5th Annual TAWC

Water College

January 17, 2019

Lubbock Civic Center

Lubbock, TX

TAWC

TEXAS ALLIANCE FOR WATER CONSERVATION

The TAWC project was made possible through a grant from the

Texas Water Development Board

5th Annual Water College

January 17, 2019
Lubbock Memorial Civic Center
Lubbock, TX

Morning Sessions:

8:30 am **Registration and exhibits**

8:50 am **Welcome & Introductions**
***Dean Bill Brown**, College of Agricultural Sciences and Natural Resources, TTU*
***Cameron Turner**, Manager, Agricultural Water Conservation Program, TWDB*

9:15 am **Utilizing Cover Crops and Irrigation Technology**
***Kelly Kettner**, Bailey County Producer*
***Jeff Miller**, Forefront Agronomy*

10:15 am **Utilizing New Online Tools for Producers**
Shawn Wade, *Plains Cotton Growers*

10:45 am **Break with exhibits**

11:00 am **Cotton Yield Response to Water and Cropping Alternatives Based on Water Economy**
***Bob Glodt,** AgriSearch Consulting*

11:40 am **Caught in the Crossfire: The US Sorghum Industry's Battle with the Chinese Ministry of Foreign Commerce.**
John Duff, *National Sorghum Producers*

12:10 pm **Lunch**
Dr. Lawrence Schovanec, President of Texas Tech Univ., Keynote Address

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Afternoon Sessions:

1:15 pm **From Farm to Brands: US Cotton Industry's Approach to Sustainability**

***Jesse Daystar**, Cotton Inc.*

1:45 pm **Texas Water Law and Policy Update**

***Victoria Whitehead**, High Plains Undergound Water District*

2:15 pm **Break with exhibits**

2:40 pm **Update from Texas Water Development Board**

***Kathleen Jackson**, Texas Water Development Board*

3:00 pm **Upcoming Weather Patterns Video**

***Brian Bledsoe**, Chief Meteorologist & Climatologist, Colorado Springs*

3:30 pm **Close**

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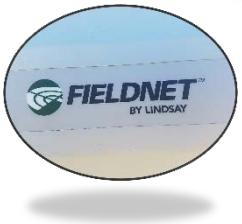
THANKS TO OUR SPONSORS

TEXAS TECH UNIVERSITY
College *of* Agricultural Sciences
& Natural Resources

FiberMax cotton | BASF We create chemistry

Cotton Incorporated



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TEXAS TECH UNIVERSITY
College *of* Agricultural Sciences & Natural Resources

If questions/needs ask any of these TAWC Personnel:

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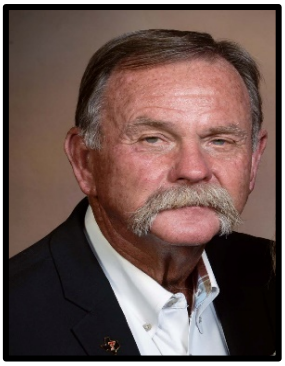

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Moderator and Presenters for

2019 TAWC Water College

Dr. Bill Brown

William F. (Bill) Brown has served as dean of Texas Tech University's College of Agricultural Sciences and Natural Resources since April of 2018. Dr. Brown came to Texas Tech after having served as Dean for Research and Director of the Agricultural Experiment Station at the Institute of Agriculture, University of Tennessee. There, his office provided support and oversight for all research activities within the Institute of Agriculture in seven departments and 10 Research and Education Centers across the state.

Prior to his appointment at the University of Tennessee, he served as Assistant Dean for Research and Assistant Director of the Florida Agricultural Experiment Station with the Institute of Food and Agricultural Sciences at the University of Florida.

Dr. Brown's academic training is in animal science with a focus in ruminant nutrition. He received the BS degree from the University of Florida, the MS degree from the University of Tennessee and the PhD degree from the University of Nebraska. In his faculty role at the University of Florida, Dr. Brown was located at a Research and Education Center in South Central Florida and worked directly with cattle producers to address their needs.

Dr. Brown has been active in national leadership roles with the Experiment Station Committee on Policy (ESCOP), serving as Chair of multiple committees.

Bill and his wife Lindsey (an attorney) have two children; Austin, a recent graduate of the University of Florida and now a software engineer with American Express, and Morgan a sophomore at Florida State University.

Mr. Cameron Turner

Cameron is the Manager of the Agricultural Water Conservation Program at the Texas Water Development Board. His duties include managing grant projects, developing statewide irrigation estimates, and providing outreach and education to the public.

He was raised on a family farm with operations in parts of Deaf Smith, Parmer, Bailey, and Lamb counties. His rural upbringing fuels his passion for

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conservation as a means to preserve rural economies, livelihoods, and the prosperity of agriculture in rural Texas.

Cameron attended Texas A&M University where he received a degree in Agricultural Economics with a focus on Farm and Ranch Management. He now lives in Cedar Park with his wife and two children.

Mr. Jeff Miller

Jeff was born and raised in Plainview, TX and has been involved in agriculture his whole life. Jeff holds a BS in Integrated Pest Management from Texas Tech and an MS in Crop Physiology from Texas Tech.

Jeff is married to Kate and has 4 beautiful children. Jeff worked for 10 years with Deltapine/Monsanto in product development and worked 8 years with Pioneer in drought research, sales, and agronomy.

He founded Forefront Agronomy in 2017 to provide leading edge individualized agronomy insight and support to the growers of West Texas. There are many challenges in agriculture and by utilizing our partnerships with DuPont Pioneer, CropMetrics, and 360 Yield Center we have the best support behind us to tackle these challenges and strive for profitability.

Mr. Kelly Kettner

Kelly has been practicing continuous no-till on most of his farms since 2009. He started his farm operation in Parmer county Texas in 2001.

After a significant drop off in the production of his wells during the drought of 2011 and 2012, he decided to farm with the 5 soil health principles on both irrigated and dryland production.

He grows cotton, corn, sorghum, wheat, and mixed species cover crops on his farm. Kelly graduated with a degree in Agronomy from Texas Tech in 1995. Kelly and his wife Deborah have three kids: Jacob, Riley, and Kyle.

Mr. Shawn Wade

Shawn is Director of Policy Analysis and Research at Plains Cotton Growers, Inc. His primary responsibilities at PCG include farm policy, crop insurance, and research.

A Lubbock native, Wade came to PCG in 1991 as communications director after graduating from Texas Tech University with a degree in agricultural communications. In his twenty-plus years at PCG, Wade developed a keen interest in legislative and

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regulatory issues through his work in communications. He monitors how current programs are working once they're passed and helps PCG members understand how they work and how proposed changes to those programs might impact them at the farm level.

Wade also works closely with cotton researchers, helping to guide and advise on new projects that address key industry needs through programs such as the Plains Cotton Improvement Program and the Cotton Incorporated State Support Program.

Shawn and his wife, Melissa, live in Lubbock with their two daughters, Emily (21) a Senior Agricultural Communications major at Texas Tech and Rachel (17) a senior at the Margaret Talkington School for Young Women Leaders.

Mr. Bob Glodt

Bob is the president and founder of Agri-Search, Inc.- an independent research and consulting firm in Plainview, Texas. Agri-Search was founded in 1980 and is the oldest continuously operating independent agricultural research firm on the Texas High Plains. In addition to independent research trials, Bob serves as agricultural consultant and advises growers in Hale, Lamb, and Castro Counties on irrigation management, weed, insect, and disease control.

He has received numerous awards including Cotton Farming Magazine's "Cotton Consultant of the Year Award" and Texas Association of Agricultural Consultants – "Consultant of the Year Award." Bob served as an IPM Specialist with the Texas Agricultural Extension Service in Georgetown, Texas. He Bob also served in the United States Army and received a Bachelor of Science degree in entomology from Texas A&M University. He and his wife Barbara have raised two sons and live in Plainview, Texas.

Mr. John Duff

John serves as strategic business director for National Sorghum Producers, where he provides analysis of farm policy, crop insurance and ethanol regulatory issues. He also has a role promoting and marketing grain sorghum for the Sorghum Checkoff and works with NSP's for-profit subsidiaries, Elite Ag and Sustainable Crop Insurance Services.

A recognized expert on the sorghum industry, John is frequently featured on farm radio and TV stations such as KGNC, KFLP and RFD-TV as well as in Sorghum Grower and other print publications. His unique perspective on policy and markets allows him to provide added value to sorghum producers.

John grew up southeast of Levelland, Texas, on a cotton and grain sorghum farm. In May 2012, he graduated summa cum laude from Texas Tech University with a bachelor's degree in agribusiness.

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Dr. Jesse Daystar

Dr. Jesse Daystar is the Chief Sustainability Officer and Vice President of Sustainability at Cotton Incorporated and an Adjunct Professor at Duke University Nicholas School of the Environment. In his role at Cotton inc., he engages with all levels of the supply chain to help create systemic change towards more sustainable production systems. He believes that industry changes must be made upon a strong backbone of data generated by tools such as life cycle assessment to avoid unintended environmental consequences and to ensure sustainability is balanced with economic viability.

After serving as a sustainability consultant with Cotton Incorporated for two years, Dr. Daystar filled the newly created position of Chief Sustainability Officer in 2017. Prior to his work at Cotton Incorporated, Daystar was the Assistant Director of the Center for Sustainability and Commerce at Duke University where he directed sustainability research for apparel, energy, bioproduct, and other industry sectors. He earned his two Bachelor of Science Degrees in Chemical Engineering and Pulp & Paper Engineering, a Master of Science Degree and a Ph.D. in Forest Biomaterials at North Carolina State University.

In his personal time, Dr. Daystar is an avid mountain biker and in 2009 rode his bike across the United States with the nonprofit Bike and Build.

Victoria Messer Whitehead, General Counsel

Mrs. Whitehead is a native of the Texas Panhandle, growing up in Hereford, and graduating from Canyon High School in 2008.

She received her Bachelor of Arts in Political Science from Texas Tech University in 2012 and her Juris Doctorate Degree from Texas Tech University School of Law in 2016.

For the past ten years, Mrs. Whitehead has had a storied career that spans four legislative sessions. Working for Texas leaders such as State Senator Robert Duncan, Representative Drew Darby, and Senator Kay Bailey Hutchison, Victoria developed a passion for serving rural Texas through legislative advocacy and education.

She is the distinguished recipient of many honors including the Texas Tech School of Law's Top Extern Award, Capitol Crowd's House Intern Most Likely to Be Running the Legislature in 10 Years, and most recently was appointed by Governor Greg Abbott as Student Regent for the Texas Tech University System Board of Regents for the 2015-2016 year.

Currently, Mrs. Whitehead serves as the General Counsel for the High Plains Water District, where she is responsible for assisting and advising the District on groundwater law and policy issues, grant acquisitions, state and federal compliance, and legal matters that face the District.

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Ms. Kathleen Jackson

Kathleen was reappointed to the Texas Water Development Board by Governor Greg Abbott on March 9, 2017. She was appointed to the Board by Governor Rick Perry on March 18, 2014.

Jackson has a diverse background representing agricultural, environmental, industrial, and wholesale-supply interests, which includes developing and implementing water management strategies for Southeast Texas. As a registered professional engineer, Jackson served as public affairs manager for one of the world's largest petroleum and petrochemical producers.

Additionally, she was involved in production agriculture with her late husband, who ran a cattle operation and farmed rice. She served as a past member of the Lower Neches Valley Authority Board of Directors, the Texas Water Conservation Association, and participated on the Sabine and Neches Rivers Bay and Estuary Environmental Flows Assessment Program Stakeholders Committee.

She is also a board member and past president of the Lamar Institute of Technology Foundation, a sustaining member of the Junior League of Beaumont, a member of the Texas Farm Bureau, past president of the American Cancer Society of North Jefferson County, and a past board member of Junior Achievement of the Golden Triangle.

Jackson received a bachelor's degree in chemical engineering from North Carolina State University.

Jackson has three children, sixth-generation Texans who all reside and work in Texas, and three grandchildren. She is a long-time resident of Beaumont.

Mr. Brian Bledsoe (Video Presentation)

Brian grew up on a farm/ranch in eastern Colorado. He has been interested in weather since he was a child. Brian's true passion is helping farmers and ranchers with seasonal weather forecasting. He speaks all over the state of Colorado and elsewhere. Brian's work has been featured in the High Plains Journal, Southern Livestock Standard, Ag Journal, and the Greeley Tribune. He also writes for the Colorado Association of Wheat Growers. He deems it his mission to show how he can make the weather can work for you.

Brian is currently Chief Meteorologist at KKTV 11 News in Colorado Springs, Colorado Area. Brian graduated from the University of Northern Colorado and maintains his own weather forecasting website: BrianBledsoeWX.com.

"**It's a GIRL**", Brian is unable to be with us due to the imminent birth of a child. Congratulations to Brian and his wife!

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Keynote Speaker

Dr. Lawrence Schovanec, 17th President of Texas Tech University

Since, Dr. Schovanec was named president in 2016, Texas Tech University has seen record levels of enrollment, student retention, degrees awarded and research expenditures. In the past year, Texas Tech was designated as a Hispanic-Serving Institution, one of 12 Carnegie Tier One Research institutions to achieve this distinction. In addition, Texas Tech was one of four institutions in the nation to be named as a recipient of the 2018 W.K. Kellogg Foundation Community Engagement Scholarship Award. This qualifies Texas Tech as a finalist for the national C. Peter Magrath Community Engagement Scholarship Award, presented annually by the Association of Public and Land Grant Universities. The university also received the 2018 Sen. Paul Simon Award for Comprehensive Internationalization. These achievements reflect the emphasis Schovanec has placed on promoting student success and diversity, while also solidifying Texas Tech's status as a world-class research institution.

This vision for the university has guided Schovanec throughout his career at Texas Tech, which began as an assistant professor in the Department of Mathematics and Statistics, where he eventually served as chairman for nearly 10 years. He subsequently was appointed dean of the university's largest college, the College of Arts & Sciences, then served as interim president for 10 months in 2012 and 2013, before being named Provost.

As the university's chief academic officer, Schovanec instituted an initiative to improve student success that helped Texas Tech achieve record retention rates each of the past two years. To promote transparency in the budget process, he initiated the annual college budget hearings that continue to this day. Under his leadership, the university introduced TTU Worldwide eLearning, which was created to enhance the quality and availability of online courses for both residential and nonresidential students and grow Texas Tech's presence at regional sites across the state. Schovanec also established the Humanities Center and coordinated the initial planning for the establishment of Texas Tech University at Costa Rica (TTU-CR), an endeavor that was finalized shortly after he assumed the role of president. The TTU-CR campus was inaugurated in May and will host its first classes in fall 2018.

In all of his administrative roles, Schovanec has emphasized the importance of teaching excellence and scholarship support. In his first year as president, Texas Tech increased merit- and need-based scholarships by $8 million, which contributed to a fall 2017 freshman class that was distinguished by a record number of national merit finalists, presidential scholars and first-generation students. As part of Schovanec's and Texas Tech's commitment to its core missions, 50 Presidential Teaching and Research Excellence Professorships were established.

Texas Tech continues to increase and improve its infrastructure during Schovanec's tenure. When he was named president, Schovanec announced a five-year, $20 million investment in classroom and teaching laboratories. Since then, Texas Tech has dedicated the opening of the new Honors Residence Hall, started construction on a second $77 million Experimental Sciences Building, and begun a $43 million major renovation of the Maedgen Theatre.

An Oklahoma native, Schovanec earned a bachelor of science in mathematics from Phillips University and a master of science in mathematics from Texas A&M University. He earned his doctorate in mathematics from Indiana University. Schovanec's wife, Patty, is an instructor and advisor in the Department of Mathematics & Statistics. They have two sons, Tyler and Cory.

Using Cover Crops and Irrigation Technology

Kelly Kettner – Muleshoe, TX
Jeff Miller – ForeFront Agronomy LLC

1

Historic Water Conservation Techniques

Surge valves
Pivot irrigation
LEPA system
Drip irrigation
VRD pump panels
Moisture Monitors
Variable Rate Irrigation

All of these are tools used to conserve water, but when it is gone, they don't do much for you!

I had to start paying more attention to farm practices and less attention to EQUIP tools.

Soil Health practices use the water we have available more efficiently and work very well with the mechanical improvements mentioned above.

2

Reasons for soil health attention

- We are learning that soils need something growing on them at all times. They do not like direct sunlight.
- The use of cover crops is helping to smother weeds, cycle nutrients and stop erosion
- Multi species cover crops help to host many beneficial insects that can help reduce insecticide use in nearby cotton fields.
- We are better understanding the role that microbes play in the soil ecosystem.
- Aids in the sustainable production of the soil.

3

Soil Health benefits

- Increased water holding capacity
- Less erosion
- Increased fertility
- Reduced chemical use
- Increased microbial activity

4

Principles of soil health

- Not plowing the soil
- Using cover crops during periods of no cash crop
- Using crop rotation to break pest cycles
- Reducing use of synthetic chemicals and fertilizers.
- Try to mimic the original ecosystem in place before human disturbance.

5

No tillage

- Builds soil structure
- Increased water infiltration
- Increased earthworm and microbe activity
- Begins to return soil to it's natural state

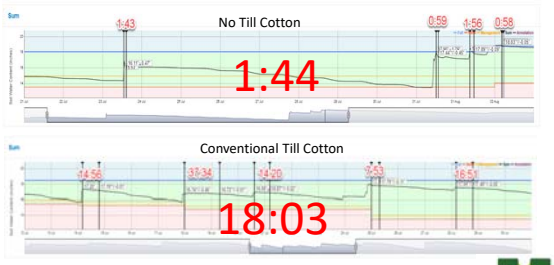
6

How does tillage and residue cover affect water management in a field?

- **Residue**
  - Breaks up the rain (or sprinkler) water droplet instead of having it impact the soil directly and break down the aggregates causing compaction
  - Creates a barrier that cuts down on moisture evaporation so the soil retains water longer
  - Reduces runoff so there is less movement of sediment, fertilizers, and herbicides
- **Tillage**
  - Breaks down aggregates and causes compaction reducing infiltration rates and water holding capacity.
  - There can be as much as 10 times more infiltration into a no till field vs conventional

7

Infiltration Rate Comparison



8

Water Holding Capacity Comparison

9

Crop rotation

- Breaks pest cycles
- Adds organic carbon to the soil
- Creates greater populations of microbes
- Use water at different times of the year

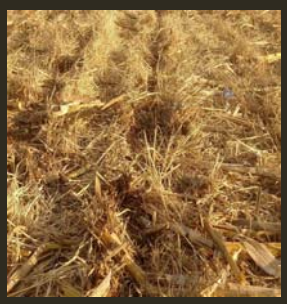
10

Reduction of synthetic inputs

- Allows the microbes to behave in their natural state
- Helps to stimulate root growth which makes plants more drought and disease tolerant
- Creates a symbiotic relationship between fungi and plant roots.

11

Bio Mimicry



- Returning animals to the land
- Maintaining a grass residue
- Trying to restore our fields to their natural state when Buffalo roamed our vast grasslands
- Allows our soil to regenerate

12

Bio mimicry

13

Regenerative Farming

14

Cover crops

- Work to form the mulch needed to protect the soil surface
- Provide the environment for beneficial insects and microbes to thrive in
- Create the diversity needed to regenerate the soil
- Need multiple species

15

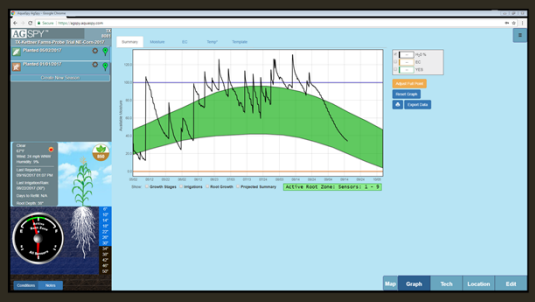
16

Blends

No perfect blend. I use what is cheap, available and adapted to my climate.
Summer mix – Proso millet, German millet, pearl millet, mungbeans, sunnhemp, radish, sunflower.
Winter mix – Rye, barley, black oat, canola, winter pea, triticale, crimson clover, hairy vetch.
Grazing – I try to graze all of my farms if it is convenient, and there is a live root mass.

17

Cover Crop Water holding ability



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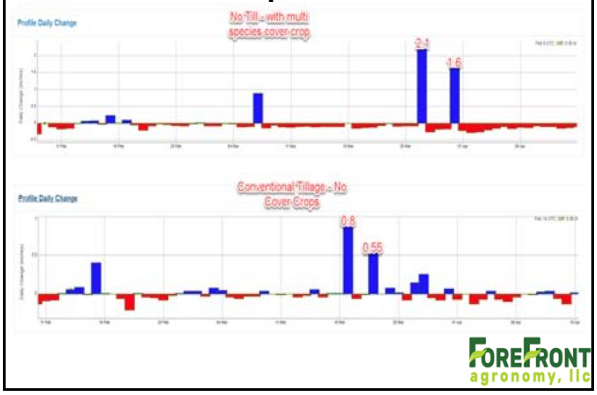
Do Cover Crops Use Moisture?



19

Do Cover Crops Use Moisture?

20

Precision Irrigation What Determines Success?

- Increased Yields
- Decreased Inputs

Profit

CropMetrics YIELD OPTIMIZATION TECHNOLOGY

21

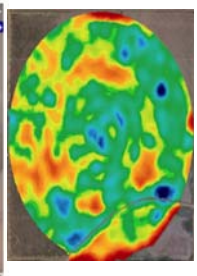
Lloyd Arthur Pivot 12 Field Information

Ralls, TX 2018

- NG 3517 B2XF – 56,557ppa
- RePlanted – May 31st
- Fertility – 32-0-0 99.35lb/A
- Herbicide – Trifluralin (1qt), 2x-Roundup PowerMax(32oz), 2x-Engenia(12oz), Outlook(12.8oz)
- Growth Regulator – MepStar (12oz)
- Harvested - Nov. 2-4
-

22

Lloyd Arthur - Ralls, TX



Cotton Planted multiple times due to weather, finally got a good stand the first of june.

Split in half VRI vs Flat Rate of 1"

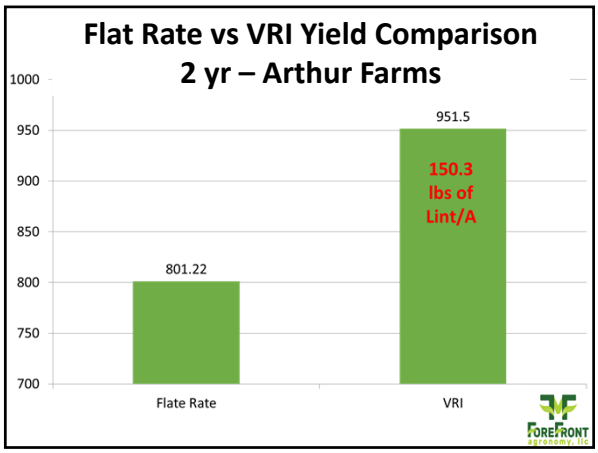
Flat Rate needed one more irrigation to finish out

23

Irrigation Scheme	Avg Application/Pass	Total inches applied inseason
VRI	0.985	9.59
Flat Rate	1.000	10.37

10.37" applied **17.24" rainfall**

24



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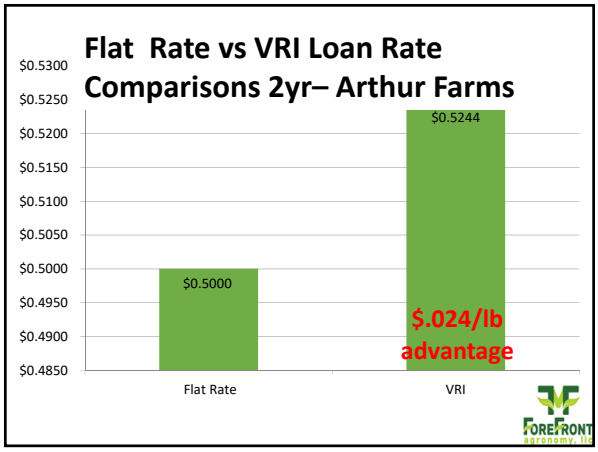

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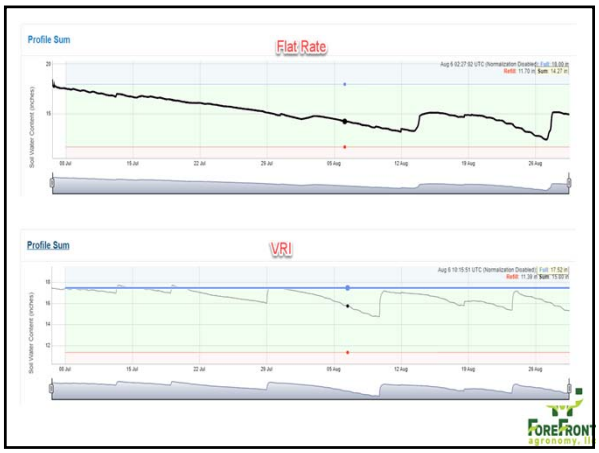
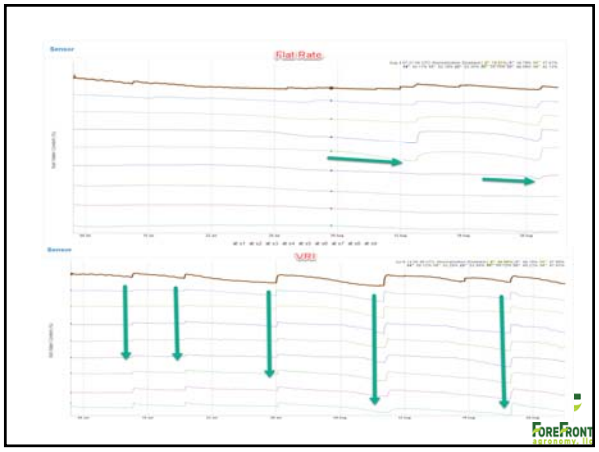
Sector	Yield	Lint	Total
Flat Rate	801.2	.50001	$400.62
VRI	951.5	.5244	$498.97
VRI Advantage	150.3	$.0244	$98.35
Probe Cost			-$13.3/A
VRI Cost			-$6/A
Controller Cost			-$10.83/A
			$68.22
Water savings of 0.52" @$8/inch		$4.16	**$72.38**

27


Profile Sum
Flat Rate
Profile Sum
VRI

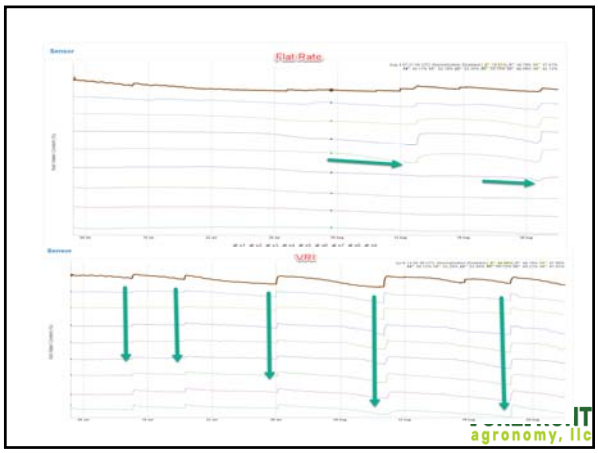
28


Flat Rate
VRI

29


Profile Sum
Flat Rate
Profile Sum
VRI

30



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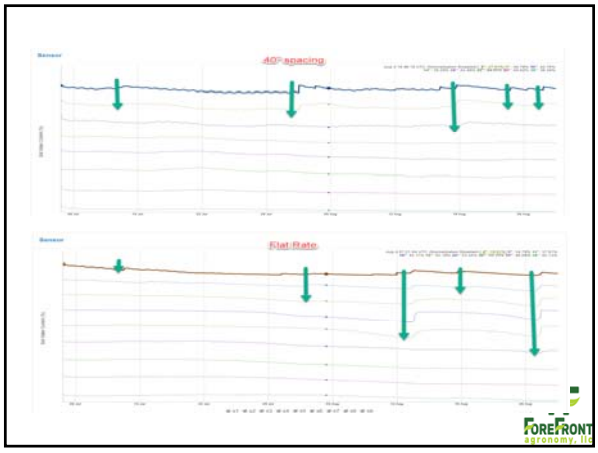
Nozzle Spacing Comparison

Irrigation Type	Yield	Loan	$/A
40” Drop Spacing	793.7	$0.5339	$423.74
80” Drop Spacing	548.3	$0.5049	$276.81

11.86” of irrigation in season
17.24” of rainfall

32



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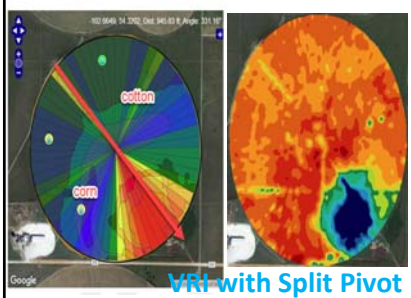
Kelly Kettner – Muleshoe, TX



Corn – 1" applications early then switched to 1.5" applications

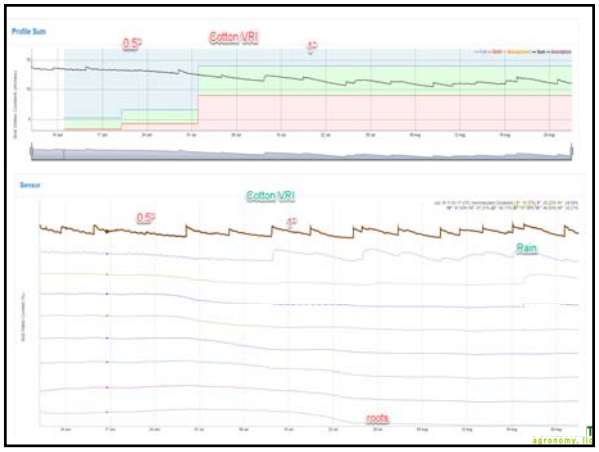
Cotton – 0.5"application early then switched to 1" applications

Corn planted at 23K, chopped for silage and made 19 tons
Very consistent plant height, ear size and yield across all regions

Cotton had very even emergence across all zones, 1554lbs/a $0.56 loan

VRI with Split Pivot Corn/Cotton

34



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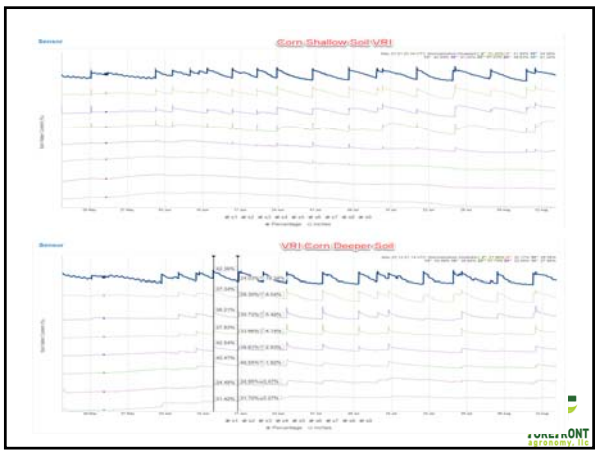

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What's happening below the ground?

What's the cost of estimating?

The #1 way to **SAVE** money?

ELIMINATE WASTE

The #1 way to **MAKE** money?

MAXIMIZE ROI

Return on INPUT!

37

Technology is <u>NOT</u> the Solution

The <u>ADOPTION</u> of Technology is the Solution

CropMetrics
YIELD OPTIMIZATION TECHNOLOGY

38

General Notes

The TAWC project was made possible through a grant from the
Texas Water Development Board

Shawn Wade, Plains Cotton Growers, Inc.

Data Tools for Producers

1

A Broad Assortment

Producers have many choices available to them to assist with the day to day decision-making and record-keeping requirements they face.

- Options include:
  - Online or web-based applications accessed through a web browser
  - Stand-alone applications that can be accessed on mobile devices
  - "Combo" tools that can be accessed through a mobile device, but link back to web- or server-based content

2

What is Out There?

- **Data management and recordkeeping -** FarmLogs, Sirrus, Trimble AgWorks, AgDNA, Climate FieldView, AgVault Mobile
- **Input Purchasing -** Agrelllus
- **Weather** –TTU MesoNet, Wunderground/Storm (iOS), RadarScope (iOS-$10)
- **Markets/Information** – AgMobile, agIndex, The Farming Forum
- **Resources for producers** – Cotton Cultivated (website), Flag the Technology/Hit The Target (crop registry), Insect Identification – *Managing Cotton Insects in Texas* (PDF)
- Apps to help select nozzles and calibrate sprayers, make GPS-based land measurements, identify weeds and insects, identify soil types, and crop nutrient deficiencies, and on and on and on . . . . . .

3

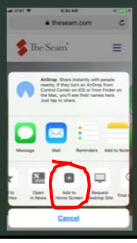
Websites are great, but how can I access access them from my phone or tablet?

Add a webpage to your Home screen

- iOS makes it easy – just two steps

Step One:

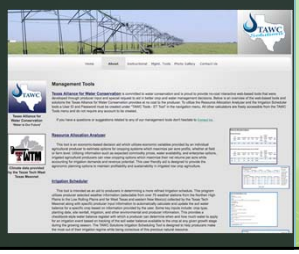
Step Two:



4

Texas Alliance for Water Conservation

- www.tawcsolutions.org/html/web_tools.html
  - **Resource Allocation Analyzer** (requires user account)
  - **Irrigation Scheduler**
  - **Simple Heat Unit Calculator(s)**
  - **Cotton Water Use Estimator**
  - **Basic Irrigation Calculator**
  - **Contiguous Acre Calculator**
  - **West Texas Agro-Climate Monitor**



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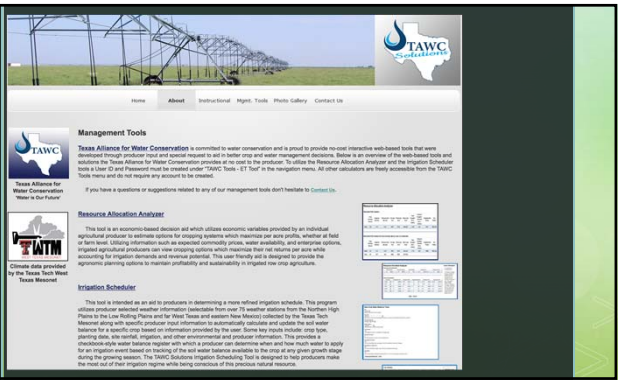
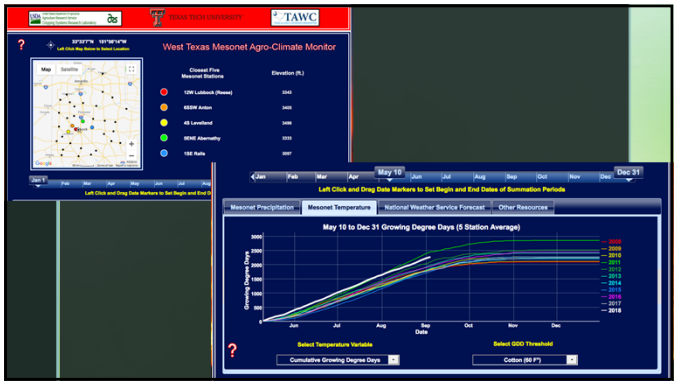


6

West Texas Mesonet Agro-Climate Monitor

- https://www.csrl.ars.usda.gov/wewc/WestTXClimMonitor/index.php
- **Map-based** – Click approximate location of any farm and system will calculate average data for nearest FIVE West Texas Mesonet weather stations
- **Date slider -** Allows you to select start and end dates for different data products
- **Temperature Data**
  - Cumulative Growing Degree Days by Crop
  - Daily Max/Min Temperature
  - Cumulative Hard Freeze Hours
  - Soil Temperature
  - Previous Year First Freeze Date
- **Precipitation**
  - 5 Station Average Cumulative Precip by Year
  - Current Year Cumulative Precip for Five nearest stations
  - Previous Years Cumulative Precip for Five nearest stations
- **NWS Forecast Data**
- **Other Resources**

7



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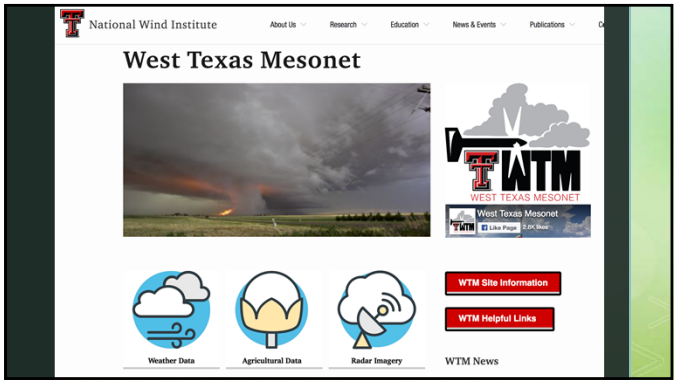
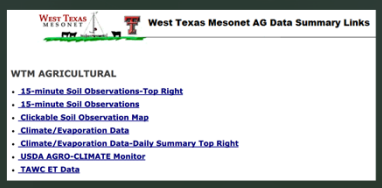


9

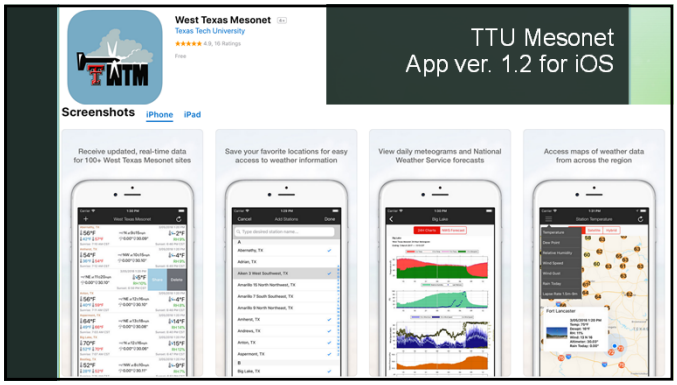
West Texas Mesonet

- https://www.csrl.ars.usda.gov/wewc/WestTXClimMonitor/index.php



10

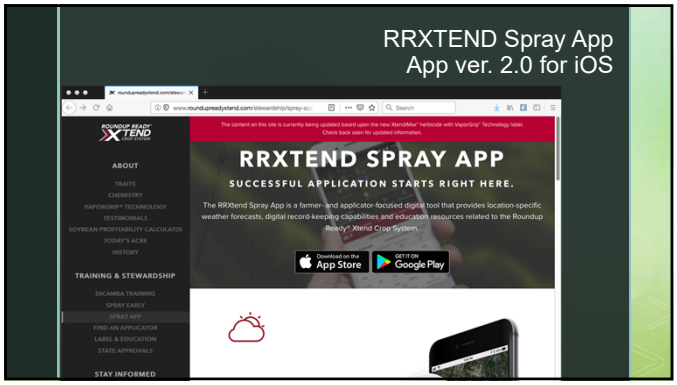
TTU Mesonet App ver. 1.2 for iOS



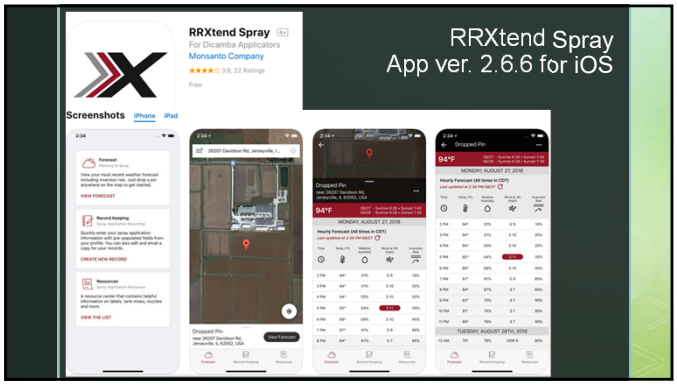
11

TTU Mesonet App ver. 2.0 for iOS

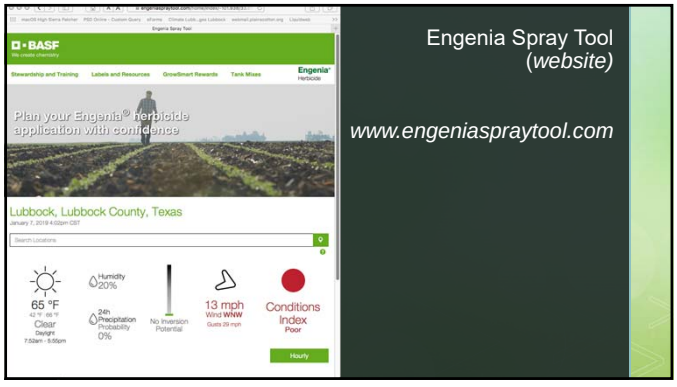
12


RRXTEND Spray App
App ver. 2.0 for iOS
RRXTEND SPRAY APP
SUCCESSFUL APPLICATION STARTS RIGHT HERE.
The RRXtend Spray App is a farmer- and applicator-focused digital tool that provides location-specific weather forecasts, digital record-keeping capabilities and education resources related to the Roundup Ready® Xtend Crop System.
App Store
Google Play

13


RRXtend Spray
App ver. 2.6.6 for iOS
RRXtend Spray
For Dicamba Applicators
Monsanto Company
Screenshots

14


Engenia Spray Tool
(website)
www.engeniaspraytool.com
BASF
Plan your Engenia® herbicide application with confidence
Lubbock, Lubbock County, Texas
65 °F
Clear
Humidity 20%
24h Precipitation Probability 0%
13 mph
Conditions Index
Poor

15

PRODUCTIVITY:
Farm Management and Recordkeeping

Most apps are available from Apple's App Store or the Google Play site:

FarmLogs
Farmers Business Network – FBN
Quick Commodities
Granular
Mix Tank – Tank Mixing Order
WagNet Mobile
AgMobile
Agriland News
Farm Futures
Growing Degree Days
seeCrop
Mavrx Scout
Planimeter-Measure Land Area
Farm At Hand & Farm At Hand – Scouting
Growers Edge
Ag Sense
Tank Mix Calculator
RealAgriculture & RealAg Markets
AgWeb News & Markets
Farm Progress
AgriTalk
FarmLead
Contour
Agworld for iPhone

16

PRODUCTIVITY:
Farm Management and Recordkeeping

Input and equipment suppliers also offer a wide variety of Apps:

- **Pioneer Hybrid**: Encirca Pro, Encirca View
- **Monsanto**: Weed ID, agIndex, RRXtend Spray,
- **Climate Corporation**: VitalFields farm fieldbook, Climate Fieldview
- **Farmers Edge**: FarmCommand, E-Scout, eSample Zone, eSample Grid
- **Agrian**: Echelon Ag, Agrian, Agrian Mobile, Agellum, Simplot Advisor
- **John Deere** App Center: Mobile Farm Manager, PlanterPlus, PowerAssist, GoHarvest, MyOperations, JDLink
- **BASF**: Grow Smart Live, Weed ID
- **Ag PhD**: Ag PhD Soils, Fertilizer Removal by Crop, Spray Tips Guide, Field Guide, Nurtient Deficiencies by Crop,
- **ADM**: ADM FarmView,
- **Agrible**: Pocket Spray Smart, Pocket Rain Guage, Pocket Drone Control

17

PRODUCTIVITY:
Weather Apps

Weather apps are always in demand and there are many to choose from. Many have FREE versions as well as upgraded 'Pro" versions that provide addiiotnal functionality for an extra charge.

- **TTU Mesonet**
- **Weather Underground**
- **Storm Radar: Weather Underground**
- **NOAA Weather Radar Live**
- **AccuWeather: Weather Forecast**
- **WeatherBug – Weather**
- **Weather: The Weather Channel**
- **HD Weather Doppler Radar**

18

COTTON YIELD RESPONSE TO WATER AND CROPPING ALTERNATIVES BASED ON WATER ECONOMY

BOB GLODT
AGRI-SEARCH, INC.
PLAINVIEW, TEXAS

1

WHEN YOU BEGIN A NEW CROP YEAR, DO YOU?

- BASE YIELD EXPECTATIONS ON PREVIOUS YEAR'S YIELD RESULTS OR BASE THEM ON HOW MUCH WATER YOU HAVE TO IRRIGATE?
- VARY YOUR IRRIGATION RATES BASED ON THE GROWTH STAGE OF THE CROP?
- SET ACHIEVABLE AND REALISTIC YIELD GOALS?
- OVERPLANT AND HOPE FOR RAIN?

2

EVERY DECISION WE MAKE OR ANY PLAN WE SEEK TO IMPLEMENT IN ONE WAY OR ANOTHER IS AFFECTED BY WATER.

3

SOUND PLANNING SHOULD INCLUDE:

1. A PRE-PLANT IRRIGATION STRATEGY
2. REALISTIC AND ACHIEVABLE YIELD GOALS
3. VARIETY SELECTION BASED ON YOUR CAPACITY TO IRRIGATE.
4. IRRIGATING BASED ON A SPECIFIC PERCENTAGE OF PET.
5. TAKING ADVANTAGE OF RAIN
6. AN EFFICIENT IRRIGATION DELIVERY SYSTEM

4

WHAT ARE REALISTIC AND ACHIEVABLE YIELD GOALS?

5

AVERAGE YIELDS PER IRRIGATION REGIMEN – AGRI-SEARCH 2012 - 2014 DATA

YEAR	SITE	# VAR.	POUNDS LINT PER ACRE			
			RF	30%	60%	90%
2012	OLT	7	327	824	1286	1523
2013	EDM	8	598	801	1210	1435
2014	EDM	12	786	1067	1388	1486
		AVG.	611	925	1309	1480

6

AVERAGE YIELDS PER IRRIGATION REGIMEN – AGRI-SEARCH DATA - 2018

YEAR	SITE	# VAR.	POUNDS LINT PER ACRE			
			RF	30%	60%	90%
2018	EDM - 1	8	720	967	1072	947
2018	EDM - 2	12	837	953	1027	1028
		AVG.	790	960	1045	996

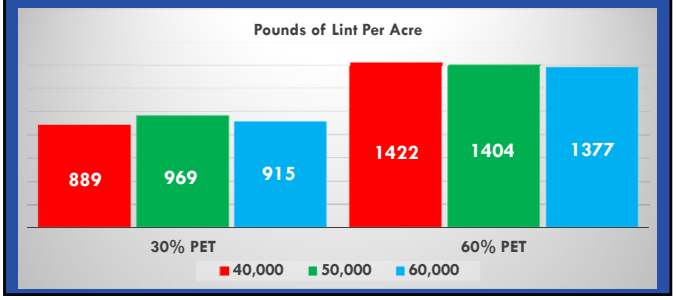
7

AVERAGE YIELDS PER IRRIGATION REGIMEN – AGRI-SEARCH DATA

YEAR	SITE	# VAR.	POUNDS LINT PER ACRE			
			RF	30%	60%	90%
2012-14	EDM/OLT	27	611	925	1309	1480
2018	EDM (1&2)	20	790	960	1045	996

8

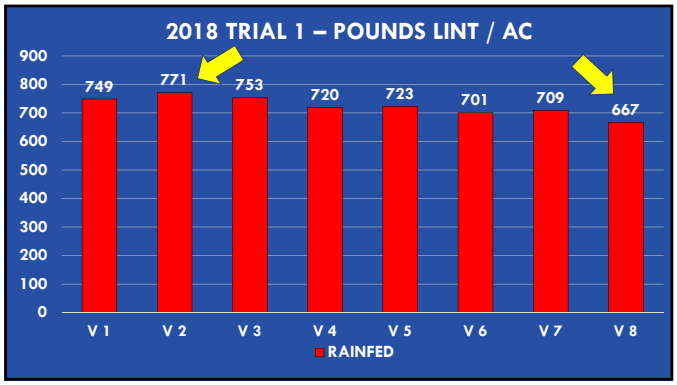
2018 PLANT POPULATION, YIELD, VERSUS PET IRRIGATION - FIBERMAX 1911



9

DOES VARIETY SELECTION BASED ON YOUR IRRIGATION CAPACITY REALLY MATTER?

10



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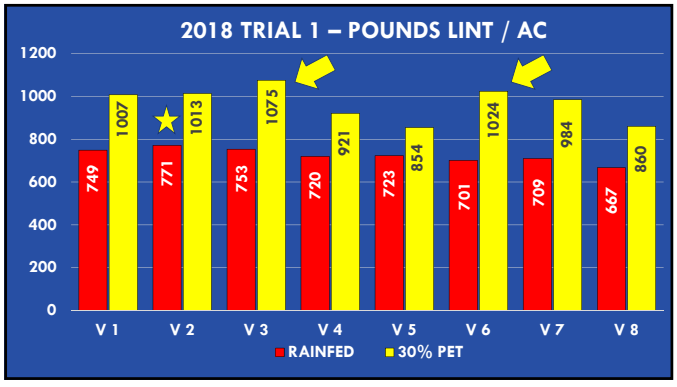

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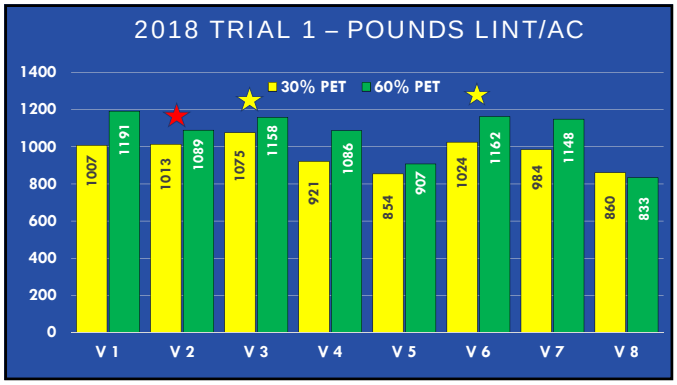

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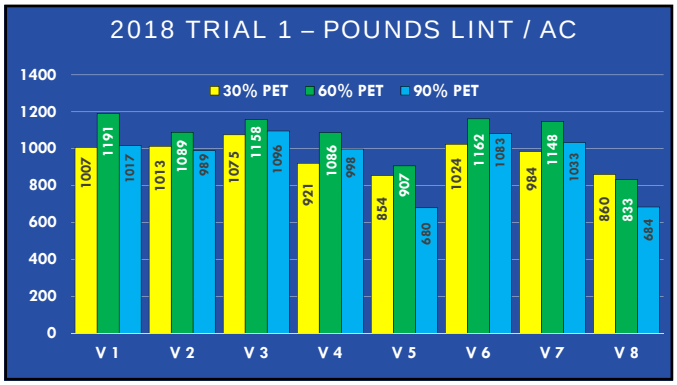


14

AVERAGE YIELDS PER IRRIGATION REGIMEN – AGRI-SEARCH DATA

YEAR	SITE	# VAR.	POUNDS LINT PER ACRE			
			RF	30%	60%	90%
2018	EDM-1	8	720	967	1072	947
2018	EDM-1	SEL	753	1075	1191	1017
2018	EDM-1	DIFF	+33	+108	+119	+70

15

AVERAGE YIELDS PER IRRIGATION REGIMEN – AGRI-SEARCH DATA

YEAR	SITE	# VAR.	POUNDS LINT PER ACRE			
			RF	30%	60%	90%
2018	EDM-1	12	839	953	1027	1028
2018	EDM-1	SEL	925	1150	1244	1298
2018	EDM-2	DIFF	+86	+197	+217	+270

16

WHAT IS POTENTIAL EVAPOTRANSPIRATION (PET)

PET Represents the combined loss of water through:

- The plant's process of transpiration via it's vascular system
- Evaporation of water from the earth's surface.

17

PET VALUES INDICATE THE AMOUNT OF WATER THAT HAS BEEN LOST, AND THUS NEEDS TO BE REPLACED THROUGH RAINFALL OR IRRIGATION

18

USING PET DATA TO MAKE IRRIGATION MANAGEMENT DECISIONS IS A RELIABLE WAY TO INSURE CONSISTENT YIELD GOALS WITHOUT WASTING WATER.

19

WWW.TAWCSOLUTIONS.ORG

WHERE CAN YOU GET PET DATA?

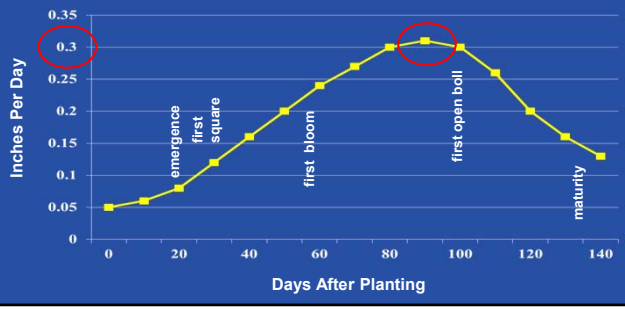
20

PLANNING AHEAD

IRRIGATION STRATEGIES SHOULD BE DEVELOPED BEFORE YOU PLANT AND BE BASED ON YOUR CAPACITY TO IRRIGATE THE CROP

21

COTTON WATER DEMAND AT 100% OF PET



22

IRRIGATION CAPACITY AT PEAK WATER DEMAND

% PET	@100% PET Inches/Day	@100% PET Inches/Wk	Inches/ Week @ % of PET	GPM/AC Required @ % of PET
90%	0.32"	2.24"	2.02"	5.46
60%	0.32"	2.24"	1.34"	3.62
30%	0.32"	2.24"	0.67"	1.81

23

ACRES IRRIGATED BASED ON PEAK DEMAND

PUMPING CAPACITY	% PET	GPM/AC	ACRES IRRIGATED
200	90	5.46	36.6
200	60	3.62	55.2
200	30	1.81	110.5

24

CALCULATING GALLONS PER MINUTE PER ACRE

27,154 GALLONS/ACRE/INCH

0.32" PER DAY REQUIRED IN PEAK DEMAND

****

0.32" X 60% PET = 0.192"

27,154 GPA/INCH X 0.192" = 5,213.568 G/D/AC

5,213.568 / 1440 MIN/DAY = 3.62 GPM/AC

25

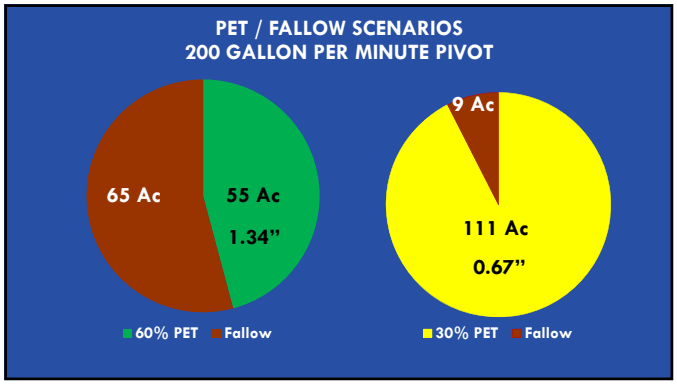
AS LONG AS WATER IS APPLIED USING A SYSTEMATIC APPROACH, THE CORRELATION BETWEEN WATER AND YIELD IS A LINEAR RELATIONSHIP.

26

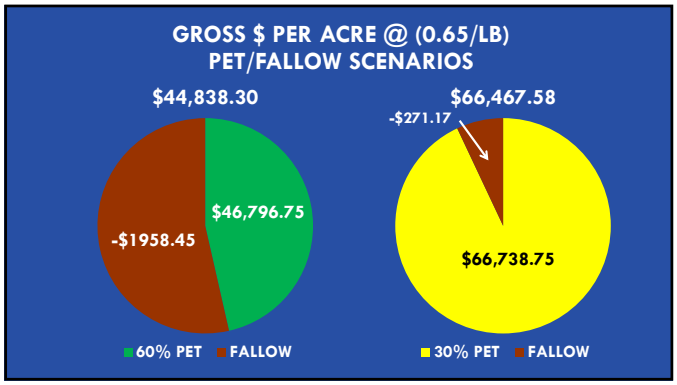
RULES FOR SUCCESS

- YOUR IRRIGATION SYSTEM MUST BE EFFICIENT.
- KEEP WATER IN ROOT ZONE PRIOR TO FIRST FLOWER.
- ADD EXTRA WATER JUST PRIOR TO BLOOM TO BUILD SOIL RESERVE.
- IRRIGATE A CONSISTENT PERCENTAGE OF PET AFTER FIRST FLOWER.

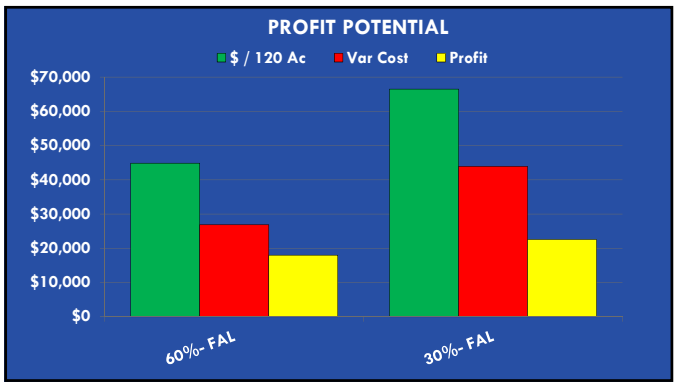
27


PET / FALLOW SCENARIOS
200 GALLON PER MINUTE PIVOT
65 Ac
55 Ac
1.34"
9 Ac
111 Ac
0.67"
60% PET
Fallow
30% PET
Fallow

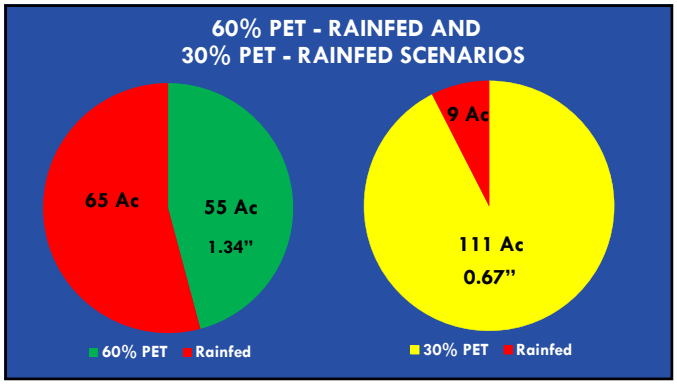
28


GROSS $ PER ACRE @ (0.65/LB)
PET/FALLOW SCENARIOS
$44,838.30
$46,796.75
-$1958.45
$66,467.58
-$271.17
$66,738.75
60% PET
FALLOW
30% PET
FALLOW

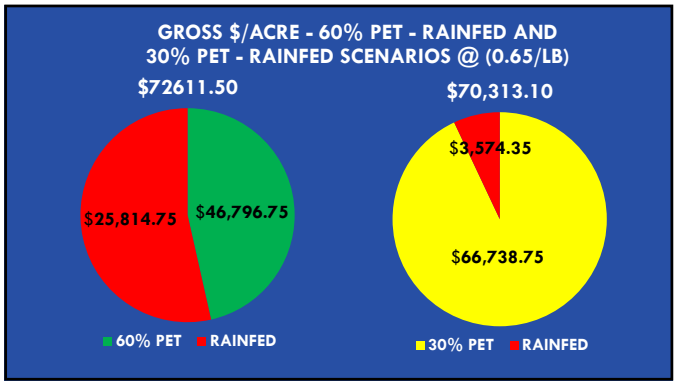
29


PROFIT POTENTIAL
$ / 120 Ac
Var Cost
Profit
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
60%- FAL
30%- FAL

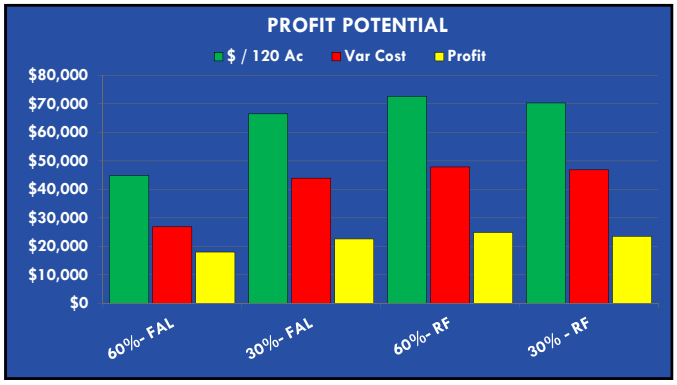
30


60% PET - RAINFED AND
30% PET - RAINFED SCENARIOS
65 Ac
55 Ac
1.34"
9 Ac
111 Ac
0.67"
60% PET
Rainfed
30% PET
Rainfed

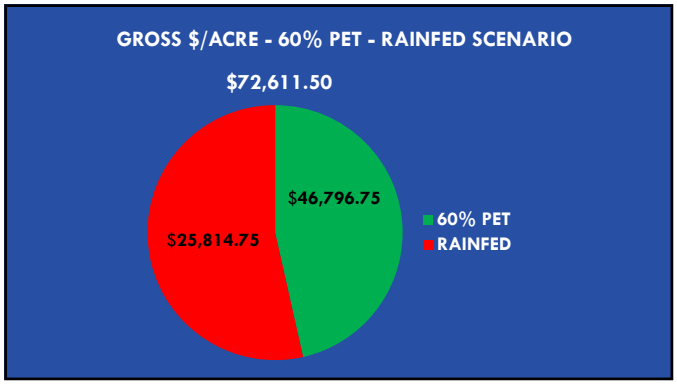
31


GROSS $/ACRE - 60% PET - RAINFED AND
30% PET - RAINFED SCENARIOS @ (0.65/LB)
$72611.50
$25,814.75
$46,796.75
$70,313.10
$3,574.35
$66,738.75
60% PET
RAINFED
30% PET
RAINFED

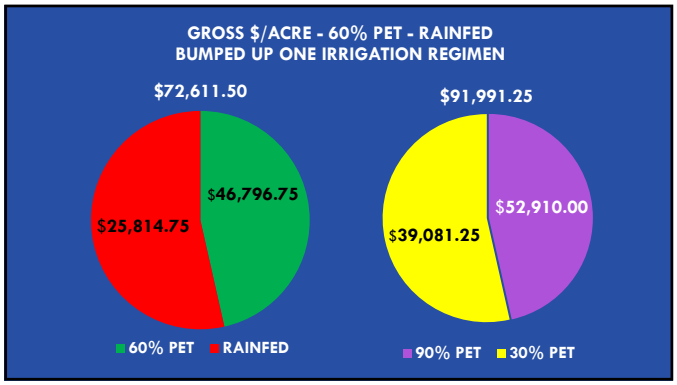
32


PROFIT POTENTIAL
$ / 120 Ac
Var Cost
Profit
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
60%- FAL
30%- FAL
60%- RF
30% - RF

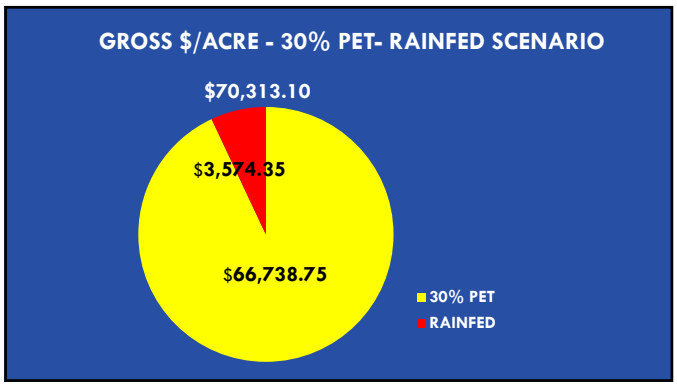
33


GROSS $/ACRE - 60% PET - RAINFED SCENARIO
$72,611.50
$46,796.75
$25,814.75
60% PET
RAINFED

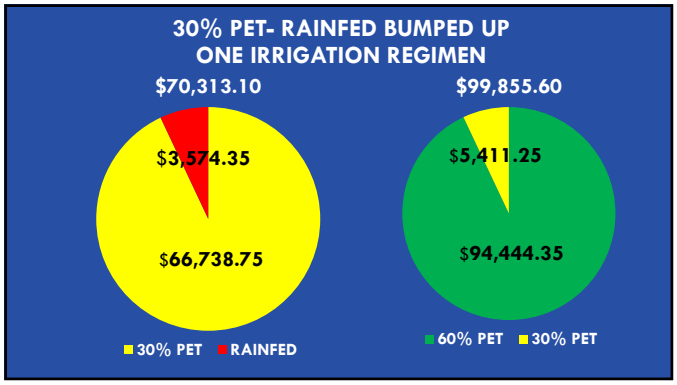
34


GROSS $/ACRE - 60% PET - RAINFED
BUMPED UP ONE IRRIGATION REGIMEN
$72,611.50
$46,796.75
$25,814.75
60% PET
RAINFED
$91,991.25
$52,910.00
$39,081.25
90% PET
30% PET

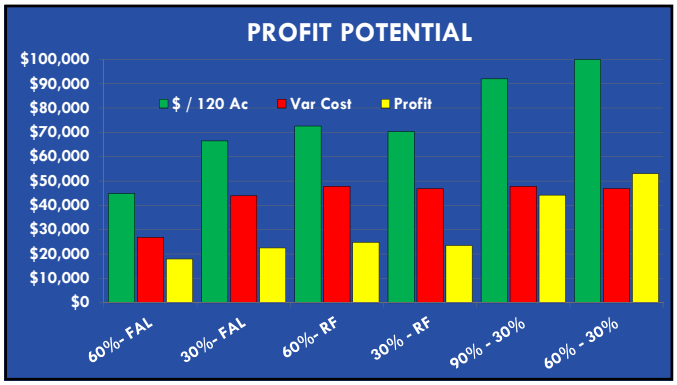
35


GROSS $/ACRE - 30% PET- RAINFED SCENARIO
$70,313.10
$3,574.35
$66,738.75
30% PET
RAINFED

36



37



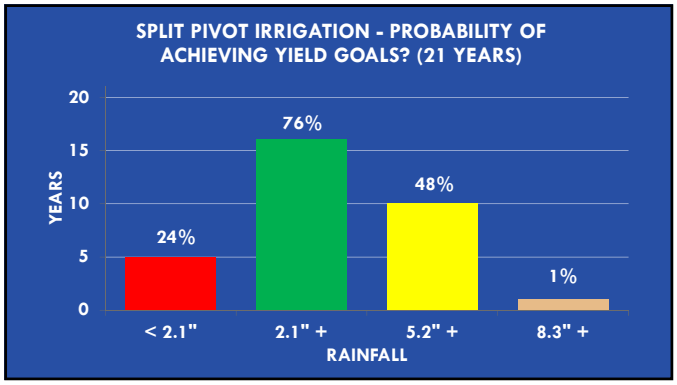
38

HOW MUCH WATER DOES IT TAKE TO JUMP UP ONE PET REGIMEN?

% PET	2012 IRR.*	2013 IRR.*	2014 IRR.*	AVG.
RAINFED	1.4"	2.8"	2.0"	2.1"
30% PET	2.7"	3.3"	3.3"	3.1"
60% PET	5.5"	6.6"	6.5"	6.2"
90% PET	8.2"	9.9"	9.8"	9.3"
RAIN	1.4"	2.8"	2.0"	2.1"

*POST FLOWER RAIN AND IRRIGATION

39



40

WHY SHOULD YOU LEARN HOW TO USE PET?

THERE IS NO WAY TO KNOW WHERE YOU ARE ON THE YIELD PROGRESSION CURVE (RAINFED TO 30% AND 30% TO 60%) UNLESS YOU TRACK WATER DEMAND!

41

THANK YOU FOR YOUR ATTENTION!

42

CAUGHT IN THE CROSSFIRE:
The US Sorghum Industry's Battle with the Chinese Ministry of Foreign Commerce

John Duff
Strategic Business Director, National Sorghum Producers

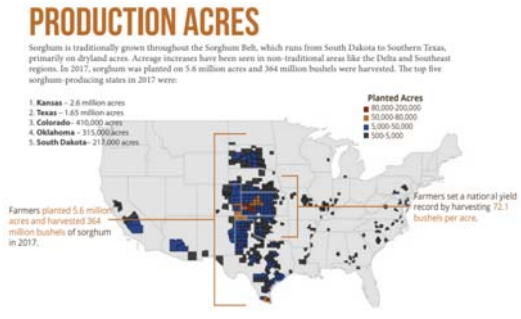
1

I ♥ promoting #agriculture!

- Twitter handle: @SorghumDuff
- Facebook username: /john.nolan.duff
- Instagram handle: @duffsorghum

2

Sorghum Industry Today



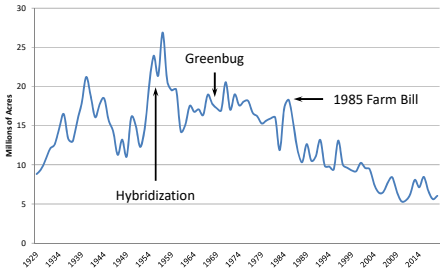
3

US Sorghum History

- Sorghum dates to at least 8000 BCE
- Approximately 100 million acres worldwide today
- Sweet sorghum (syrup from stalk) was predominate table sweetener in US prior to cane industry
- Primarily concentrated in arid areas of High Plains due to drought tolerance
- Sorghum water use is 50-67% of corn water use
- Over 90% of sorghum acres are dryland
- Conservation tillage practices are employed on 74% of sorghum acres
- Currently plant 5.8 million acres

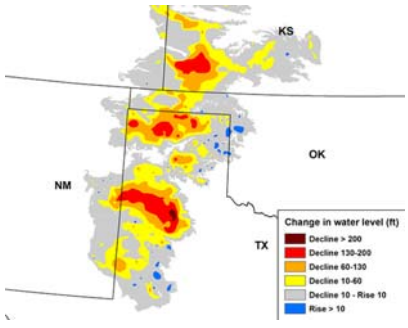
4

Key Events in Sorghum History



5

Water-Sipping Crops Are not Optional



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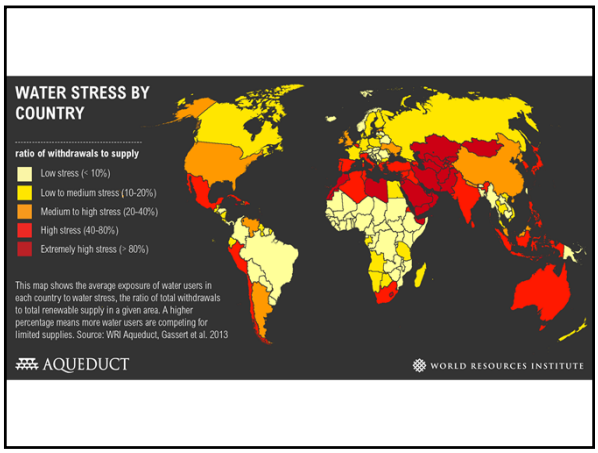
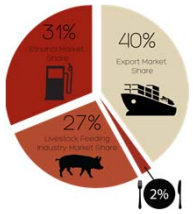


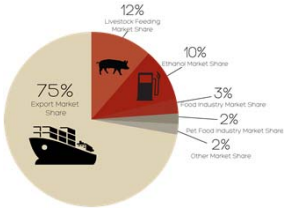
7

Evolution of Sorghum Demand



Pre-China Sorghum Usage

Current Sorghum Usage



8

US Sorghum Export History

- Exports have been key for US sorghum farmers for last six decades
- NSP was founding member of US Grains Council
- Historically, primary trading partner was Mexico

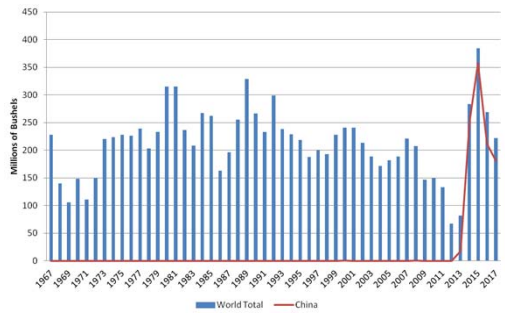
9

US Sorghum Exports to China

- China made first significant purchases of US sorghum in April 2013
- Key markets include ducks, hogs and dairy cattle
- China soon became largest consumer, eclipsing ethanol producers in first full year in market

10

US Sorghum Exports



11

Chinese Investigation

- Early February 4, Chinese Ministry of Commerce (MOFCOM) launched two investigations into imports of US sorghum
  - Anti-dumping (AD) case alleged US sorghum was sold below normal value, or price calculated based on costs of production and shipping
  - Countervailing duty (CVD) case alleged US sorghum farmers are unfairly subsidized
- First case in history self-initiated by MOFCOM rather than domestic petitioners
- Legally, NSP had 20 days to register as cooperative

12

Initial Registration

- MOFCOM deeming NSP as uncooperative was not an option
- No legal recourse for future challenge if deemed uncooperative by MOFCOM
  - Tariffs would take effect immediately
  - Even if trade war ended next day, tariffs would remain in effect as political resolution would be impossible without legal recourse
  - A WTO challenge could change this, but WTO challenges often take decades to fully resolve

13

Initial Registration

- NSP registered 29 parties, including seven farmers, three Co-ops, five state sorghum associations, US Grains Council, NSP itself and 12 grain traders
- Registration documents were required to be original and printed in simplified Chinese

14

Questionnaire Issuance

- MOFCOM typically issues questionnaires to sample of registrants
- MOFCOM legally must wait at least 48 hours
- MOFCOM typically waits at least few days
- Responding to questionnaires and complete adjudication usually takes 12-18 months
- We were told final resolution would likely come in July 2019

15

Questionnaire Issuance

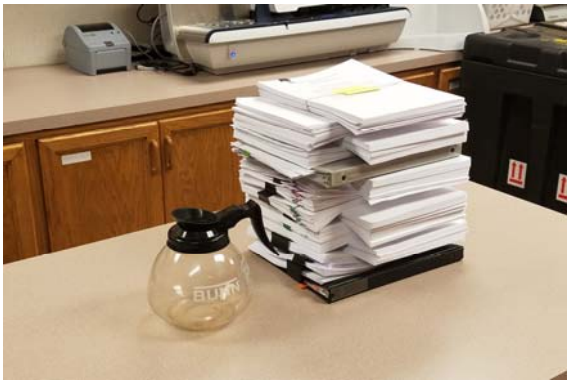
- Questionnaires were issued in just over 48 hours, on February 26, setting Chinese trade adjudication record
- MOFCOM refused to pick sample respondents and issued questionnaires to all parties (including 20,000 sorghum farmers) with virtually no guidance for completing questionnaires
- NSP made multiple appeals for guidance, but MOFCOM gave none for first time ever
- Combined, questionnaires included almost 200 pages
- Deadline for questionnaire completion was April 4 or 37 days from issuance
- Perfect was not an option

16

Completing Questionnaires

- AD questionnaire was to be completed by grain traders using internal information and farmer information
- CVD questionnaires were to be completed primarily by sorghum farmers and US government with short version to be completed by grain traders
- Farmer information required was significant and extremely personal, for example:
  - Monthly expenditures for 2016-2017
  - Tax returns for 2007-2017
  - Farm program payments for 2007-2017
- NSP made a formal appeal for a short extension, but MOFCOM refused for first time ever
- No way process would have been completed without farmer organizations and staff with economics, accounting and policy backgrounds working with attorneys

17



18

Submitting Questionnaires

- Early April 4, NSP met deadline with 2,000-page complete submission printed in simplified Chinese
  - Five grain traders submitted AD questionnaires
  - NSP submitted nine farmer CVD questionnaires
  - US government submitted CVD questionnaire
  - NSP submitted common defense
- MOFCOM announced 25% tariffs on sorghum and most other US agricultural commodities same day

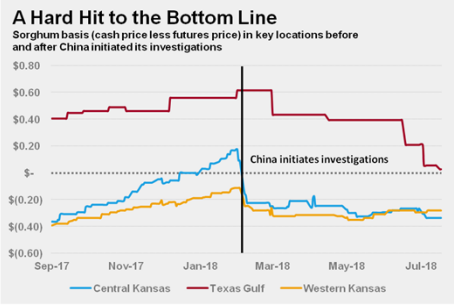
19

Trade is Halted

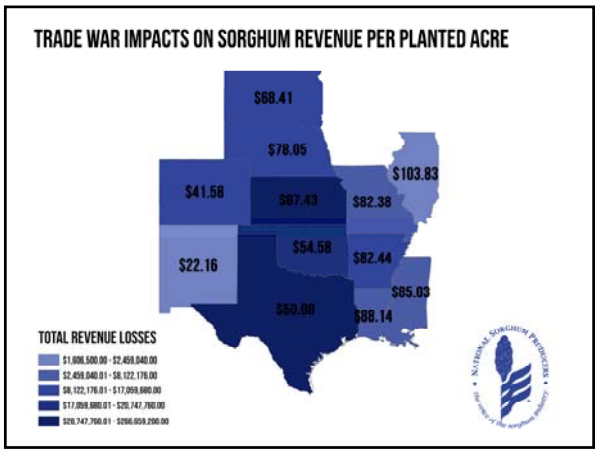
- Due to political nature of situation, NSP expected swift action from MOFCOM
- MOFCOM announced 178.6% preliminary AD tariffs on April 17 after no meaningful review of submission and stated reason of insufficient information from farmers
- Approximately 60 million bushels en route to China had to be redirected
- Tariff liabilities were over $500 million

20

Price Collapses



21



22

Political Resolution

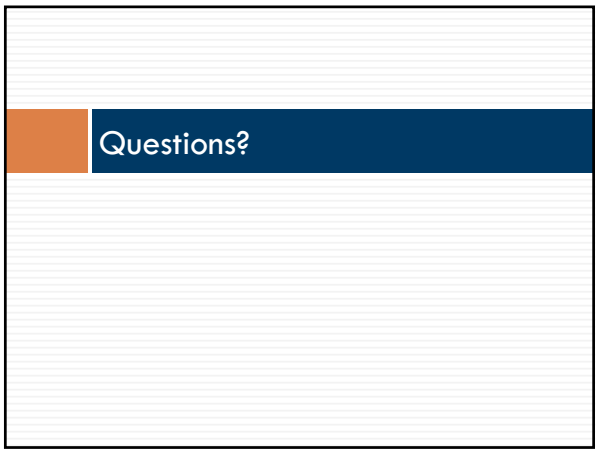
- On May 17, as part of ZTE Corporation settlement, sorghum investigation was terminated 102 days after initiation, a Chinese trade adjudication record

23

Trade is Still Effectively Halted

- Grain previously redirected was once again rerouted, this time back to China, after resolution
- Tariffs announced April 4 (25%) took effect July 6 on sorghum and 105 other commodities
- Trade is slow to nonexistent due to uncertainty

24



25

General Notes

The TAWC project was made possible through a grant from the
Texas Water Development Board


FROM FARM TO BRANDS:
US COTTON INDUSTRY'S APPROACH TO SUSTAINABILITY
Dr. Jesse Daystar
Chief Sustainability Officer
Presented to TAWC
January 17th, 2019

1

2

3

4

35 Years of Reduced Environmental Impact

Land Use	Soil Loss	Water	Energy	GHG
31%	44%	82%	54%	30%

Field to Market: Keystone Alliance for Sustainable Agriculture 2016
https://fieldtomarket.org/national-indicators-report-2016/

5

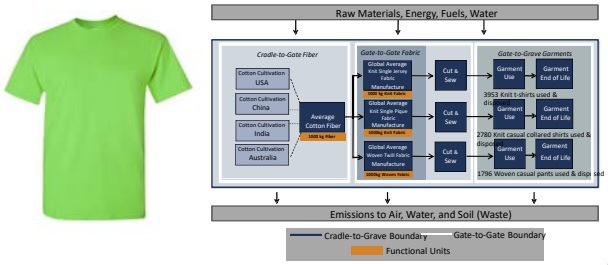
Cotton Apparel Life Cycle Assessment

6

Life Cycle Assessment Overview

7

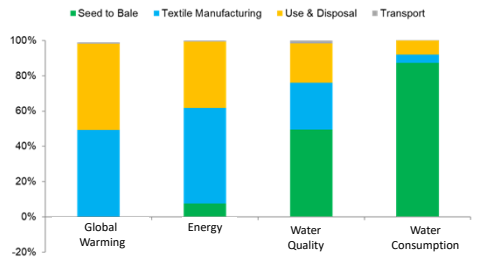
LCA Goal, Scope Functional Units



8

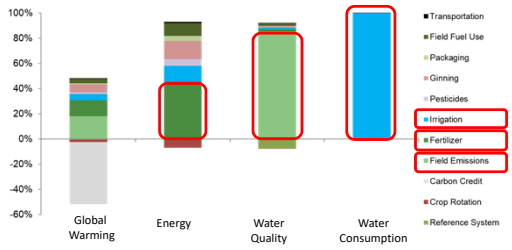
9

Overall Results for A Knit Collared Shirt



10

Agricultural Phase Details



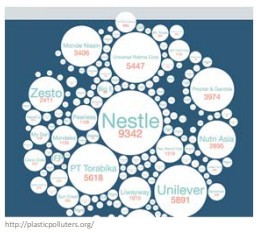
11

Microplastics Under Pressure

Plastic makes the headlines

Invisible plastic: microfibers are just the beginning of what we don't see
Mary Catherine O'Connor

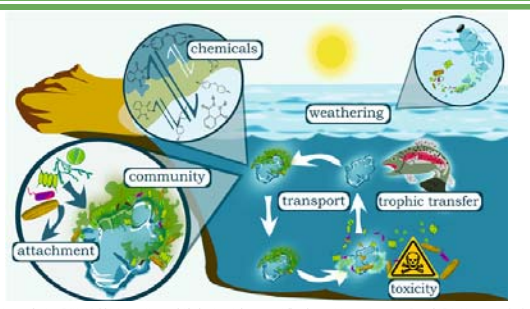
Brands are put under pressure



http://plasticpollutors.org/

12

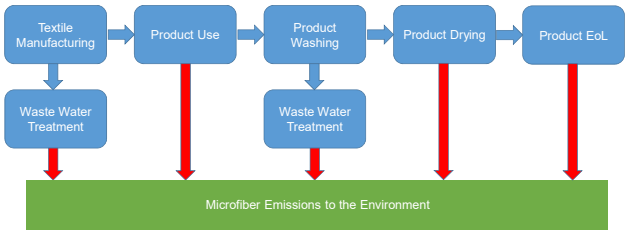
Microplastics in the Environment



Rummel, C. D., Jahnke, A., Gorokhova, E., Kühnel, D. & Schmitt-Jansen, M. Impacts of biofilm formation on the fate and potential effects of microplastic in the aquatic environment. Environ. Sci. Technol. Lett. 4, 258–267 (2017).

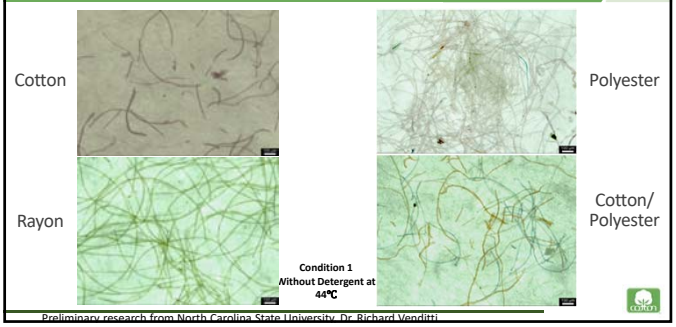
13

Microfiber Source Flow Chart



14

Fibers Removed from Accelerated Wash

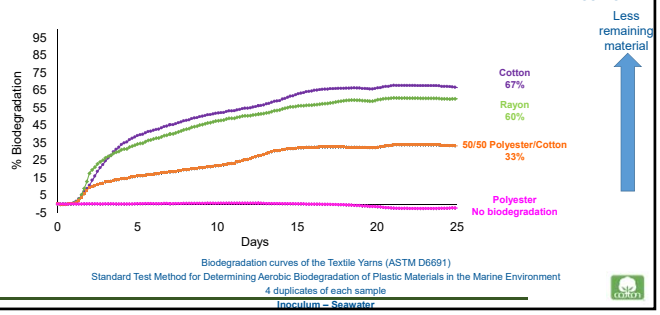


Preliminary research from North Carolina State University, Dr. Richard Venditti

15

Aerobic Biodegradation of Textile Spun Yarns in Aquatic (Sea Water) Environments

PRELIMINARY RESULTS



Biodegradation curves of the Textile Yarns (ASTM D6691)
Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials in the Marine Environment
4 duplicates of each sample
Inoculum – Seawater

16

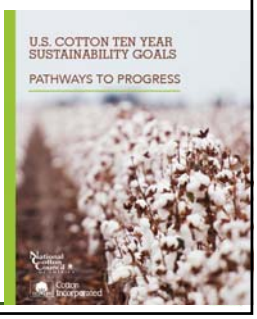
U.S. Cotton Sustainability Goals

17

How We Define Sustainable Agriculture

Meeting the needs of the present while improving the ability of future generations to meet their own needs by:

- Increasing productivity to meet future food and fiber demands
- Improving the environment
- Improving human health
- Improving the social and economic well-being of agricultural communities



18

Key Performance Indicators (KPI)

- **Yield**: pounds of fiber per acre.
- **Soil erosion rate:** tons of soil loss per acre per year (estimated from RUSLE2).
- **Irrigation Water Use Efficiency:** pounds of fiber per acre above dry-land yield divided by inches of irrigation applied.
- **Energy Use:** total energy in BTUs from seed to bale per pound of cotton fiber produced. Includes energy to create inputs such as the fertilizer as well as direct energy used on the farm.
- **Greenhouse Gas Emissions:** pounds of CO_2 equivalent emitted per pound of fiber.
- **Biodiversity:** measure of different crop types and natural ecosystem area on a farm.
- **Soil Carbon:** carbon content of the soil.
- **Water Quality:** dimensionless index that reflects IPM and fertilizer practices on the farm.
- **Farm Profitability:** financial returns above variable costs.
- **Generation of Economic Value:** reflects the direct contribution of agricultural production at the farm gate to state and national gross domestic product.
- **Worker Safety:** based on worker illness and injury, and fatalities.
- **Labor Productivity:** Hours of labor to produce a pound of cotton (field to gin).
- **Market share:** Percentage of cotton's share of the global fiber market
- **Fiber Competiveness:** Fiber quality attributes and process-ability

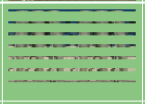
19

U.S. Cotton's Sustainability Goals for 2025

13% Increase in **Land Use Efficiency**

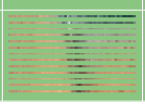
15% Reduction in **Energy Use**

50% Reduction in **Soil Loss**



39% Reduction in **GHG Emissions**

18% Increase in **Irrigation Water Use Efficiency**

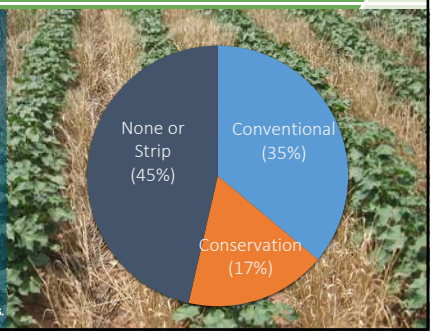


30% Increase in **Soil Carbon**

20

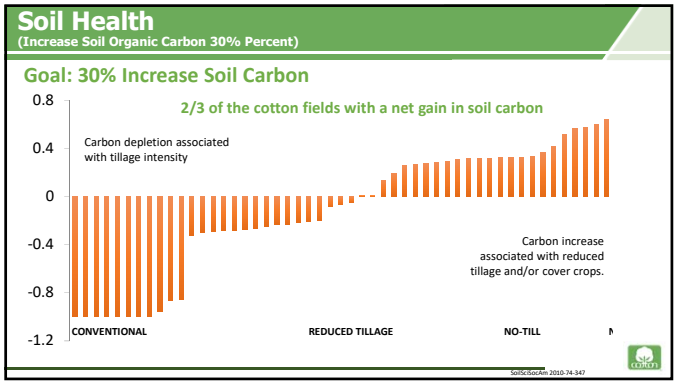
Soil Health: Conservation tillage in the U.S.

Two-thirds of U.S. growers use conservation tillage

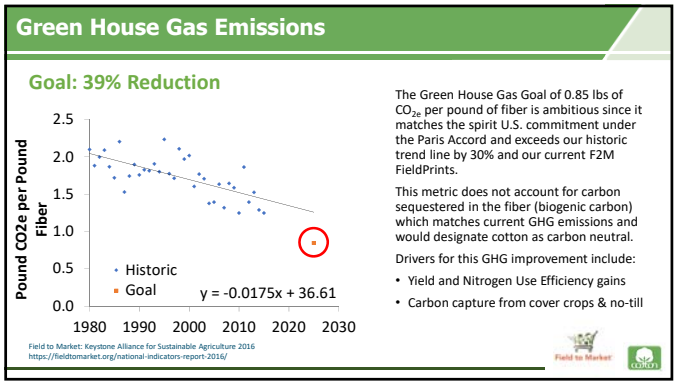


2015 Natural Resource Survey of U.S. Cotton Producers.

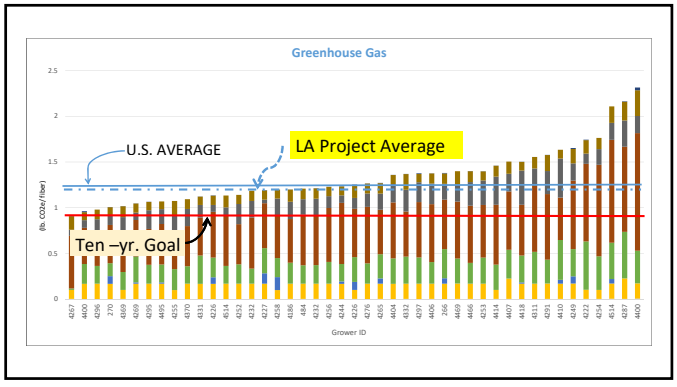
21


Soil Health
(Increase Soil Organic Carbon 30% Percent)
Goal: 30% Increase Soil Carbon
2/3 of the cotton fields with a net gain in soil carbon
0.8
0.4
0
-0.4
-0.8
-1.2
Carbon depletion associated with tillage intensity
Carbon increase associated with reduced tillage and/or cover crops.
CONVENTIONAL
REDUCED TILLAGE
NO-TILL
SoilSciSocAm 2010-74-347

22


Green House Gas Emissions
Goal: 39% Reduction
Pound CO2e per Pound Fiber
2.5
2.0
1.5
1.0
0.5
0.0
1980
1990
2000
2010
2020
2030
Historic
Goal
y = -0.0175x + 36.61
The Green House Gas Goal of 0.85 lbs of CO_{2e} per pound of fiber is ambitious since it matches the spirit U.S. commitment under the Paris Accord and exceeds our historic trend line by 30% and our current F2M FieldPrints.
This metric does not account for carbon sequestered in the fiber (biogenic carbon) which matches current GHG emissions and would designate cotton as carbon neutral.
Drivers for this GHG improvement include:
• Yield and Nitrogen Use Efficiency gains
• Carbon capture from cover crops & no-till
Field to Market: Keystone Alliance for Sustainable Agriculture 2016
https://fieldtomarket.org/national-indicators-report-2016/

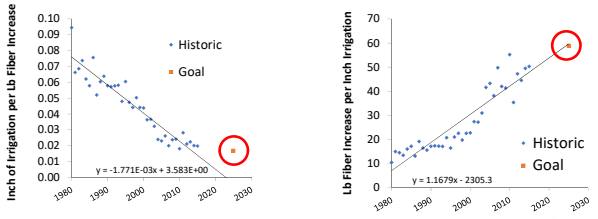
23


Greenhouse Gas
U.S. AVERAGE
LA Project Average
Ten –yr. Goal
Grower ID

24

Irrigation Water Use Efficiency (WUE)

Goal: 18% Increase



Field to Market: Keystone Alliance for Sustainable Agriculture 2016
https://fieldtomarket.org/national-indicators-report-2016/

25

What Will Drive WUE Gain?

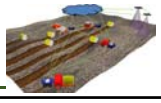
The Goal represents an 18% increase in Water Use Efficiency. Based on current F2M grower metrics (next slide) and historic trend this Goal appears reasonable.

- Yield increase (as previously discussed) will improve WUE
- Continued investment in better water delivery systems (e.g. drip, pipe planner, laser leveling, low pressure nozzles)
- Improved irrigation scheduling tools (e.g. computer programs, crops/soils sensors)

26

Common Themes for Improvement

- Yield Increase
- Cover Crops
  - Soil improvement (erosion, quality & carbon)
  - Weed suppression
  - Rainfall capture (Water Quantity & Quality)
- Precision Management
  - Optimizing fertilizer and water use
  - Robots to reduce GHG, energy, labor, and as harvested when boll opens, less field loss and better quality.



27

Fieldprint Calculator Adoption

- API data collection needed to meet goals

CLIMATE FIELDVIEW

AGRIBLE

Time	Participation in FTM (acres)	Comment
Now	100,000	To date at least 100 farmers have Field Printed at least one cotton field. The average cotton acres per farm in the US is ~1,000 acres
5 years	1,000,000	Add an additional 900 farmers to the list of using the Field Print Calculator
10 years	2,500,000	Add an additional 1,500 farms to the list of farms using the Field Print Calculator
30 years	100% of US Cotton Acres	All U.S. farms use the Field Print Calculator on at least one field.

28

Walmart Gigaton Project

Walmart Launches Project Gigaton to Reduce Emissions in Company's Supply Chain

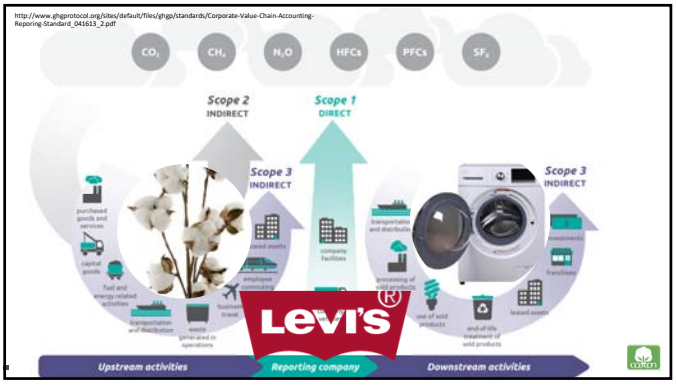
Through release of a sustainability toolkit, Walmart asks suppliers to reduce greenhouse gas emissions by one gigaton – the equivalent to taking more than 211 million passenger vehicles off of U.S. roads for an entire year

BENTONVILLE, Ark., April 19, 2017 – Today, during Walmart's annual Milestone Summit, the company launched a sustainability platform inviting suppliers to join Walmart in committing to reduce greenhouse gas emissions resulting from their operations and supply chains.

Digital Press Kit

29

http://www.ghgprotocol.org/sites/default/files/ghgp/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf



30

Brand Engagement in Sustainability

- Walmart
  - Soil health
  - Water sensor
  - Traceability
  - Fieldprint Calculator use
- Wrangler
  - Soil health project in Texas
- Louisiana Fieldprint Calculator Project

31

Walmart Water Sensor Project

Project Summary

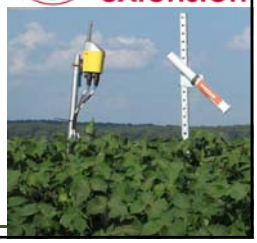
Description: **Promoting the use of water sensors in cotton fields through research & education.**

Solving for: Inconsistent irrigation scheduling in humid regions can result in over or under watering crops. The use of water sensors has the potential to increase yields and water use efficiency.

Estimated Duration: Long-Term (24 months)

Progress

- Partnered with UGA to support pilot water sensors study
  - ***22 farmers participating in 2017***
  - Opportunity to expand participation in 2018 with additional support
  - ***Secured two brand sponsors***



32

U.S. Cotton's Sustainability Trust Protocol

1. Field to Market National Metrics with Future Goals
+
2. Strong Regulatory Environment, Required & Voluntary Conservation Efforts
+
3. Fieldprint Platform: Evaluates Resource Efficiency (1m acres in 5 yrs)

AND

4. Add Questionnaire of Practices & Establish Standards

AND

5. Add Independent Party Verification

AND

6. Achieve Statistically Valid Sample of Acres to Reinforce National Message

AND

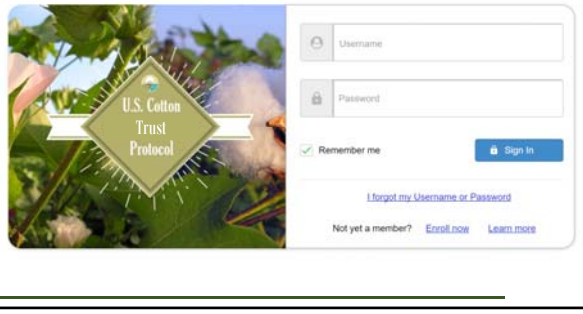
7. Aggregate Farm-level Program with Mass Balance Approach

AND/OR

8. Aggregate Farm-level Program with Identity Preserved

33

Individual farmer enrollment



34

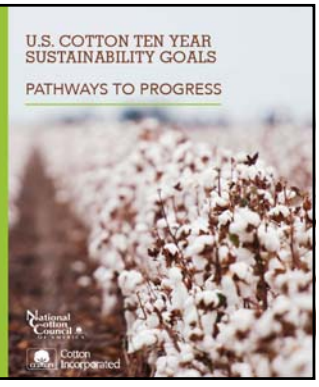
Protocol timeline

- The Protocol is a work in progress
- Pilot to be launched in 2019 with roll out in 2020
- IT development by The SEAM in Memphis
- Seeking critical feedback from farmers, merchandiser, mill, brands, retailers and NGOs

35

Value Driven Sustainability Strategy

Thank You!



36

Groundwater Law & Policy Update

Victoria Whitehead
General Counsel
High Plains Water District
806.781.3977
victoria.whitehead@hpwd.org

1

Chapter 36, Texas Water Code

In order to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater . . . Groundwater conservation districts created as provided by this chapter are the state's preferred method of groundwater management in order to protect property rights, balance the conservation and development of groundwater to meet the needs of this state, and use the best available science in the conservation and development of groundwater through rules developed, adopted, and promulgated by a district in accordance with the provisions of this chapter.

HPWD
High Plains Water District
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Groundwater Law & Policy Timeline

- 1904: Rule of Capture
- 1917: Article 16 §59 Texas Constitution
- 1949: Groundwater Conservation District Act
- 1997: Senate Bill 1 (Regional Water Planning)
- 2008: Del Rio v. Clayton Sam Colt Hamilton Trust
- 2012: EAA v. Day

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Chapter 36 Playbook

- Drafted in a manner to provide for the breadth of groundwater-management across Texas:
  - Aquifer Types
  - Socio-Economic Situations
  - Majority of the language is pre-Day*
- "Bottom-Up" Approach
- "Toolbox" for Permitting and Regulation

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Major Groundwater Topics: 85th Lege

Groundwater Permitting
- HB 2377 by Larson: Vetoed
- SB 1009 by Perry: Effective 09/01/2017
- SB 1392 by Perry: Placed on intent calendar 05/15/2017

Groundwater Ownership
- HB 4122 by Kacal: S reported favorably, 05/16/2017
- SB 862 by Perry: H left pend. in Cmt., 05/17/2017

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Major Groundwater Topics: 85th Lege

Groundwater Ownership Cont.
- HB 3028 by Burns, H left pend. in Cmt. 04/10/2017

Groundwater Planning
- SB 1511 by Perry: Effective 09/01/2017
- HB 2215 by Price: Effective 06/09/2017

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85th Texas Legislature

Session	Introduced (HB & SB)	Sent to the Governor	Pass Rate	Signed into Law
85th Lege	6615	1208	18.2%	645
84th Lege	5299	1119	21.1%	824
83rd Lege	5868	1433	24.4%	1395
82nd Lege	5796	1374	23.7%	1327

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85th Interim Charges: House

- Evaluate the status of groundwater policy in Texas, including the following issues:
  - Developments in case law regarding groundwater ownership and regulation
  - Potential improvements to the existing groundwater permitting process.
  - Appropriate consideration of the service area of a water supplier when groundwater resources are allocated based on surface ownership.
  - Brackish Groundwater Production Zones
  - Data and Science Needs
  - Groundwater and Surface Water Interactions

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85th Interim Charges: Senate

- Streamlining Water Permitting
  - Study and recommend changes that promote streamlining of water right permit issuance and the amendment process by the TCEQ for surface water, and that promote uniform and streamline permitting by groundwater conservation districts for groundwater. Evaluate more transparent process needs and proper valuation of water.
- Regulatory Framework of Groundwater Conservation Districts
  - Study and make recommendations on the regulatory framework for managing groundwater in Texas to ensure that private property rights are being sufficiently protected. Study the role of river authorities and groundwater conservation districts including the state's oversight role of their operations and fees imposed

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85th Interim Hearings

House

- 10/16/2018
  - Water Markets
  - Water Campaigns/Awareness Issues
- 09/27/2018
  - GW Ownership
  - Texas & New Mexico
- 09/13/2018:
  - GW/SW Interactions
  - Abandoned/Deteriorated Wells
- 06/05/2018:
  - Permitting/Similar Rules
  - Attorneys Fees
  - Brackish Groundwater *
  - GW Data and Science
- 05/23/2018: GW/SW Interaction
- 04/17/2018: ASR/Flooding

Senate

- 06/05/2018: RWPG
- 06/04/2018: Regulatory framework for protection of private property rights. *

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Groundwater Case Law Update

- Meyer v. Lost Pines Groundwater Conservation District
- Lone Star Groundwater Conservation District v. City of Conroe
- Uvalde County Underground Water Conservation District v. Edwards Aquifer Authority
- State of Texas v. Roddy Harrison, Yellow-Top Ranch, Inc., H.E. Cattle Co., and BHP Billiton Petroleum Properties
- League of United Latin American Citizens v. Edwards Aquifer Authority

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Groundwater Case Law Update

- Texas v. New Mexico and Colorado
- Florida v. Georgia
- Mississippi v. Tennessee
- County of Maui v. Hawaii Wildlife Fund, Sierra Club- Maui Group, Surf Rider Foundation, and West Maui Preservation Association
- National Association of Manufacturers v. Department of Defense

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86th Legislative Preview

- New Leadership
- Hurricane Harvey
- Appropriations Bill (Education v. Health Care)
- Property Tax "Reform" and School Finance
- Groundwater Topics: Wash – Rinse – Repeat
  - Groundwater Ownership/Permitting
  - Brackish Groundwater Production
  - Regional Water Planning Groups
  - Abandoned & Deteriorated Water Wells

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Groundwater Law & Policy Update

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General Notes

The TAWC project was made possible through a grant from the
Texas Water Development Board

WATER for TEXAS

Water for the Future

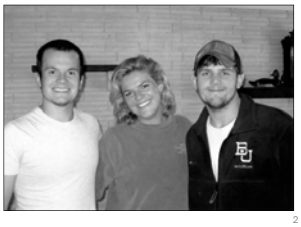
Kathleen Jackson, P.E.
Texas Alliance for Water Conservation Water College
Lubbock
January 17, 2019

Texas Water Development Board

1

OUR MISSION

To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas.



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AGRICULTURAL WATER CONSERVATION

TWDB provides funding for projects that research, educate, demonstrate, and implement proven **best management practices** to conserve water and increase irrigation water use efficiency.

3

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AGRICULTURAL WATER CONSERVATION

IRRIGATION: 9 million acre-feet on about 6 million irrigated acres

EFFICIENCY: Individual Ag producers can achieve up to 98 percent irrigation efficiency with their irrigation systems

EDUCATION: Technical assistance, public speaking, and outreach to Ag communities

FUNDING: TWDB has provided over $100 million in Ag Grants and Ag Loans since 1985

4

TEXAS ALLIANCE FOR WATER CONSERVATION

Texas Tech University, Texas A&M AgriLife, High Plains Water District, Irrigation Equipment Dealers, Crop Consultants & Agricultural Producers in the Southern High Plains

→ Mission: *To conserve water with practices and technologies that reduce depletion of groundwater while enhancing economic opportunities*

Texas Water Development Board

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NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT

3-4-5 Gallon Production Maximization

→ Participants apply variable rate irrigation to simulate 3, 4, and 5 gallons-per-minute (GPM) per-acre conditions in side-by-side, production-scale demonstrations.

→ $197,313 in grant assistance provided by TWDB

Texas Water Development Board

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REGIONAL WATER PLANNING GROUPS

Region O

Region A

- Local Political Subdivision serves as administrator
- Public, consensus-driven
- Local/regional decision making process

Region F

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REGIONAL WATER PLANNING GROUPS AGRICULTURAL VOTING MEMBERS (A-H)

Voting Region	First Name	Last Name	Entity	Interest County
A	Ben	Weinheimer	Texas Cattle Feeders Association	All counties
A	Joe	Baumgardner	Farmer	Collingsworth
A	Janet	Tregellas	Farmer	Lipscomb
B	Wilson	Scaling	Clay County Commissioners Court	Clay
B	Todd	Thomas	Waggoner Ranch	Wilbarger
C	Tom	Woodward	Broseco Ranches	Wise
D	Dennis	Hilliard	Farmer	Van Zandt
D	David	Nabors	Rancher	Lamar
D	Bruce	Bradley	Farmer	Marion
D	Bob	Staton	Retired	Smith
E	Rick	Tate	Presidio County Rancher	Presidio
E	Tom	Beard	Rancher	Brewster
F	Doug	Wilde	Reata Cotton Company	Tom Green
F	Kenneth	Dierschke	Texas Farm Bureau	Tom Green
F	Don	Daniel		Mason
G	Wayne	Wilson	Wilson Cattle Company	Brazos
G	Dale	Spurgin	Jones County	Jones
H	Robert	Bruner	Bruner Cattle	Walker
H	Pudge	Willcox		Chambers

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REGIONAL WATER PLANNING GROUPS AGRICULTURAL VOTING MEMBERS (CONT'D I-P)

Voting Region	First Name	Last Name	Entity	Interest County
I	Josh Wilson	David	Tyler County Rancher	Tyler
I	David	Alders	Carrizo Creek Corporation	Nacogdoches
J	Wes	Robinson	Rancher	Kinney
K	Paul	Sliva		Matagorda
L	Weldon	Riggs	South Texas Cattleman's Association	
L	Adam	Yablonski	Medina County Farm Bureau	Medina
L	Tom	Jungman	Retired	
M	Neal	Wilkins	East Wildlife Foundation	Jim Hogg
M	Dale	Murden	Texas Citrus Mutual	Cameron
N	Chuck	Burns	Willacy Co.	Willacy
N	Charles	Ring	San Patricio Co.	San Patricio
O	Jimmy	Wedel	Wedel Farms	
O	Mark	Kirkpatrick	Farming and Ranching	
O	Delmon	Ellison, Jr.	Agricultural Producer	
O	Ben	Weinheimer	Texas Cattle Feeders Association	
O	Chris	Grotegut, DMV		
O	Harry	DeWit	Blue Sky Farms	
P	Steve	Cooper	Self Employed	Wharton
P	Gary	Skalicky	Edna Rice Producer	Jackson
P	Bart	McBeth	CAPP Crop Adjuster	Lavaca

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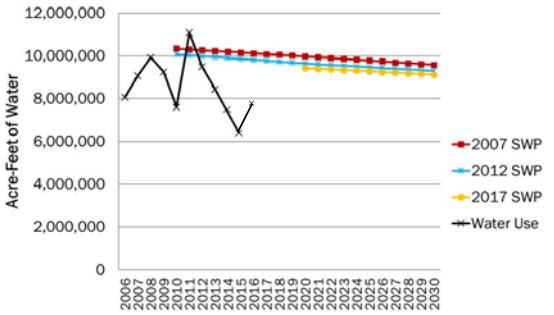
IRRIGATION WATER USE AND DEMAND PROJECTIONS



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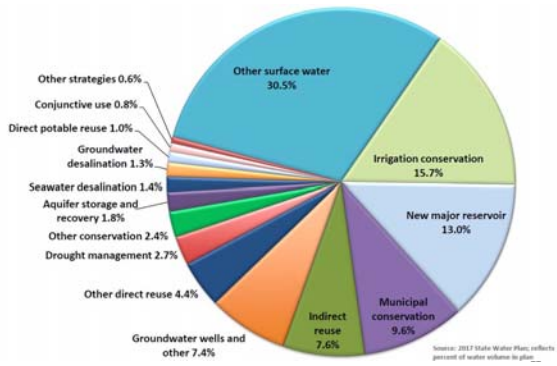
SHARE OF WATER MANAGEMENT STRATEGIES IN 2070



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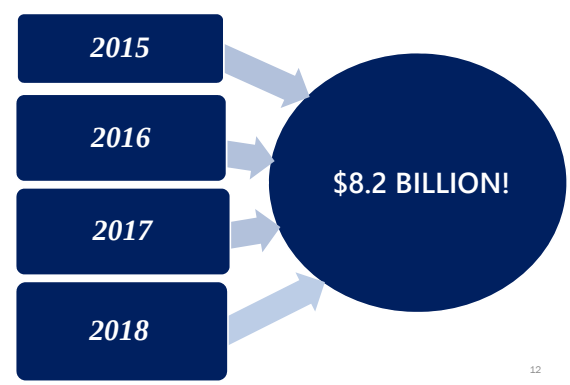
TOTAL SWIFT COMMITMENTS



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TWDB REGIONAL PROJECT TEAMS

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TWDB SWIFT AG FUNDED PROJECTS

Hidalgo County Irrigation District #1
SWIFT - $7,100,000
Ag Irrigation Conveyance System Improvements

United Irrigation District
SWIFT - $8,100,000
Off Channel Storage Facility

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LEGISLATIVE PRIORITIES

- **Flood Recommendations** - included in 2018 State Flood Assessment report
- Recreation of the Strategic Mapping Account
- Extension of House Bill (HB) 30 Brackish Resources Aquifers Characterization System (BRACS) deadline
- Clean Water State Revolving Fund Statutory Update
- Clean Up of Water Conservation Plan Requirements for Financial Assistance Applicants
- Removal of Obsolete and Duplicative Requirements

TWDB PRIORITIES FOR THE 86TH TEXAS LEGISLATIVE SESSION

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STATE FLOOD ASSESSMENT

TWDB Recommendations:

- Mapping
- Planning
- Mitigation

The legislature should pursue proactive statewide flood mitigation by first developing foundational flood risk management policies and goals that will support three key pillars of investment:

(1) Improved and updated flood mapping and modeling;
(2) Coordinated watershed-based planning; and
(3) Mitigation efforts, such as policy enhancements, increased technical assistance, and financial assistance for project implementation.

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ADVANCING SCIENCE AND DATA AN IMPORTANT FIRST STEP

Exceptional Items *Legislative Appropriations Request FY 2020-2021*	General Revenue
Flood Technical Package	$4,448,000
Groundwater Funding Package	$3,000,000
Strategic Mapping Program	$3,000,000
Data Center Services (State initiative)	$489,000
CAPPS HR Implementation (State initiative)	$588,000
TOTAL	**$11,525,000**

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TWDB EXCEPTIONAL ITEM LEGISLATIVE APPROPRIATIONS REQUEST

Flood Technical Package ($4,448,000)

- Acquire high-resolution land surface (LiDAR) data to better predict floodplains and flooding levels;
- Develop hydraulic river models for priority watersheds;
- Develop coastal circulation and rainfall-runoff models;
- Update reservoir flood pool measurements;
- Create a web-based flood dashboard/water data hub;
- Expand the TexMesonet earth observation network

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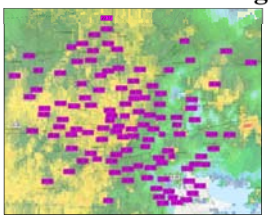
TEXMESONET - WEATHER DATA VIEWER FOR TEXAS

www.texmesonet.org



- ✓ A statewide earth observation network for weather, solar energy, soil moisture and temperature.
- ✓ Supports multiple organizations in flood monitoring and flood forecasting.
- ✓ Provides critical information related to drought monitoring.
- ✓ Can help promote improved water use efficiencies.

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MAINTAIN & EXPAND WWW.TEXMESONET.ORG




- Expand functionality of the current system, including more climate stations, adding soil moisture, and adding map analysis
- This information helps the National Weather Service make flood predictions and provides valuable data to first responders and citizens

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TWDB EXCEPTIONAL ITEM LEGISLATIVE APPROPRIATIONS REQUEST

Groundwater Funding Package ($3,000,000)

- Accelerate mapping and characterization of brackish aquifers
- Update Groundwater Availability Models (GAMs)

Texas has an estimated 2.7 billion acre-feet of brackish groundwater

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AGRICULTURE SUPPORTS A STRONG TEXAS!

Joe Reinart
Stratford
Sherman County

22

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HOW TO CONTACT ME

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Kathleen.Jackson@twdb.texas.gov

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Brian Bledsoe Notes

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Hurst Farm Supply*
Lindsay Sales and Service*
Miller Chemical*
Nachurs*
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Plains Cotton Growers*
South Plains Valley Irrigation*
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Toro*
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WaterMaster*

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Texas Sorghum Producers

Special Thanks to:

Ag Texas (Provided water)
HPWD (Provided Doughnuts and Coffee)
Plains Cotton Growers (Break Sponsor)
Texas Water Development Board (Project Sponsor)

***Please see Display Booth in Exhibit Hall.**

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