cottonworks™

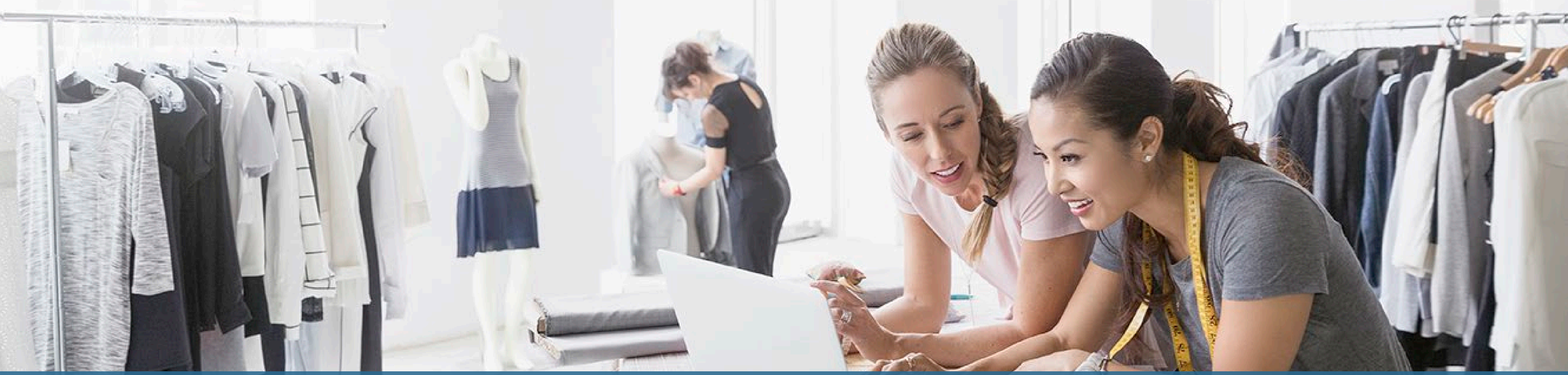
Pathways to Progress

Reducing Climate Impacts in Agriculture

cottonworks™

With hundreds of easily searchable resources, we're your go-to textile tool for discovering what's possible with cotton.

cottonworks.com



@cotton_works

cottonworks™

Pathways to Progress

Reducing Climate Impacts in Agriculture

Today's Speakers

Dr. Jesse Daystar
Vice President &
Chief Sustainability Officer

Cotton Incorporated

Dr. Arlene Adviento-Borbe
Research Agronomist
Jonesboro Arkansas

USDA
United States Department of Agriculture
Agricultural Research Service

Webinar Support

Type your questions using the Q&A feature at any time during the webinar.

A recording of this webinar will be available on **cottonworks.com**.

Climate Change in the Headlines

More Than a Third of Heat Deaths Are Tied to Climate Change, Study Says

Sweeping new research found that heat-related deaths in warm seasons were boosted by climate change by an average of 37 percent.

Cool drinks were distributed on a New Delhi roadside in 2017. Tsering Topgyal/Associated Press

By John Schwartz

Consumers demand action on climate change — and it's time for retailers to listen

Published Feb. 21, 2020

SUSTAINABILITY

Fashion and carbon emissions: Crunch time

The international fashion industry must urgently cut emissions by 50 per cent to reach a 1.5 °C target, says a new report from McKinsey and the Global Fashion Agenda.

BY BELLA WEBB

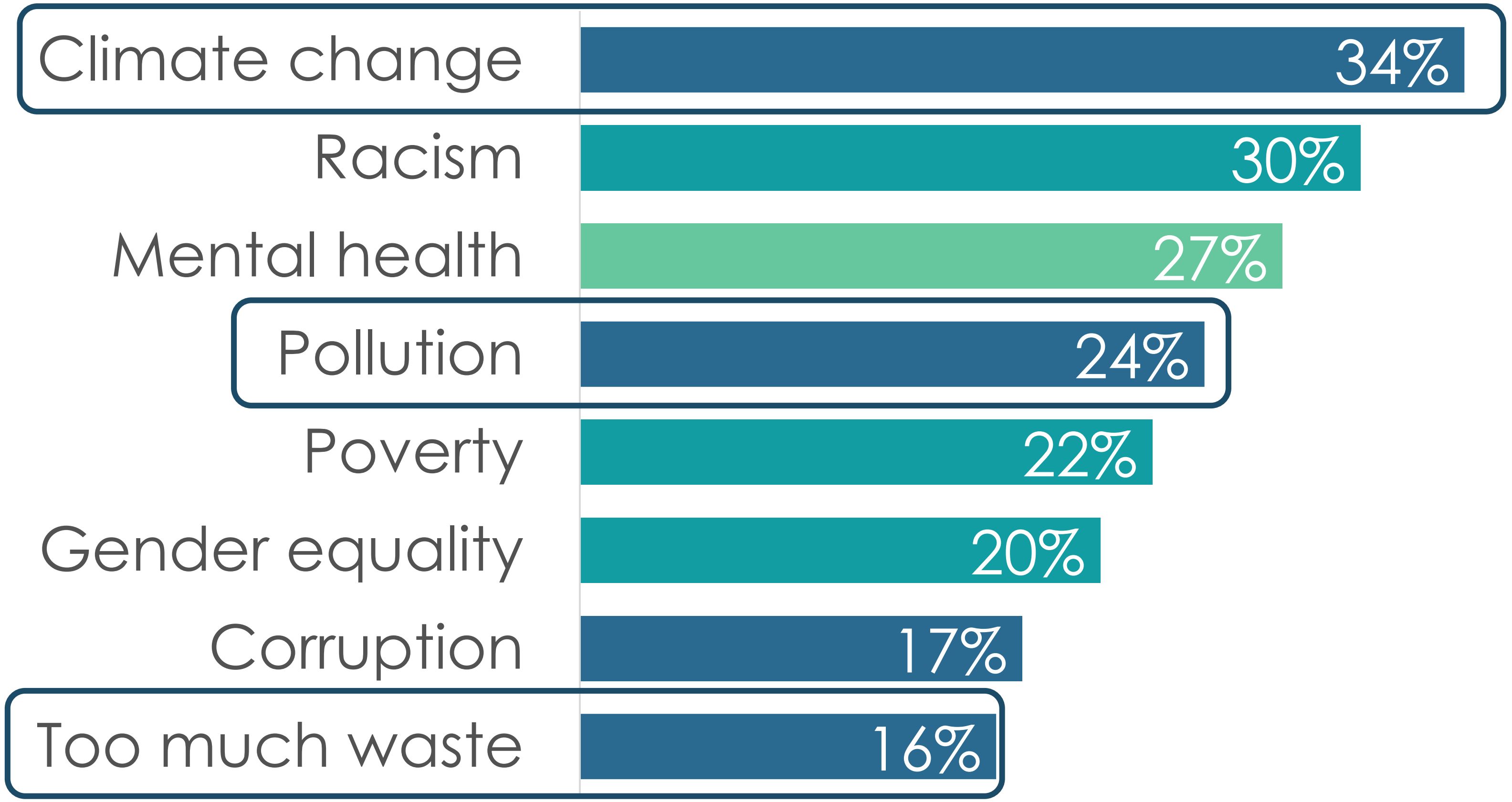
26 AUGUST 2020

https://www.nytimes.com/2021/05/31/climate/heat-deaths-climate-change.html
https://www.retaildive.com/spons/consumers-demand-action-on-climate-change-and-its-time-for-retailers-to/572572/
https://www.voguebusiness.com/sustainability/fashion-and-carbon-emissions-crunch-time

Generation Z Highly Concerned About Climate

Environmental issues top list of Gen Z concerns

Most important challenges facing our world today:



Sources:
Data: CCI & Cotton Incorporated's 2017 Global Environment Survey;
Photo: Getty Images Premium

cottonworks

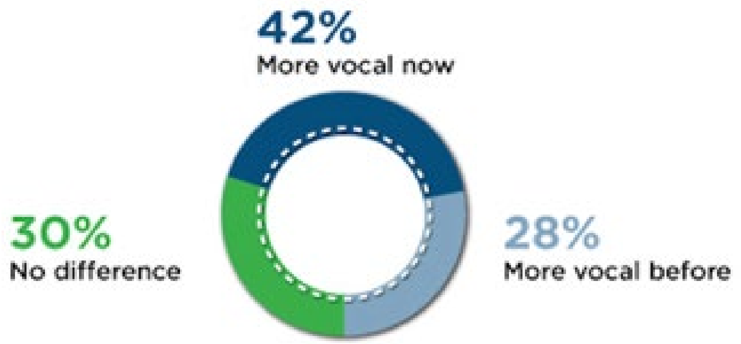
And it remains so even during Covid-19

Customers are more engaged than ever

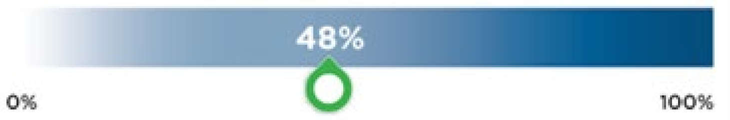
Sustainability decision-makers believe their customers demand more environmental commitments than ever and will hold companies accountable with the power of their purchase.

Since the COVID-19 pandemic, how has customer demand changed for environmentally sustainable business practices and goods/services?

How vocal are your customers about their environmental and sustainability concerns since the COVID-19 pandemic?



If you had to guess, what percentage of your customer base would switch to a competitor if your company did not meet its sustainability goals or commitments?

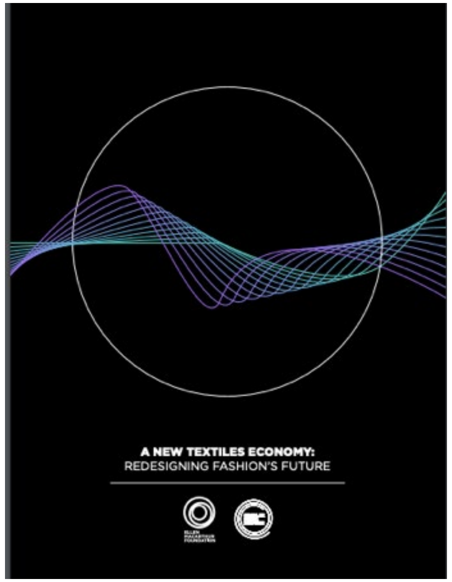


US Cotton Trust Protocol and Sourcing Journal Research (2020)
https://sourcingjournal.com/topics/sustainability/u-s-cotton-trust-protocol-webinar-levis-gap-sustainability-traceability-222246/
https://sourcingjournal.com/webinar/where-to-from-here-us-cotton-trust-protocol-sustainability-covid-19/

cottonworks

Apparel Industry GHG Emissions

Ellen MacArthur Foundation & McKinsey (2017)



1.2 billion tonnes CO_2e

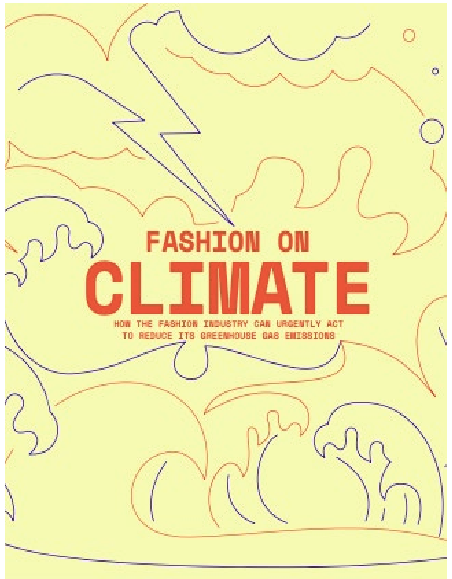
2% of global budget

Quantis (2018)

3.29 billion tonnes CO_2e

6.7% of global emissions

Global Fashion Agenda & McKinsey (2020)



2.1 billion tonnes CO_2e

4% of global emissions

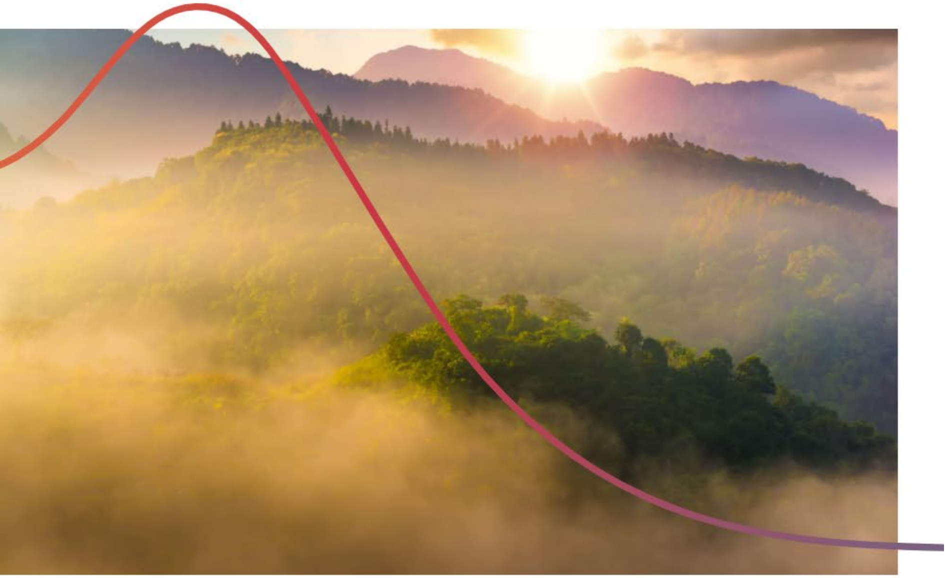
See the Roadmap for additional examples of sector GHG estimates

https://www.wri.org/insights/5-things-know-about-ieas-roadmap-net-zero-2050

Science-Based Targets Initiative

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

How it works | Set a target | Companies taking action | Sector guidance | Resources | Net-zero



COMPANIES TAKING ACTION

The world is transitioning to a zero-carbon economy. More than 1,000 businesses are working with the Science Based Targets initiative (SBTi) to reduce their emissions in line with climate science.

MEET THE COMPANIES | JOIN THEM

Join the companies taking action

We need a race to the top, led by pioneering companies. This will empower peers, suppliers and customers to follow suit and drive governments to take bolder action.

The change has already begun and action is gaining pace. More than 1,000 companies worldwide are leading the zero-carbon transition by setting emissions reduction targets through the Science Based Targets initiative (SBTi).

Today's business climate leaders are located across the globe and working in a range of sectors– meet them below, and join them.

SET A TARGET

744
with science-based targets

1494
companies taking action

589
commitments to 1.5˚C

https://sciencebasedtargets.org/companies-taking-action#table

Climate Roadmap to Net Zero Preliminary Results

Total Apparel GHG Emissions: **1,393 million tonnes CO_2e**

TIER 4	TIER 3	TIER 2	TIER 1
RAW MATERIAL EXTRACTION	**RAW MATERIAL PROCESSING**	**MATERIAL PRODUCTION**	**FINISHED PRODUCTION ASSEMBLY**
Cultivation and extraction of raw materials from the earth, plants, or animals.	Processing of raw materials into yarn and other intermediate products.	Production and finishing of materials (e.g., fabric, trims) that go directly into finished product.	Assembly and manufacturing of final products.
326M tonnes CO_2e	**225M tonnes CO_2e**	**624M tonnes CO_2e**	**218M tonnes CO_2e**
23%	**16%**	**45%**	**16%**

Source: International Energy Agency, Net Zero by 2050 Report, 2021

WORLD RESOURCES INSTITUTE

35 Years of Reduced Environmental Impact

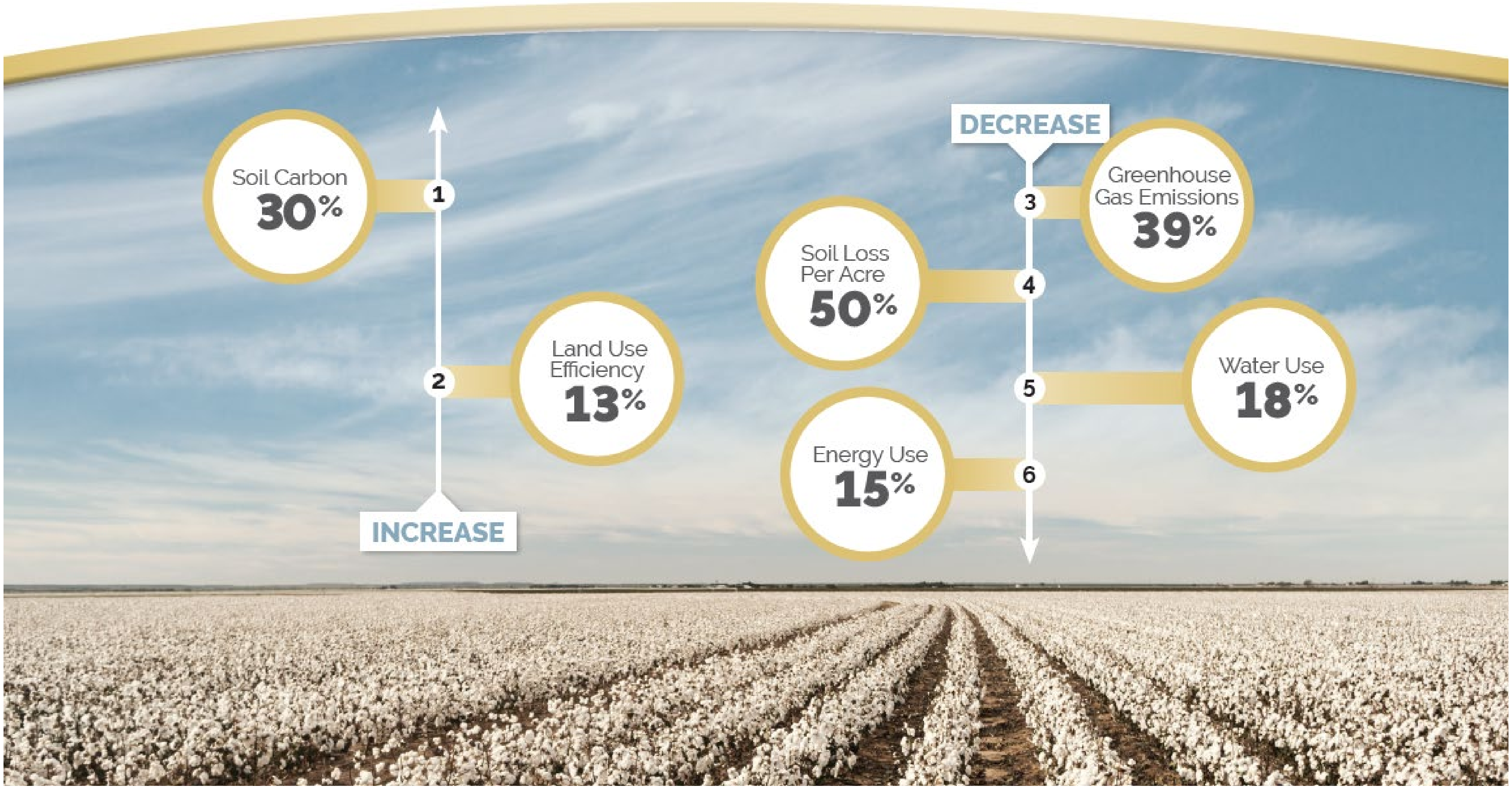
Land Use	Soil Loss	Water	Energy	GHG
49%	37%	79%	54%	40%

Field to Market

cottonworks

Source: Field to Market: The Alliance for Sustainable Agriculture National Indicators Report (2016). https://fieldtomarket.org/national-indicators-report-2016/

U.S. Cotton's Sustainability Goals for 2025

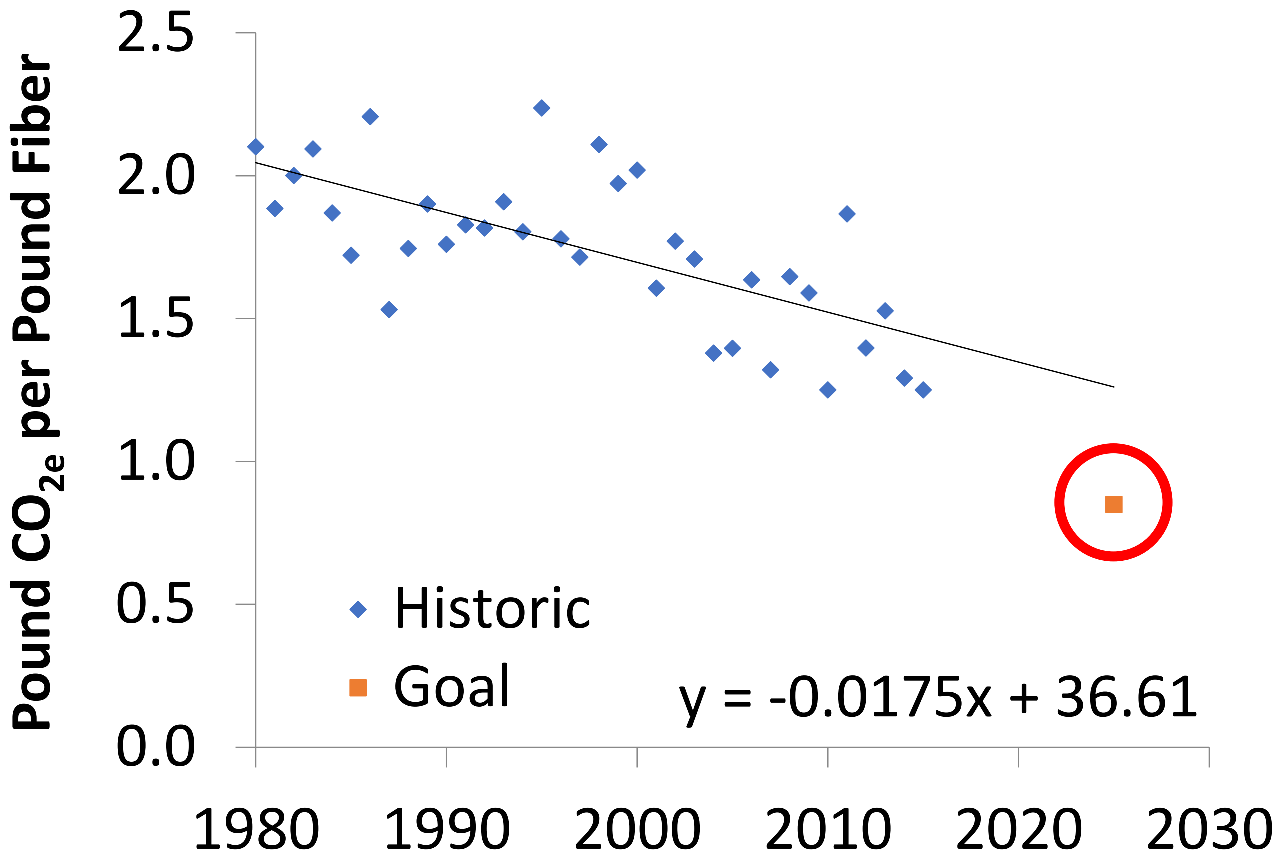


cottonworks

Source: Cotton Incorporated (2018). U.S. Cotton ten-year sustainability goals, Pathways to progress. https://www.cottoninc.com/wp-content/uploads/2018/02/Cotton_Sustainability_2018.pdf

Greenhouse Gas Emissions

Goal: 39% Reduction



The Greenhouse Gas Goal of 0.85 lbs. of CO_{2e} per pound of fiber is ambitious since it matches the spirit of the 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®

cottonworks™

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

Common Themes for Improvement

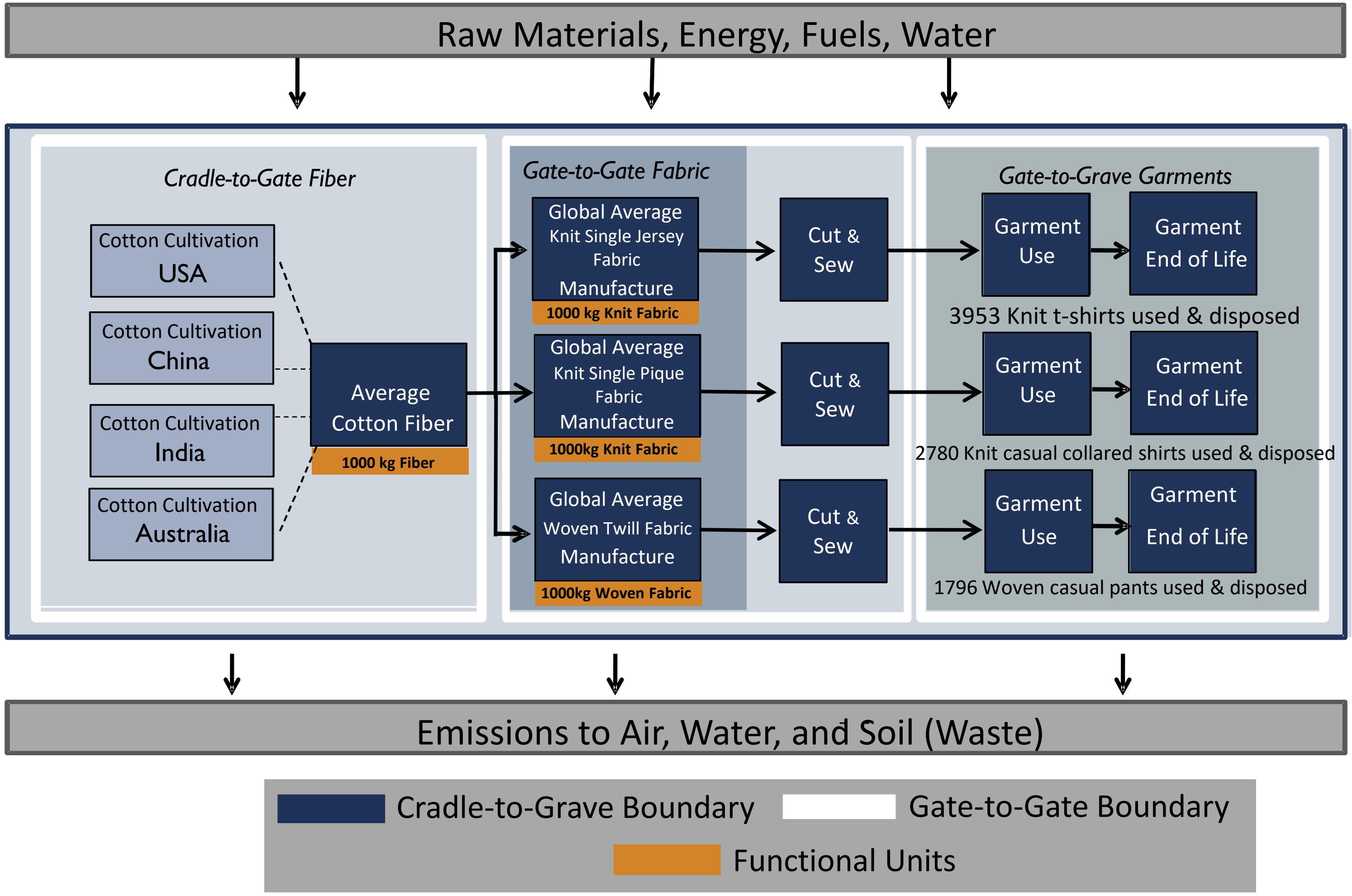
- Yield Increase
- Cover Crops
  - Soil improvement (erosion, quality & carbon)
  - Weed suppression
  - Rainfall capture (water quantity & quality)
- Precision Management
  - Optimizing fertilizer and water use
  - Robots to reduce GHG, energy, labor, and as harvested when boll opens, less field loss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

Photo credit, top to bottom: Flickr creative commons license, Getty Images premium, Getty Images Premium

Life Cycle Assessment Overview

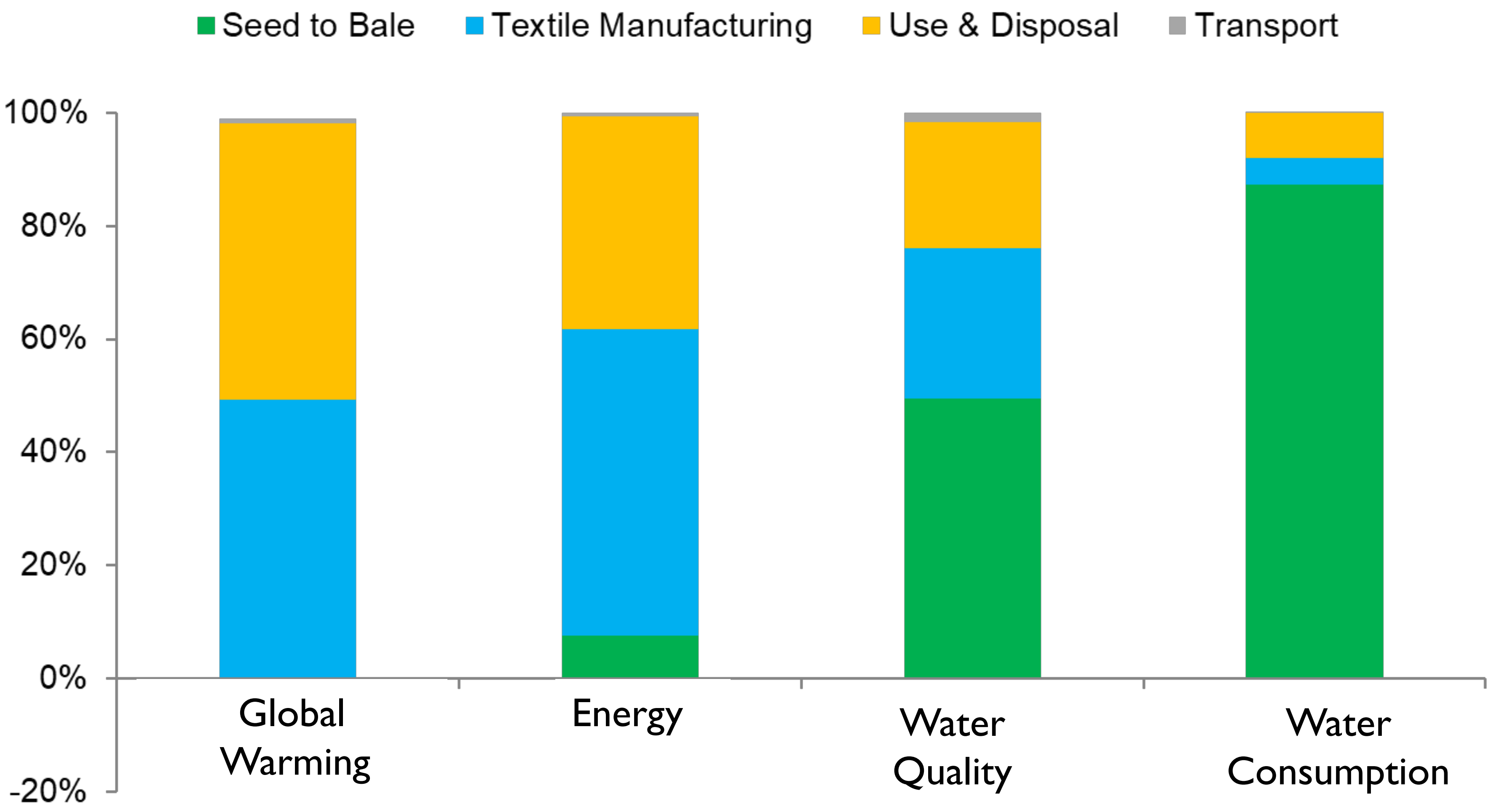
Source: Cotton Incorporated (2017). LCA Update of cotton fiber and fabric life cycle. https://cottontoday.cottoninc.com/wp-content/uploads/2019/11/2016-LCA-Full-Report-Update.pdf

LCA Goal, Scope Functional Units



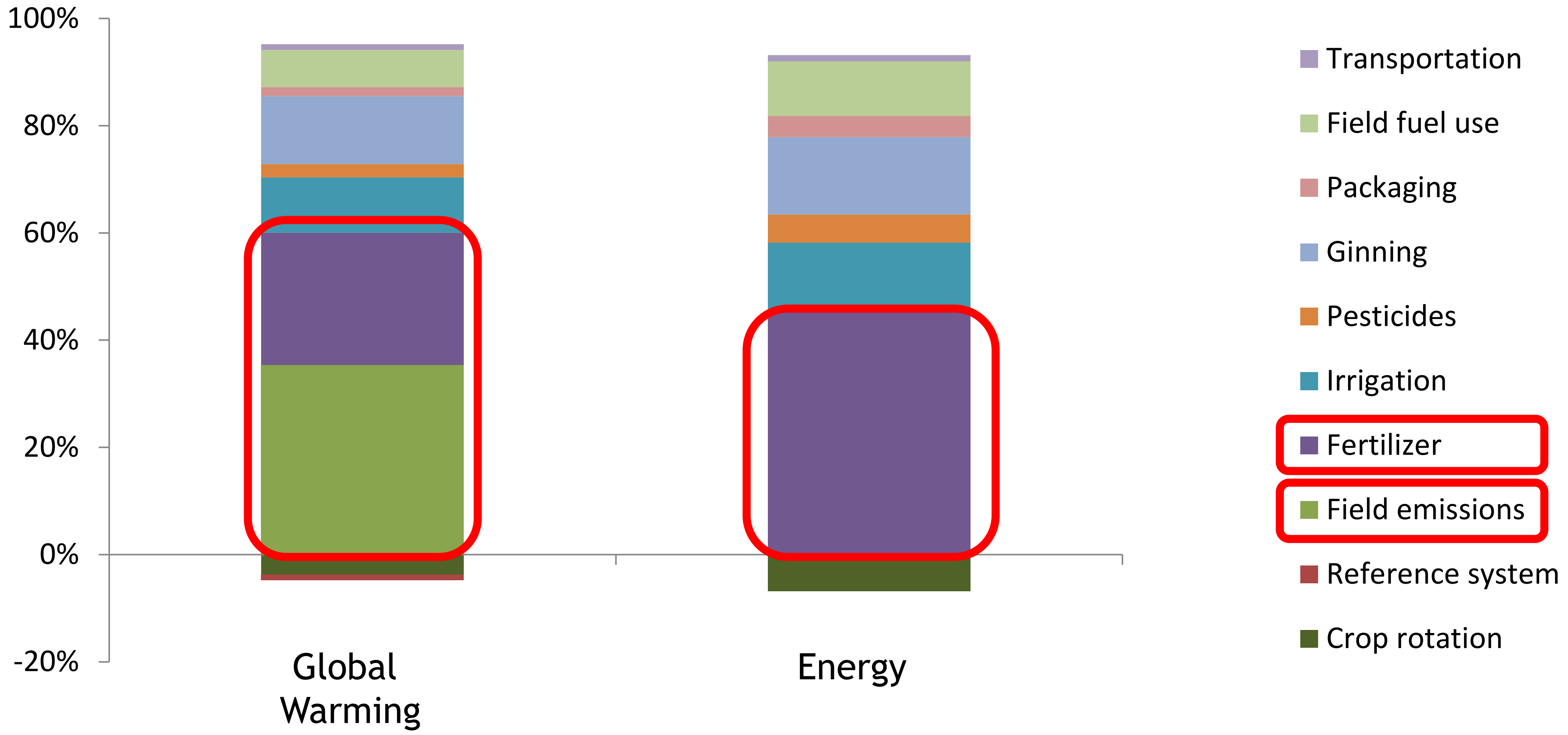
Source: Cotton Incorporated (2017). LCA Update of cotton fiber and fabric life cycle. https://cottontoday.cottoninc.com/wp-content/uploads/2019/11/2016-LCA-Full-Report-Update.pdf

Overall Results for a Knit Collared Shirt



Source: Cotton Incorporated (2017). LCA Update of cotton fiber and fabric life cycle. https://cottontoday.cottoninc.com/wp-content/uploads/2019/11/2016-LCA-Full-Report-Update.pdf

Energy & Greenhous Gas Emissions for Cotton Production

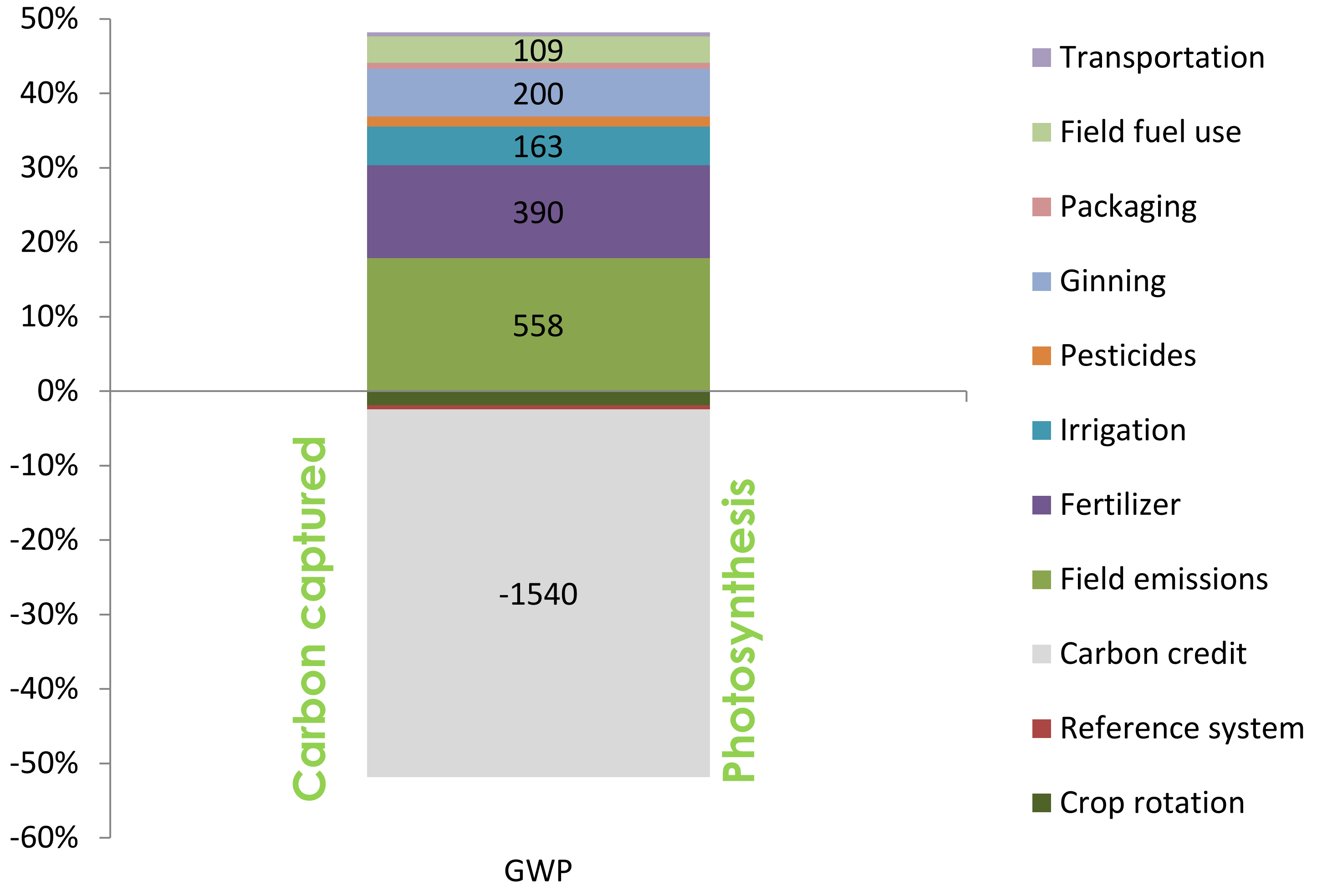


cottonworks

Source: Cotton Incorporated (2017). LCA Update of cotton fiber and fabric life cycle. https://cottontoday.cottoninc.com/wp-content/uploads/2019/11/2016-LCA-Full-Report-Update.pdf

Greenhouse Gas Emissions & Carbon Capture

Net -113 kgs of CO_2 eq. captured per 1,000 Kg cotton



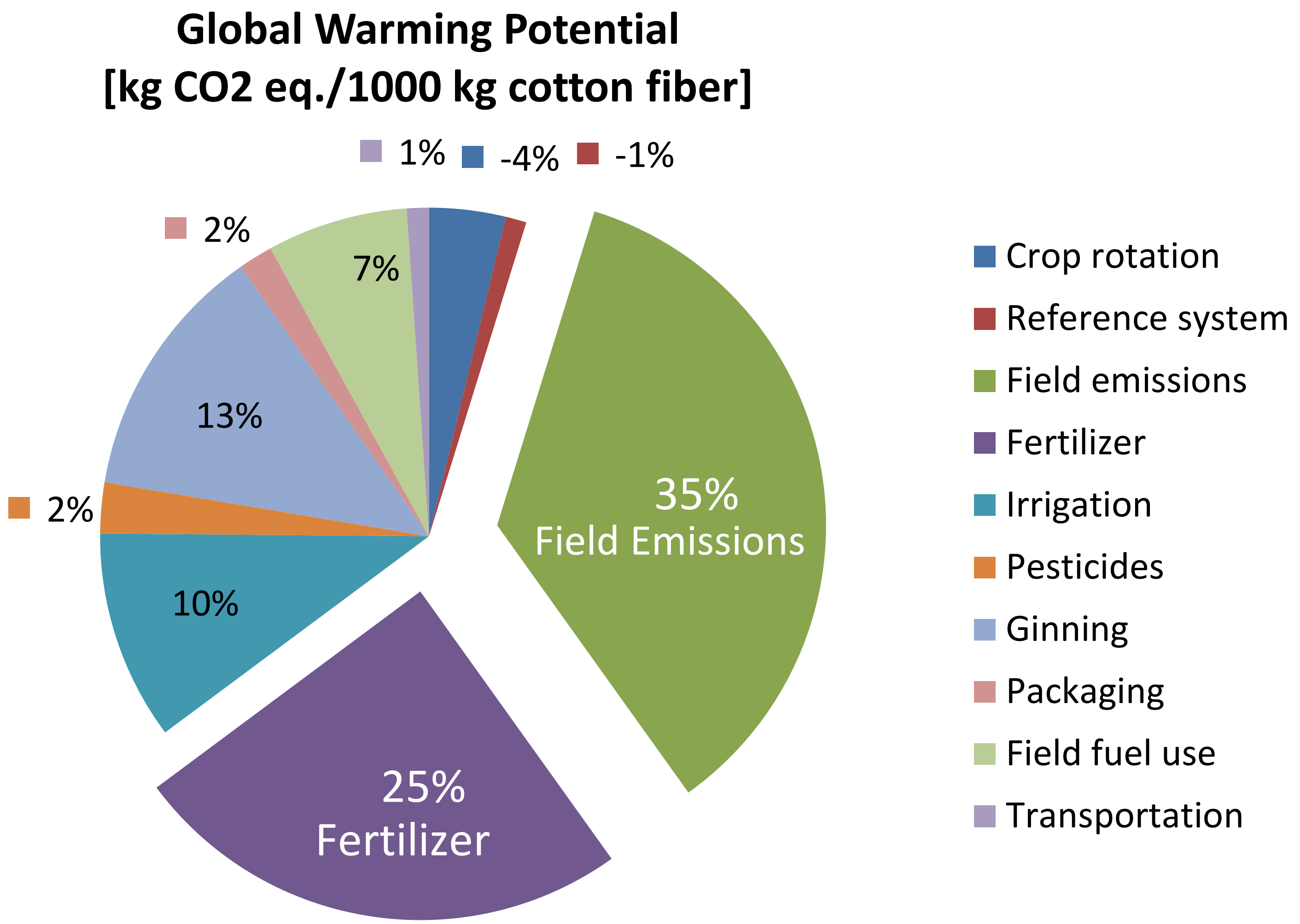
cottonworks

Source: Cotton Incorporated (2017). LCA Update of cotton fiber and fabric life cycle. https://cottontoday.cottoninc.com/wp-content/uploads/2019/11/2016-LCA-Full-Report-Update.pdf

Nitrogen Fertilizer Contribution to GHG Emissions

Fertilizer contributes 60% to the overall global warming potential of cotton production

35% of GWP from nitrous oxide emissions from N volatilization

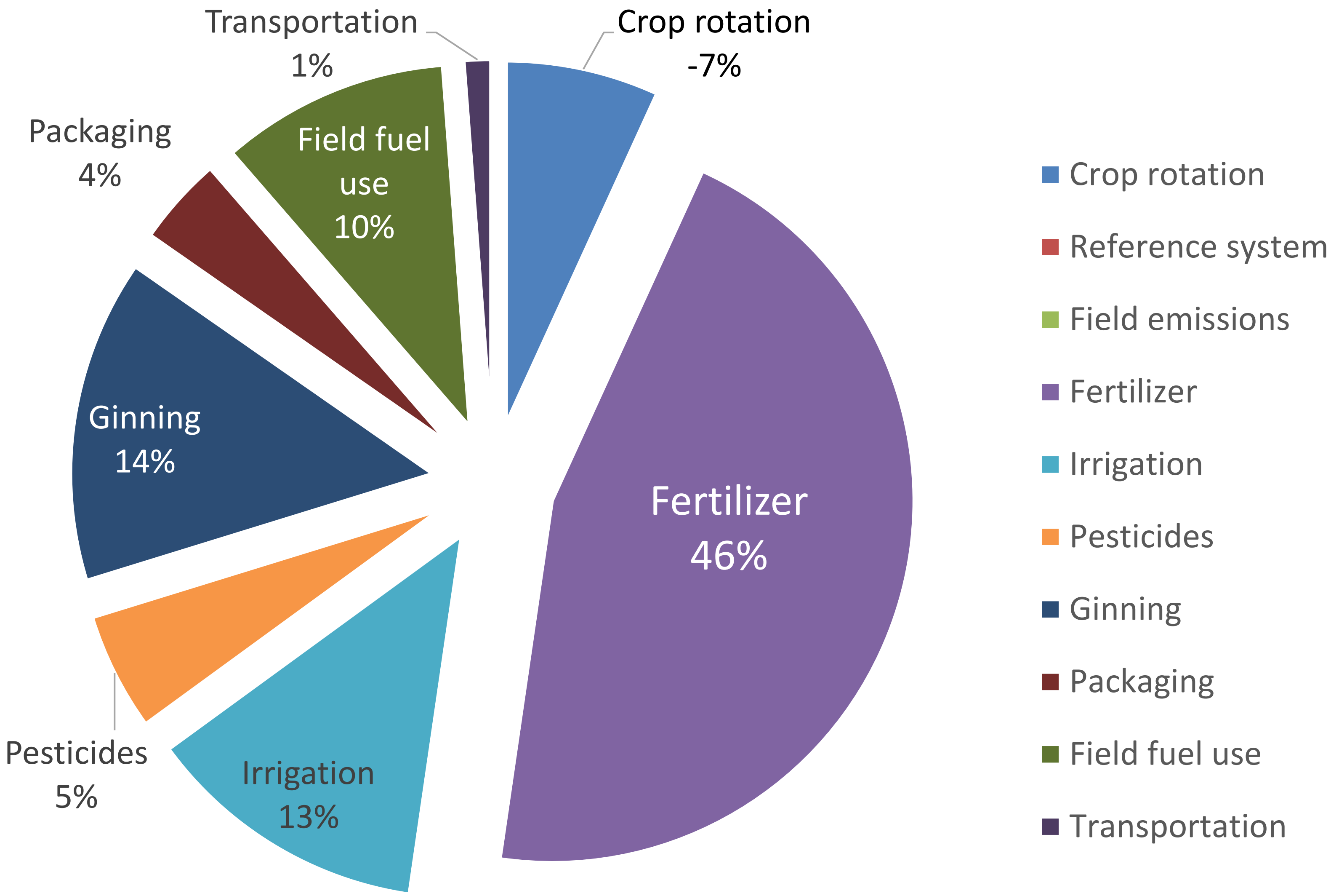


cottonworks

Source: Cotton Incorporated (2017). LCA Update of cotton fiber and fabric life cycle. https://cottontoday.cottoninc.com/wp-content/uploads/2019/11/2016-LCA-Full-Report-Update.pdf

Fertilizer Contribution to Energy Use

Fertilizer contributes 46% to the overall primary energy demand for cotton production



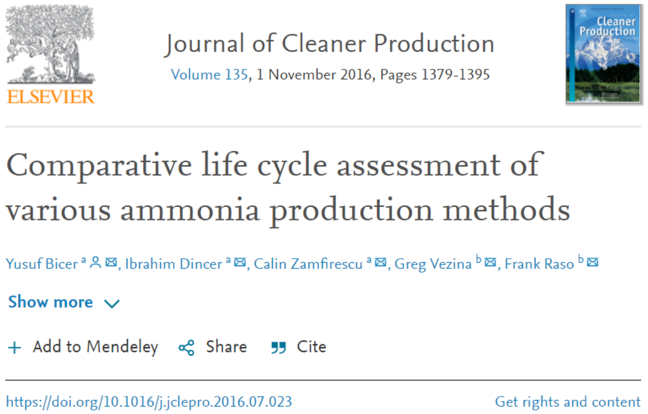
Source: Cotton Incorporated (2017). LCA Update of cotton fiber and fabric life cycle. https://cottontoday.cottoninc.com/wp-content/uploads/2019/11/2016-LCA-Full-Report-Update.pdf

Fertilizer Production Process & Alternatives

Haber-Bosch process

Ammonia production consumes almost 1.2% of total primary energy and contributes 0.93% of greenhouse gas (GHG) emissions ([Gilbert and Thornley, 2010](#)).

$$N_2 + 3\,H_2 \longrightarrow 2\,NH_3 \quad \Delta H^\circ = -91.8\ \mathrm{kJ/mol}$$



ELSEVIER

Journal of Cleaner Production

Volume 135, 1 November 2016, Pages 1379-1395

Comparative life cycle assessment of various ammonia production methods

Yusuf Bicer [a], Ibrahim Dincer [a], Calin Zamfirescu [a], Greg Vezina [b], Frank Raso [b]

Show more

+ Add to Mendeley   Share   Cite

https://doi.org/10.1016/j.jclepro.2016.07.023   Get rights and content

Production methods with lower fossil fuel inputs and lower GHG emissions

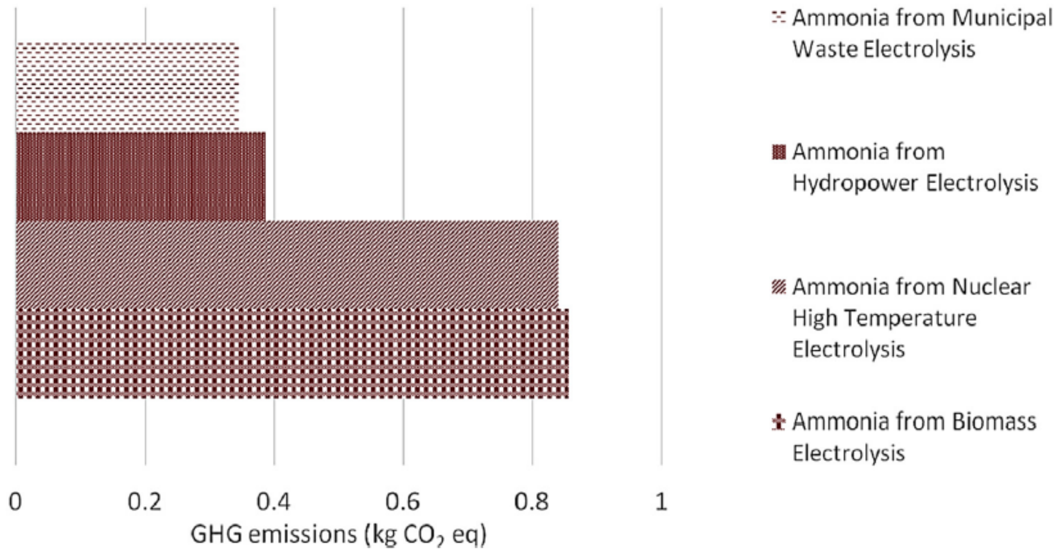
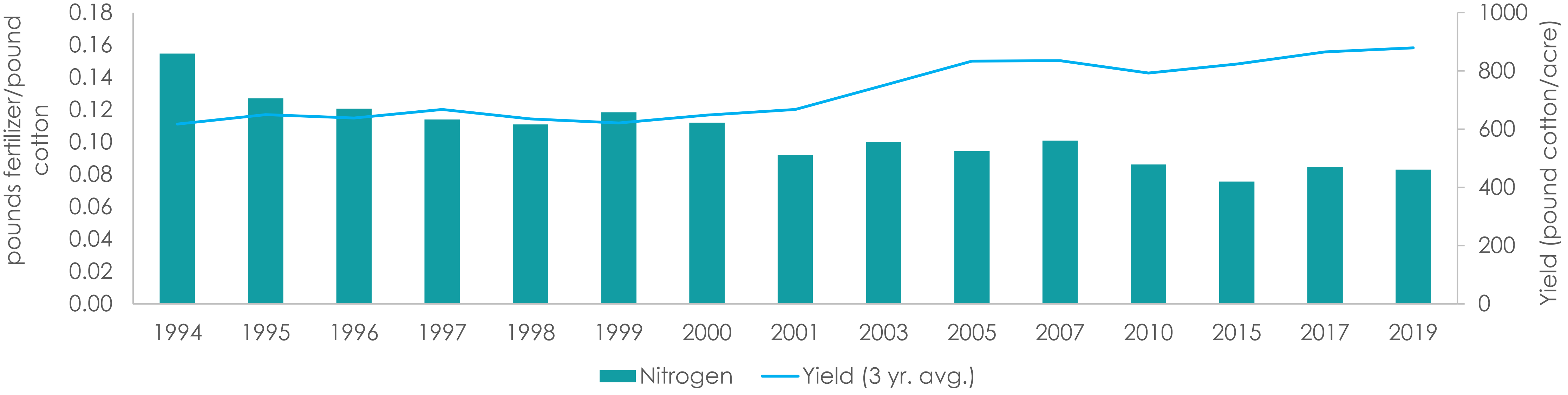


Fig. 9. Global warming values of various ammonia production methods according to CML 2001.

Bicer, Y., Dincer, I., Zamfirescu, C., Vezina, G., Raso, F.. (2015). Comparative life cycle assessment of various ammonia production methods. Journal of Cleaner Production. http://dx.doi.org/10.1016/j.jclepro.2016.07.023
Gilbert, P., & Thornley, P. (2010). Energy and carbon balance of ammonia production from biomass gasification. https://www.research.manchester.ac.uk/portal/files/33615474/FULL_TEXT.PDF

US Nitrogen Fertilizer Per Pound of Cotton



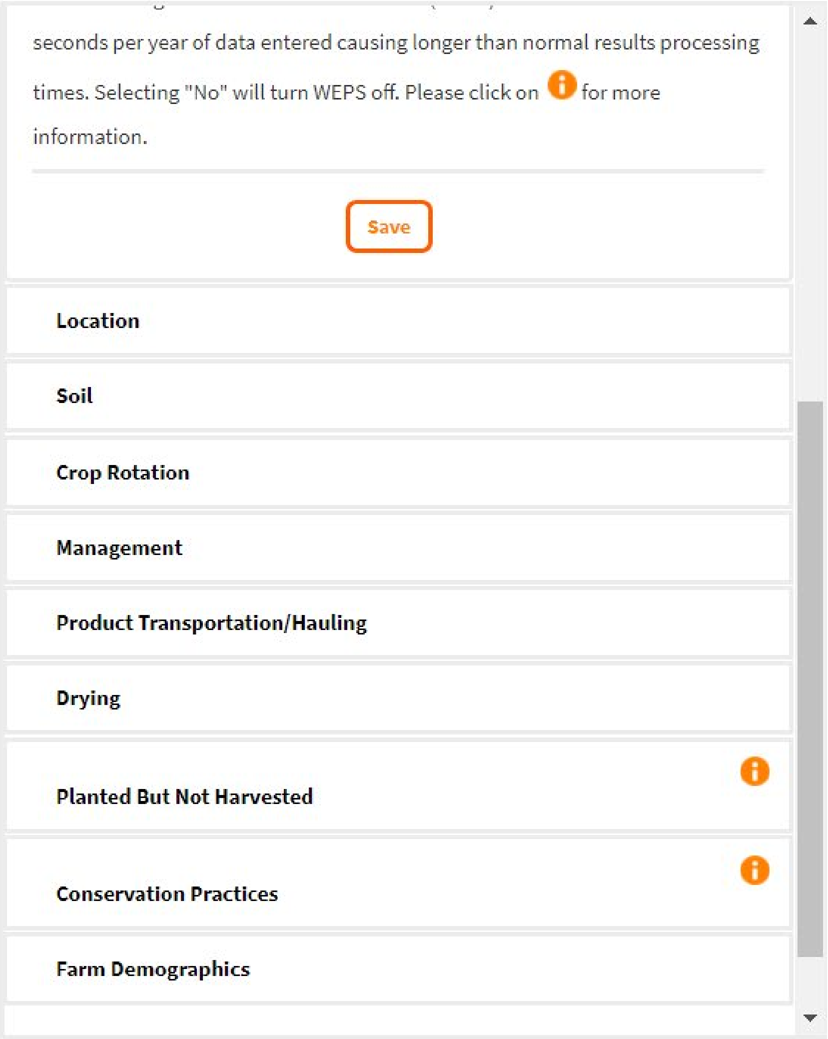
Nitrogen required per pound of cotton is on a downward trend in the U.S.

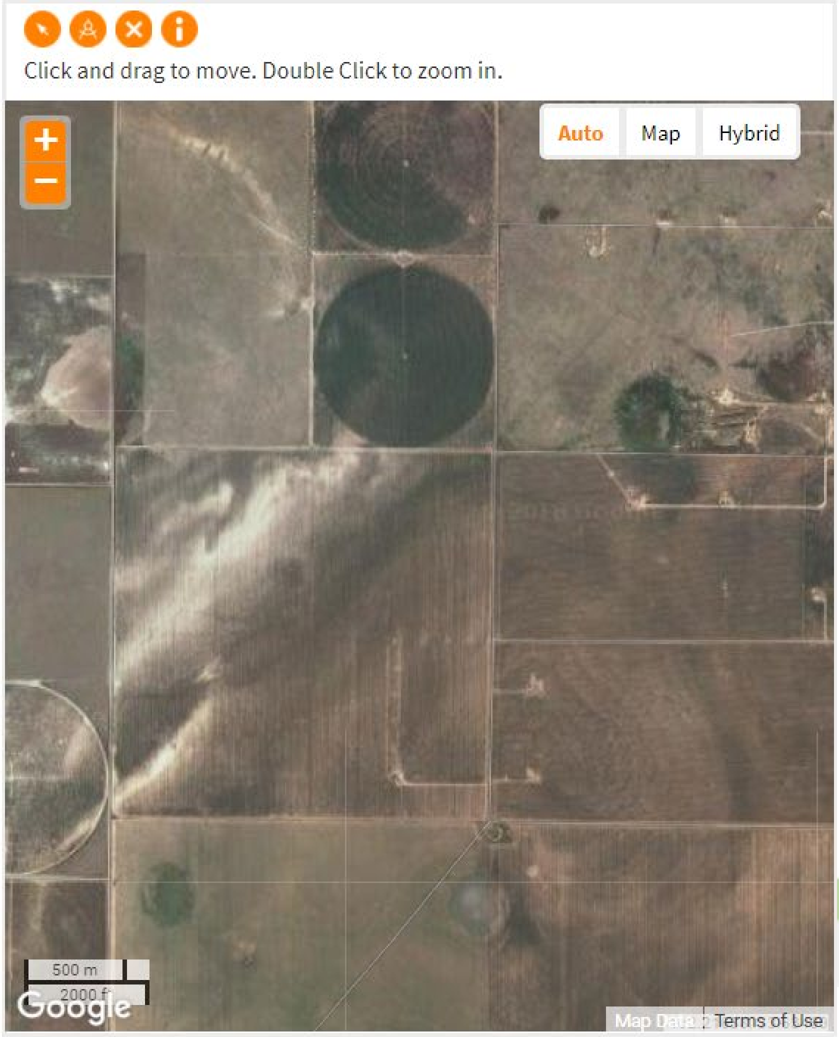
cottonworks

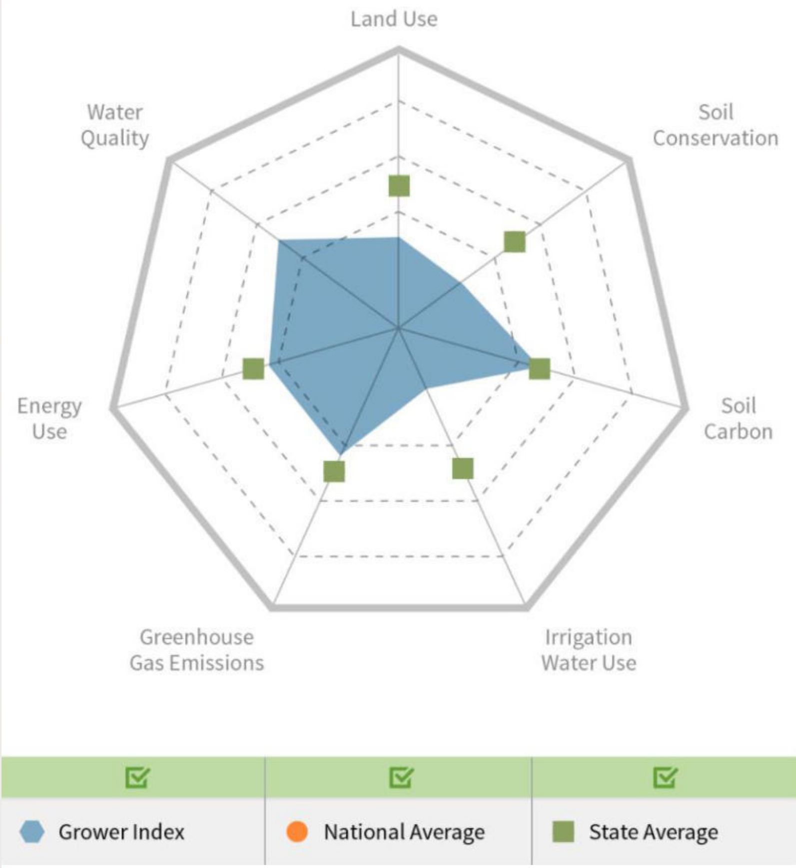
U.S. Department of Agriculture, National Agricultural Statistics Service Quick Stats. https://quickstats.nass.usda.gov/

Fieldprint Calculator

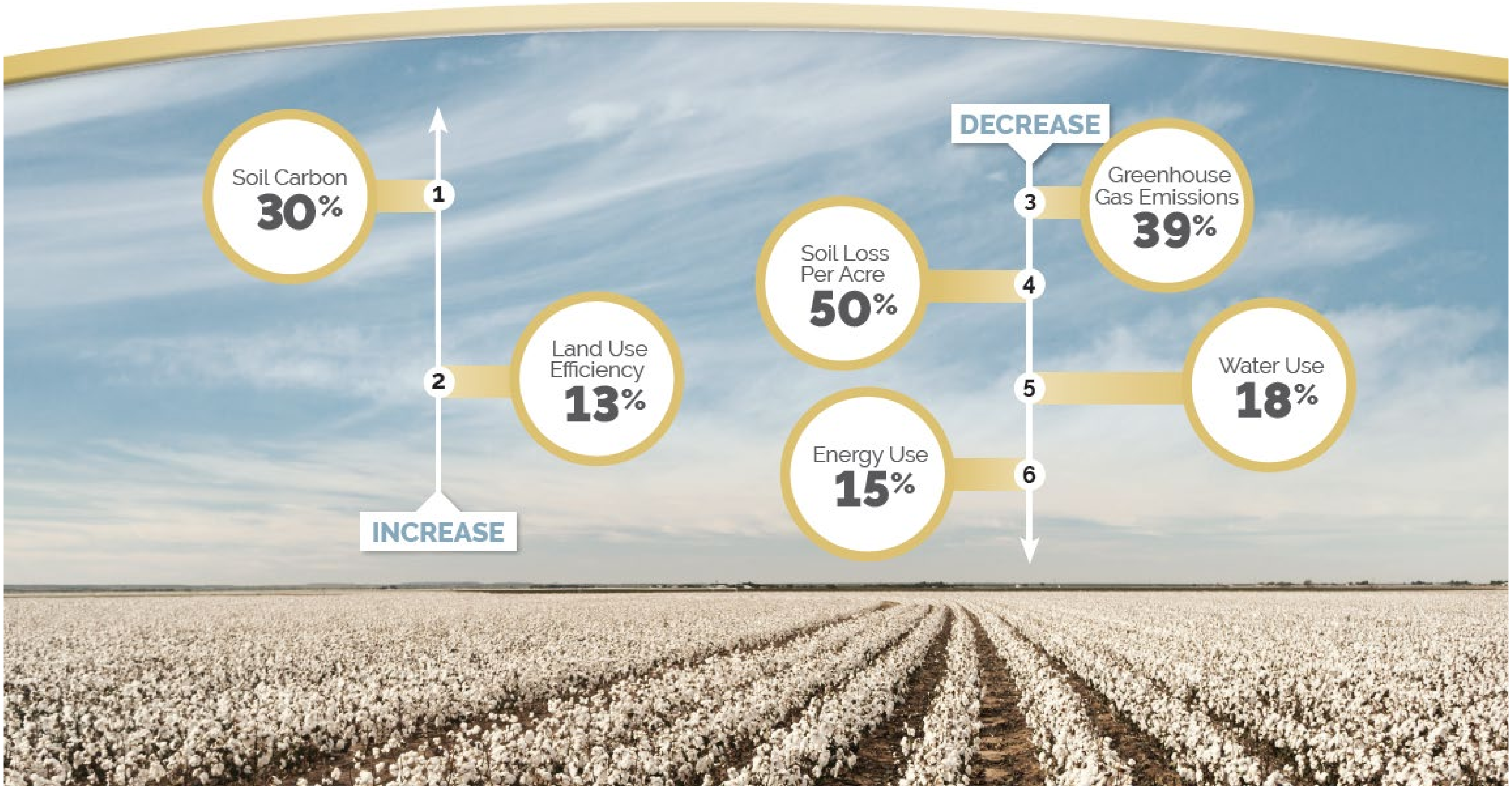
Field to Market®
The Alliance for Sustainable Agriculture







U.S. Cotton's Sustainability Goals for 2025



cottonworks

Source: Cotton Incorporated (2018). U.S. Cotton ten-year sustainability goals, Pathways to progress. https://www.cottoninc.com/wp-content/uploads/2018/02/Cotton_Sustainability_2018.pdf

Conservation Practices for Reducing Greenhouse Gas Emissions in Cotton Production

M. Arlene Adviento-Borbe

Delta Water Management Research Unit, USDA-ARS, Jonesboro, AR

arlene.advientoborbe@usda.gov

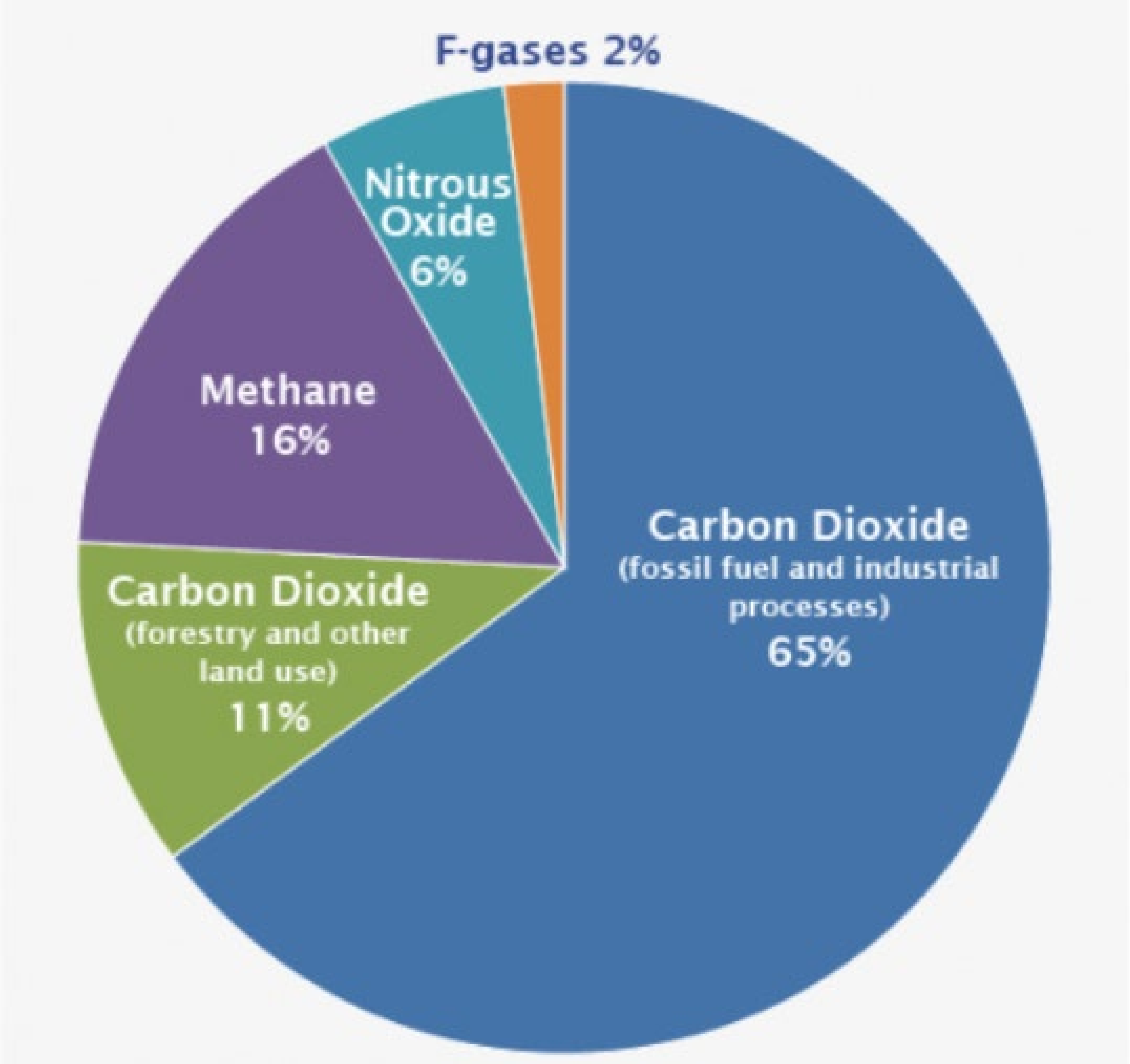
1 (870) 253-3130

United States Department of Agriculture
Agricultural Research Service

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Cotton Incorporated

The Global Greenhouse Gases Emissions by Gas

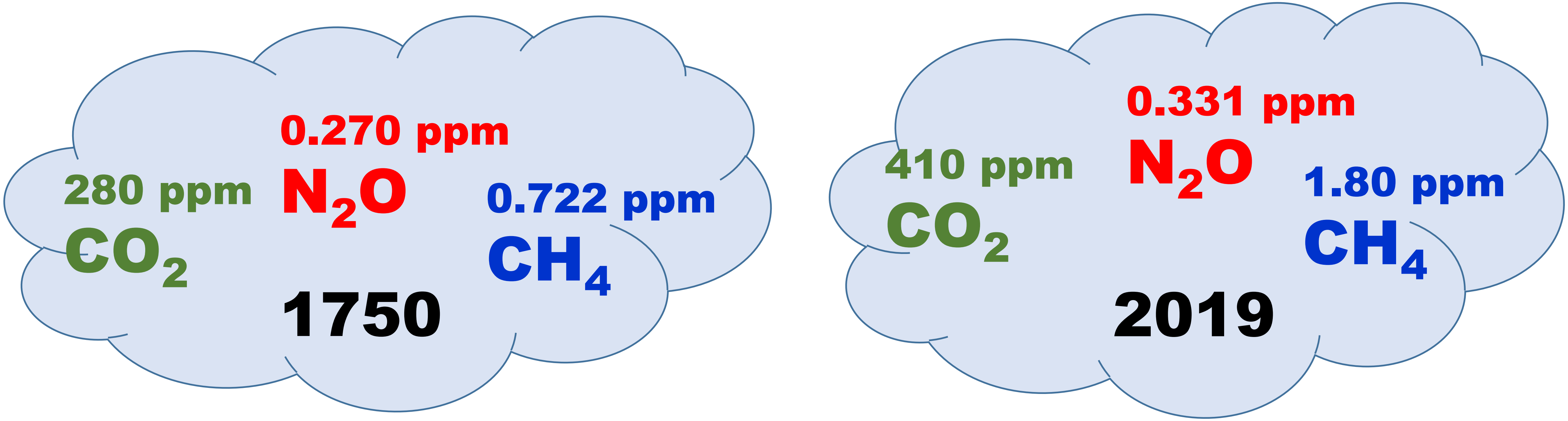


Greenhouse gas – GHG

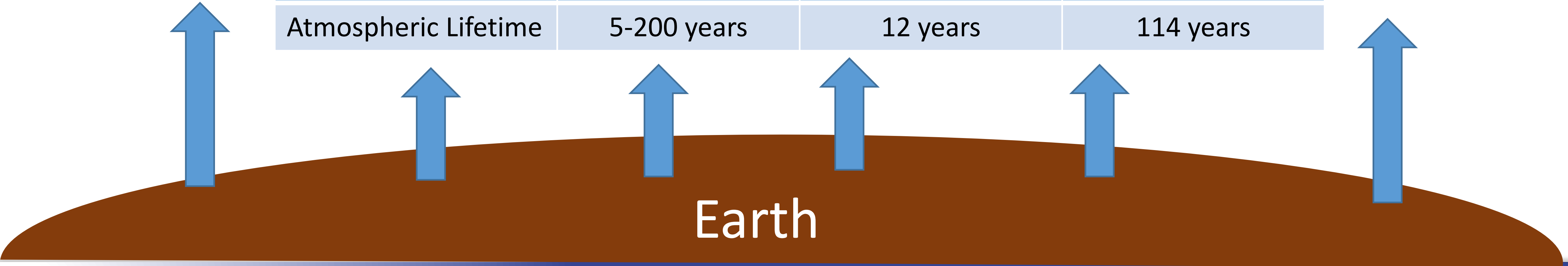
- Carbon dioxide – CO_2
  - ✓ Anthropogenic – fossil fuel, burning
  - ✓ Natural – deforestation, land clearing, soil degradation
- Methane – CH_4
  - ✓ Anthropogenic – agriculture, burning, livestock, manure
  - ✓ Natural – wetlands, peats
- Nitrous oxide – N_2O
  - ✓ Agriculture
  - ✓ Natural
- Fluorinated gases (F-gases) – HFCs, PFCs, SF_6
  - ✓ Industries, refrigeration

Source: IPCC 2014

Concentrations of Greenhouse Gases in the Stratosphere in 1750 and 2019



Greenhouse Gas	CO_2	CH_4	N_2O
Atmospheric Lifetime	5-200 years	12 years	114 years



Data source: NOAA, 2020; IPCC 2001, 2014

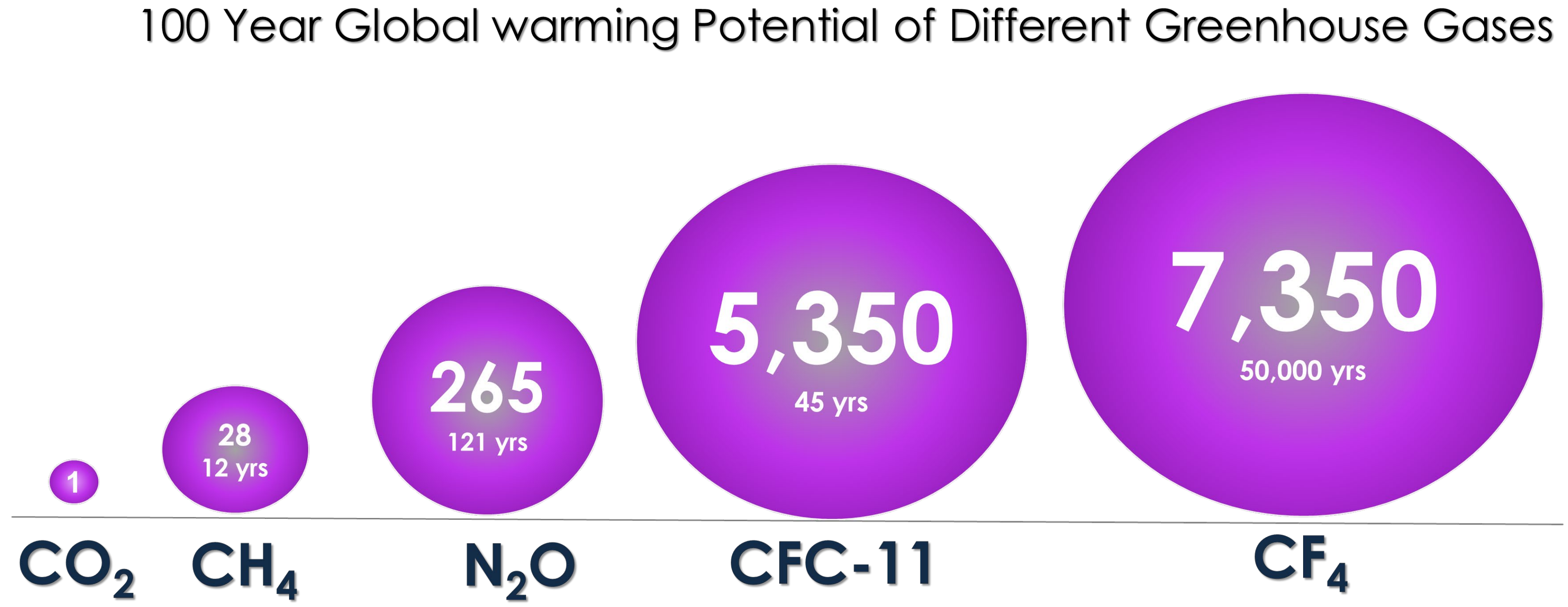
DELTA WATER MANAGEMENT
RESEARCH UNIT

Global Warming Potential: GHG Emission in Unit of CO_2 Equivalent

GWP is a relative measure of how much heat a methane or nitrous oxide gas traps in the atmosphere. It is time integrated radiative forcing due to pulse emission of GHG gas relative to 1 kg of CO_2.

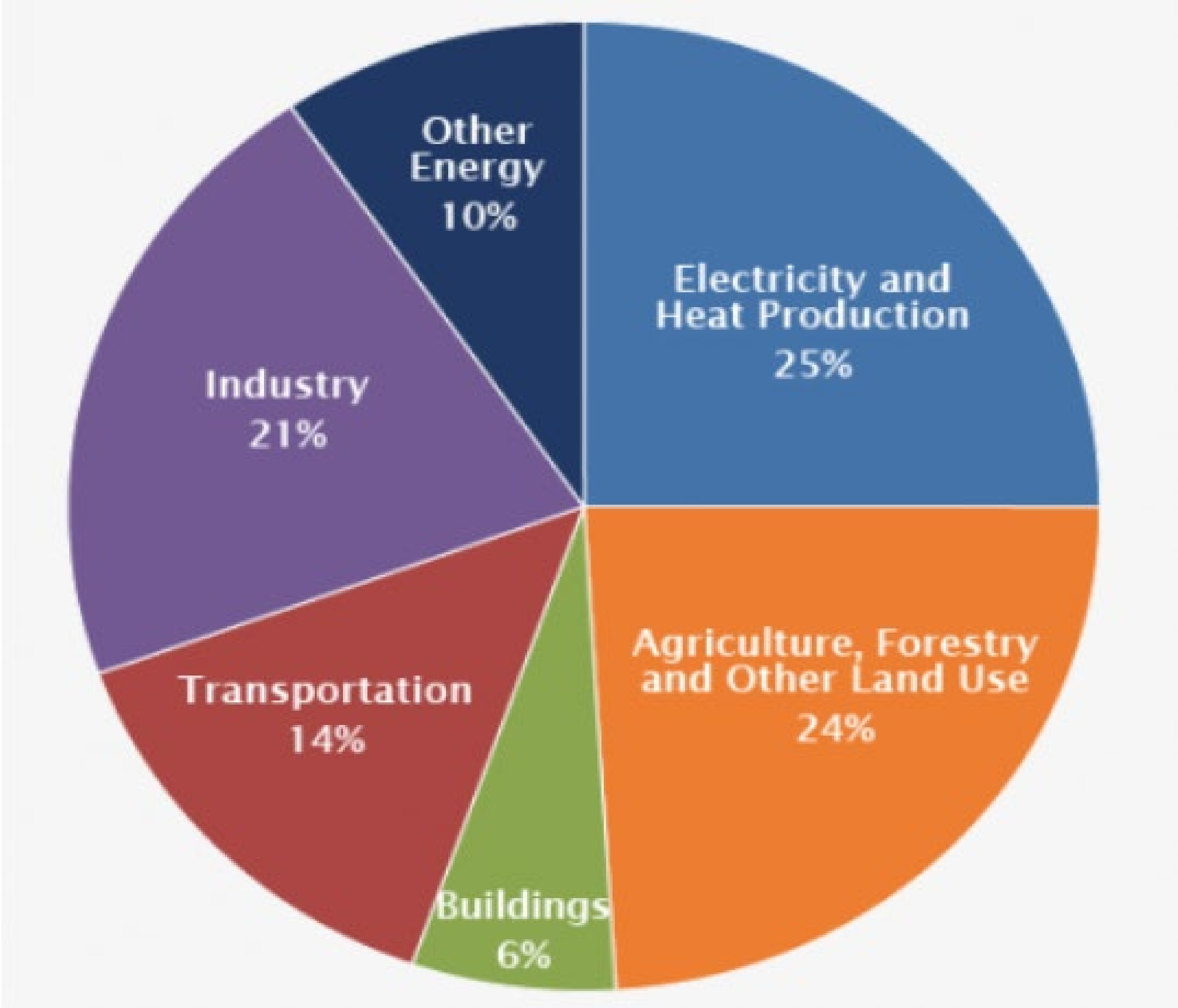
Depends on:

- Absorption of infrared radiation of gas
- Atmospheric lifetime of gas
- Spectral location of its absorbing wavelengths



Source: IPCC 2014

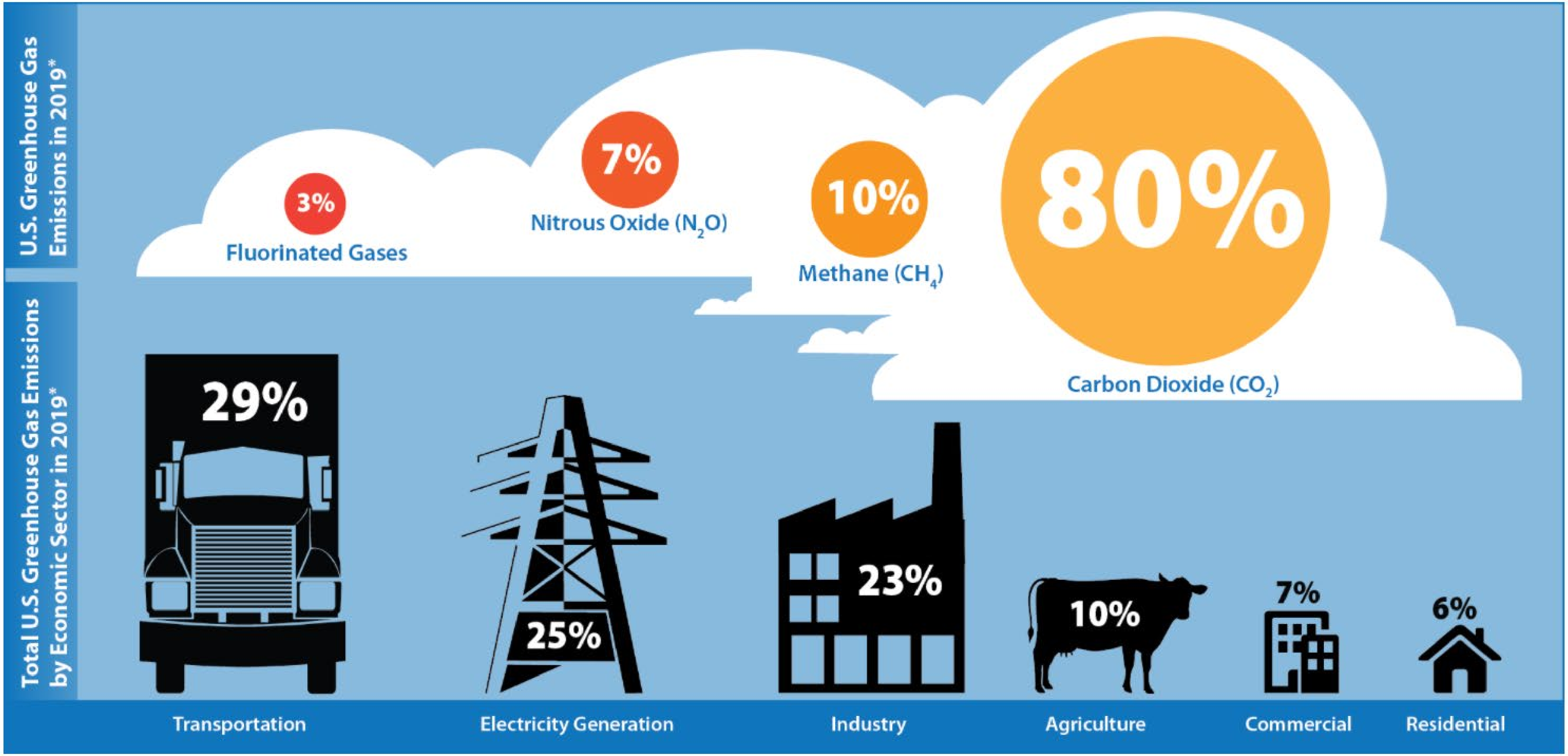
Global Greenhouse Gases Emissions by Economic Sector



Agriculture – major source of GHG emissions, excluding ecosystem C sequestration

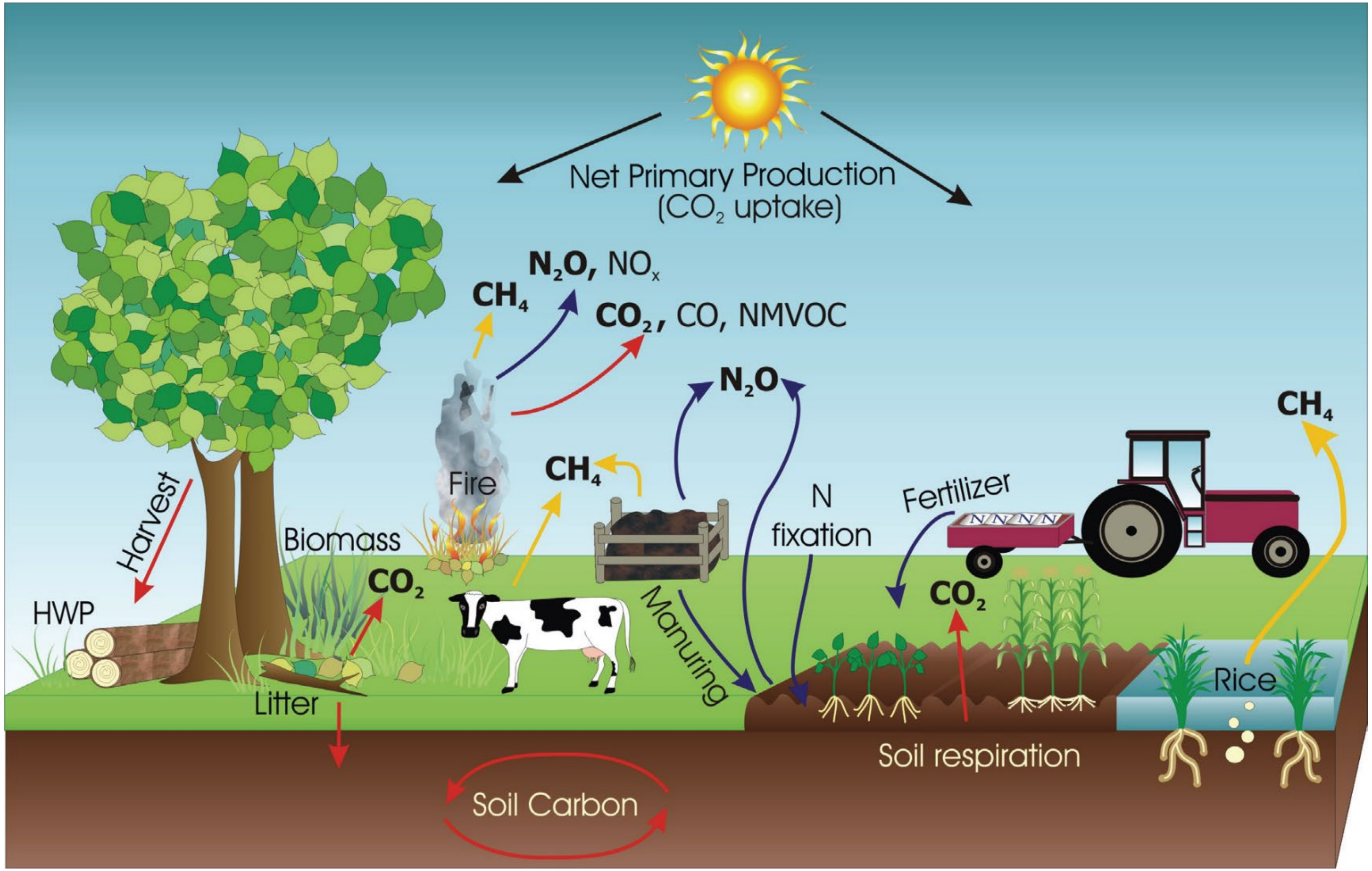
- Cultivation of crops
- Livestock
- Deforestation

The U.S. Greenhouse Gases Emissions by Gas and Economic sector in 2019



Source: US EPA

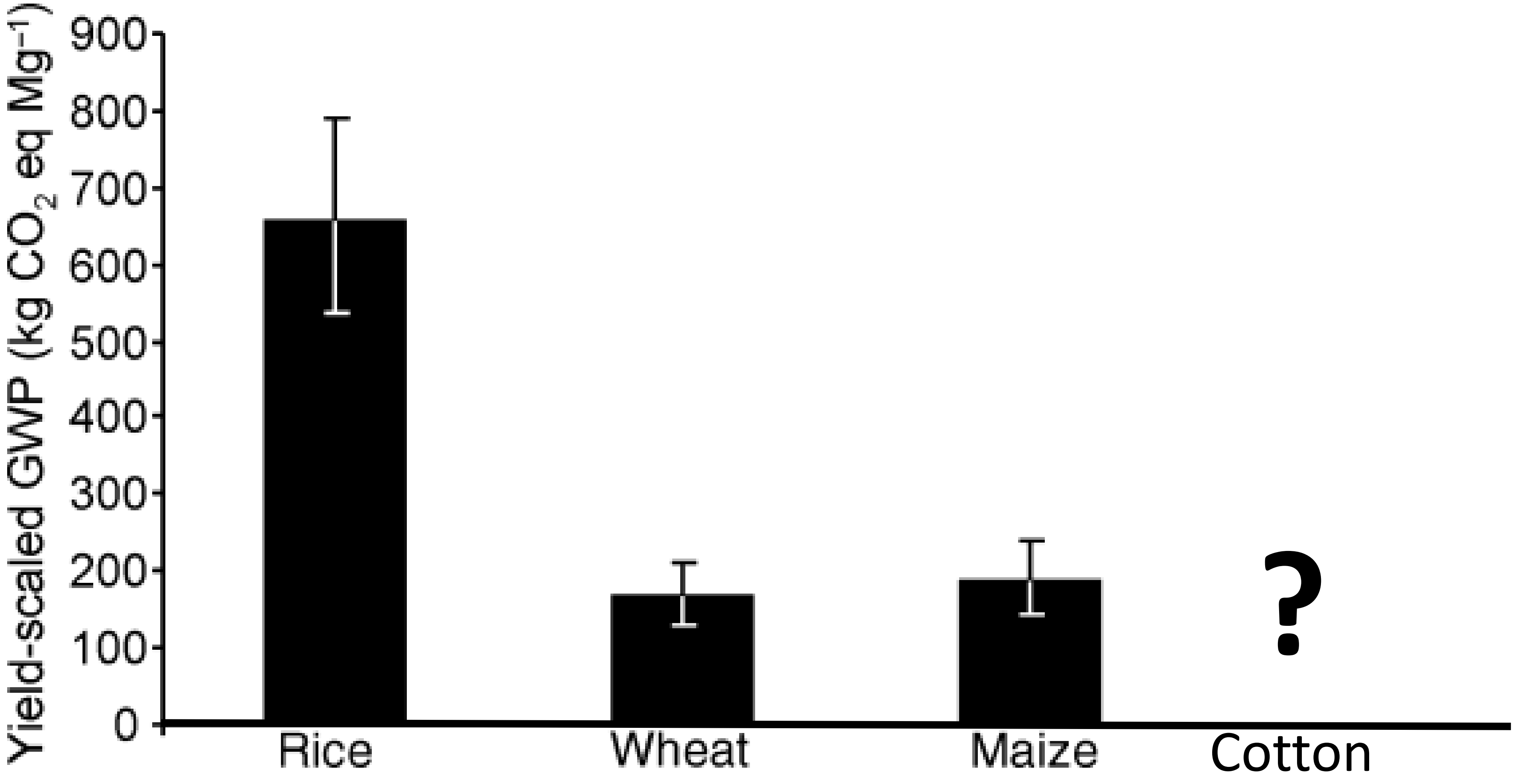
Sources of Greenhouse Gases in Agriculture



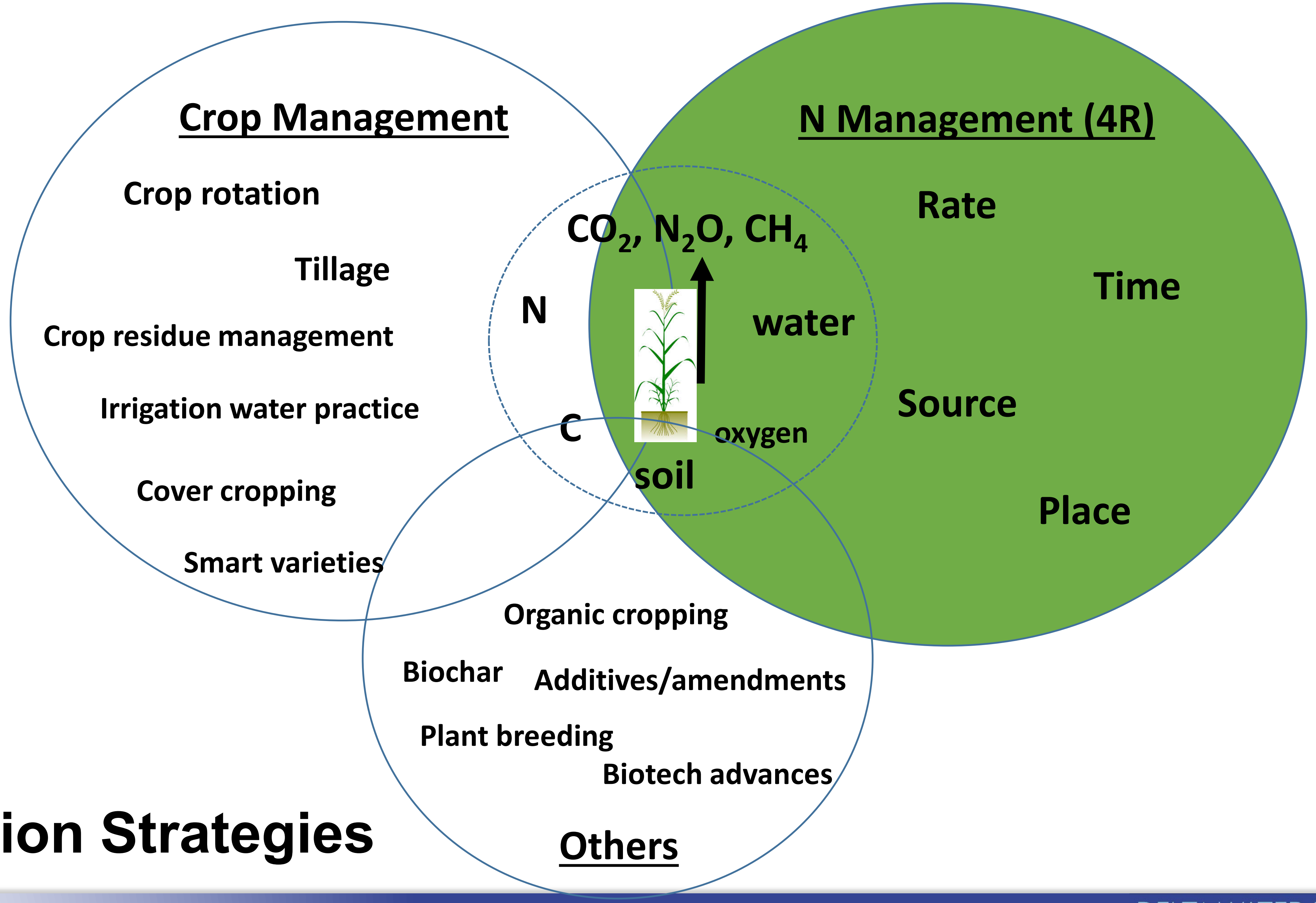
- CO_2 emission– soil respiration, plant decomposition
- N_2O emission – denitrification and nitrification
- CH_4 emission – methanogenesis

Row Crops & Climate Change: What is the Connection?

(Yield-scaled Global warming potentials)

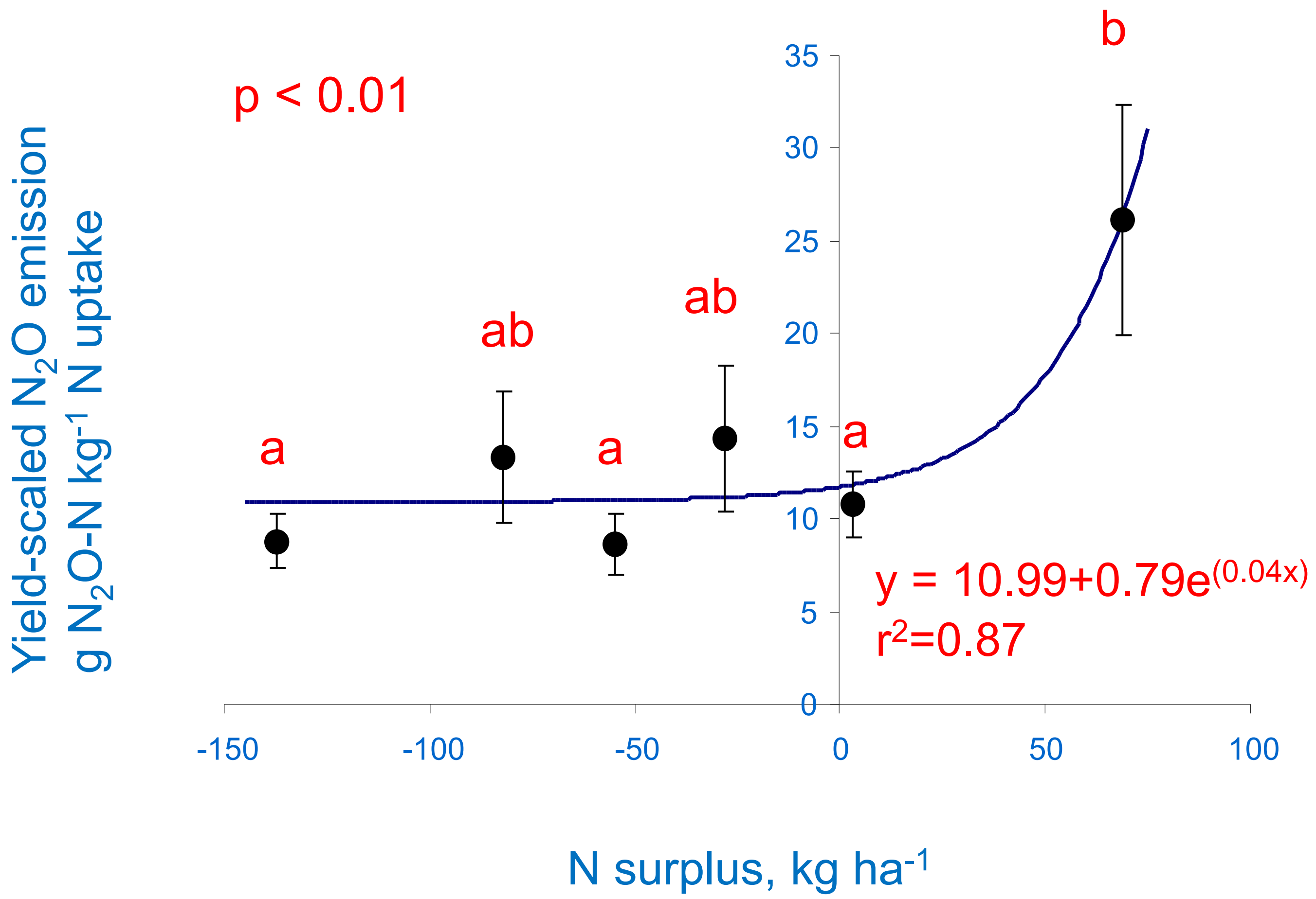


Source: Linquist et al. 2012. Global Change Biology. 18:194-209.



Mitigation Strategies

Relationship of Yield-Scaled N_2O emissions & N Crop Uptake



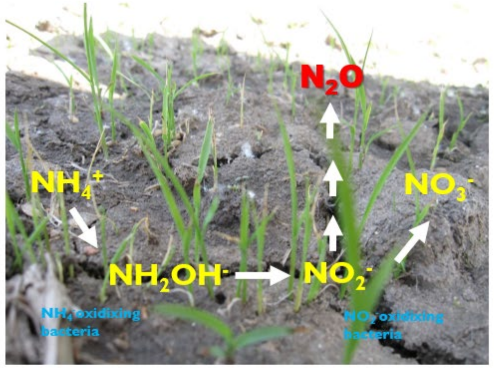
The increase in N_2O emissions was ***exponential*** *when N fertilizer was applied in excess of crop N demand.*

Mitigation Strategies to Reduce GHG Emissions in Row Cropping

1. 4R N management (source, rate, timing, placement)
2. Nitrification (and urease?) inhibitors
3. Biological nitrification inhibition
4. Crop diversification – crop rotations
5. Irrigation water management
6. Crop varieties
5. Plant growth promoting microbes

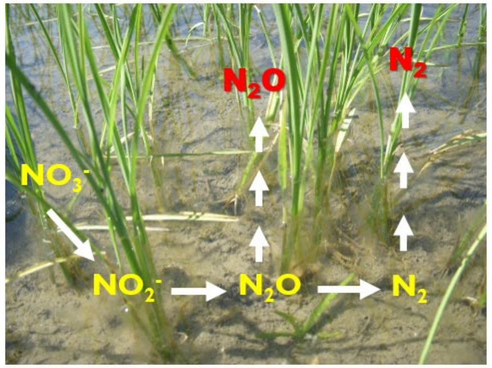
Mitigation Strategies to Reduce GHG Emissions: Challenges

aerobic



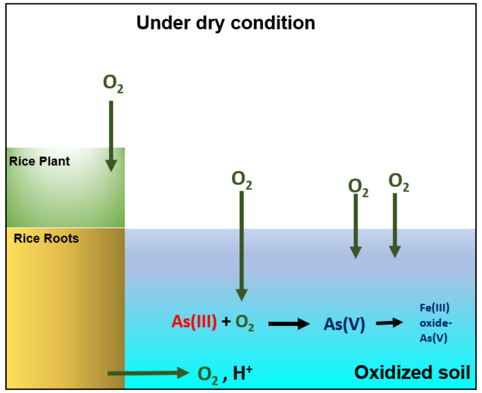
***Nitrification** is oxidation of ammonium to nitrite and subsequently to nitrate*

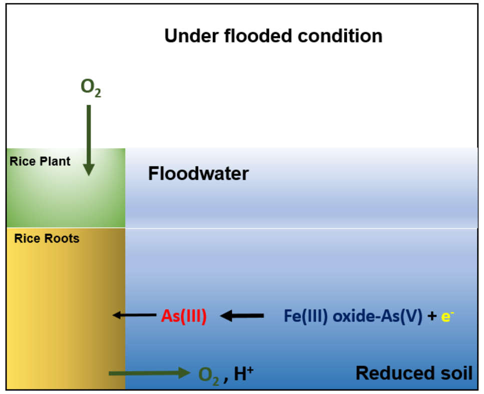
anaerobic



***Denitrification** is the reduction of nitrate to N_2 gas*

Processes causing Arsenic (As) uptake from flooded rice fields





As(V) = less mobile and thus less bioavailable for uptake and incorporation in to the rice grain

1. GHG emissions are produced under different microbial/crop controls and processes but which occurring simultaneously in soils.

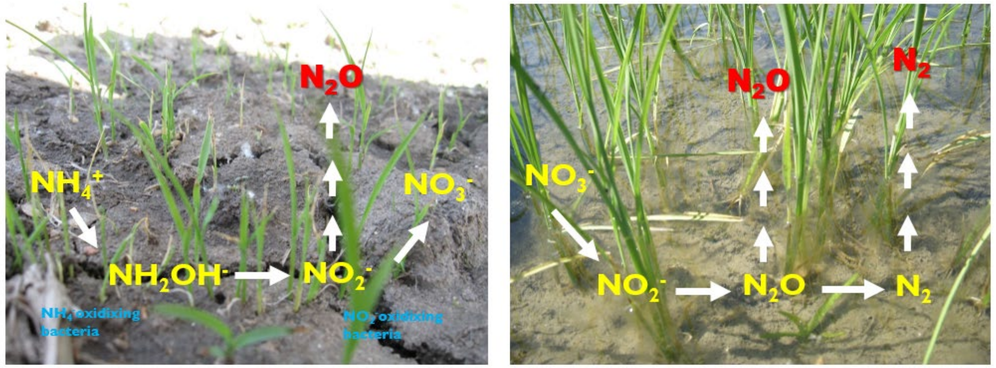
2. Emissions from soils are highly variable in time and space hence difficult to accurately estimate using commonly used practice.

3. N loss through leaching, runoff and volatilization and converted to N_2O offsite is difficult to measure (*indirect N_2O emissions).*

Mitigation Strategies to Reduce GHG Emissions: Challenges

aerobic

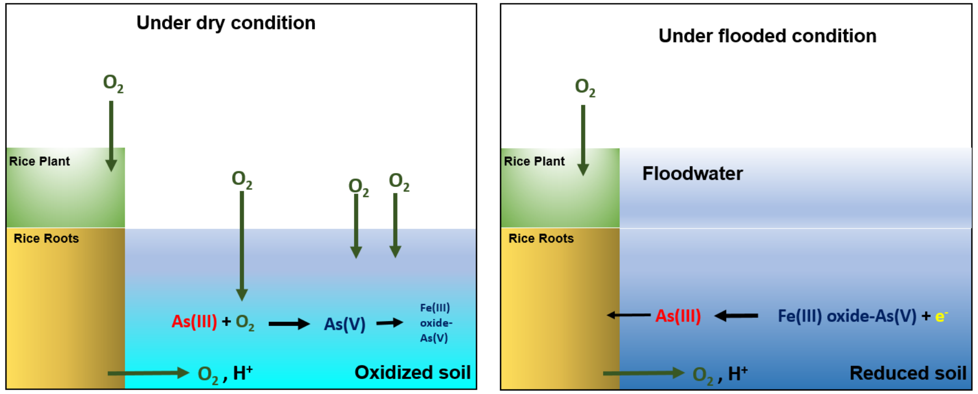
anaerobic



Nitrification *is oxidation of ammonium to nitrite and subsequently to nitrate*

Denitrification *is the reduction of nitrate to N_2 gas*

Processes causing Arsenic (As) uptake from flooded rice fields



As(V) = less mobile and thus less bioavailable for uptake and incorporation in to the rice grain

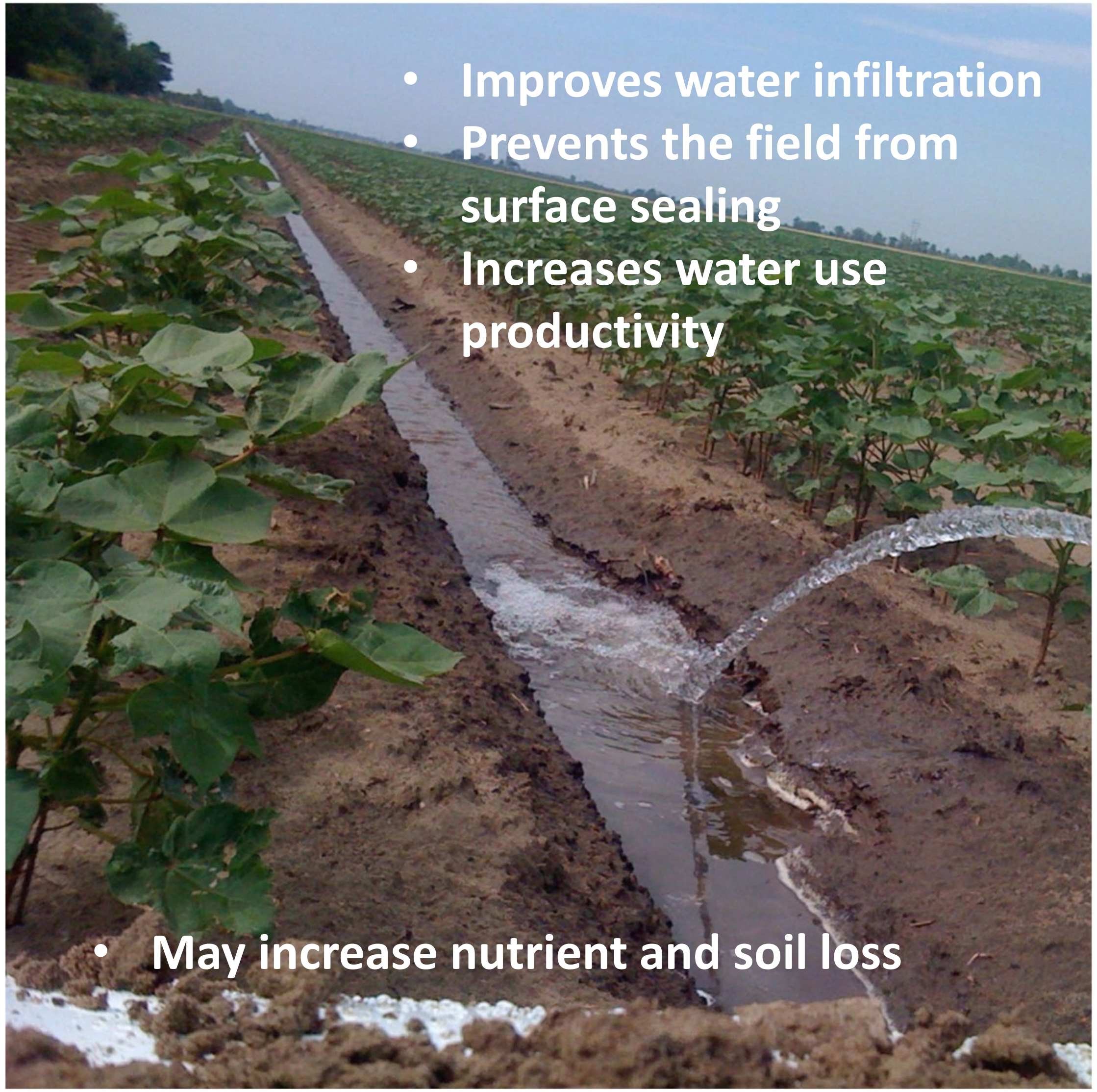
4. GHG emission models are often substantially different and the reasons for this are uncertain.

5. Many GHG mitigation strategies are available, but their efficacy varies by location and some strategies have tradeoffs with other GHG and crop yield.

6. Multiple mitigation practices are likely needed in some fields (i.e., irrigation, N addition, crop rotation).

Arkansas Cotton Production

Arkansas cotton is typically produced using conventional furrow irrigation (roughly 50% of total irrigated fields).



Conservation Management Practices

Minimum tillage

Vegetative buffer strip

Cover cropping

Non-irrigated cropping

Long-Term Field Study

- Judd Hill Foundation Research Farm, Trumann, AR
- Established in 2018
- Collaborative research with Cotton Incorporated in 2020

Four Long-term field treatments

CONVENTIONAL Practice

- **Cultivated**
- **Clear water furrows**
- **Winter fallow**

IRRIGATED

RAINFED

CONSERVATION practice

- **Low furrow tillage**
- **Winter rye cover**
- **Vegetative buffer strip**

IRRIGATED

RAINFED

Objectives of the Study

The overarching goal of this study is to explore the long-term environmental and agronomic impacts of conservation practices on GHG emissions, water use, water quality and yield in irrigated cotton production.

1. Asses the impacts of conservation practices on lint yield under irrigated and non-irrigated cropping.
2. Quantify the seasonal and annual greenhouse gas emissions from conservation practices managed under irrigated and non-irrigated cropping.

Cropping Practices & Irrigation Management

Conservation system:

A. Cover cropping:

- Winter rye (*Secale cereal sp.); 60 lb ac*$^{-1}$ *(55 kg ha*$^{-1}$*)*
- Planting dates: 23 Oct 2018, 1 Oct 2019, 9 Sep 2020
- Termination dates: 30 Mar 2019, 2 Apr 2020
- Chemical rates: 32 oz. Liberty + 40 oz. Roundup at 12-gal water ac^{-1}

B. Vegetative buffer strip:

- Switch grass, Bermuda grass, wild grasses
- Planting dates: early April
- 2 to 3 times moving during growing season

Cropping Practices & Irrigation Management

- RCBD with 3 replications
- Four cropping systems:
  - Conventional, Irrigated vs Rainfed
  - Conservation, Irrigated vs Rainfed
- Cotton cultivar: ST 4946GLB2, Phytogen 300, Phytogen 360 W3FE
- Soil type: Dundee silt loam
- N fertilizer rate: 101 kg N, 92 kg P and 92 kg K ha^{-1}
- Irrigation application: 6 times (irrigated)
- Rainfed: 22-24 times rain (2-3 heavy rain) during growing season; 27-35 times rain (2-6 heavy rain) during fallow
- Measurements:
  - Lint yield
  - CO_2, N_2O, CH_4 fluxes
  - Water quality of surface runoff : pH, EC, Turbidity, soluble N and P, TSS, SSC, hardness and alkalinity

Measurements of Field CO_2, N_2O, & CH_4 Emissions

- **30.5 cm diameter vented flux chamber**

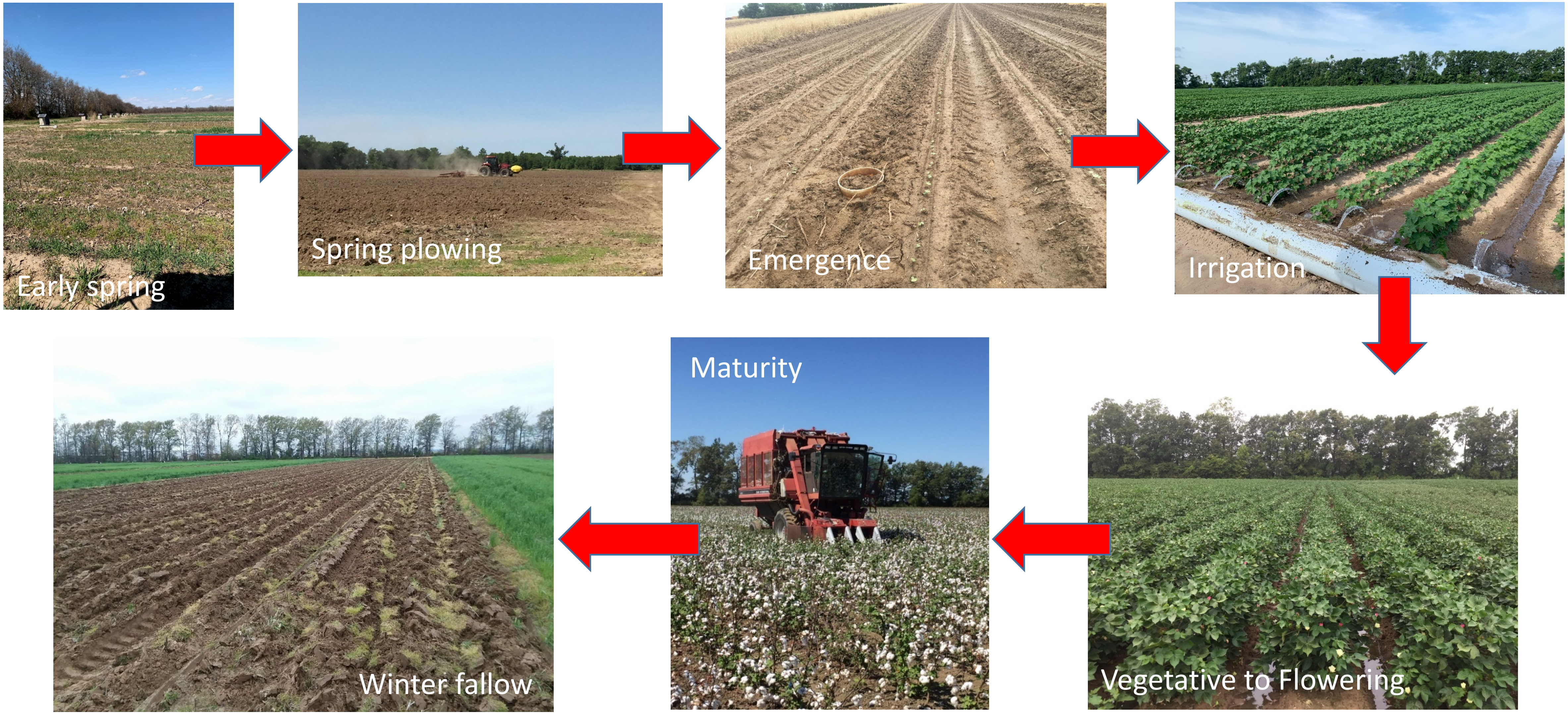
- **Base (permanently installed)**
- **Chamber lid (vent tube, fan, thermocouple)**

- **12 mL gas vial double sealed with silicon**
- **Multi-point valves GC-2014 gas chromatograph with a ^{63}NI ECD, TCD, and FID detectors**

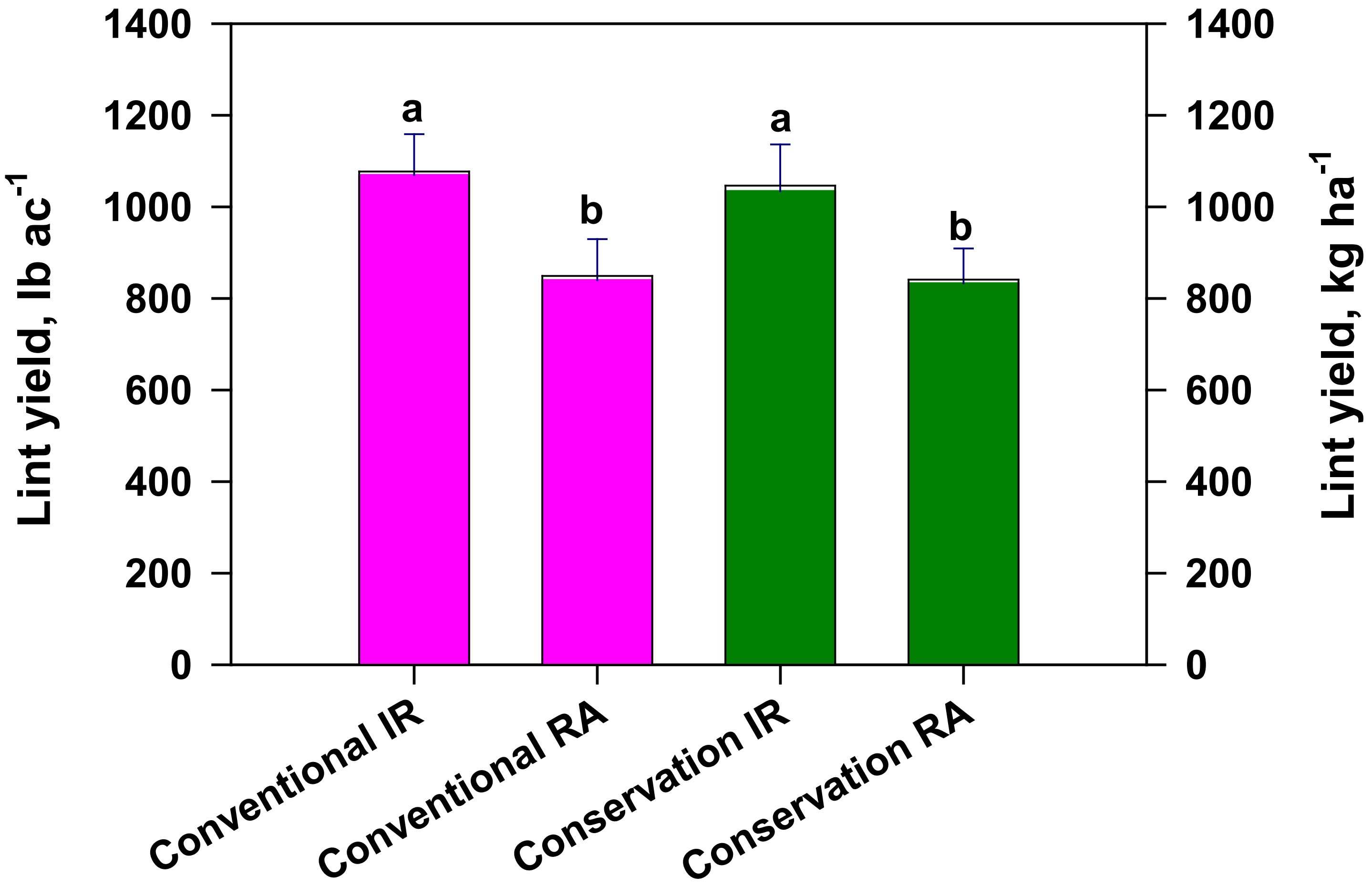
Flux chamber method:

- Within and between rows chamber
- 5 data points for GHG flux estimate
- Seasonal and annual emissions
- daily to weekly gas sampling (event-related emissions i.e., plowing, irrigation/rain, N fertilization)

Cotton Cropping



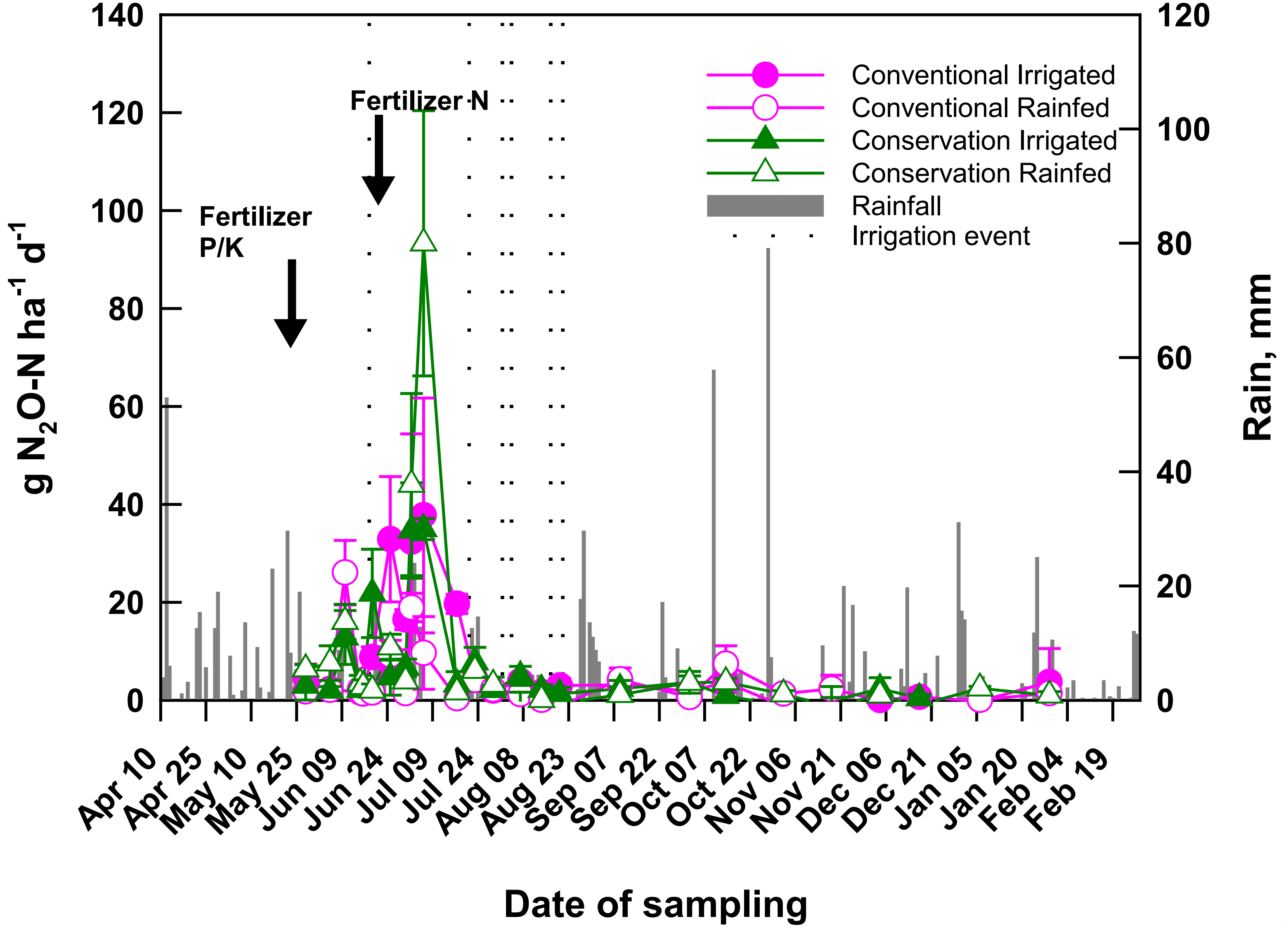
Average Lint Yield



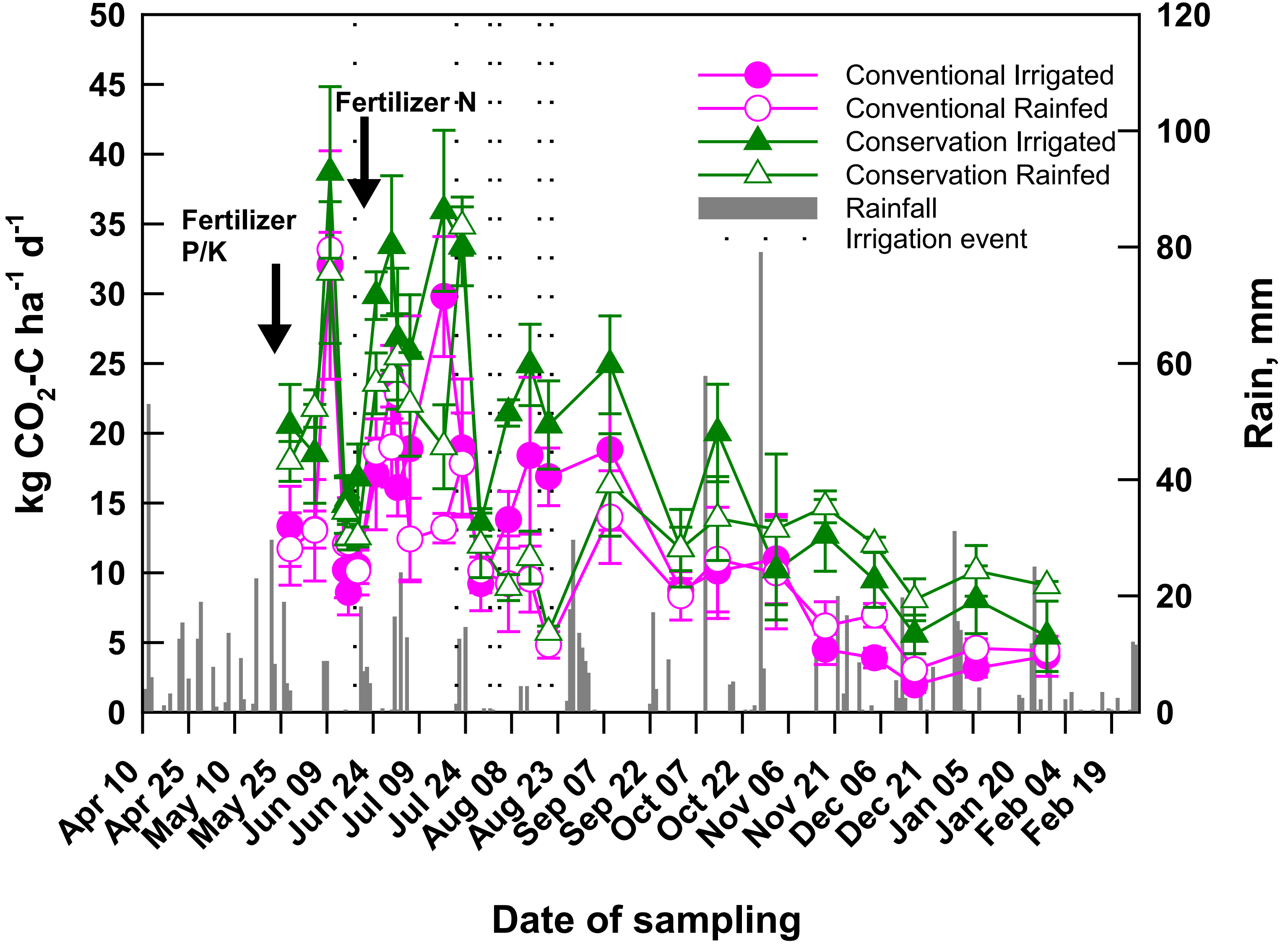
19-21% average lint yield difference between irrigated (IR) and rainfed (RA) systems

Lint yield values following same letter are not significant at P-level <0.05.

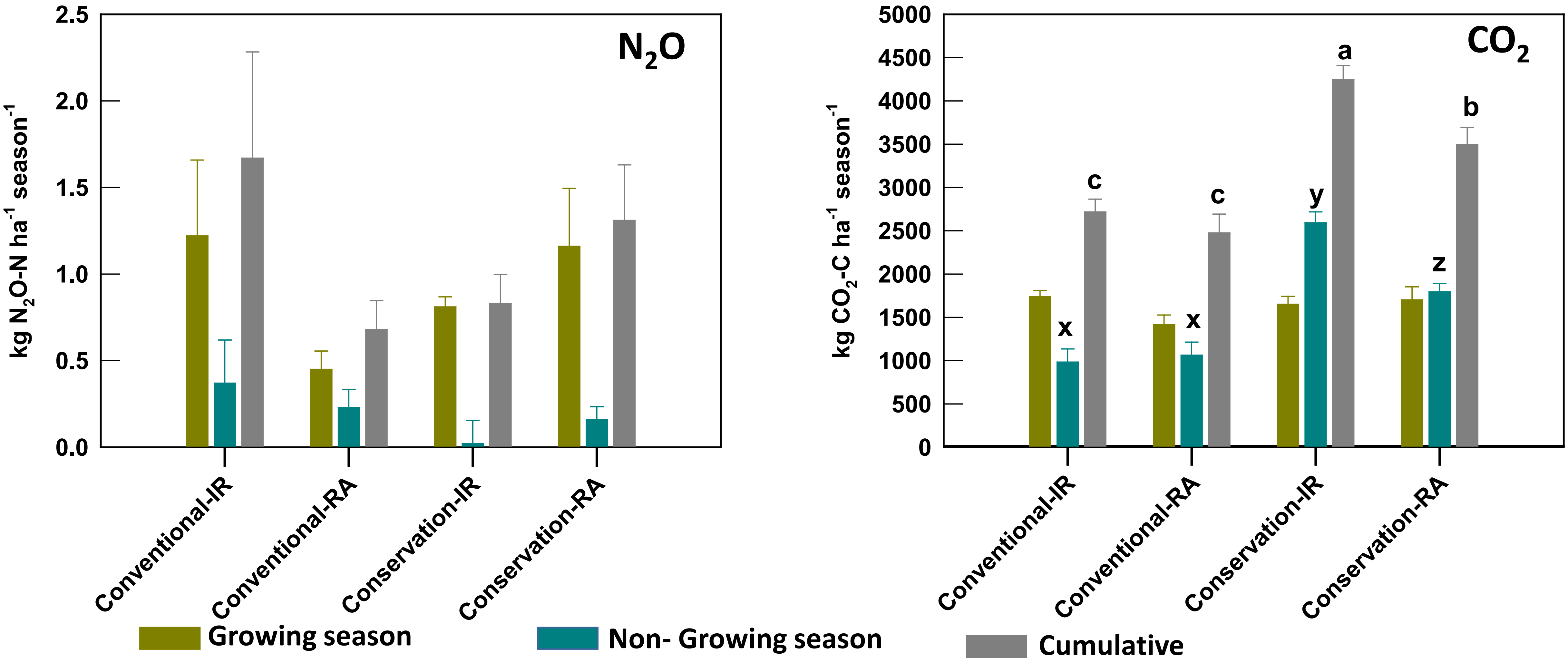
N_2O Emission Profiles in the Four Cropping Systems: May 2020-Jan. 2021



CO_2 Emission Profiles in the Four Cropping Systems: May 2020-Jan. 2021



Seasonal N_2O & CO_2 Emissions in the Four Cropping Systems



Seasonal GHG emissions followed by similar letter are not significantly different at *P*-level <0.005.

Growing Seasonal N_2O & CO_2 Emissions in the Four Cropping Systems

Cropping systems	N_2O emissions	CO_2 emissions	Global Warming Potential
	kg CO_2eq ha^{-1} $season^{-1}$	kg CO_2eq ha^{-1} $season^{-1}$	kg CO_2eq ha^{-1} $season^{-1}$
Conventional - Irrigated	509*a*	6366*a*	6875*a*
Conventional - Rainfed	186*a*	5182*a*	5368*a*
Conservation - Irrigated	337*a*	6056*a*	6393*a*
Conservation - Rainfed	482*a*	6239*a*	6721*a*

Seasonal GHG emissions followed by similar letter are not significantly different at *P*-level <0.005.

Metrics to Measure Global Warming Potentials (GWP): Area-Scaled vs. Yield-Scaled

$$\boldsymbol{Area - scaled\ GWP}$$

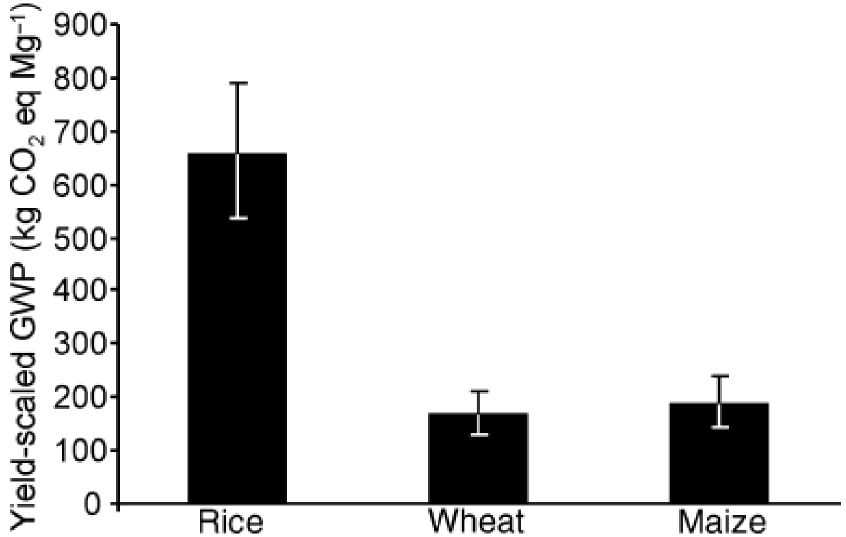
$$= \frac{Total\ N_2O, CH_4, and\ CO_2\ emissions, CO_2\ equivalent}{Total\ area\ covered, ha}$$

$$\text{GWP} = \frac{CO_2\ equivalent}{ha}$$

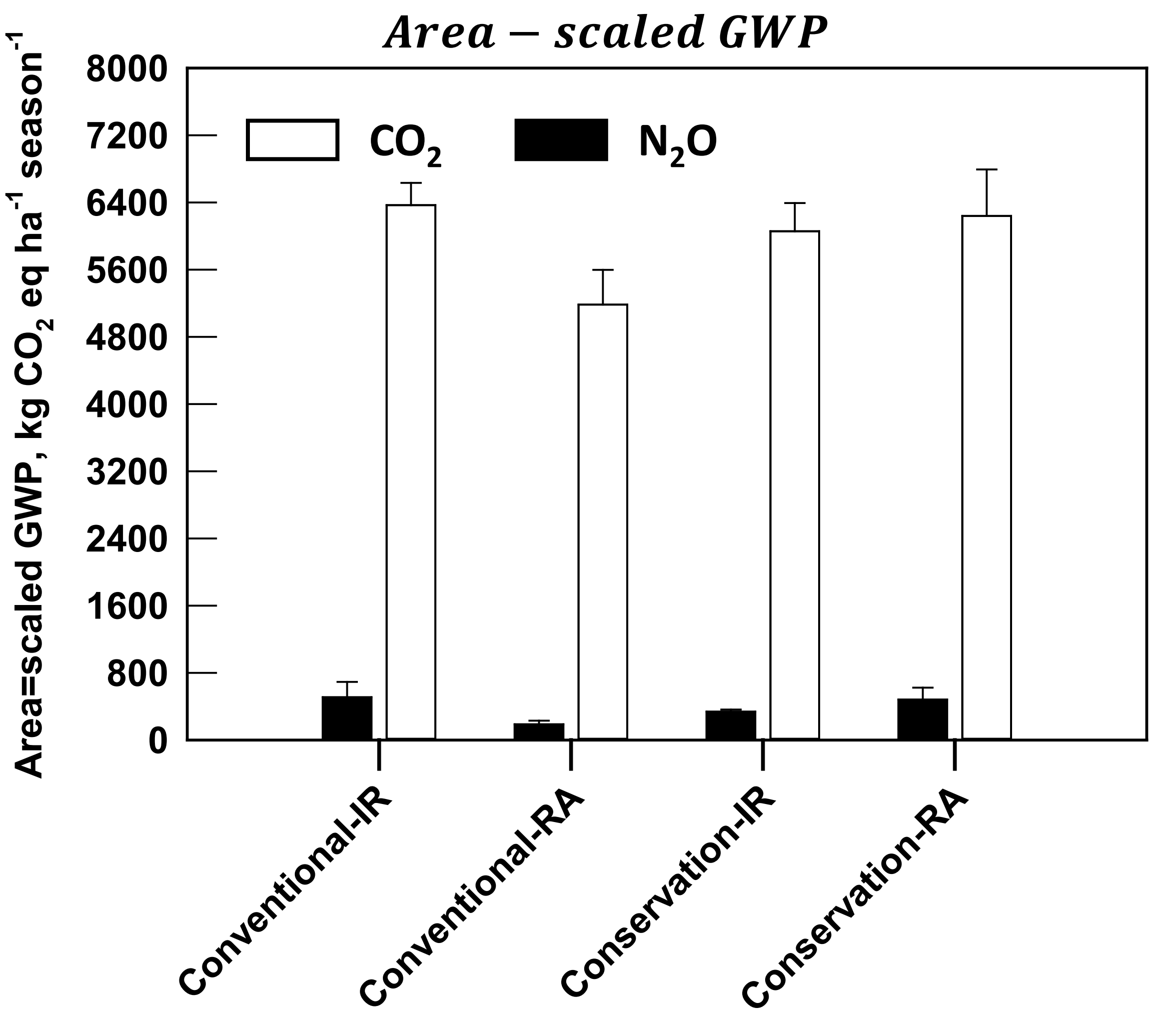
$$\boldsymbol{Yield - scaled\ GWP}$$

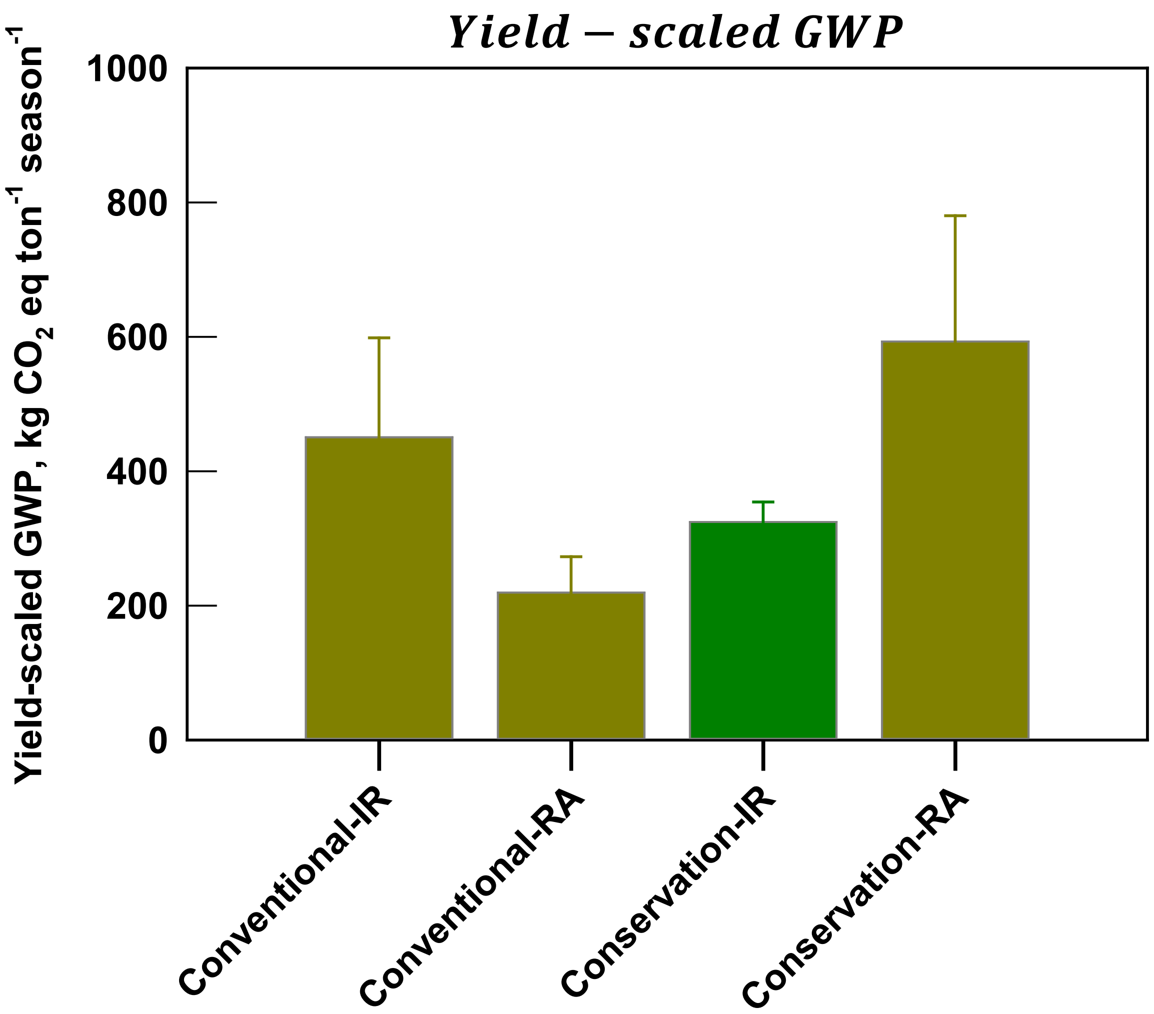
$$= \frac{Total\ N_2O, CH_4, and\ CO_2\ emissions, CO_2\ equivalent}{Crop\ yield\ per\ hectare}$$

$$\text{GWP}_Y = \frac{CO_2\ equivalent}{ton}$$



Global Warming Potential of N_2O & CO_2 Emissions in the Four Cropping Systems





Global & US N_2O Emission Datasets in Crops

Crop	N_2O emissions kg N/ha/year	References
Row crops	<1 – 10	Maaz et al. 2021. Global Change Biology. 27:2343–2360
Vegetables	<1 – 25	Maaz et al. 2021. Global Change Biology. 27:2343–2360
Rice	<5	Maaz et al. 2021. Global Change Biology. 27:2343–2360
Other cereals	<1 – 28	Maaz et al. 2021. Global Change Biology. 27:2343–2360
Cotton – Arkansas	0.5 – 1.7	This study
Cotton – Texas	0.006 – 2.83	Bronson et al. 2018. J Environ. Qual. 47:70-78
Cotton – Tanzania	0.191 – 1.15	Bwana et al. 2021. Sci. Total Environ. 147301 p.
Cotton – Australia	0.510 – 10.6	Peter Grace et al. 2016. Soil Res. 54: 598-603
Cotton – China	0.072 – 0.51	Kuang et al. 2018. Field Crops Res. 229:17-29

Yield-Scaled GWP of N_2O & CH_4 Emissions in Agriculture

Crops	Location	Yield-scaled GWP of N_2O and CH_4 kg CO_2 eq per ton yield	Reference
Cotton	Arkansas, US	397	Adviento-Borbe et al. 2021 (*this study)*
Rice	China Thailand Philippines	2240 1083 636	Shang et al. 2010 Towprayoon et al. 2005 Bronson et al. 1997
Maize	Nebraska, US Japan Malaysia	75 76 425	Adviento-Borbe et al., 2005 Yan et al., 2001 Khalil et al., 2002
Wheat	Germany China	228 414	Russer et al. 2001 Wei et al., 2010
Free stall barn Dairy cow operation*	Idaho, US Pennsylvania, US Texas, US	6135 68 1851	Leytem et al., 2012 Adviento-Borbe et al., 2010 Borhan et al., 2011

*unit is expressed as kg CO_2eq per cow per year

Summary

- Lint yields were similar in conservation and conventional systems however, yields were reduced under rainfed irrigation management.
- N_2O and CO_2 emissions during the growing season mainly constitute total GHG emissions.
- N_2O emissions were influenced by fertilizer N application and irrigation/rainfall during the growing season. CO_2 emissions were influenced by soil organic C.
- Contributions of growing season N_2O and CO_2 emissions were 18% and 48% of the total GHG emissions.
- Yield-scaled GHG emissions in cotton were within the ranges of GHG emissions of row crops.
- The success of conservation strategy depends on the overall performance of the cropping practice in a production farm, hence integrated farming should focus on all aspects of cropping systems.

Cotton Incorporated (Project No.:20-213)

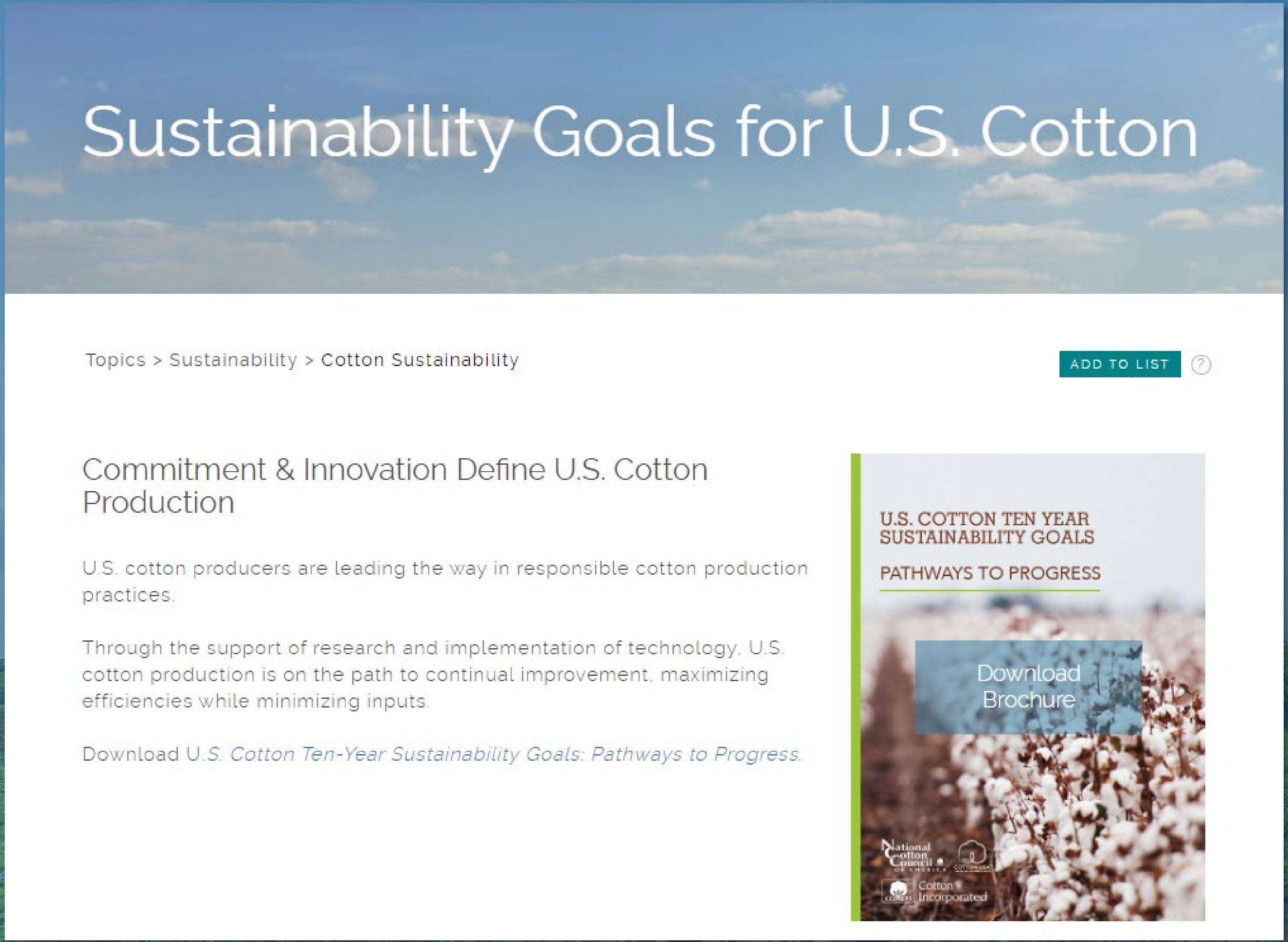
University of Arkansas System Division of Agriculture (USDA National Institute of Food and Agriculture: Project ARK02355)

College of Agriculture, Engineering and Technology, Arkansas State University

cottonworks™

Pathways to Progress

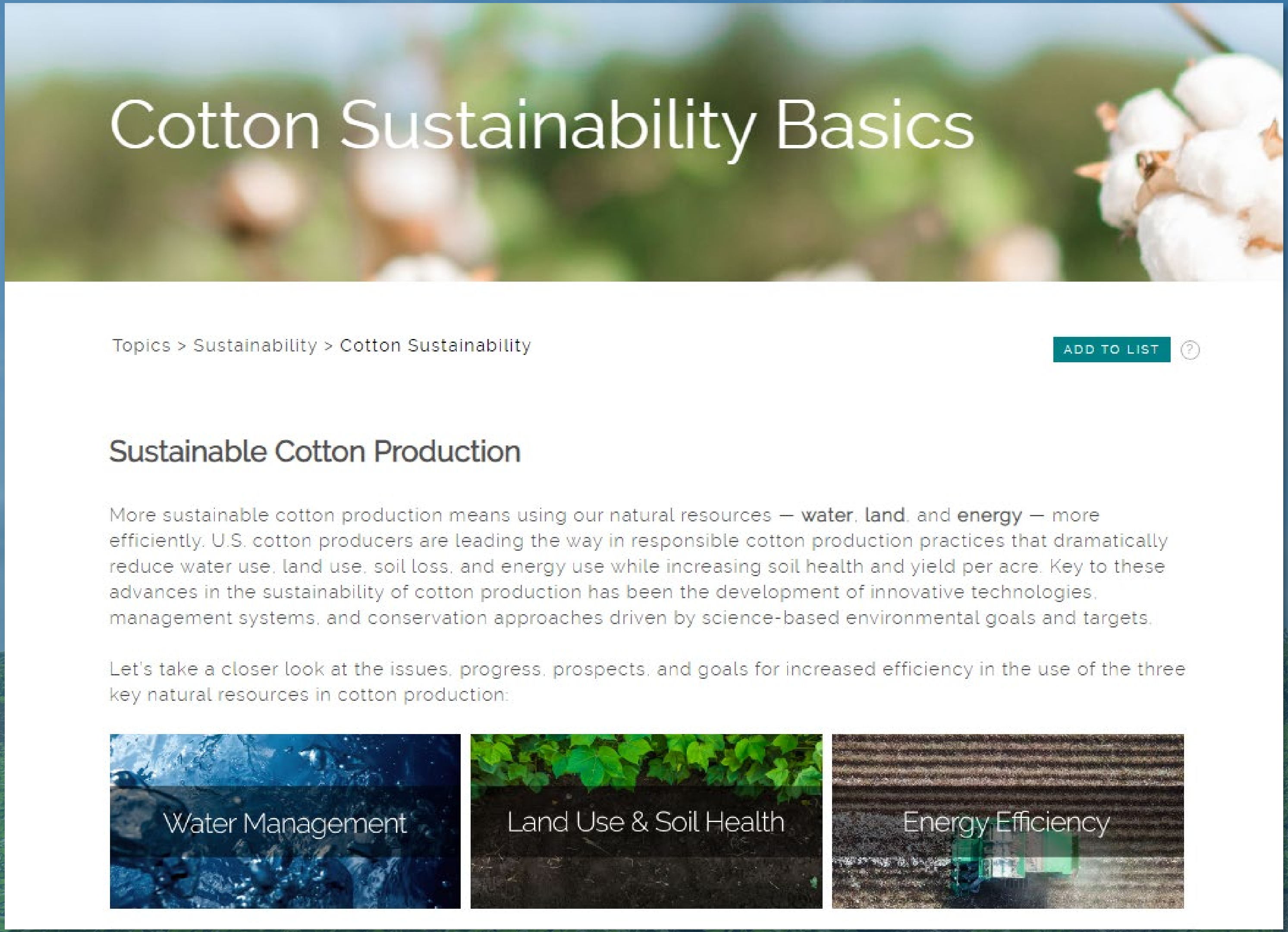
Reducing Climate Impacts in Agriculture



Sustainability Goals for U.S. Cotton

U.S. cotton producers are leading the way in responsible cotton production practices.

Learn more at **cottonworks.com/ sustainability-goals-us-cotton**


Cotton Sustainability Basics

Topics > Sustainability > Cotton Sustainability

ADD TO LIST

Sustainable Cotton Production

More sustainable cotton production means using our natural resources — **water**, **land**, and **energy** — more efficiently. U.S. cotton producers are leading the way in responsible cotton production practices that dramatically reduce water use, land use, soil loss, and energy use while increasing soil health and yield per acre. Key to these advances in the sustainability of cotton production has been the development of innovative technologies, management systems, and conservation approaches driven by science-based environmental goals and targets.

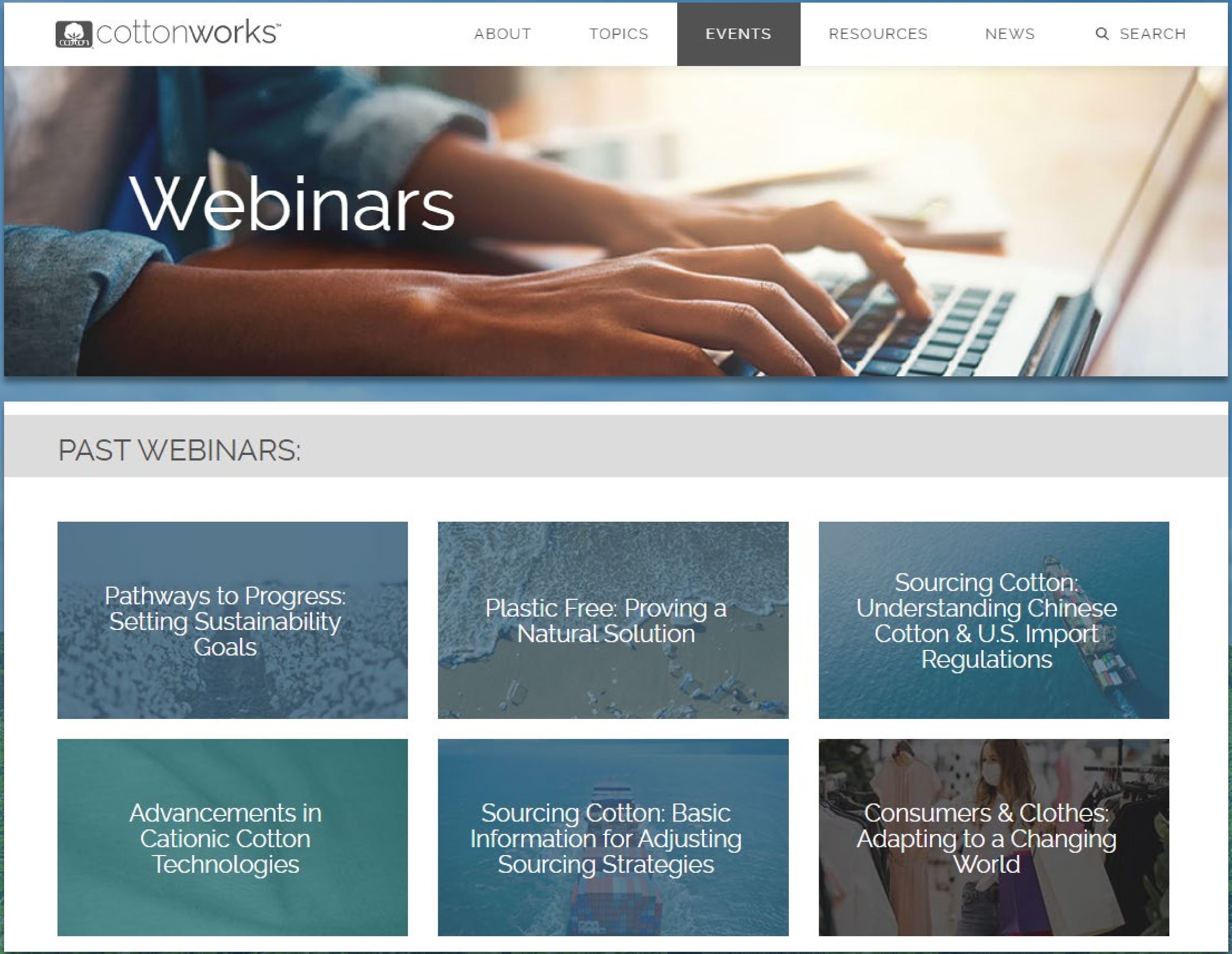
Let's take a closer look at the issues, progress, prospects, and goals for increased efficiency in the use of the three key natural resources in cotton production:

Cotton Sustainability Basics

Learn more about the issues, progress, prospects, and goals for increased efficiency in the use of the three key natural resources in cotton production: **water**, **land**, and **energy**.

Go to **cottonworks.com/ cotton-sustainability-basics**

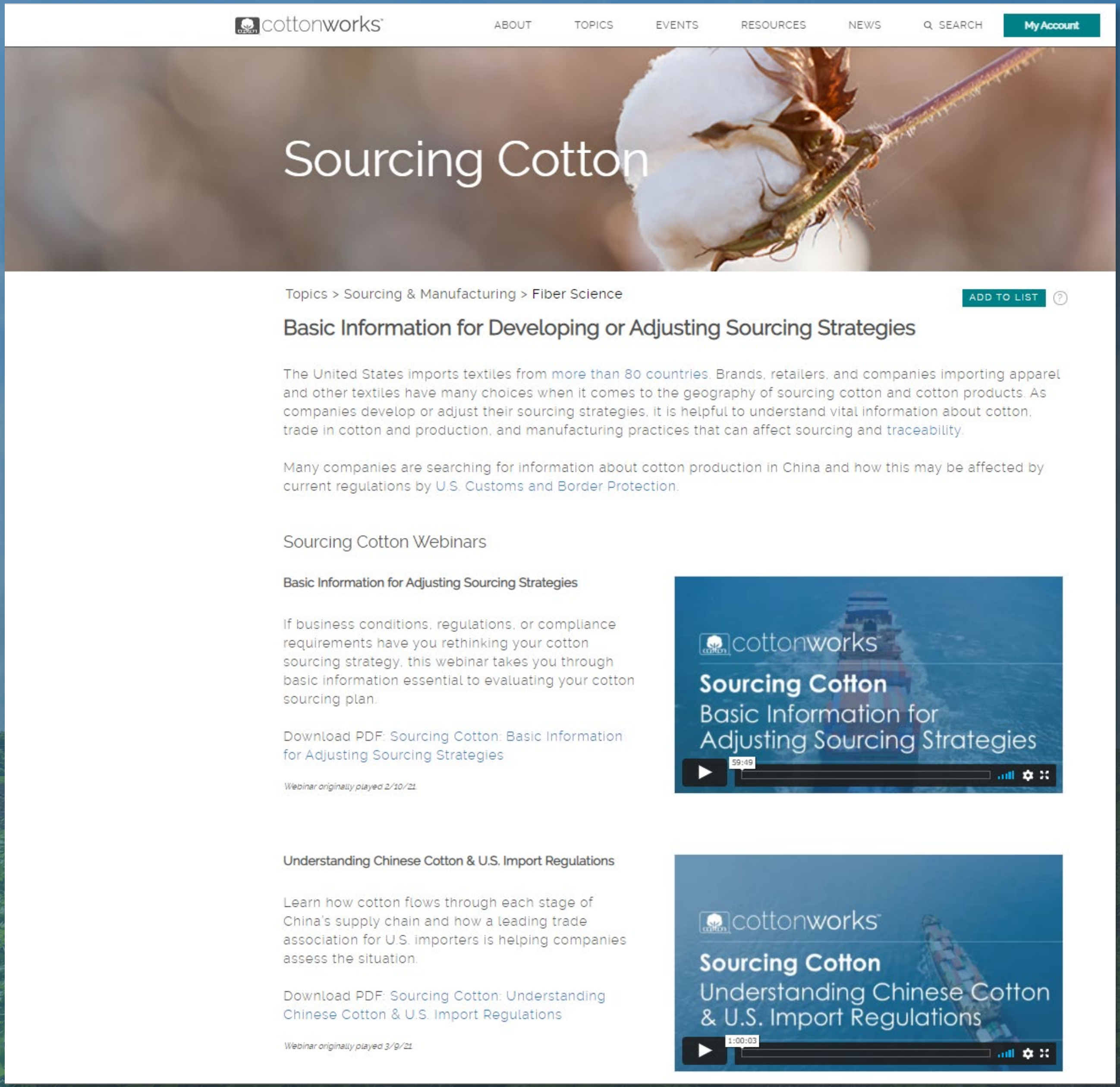
cottonworks™



Interested in sharing this content with a colleague?

Create a free CottonWorks™ account to watch this webinar and past webinars at **cottonworks.com/ webinars**.

Please allow 24-48 hours for this webinar recording to be added.



cottonworks ABOUT TOPICS EVENTS RESOURCES NEWS SEARCH My Account

Sourcing Cotton

Topics > Sourcing & Manufacturing > Fiber Science

ADD TO LIST

Basic Information for Developing or Adjusting Sourcing Strategies

The United States imports textiles from more than 80 countries. Brands, retailers, and companies importing apparel and other textiles have many choices when it comes to the geography of sourcing cotton and cotton products. As companies develop or adjust their sourcing strategies, it is helpful to understand vital information about cotton, trade in cotton and production, and manufacturing practices that can affect sourcing and traceability.

Many companies are searching for information about cotton production in China and how this may be affected by current regulations by U.S. Customs and Border Protection.

Sourcing Cotton Webinars

Basic Information for Adjusting Sourcing Strategies

If business conditions, regulations, or compliance requirements have you rethinking your cotton sourcing strategy, this webinar takes you through basic information essential to evaluating your cotton sourcing plan.

Download PDF: Sourcing Cotton: Basic Information for Adjusting Sourcing Strategies

Webinar originally played 2/10/21

cottonworks
Sourcing Cotton
Basic Information for Adjusting Sourcing Strategies
59:49

Understanding Chinese Cotton & U.S. Import Regulations

Learn how cotton flows through each stage of China's supply chain and how a leading trade association for U.S. importers is helping companies assess the situation.

Download PDF: Sourcing Cotton: Understanding Chinese Cotton & U.S. Import Regulations

Webinar originally played 3/9/21

cottonworks
Sourcing Cotton
Understanding Chinese Cotton & U.S. Import Regulations
1:00:03

cottonworks.com

cottonworks

cottonworks™

Pathways to Progress

Reducing Climate Impacts in Agriculture

Submit all final questions now using the Q&A feature.

Please take our brief survey on today's presentation prior to exiting the webinar.