howard/Dawson/Lynn/Terry

Early Cotton, Late GS



- Half pivot with cotton, planted ~May 5
 - Peak water use early July to mid-August
 - Physiological cut out (5 NAWF) by ~August 10?
 - Greatly reduce irrigation ~Aug. 20 if soil moisture is available, A&M data suggests little additional irrigation benefit esp. if some rain is received
- Consider medium maturity sorghum, ~5,000 lbs./A yield goal,
 - “Schedule” flowering about September 5
 - Back up 65-67 days (from 9/5)—plant ~July 1

Scurry/Howard/Dawson/Lynn/Terry

Early Cotton, Late GS



- Result: cotton is up to 3 weeks past cutout prior to sorghum flowering (~Sept. 5), and lower moisture requirement
- Sorghum enters peak water demand ~7 days after cotton cut out when cotton irrigation is greatly reduced
 - Sorghum maturity near October 10-15 with added potential of Sept. rainfall assisting yield
- Concentrate water to cotton early with 1-2 possible key waterings to sorghum prior to flowering (panicle differentiation, early boot)

Scurry/Howard/Dawson/Lynn/Terry

Early GS, Delayed Cotton



- Half pivot with medium-early sorghum, planted ~April 25
 - Medium-early hybrid, flower by June 25-30—peak water use is declining as cotton water needs rise rapidly
 - Maturity about first week of August with mid/late-August harvest
- Cotton planting delayed to May 15th
 - Physiological cut out ~Aug. 20th
 - Little overlap in peak irrigation needs
 - How strong is your water?

Split Pivot Sorghum—2 Plantings

Dawson/Lynn/Terry Co., **Medium** Maturity

<u>Timing</u>	<u>Planting Date</u>	<u>Flower- ing</u>	<u>Maturity</u>	<u>Maximum Water Use</u>
Early	April 25	July 1-5	Aug. 5-10	6/15 to 7/10
Late	June 30	Sept. 5	Oct. 10-15	8/20 to 9/15

Hockley/Lubbock/Crosby/Floyd/Hale

Early Cotton, Late GS



- Half pivot with cotton, planted ~May 5
 - Peak water use early July to mid-late August
 - Physiological cut out (5 NAWF) around Aug. 15?
 - Reduce irrigation ~Aug. 25 if moisture is available, A&M data suggests little additional irrigation benefit esp. if some rain is received
- Consider medium-early maturity sorghum, ~5,000 lbs./A yield goal (6-8" irrigation)
 - "Schedule" flowering about September 1
 - Back up 60-62 days (from 9/1)—plant ~7/1

Hockley/Lubbock/Crosby/Floyd/Hale

Early Cotton, Late GS



- Result: cotton is up to 2 weeks past cutout and higher moisture requirement prior to sorghum flowering (~Sept. 1)
- Sorghum enters peak water demand about time of cotton cut out but before end of cotton irrigation
 - Sorghum maturity near October 5-10 with added potential of Sept. rainfall assisting yield
- Concentrate water to cotton early with 1-2 possible key waterings to sorghum prior to flowering (panicle differentiation, early boot)

Hockley/Lubbock/Crosby/Floyd/Hale

Early GS, Delayed Cotton



- Half pivot with medium-early sorghum, planted ~April 25 (watch soil temps. if cool)
 - Medium-early hybrid, flower by ~July 1—peak water use is declining as cotton water needs rise rapidly
 - Maturity about August 5th & harvest begins ~Aug. 20
- Cotton planting delayed to May 15
 - Physiological cut out ~Aug. 25th
 - Little overlap in peak irrigation needs
 - How strong is your water?

Split Pivot Sorghum—2 Plantings

Hockley/LBB/Crosby/Floyd/Hale, **Medium** Maturity

<u>Timing</u>	<u>Planting Date</u>	<u>Flower- ing</u>	<u>Maturity</u>	<u>Maximum Water Use</u>
Early	4/25- 5/1	6/30- 7/7	Aug. 5-15	6/20 to 7/15
Late	June 25	~Sept. 1	~Oct. 5-10	8/15 to 9/10

Parmer/Castro/Bailey/Lamb/Cochran Early Cotton, Late G.S.

- This is harder to separate irrigation of the two crops than to the south and east
- Half pivot cotton, planted ~May 10
 - Plant cotton earlier if you safely can due to soil temp.
 - Peak water use early July to late August
 - Cut out (5 NAWF) about August 20-25th?
- Consider medium-early maturity sorghum, ~5,000 lbs./A yield goal (~9" irrigation?)
 - "Schedule" flowering by ~Sept. 1st
 - Back up 60-62 days (from 9/1)—plant by June 30th (the cut-off for a medium-early maturity)

Parmer/Castro/Bailey/Lamb/Cochran

Sorghum/Cotton



- Result: cotton is about 1 week past cutout before sorghum flowering (~Sept. 1)
- Cotton cutout about 0-7 days after peak sorghum water demand begins
 - Sorghum maturity near October 5-10 (this is close to early frosts) with potential of Sept. rainfall assisting yield
- Concentrate water to cotton early with 2 possible key waterings to sorghum prior to flowering (panicle differentiation, boot)

Parmer/Castro/Bailey/Lamb/Cochran Early G.S. vs. May 10 Cotton

- More separation in water use than late sorghum?
- Half pivot with sorghum, planted ~May 1
 - Medium-early hybrid, flower by ~July 4
 - Peak sorghum water demand reduces after July 10
- Can't advocate delaying cotton
- Half pivot cotton, planted ~May 10
 - Peak water use early July to late August
 - Cut out (5 NAWF) about August 20-25th?

Parmer/Castro/Bailey/Lamb

Early Corn, Late Grain Sorghum

- Half pivot 108- to 115-day relative maturity corn, planted ~April 15
 - Compare heat units requirements for specific hybrids
 - Peak water use ~V10 and especially from silking to past milk (through ~July 25); maintain good soil water to near ½ starch line
 - Don't cut the corn short...
- Consider medium maturity sorghum, ~5,000 lbs./A yield goal
 - "Schedule" flowering by ~Sept. 1st
 - Back up 65-67 days (from 9/1)—plant by June 20-25th (the cut-off for a medium-early maturity is 6/25)

Parmer/Castro/Bailey/Lamb

Early Corn, Late Grain Sorghum

- Result: half circle of corn is essentially fully irrigated, but for grain sorghum
 - One watering to establish stand (late June)
 - Before corn is finished, a possible second water ~4 weeks after planting in advance of growing point differentiation (increase spikelet & seeds per spikelet set)
- Grain sorghum maturity by ~Oct. 10 (this is close to early freezes) with potential of Sept. rainfall assisting yield
 - Modest population for grain sorghum to better prepare the crop to wait until after corn irrigation is completed

Split Pivot Sorghum—2 Plantings

Parmer/Castro/Bailey/Lamb/Cochran, **Medium-Early** Maturity

<u>Timing</u>	<u>Planting Date</u>	<u>Flower- ing</u>	<u>Maturity</u>	<u>Maximum Water Use</u>
Early	May 1	July 1-5	Aug. 5-10	6/20 to 7/10
Late	June 25	Aug. 25	Oct. 1-5	8/10 to 9/1

Splitting/Spreading Water Use with Peanuts, Gaines/Terry/Yoakum Cos.

■ Peanut considerations....

- You can not diminish water to peanuts!
- Peak peanut water use early July to early/mid September
- Recommended crop rotation is minimum 1 year peanut in 3
- One year in 4 is even better for peanut
- Preferable to let each sorghum and peanut rotate with cotton but not each other (cotton is the crop that will benefit most from a rotation with these other crops; peanut requires it among other factors to hold disease potential in check)
- Approximate peanut Market type days to maturity, or more likely 'days to digging'
- Runner, 165-170 days (Flavor Runner 458 the longest)
- Virginia, 160-165 days (Jupiter is shorter)
- Spanish, 140-145 days (AT-9899, 155 days, looks like a miniature runner, is intermediate between Spanish & Runner on maturity)
- Valencia, 125-130 days (~135 some years) must be dug if potential digging losses are evident

Splitting/Spreading Water Use with Peanuts, Gaines/Terry/Yoakum Cos.

- Half pivot with **Runner or Virginia peanuts** and grain sorghum
- Really shouldn't delay peanut planting, but perhaps the site where you might split a pivot with grain sorghum, make those the last Runner or Virginias you plant (perhaps May 1-7)
- Consider medium-early maturity sorghum, 4,500 lbs./A yield goal (6-8" irrigation & avg. rainfall & some soil moisture), and planting late April (20th at the earliest, more likely April 25)
 - Flowering by end of June; peak water use declining in early July—if you even decide to water at all (use lower seed drop)
 - Some sorghum water sharing needed with peanut production (right after planting, possibly emergence, ensure peanuts are not stressed, flowering and peg initiation)
 - Early peanuts and late grain sorghum (planted ~July 1-5) not recommended

Sorghum/Peanut (Gaines, Terry Cos.)



- Result: Sorghum is at or past flowering (~June 30) before peanut enters period of critical water needs after peanut flowering is initiated (and peak demand mid-July to late August)
- Concentrate water to peanut after July 1 with only 1 possible additional watering to sorghum, esp. if soil water is banked
 - Sorghum maturity by August 5-10

Possible Early Peanut & Late Sorghum

- ~May 1 Valencia peanut maturing in 125-130 days to digging
 - Must dig to avoid loss of large pods
 - Most remaining irrigation could go to sorghum by about Sept. 1
- Consider medium-early maturity sorghum
 - “Schedule” flowering about September 5 (Yoakum & Terry) to Sept. 10 in Gaines Co.
 - Back up 60-62 days (from 9/5 in Terry & Yoakum)—plant grain sorghum ~7/5 (the cut-off for medium-early planting in Yoakum/Terry; 7/10 the cutoff for medium-early in Gaines Co.)

Possible Early Peanut & Late Sorghum (#2)

- Outcome of early Valencia/late grain sorghum: Overlap in higher water use in both crops is largely NOT avoided.
- Valencia market types in Texas A&M AgriLife observations tend to have better cold soil germination, so in this scenario perhaps the Valencia could be seeded up to 1 week earlier (April 23).

Grain Sorghum & Sunflower

Cotton & Sunflower



- Split pivot scenarios with sunflower and grain sorghum/cotton are highly flexible as sunflower has a very wide range of planting dates and is less affected by cool fall weather
 - Suggested sunflower planting, lower South Plains, April 10-July 15
 - Northwest South Plains, April 20-July 10

Cotton & Guar or Sesame



- Split pivot scenarios with cotton using Guar or Sesame favor early planting of the cotton
- Why? Guar and Sesame have much higher soil temperature requirements—they can't be planted early

Research Interest, 2011+



- Starter funding (TGSA; Cotton Inc.; USDA) will initiate research for dryland no-till cropping systems for the South Plains
- “It won’t work!”
- Never say never—anything that can reduce labor, fuel, chemical, erosion, etc. must be considered carefully
- A successful system likely requires stubble and other residues on the field
- Increase OM, hard soil, even mixed cover?

Sorghum Mistakes

Below: Sorghum on the edge of the field demonstrates the value of more area—and more moisture per plant achieves yield.

Sorghum planted at too high seeding rate on the right, has not headed out.



Sorghum in the dryland corner planted at the same seed drop as on the pivot.



The need to ensure sorghum braces roots have soil around them so that sorghum stands better.



For the heck of it: A sorghum/sudan field in which the cattle were turned in way too late. The crop is 'stalky,' the cattle only ate the leaves, wasted forage growth. "West Texas Bamboo Forest"

