U.S. Sorghum Assurances Protocol

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U.S. GRAINS & BIOPRODUCTS COUNCIL

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Introduction

Over the past decade, requirements for food, feed, and fuel supply chains have significantly expanded in both domestic and international markets. These requirements often encompass a wide range of factors related to inputs, ingredients, and feedstocks. In addition to compliance-focused conservation metrics, new criteria often include aspects such as a product's impact on climate change (e.g., greenhouse gas emissions), risk of deforestation, effects on soil health and biodiversity, and social factors such as labor rights and the prohibition of child labor within supply chains.

Background

The U.S. sorghum industry, represented by the United Sorghum Checkoff Program (USCP), seeks to lead in the development of standardized guidelines to effectively capture the comprehensive regulatory framework and best practices that drive sorghum production and its positive impact across social, economic and environmental spheres. By providing both domestic and international supply chain partners with clear information and tools, the U.S. sorghum industry seeks to:

1. Provide a baseline assessment of the robust laws, regulations, and best practices that U.S. sorghum growers follow in the U.S., allowing stakeholders to more easily assess and validate that U.S. origin sorghum can meet the highest industry and public standards that determine market access criteria in existing markets
2. Allow current and potential users of U.S. sorghum across various industries and geographies, to better understand and capture how sorghum can be integrated as a sustainable input across food, feed, and even fuel supply chains in developed and emerging markets

The Checkoff is a producer-funded organization dedicated to improving the sustainability of the sorghum industry through research, promotion and education. The mission of the Checkoff "commits to reveal the potential and versatility of sorghum through increased shared value."

Representing the U.S. sorghum industry, the Checkoff has developed this protocol in partnership with the U.S. Grains & BioProducts Council (USGBC). As a member-driven organization, USGBC develops export markets for U.S. barley, corn, sorghum, and related products, including distiller's dried grains with solubles (DDGS) and ethanol. Exports play a vital role in global economic development and the profitability of U.S. agriculture, and USGBC supports free and fair trade worldwide through programs in more than 50 countries and the European Union. USGBC works closely with the Checkoff to represent the interests of the more than 20,000 sorghum growers across the U.S.

U.S. sorghum positive production impacts

Sorghum is a sustainable crop by nature, and recent research in the U.S. highlights positive benefits, including water use efficiency, improved soil health from crop residue, and enhanced biodiversity. Supporting statistics show that for:

Water

- Nationally, 91% of sorghum acres are rain fed, which represents 1.5 trillion gallons of irrigation water savings per year.[1]
- Sorghum is recognized as a highly drought-tolerant crop, making it a sustainable choice for water-limited regions.*

Soil health

- Sorghum stalks left standing in the field add nutrients back to the soil, break up soil compaction, help retain moisture, and reduce effects of wind erosion, improving soil health.[2]
- Through breeding innovations, sorghum growers have successfully adopted no-till or minimum-till practices on approximately 75% of sorghum acres – meaning carbon is sequestered for longer and deeper than in most cropping systems.[3]

Environment

- Sorghum improves air quality by removing carbon from the atmosphere and safely storing it in the soil.[4]
- Sorghum reduces greenhouse gas emissions and sequesters carbon. With its dense and robust root structure, sorghum translocates carbon deeper into soils.[3]
- Sorghum also plays a significant role in domestic biofuel markets, which according to EPA resulted in reduced GHG emissions equivalent to removing 17 million cars from the road.[3]
- Sorghum contributes to soil conservation and carbon sequestration, helping reduce greenhouse gas emissions while enhancing soil structure and fertility.

Biodiversity

- Sorghum offers valuable characteristics related to wildlife conservation. Its stalks provide critical habitat and ideal winter cover for pheasants and quail.[5]

*https://www.sciencedirect.com/science/article/abs/pii/0378377495012265

Scope and structure of the Sorghum Assurances Protocol

Through a process informed by stakeholder and subject matter expert engagement, this protocol was developed to serve as a reference for customers and supply chain participants across domestic and international sorghum markets. It establishes clear assurances that serve as a point of reference and help stakeholders understand how the industry is moving to drive alignment towards cohesive and effective efforts to improve economic, social and environmental impacts across the U.S. sorghum industry.

This document is structured into three key sections:

1. A compilation of the various laws and regulations that U.S. sorghum growers comply with, categorized by the social, economic, and environmental impacts associated to crop production; as well as the best practices encouraged by the sorghum industry.
2. A section that defines the specific verified elements of sustainable sorghum production and its assurances to supply chain stakeholders, including the operational definition of sustainable sorghum volumes and the adopted levels of traceability and chain of custody methodologies.
3. A governance section, specifying the Sorghum Assurances Protocol's development process, the bodies/individuals responsible for stewarding it, and the process to review and update it.

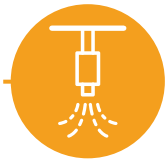
The U.S. Sorghum Assurances Protocol

The Sorghum Assurances Protocol provides an assessment of 13 impact categories associated to U.S. sorghum production and establishes a three-tiered approach for the U.S. sorghum industry to provide stakeholders with assurances of sustainable sorghum volumes. The approach outlined in this document will offer sorghum buyers and export markets insights into U.S. sorghum production's value.

U.S. Sorghum Assurances Protocol Impact Categories

To support cohesion throughout the industry, the U.S. Sorghum Assurances Protocol seeks to align with the impact categories and best practices addressed by internationally recognized sustainability standards and schemes, mapping the U.S. regulation and compliance criteria relevant to U.S. sorghum production for each impact category.

Irrigation water use



Continuous improvement goals:

- **Continued improvement in irrigation water use efficiency and c onservation on U.S. cropland.**
- **Improved regional water quality through reduction in sediment, nutrient and pesticide loss from U.S. cropland.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are expected to protect the quality and supply of surface and ground water by utilizing best management practices, including the development of an irrigation plan that:
    a. Optimizes water use according to plant needs
    b. Prevents pollution
    c. Includes a record of water usage
2. Growers are encouraged to use a written water management plan to record analysis results, availability of water resources, and irrigation scheduling.
3. Growers utilize additional best practices that:
    a. Monitor and manage water quality
    b. Manage wastewater to prevent pollution
    c. Establish buffer zones and adopt working practices to prevent run-off of any inputs
    d. Take measures to control erosion
4. Growers are expected to be fully aware and comply with all guidelines and regulations with respect to water extraction, use, and treatment following local, state, and federal regulation to:
    a. Optimize irrigation and comply with all applicable water conservation efforts in their irrigation districts to ensure effective and equitable allocation of water resources
    b. Adopt appropriate conservation tillage methods to reduce water runoff and increase infiltration
    c. Have a risk assessment for the frequency and timing of water analysis and the tolerance limits for potential contaminants
    d. Implement best management practices to reduce phosphorus (P) and nitrogen (N) loss and transport, including:
        i. Balancing P and N inputs with outputs
        ii. Using proper application rates, methods, and timing for P and N application, in line with the 4R principles of nutrient management (right source, right rate, right time, right place) or other nutrient management methodologies
        iii. Using cover crops, terracing, strip cropping, contour farming, filter strips, conservation buffers, and other management and structural conservation practices suited to the farm to minimize erosion runoff and P and N transport
5. Irrigation methods used by growers are expected to balance farm economics and water efficiency for optimum performance.

6. The method of irrigation used optimizes the irrigation system, based on water sources; local conditions; regulations and laws; results of soil assessments; and the theoretical needs of the relevant crop.
7. Growers are required to comply with U.S. Clean Water Act Law 40 parts 116–117 which regulate discharges of designated hazardous substances. Facilities must immediately notify the National Response Center and state agencies of any unauthorized discharge of reportable quantity of designated hazardous substance into navigable waters, the shorelines of navigable waters, and contiguous zones. Discharge of harmful quantities of oil must also be reported immediately.[6]
    a. Watersheds with stream reaches with demonstrated water quality concerns are listed by each state government on the U.S. EPA Clean Water Act 303(d) list.
    b. State governments may require monitoring under Clean Water Act section 319 to ensure the implementation of best management practices and to determine how conservation measures affect water quality.
    c. Growers comply with National Pollutant Discharge Elimination System (NPDES) requirements on discharges of biological pesticides, and chemical pesticides that leave a residue, into waters of the U.S.[7]
8. Growers are required to comply with Section 404 of the Clean Water Act regarding agricultural impacts on wetlands.[8]
9. Growers are required to comply with Safe Drinking Water Act to protect public health by preventing contamination of surface and ground sources of drinking water.[9]

Nationally, ***91%*** *of sorghum acres are rain fed, which represents* ***1.5 trillion*** *gallons of water.*

10. Growers participate in and abide by applicable state statutes and regulatory systems that allocate water rights for agricultural activities, which vary across each state of the U.S.[10]
11. Growers identify and implement measures conducive to appropriate water stewardship in accordance with local farming conditions.
    a. Growers implement structural and nature-based solutions such as terraces, grass waterways, buffer strips, ponds, and lakes on their land as appropriate, and in accordance with regulations, to reduce soil erosion and runoff, and optimize water use for their crops.
    b. Growers apply the harvesting of surplus rainwater and the recycling of greywater, where possible and appropriate.
    c. Growers implement best practices in the management of field margins, boundaries, and watercourses to preserve wildlife habitats and reduce agrochemical impacts.
12. Growers record and report their irrigation practices to the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) through the Irrigation and Water Management Survey[11]. Additionally, growers also abide by state-level irrigation reporting requirements, which vary in terms of thresholds, frequency, and means of submission.
13. Growers voluntarily adopt on-farm best practices in water use, implement irrigation management plans where appropriate, and participate in federal government technical assistance programs that target increased efficiency in water use and irrigation[12]. These programs include research, monitoring and water consumption reporting; the implementation of best management practices in areas such as on-farm water conveyance, application methods, and irrigation scheduling; and the adoption and adequate servicing and maintenance of the appropriate irrigation equipment technology for each farm.

Energy use

Continuous improvement goal:

- **Continued improvement in energy use efficiency.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are encouraged to implement methods to improve energy efficiency by:
    a. Reducing energy usage through conservation tillage methods, as appropriate
    b. Optimizing nitrogen (N) and phosphorus (P) fertilizer use and application
    c. Monitoring and reducing fossil fuel use for management records and to increase enterprise viability
        i. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) maintains four energy tools to increase awareness and help farmers identify energy reduction potential in their operations. The estimators can be used to estimate potential energy savings for irrigation, nitrogen fertilizer use, grain drying, and tillage systems.[13] The NRCS also maintains energy conservation tools to help farmers estimate current energy usage and calculate energy and cost savings that could be achieved through the use of high efficiency equipment and energy conserving practices, and renewable energy tools to help farmers estimate energy production potential from solar panels, wind turbines, and biogas.[14]
    d. Utilizing renewable energy resources, when possible, to reduce fossil fuel use
2. Growers adopt precision farming techniques as appropriate utilizing global positioning system (GPS) and other advanced technologies to optimize fossil fuel use and fertilizer application.
3. Growers use USDA-NRCS tools and resources to plan and implement energy-efficient practices.[15] These include AgEnergy Management Plans (AgEMPS), which help to identify and prioritize energy conservation opportunities on a farm; and online tools such as the Energy Estimator, which allows farmers to estimate the energy use and costs of different farming activities, such as crop irrigation, tillage, nitrogen use, and animal housing.[16]

Land use

Continuous improvement goal:

- **Improved productivity on U.S. croplands.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. U.S. sorghum is not produced on wetlands or on peatland.
    a. Growers are in compliance with U.S. Code of Federal Regulations, Title 16—Conservation, chapter 58—erodible land and wetland conservation and reserve program.[17]
        i. Wetland is defined as an area that: has a predominance of hydric soils; is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of water tolerant vegetation typically adapted for life in saturated soil conditions.
        ii. USDA Natural Resources Conservation Service (NRCS) makes and keeps records of wetland determinations, which remain in effect as long as the land is used for agricultural purposes. Growers are provided with copies of this information from their local USDA office.
        iii. Growers planning to make changes which could impact wetlands must notify USDA for a technical determination before proceeding.
        iv. Growers file Form AD-1026[18] with the USDA Farm Service Agency (FSA) certifying adherence to Highly Erodible Lands Conservation and Wetland Conservation provisions.
    b. Growers are required to maintain compliance with wetland conservation regulations by not draining or converting wetlands.
    c. Growers are required to follow applicable state laws that prohibit changing peatland without a regulated permit.
    d. Growers are required to not plant on a converted wetland.
    e. Growers cannot convert a wetland to make possible production of agricultural commodity.
    f. Growers are required to follow Section 404 of the Clean Water Act regarding agricultural impacts on wetlands.[19]
    g. The USDA Farmable Wetlands Program provides rental payments to growers for restoring and establishing plant cover on wetlands and wetland buffer zones that were previously farmed.[20]
    h. The NRCS Wetland Reserve Easements program[21] enrolls croplands that were formerly wetlands and restores them to their natural wetland condition in either 30-year or permanent easements.
2. U.S. sorghum is not produced on highly biodiverse grassland (native grasslands). The USDA Grasslands Conservation Reserve Program (CRP) provides rental payments and cost-share assistance to enrolled growers to maintain and protect grassland, including rangeland and pastureland, with an emphasis on plant and animal biodiversity.

3. Primary forest or continuously forested land will not be converted to land for future sorghum production.
    a. Growers are required to follow U.S. laws regarding conversion of primary forests to other uses. Use or occupancy of national forest system land is prohibited without special-use authorization.[22]
    b. Growers are required to follow U.S. laws prohibiting the use, occupancy, or conversion of public lands designated as national forests or national grasslands.
    c. The NRCS Healthy Forests Reserve Program provides owners with 10-year restoration agreements and 30-year or permanent easements for conservation actions intended to improve biological diversity, increase carbon sequestration, or help threatened or endangered species.[23] Forestland that is part of a working farm or ranch can also be protected by permanent easements in the NRCS Agricultural Easement Program.[24]
    d. For more than 100 years, the amount of forested land in the U.S. has stayed relatively constant.[25]
4. The aforementioned commitments to the conversion of primary forests or continuously forested land for future sorghum production, to the production of sorghum on wetlands or peatland, and to self-auditing under the highly erodible lands and wetland conservation provisions, are applicable since January 2016.
5. U.S. sorghum is not produced on designated protected areas.
    a. Growers follow U.S. laws that prohibit the production of sorghum on land under federal protected status, land designated wilderness or research natural areas, protected land in national forests and grasslands, and land in the national landscape conservation system.
    b. Growers follow U.S. laws that prohibit production of sorghum on land protected by the National Park Service.
6. Growers participate in federal programs that restore environmentally valuable or low productivity areas to natural habitat, as well as in Farm Bill conservation programs that help restore natural habitats, including:
    a. Conservation Reserve Programs (CRP), in which temporary changes in land use or management are implemented to achieve environmental benefits; and
    b. Healthy Forests Reserve Programs (HFRP), in which landowners implement voluntary 10-year, 30-year, or permanent land-restrictions for specific conservation actions that promote the recovery of endangered or threatened species, improve plant and animal biodiversity, and enhance carbon sequestration.

Growers utilize tools to estimate the energy use and costs of farming activities.

Greenhouse gas (GHG) footprint

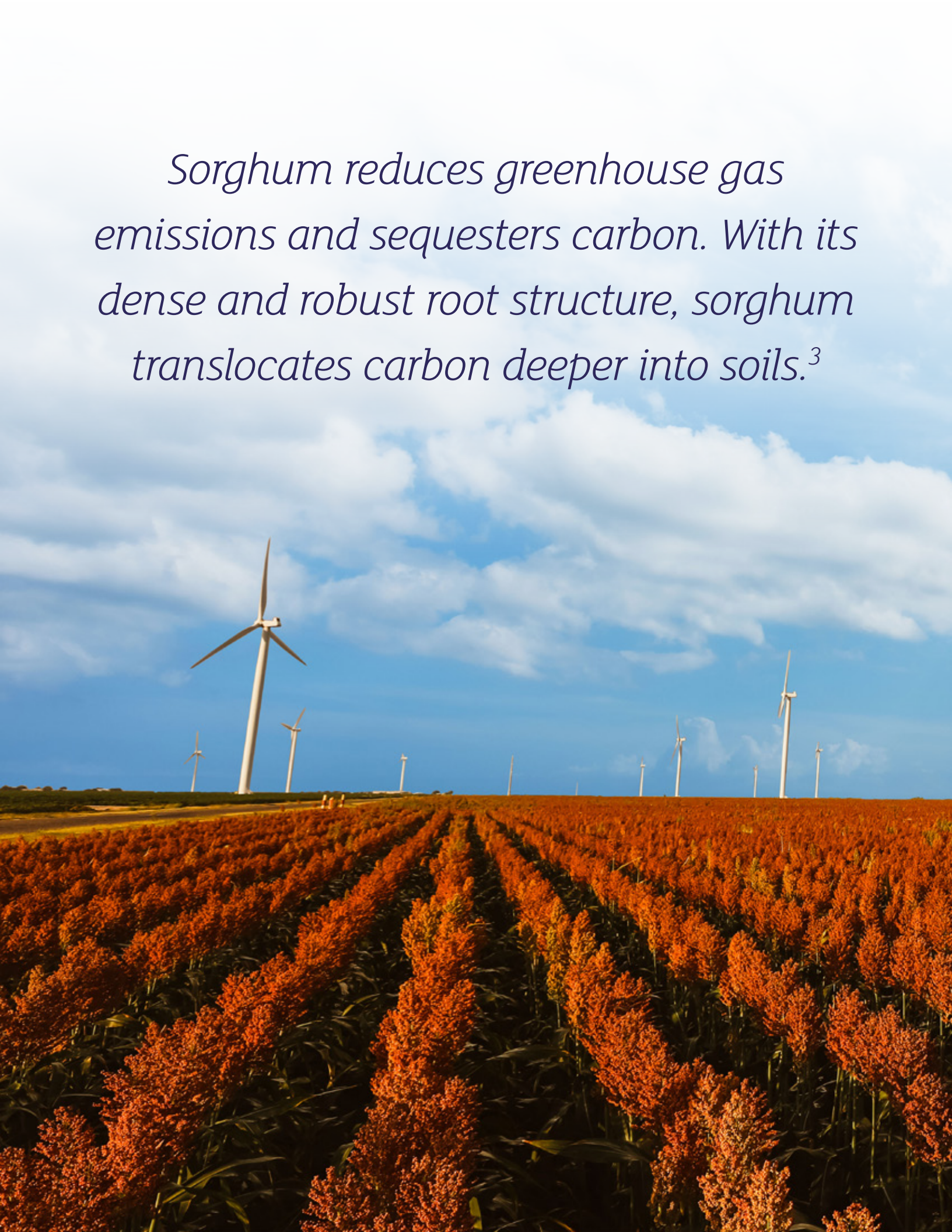
Continuous improvement goals:

- **Reduced emissions from U.S cropland per unit of output.**
- **Sustained contribution to reducing the overall greenhouse gas emissions from the agricultural landscape.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers strive to implement methods to minimize GHG emissions by:
    a. Reducing energy usage through conservation tillage methods as appropriate
    b. Optimizing nitrogen (N) and phosphorus (P) fertilizer use and application
    c. Monitoring and reducing fossil fuel use for management records and to increase enterprise viability
        i. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) maintains four energy tools to increase awareness and help farmers identify energy reduction potential in their operations. The estimators can be used to estimate potential energy savings for irrigation, nitrogen fertilizer use, grain drying, and tillage systems.[26] The NRCS also maintains energy conservation tools to help farmers estimate current energy usage and calculate energy and cost savings that could be achieved through the use of high efficiency equipment and energy conserving practices, and renewable energy tools to help farmers estimate energy production potential from solar panels, wind turbines, and biogas.[27]
    d. Utilizing renewable energy resources, when possible, to reduce fossil fuel use.
    e. Prioritizing transportation methods such as barge and rail, when possible, to reduce GHG emissions and fossil fuel use.
2. Growers adopt precision farming techniques as appropriate utilizing global positioning system (GPS) and other advanced technologies to optimize fossil fuel use and fertilizer application.
3. Growers support the development of non-fossil fuel ethanol.
4. Growers support ethanol production, job creation, and economic vitality across the U.S.
5. Growers use USDA-NRCS tools and resources to plan and implement energy-efficient practices.[28] These include AgEnergy Management Plans (AgEMPS), which help to identify and prioritize energy conservation opportunities on a farm; and online tools such as the Energy Estimator, which allows farmers to estimate the energy use and costs of different farming activities, such as crop irrigation, tillage, nitrogen use, and animal housing.[29]
6. Growers are encouraged to participate in USDA surveys and to use GHG emissions tracking tools to measure and monitor sources of on-farm emissions.

Sorghum reduces greenhouse gas emissions and sequesters carbon. With its dense and robust root structure, sorghum translocates carbon deeper into soils.[3]



Air quality

Continuous improvement goal:

- **Continued improvement in air quality.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are expected to monitor air quality, identify sources of air pollution, and implement mitigation measures to manage air pollution risks.
2. Growers are required to comply with the Clean Air Act (CAA) and its amendments to protect and enhance air resources to promote public health and welfare.[30]
    a. Under Section 110 of the CAA, each state must develop a State Implementation Plan (SIP) to identify the sources of air pollution and to determine what reductions are required to meet federal air quality standards, which includes emissions from agricultural practices.[31]
    b. Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of 'criteria pollutants', including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide. SIPs are location-specific and regulate farming practices in specific geographic areas to limit the impact of agriculture on air quality levels.[31]
3. Growers are expected to comply with their state regulations that ensure compliance with the plans their state implementation plans that are registered and approved by the EPA according to the Clean Air act.[30]

Waste and pollution

Continuous improvement goals:

- **Continued efforts to minimize waste throughout the production, processing, and consumption process.**
- **Continued use of agricultural technologies to expand the uses for sorghum and make the use of sorghum products even more efficient.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers take measures to reduce, recycle, separate, and store waste in accordance with local regulations and legal requirements.
2. Growers are required to follow local regulations pertaining to burning crop residue.
3. Growers are expected to have a waste management plan in place which aims to reduce waste, or if this is not possible, to re-use and recycle waste.
4. Growers are required to comply with Federal Water Pollution Control Act (Clean Water Act) Law 40 parts 116–117 which regulate discharges of designated hazardous substances. Facilities must immediately notify the National Response Center and state agencies of any unauthorized discharge of reportable quantity of designated hazardous substance into navigable waters, the shorelines of navigable waters, and contiguous zones.
5. Discharge of harmful quantities of oil must also be reported immediately.[32]
    a. Watersheds with stream reaches with demonstrated water quality concerns are listed by each state government on the U.S. EPA Clean Water Act 303(d) list.
    b. State governments may require monitoring under Clean Water Act section 319 to ensure the implementation of best management practices and to determine how conservation measures affect water quality.
    c. Growers comply with National Pollutant Discharge Elimination System (NPDES) requirements on discharges of biological pesticides and chemical pesticides that leave a residue in waters of the U.S.[33]
6. Growers comply with Title 40, Chapter I, Subchapter O, Part 503 of the Code of FederalRegulations[34], which establishes the standards for the use or disposal of sewage sludge, including general requirements, management practices, and operational standards related to agricultural land.
    a. Growers comply with section 405(a) of the Clean Water Act, which regulates sewage sludge disposal.
    b. Sorghum growers abide by the federal and state wastewater treatment authorities' dispositions regulating the use of discharge or untreated sewage, sludge, or slurry onto land or watercourses.

*Sorghum growers have successfully adopted no-till or minimum-till practices on approximately **75%** of sorghum acres – meaning carbon is sequestered for longer and deeper than in most cropping systems.[3]*

Agrochemical and nutrient management

Continuous improvement goal:

- **Continued reductions in sediment, phosphorus, nitrogen, and pesticide loads from agriculture in U.S. waterways.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are encouraged and incentivized to adopt a wide range of conservation practices such as conservation tillage, crop rotation, cover crops, buffers, and nutrient management appropriate for their farms to reduce nutrient and pesticide / herbicide loss and runoff.
2. Growers implement precision farming techniques as appropriate, utilizing global positioning system (GPS) and other advanced technologies such as:
    a. Variable rate fertilizer and herbicide application
    b. Field mapping for herbicide, pesticide, and fertilizer application
3. Growers are required to follow the U.S. Environmental Protection Agency (EPA) Worker Protection Standard for Agriculture Pesticides[35], meeting regulations for pesticide safety training, notification of pesticide application, use of personal protective equipment, restricted-entry intervals after pesticide application, decontamination supplies, and emergency medical assistance.
4. Growers are required to follow the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)[36] maintaining compliance with agricultural chemical handling, storage, and application regulations.
    a. All pesticides are registered with the EPA with proper labels and used in accordance with specifications, including how and under what conditions chemicals can be applied.
    b. Certification and training are required for pesticide applicators using restricted use pesticides.
    c. Growers adhere to EPA regulations concerning rotation of chemical active ingredients.
    d. Pesticides are classified for general or restricted use. Restricted category pesticides may be used only under the direct supervision of certified applicators, or under such other regulatory restrictions as the EPA administrator may require.
    e. U.S. regulations provide penalties for violations of FIFRA regulations, and violation of these instructions is equivalent to violating the law. Consequences can include criminal prosecution, civil remedies for damages, and loss of license.

Sorghum contributes to soil conservation and carbon sequestration, helping reduce greenhouse gas emissions while enhancing soil structure and fertility.

f. FIFRA provides states the authority to regulate the sale or use of any federally registered pesticides in that state.

g. Growers adhere to all federal regulations and guidelines on farm chemical application, including not applying WHO Class Ia, Ib, and II pesticides within 500 meters of populated areas or water bodies.

h. EPA is responsible for FIFRA legal compliance and monitoring, having the authority to regulate the registration, distribution, sale, and use of pesticides, insecticides, herbicides, rodenticides, and antimicrobials. Enforcement of regulations pertaining to plant protection products and other chemicals is carried out by EPA's Office of Enforcement and Compliance Assurance, through civil judicial actions and criminal actions. Application of plant protection products must also be consistent with state and tribal laws and regulations, where states have primary authority for compliance monitoring and enforcement. Compliance activities range from off-site record reviews to on-site inspections, as well as assistance support to enhance compliance with the regulations promulgated under FIFRA.

i. The EPA works cooperatively with each state's lead regulatory agencies to enforce federal pesticide regulations and respond to potential complaints.

j. Growers procure plant protection products and other registered chemicals from establishments, dealers, or distributors legally authorized and licensed at the federal and state levels.[37]

k. The EPA and each state's department of agriculture are responsible for regulating fertilizer products in the U.S., including proper labeling and distribution.

l. Growers will follow recommended application methods in accordance with specific crop needs.

5. The U.S. is signatory to Rotterdam Convention of the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade enforcing a banned list of chemicals for producer use.
6. Growers comply with federal and state regulations, as well as with the obligations derived from subscribed international agreements, regarding the use and commercialization of nutrient and plant protection products.
7. Growers follow industry guidelines regarding proper application rates, methods, timing, and recordkeeping for nutrient and protection products, in line with the 4R principles of nutrient management (right source, right rate, right time, right place), or other nutrient management methodologies.
8. Growers are required to comply with the U.S. Toxic Substances Control Act[38] to regulate chemicals that pose an unreasonable risk to health or to the environment and to regulate these chemicals' distribution and use.
9. Growers are required to follow the U.S. Resource Conservation and Recovery Act which controls hazardous waste, non-hazardous solid waste, and underground storage tanks.[39]
10. Growers are required to follow U.S. Safe Drinking Water Act regulations to protect public health by preventing contamination of surface and ground sources of drinking water.[40]
11. Growers perform regular maintenance, servicing, and calibration of vehicles, machinery, and equipment to keep them operating in accordance with recommended guidelines to ensure safety and optimal performance and to comply with local and federal regulations. Additionally, all motor vehicles, including over the road trucks, must be inspected every year by state certified inspectors.

a. Growers follow the Occupational Safety and Health Administration (OSHA) standard 1928.58 for guarding farm field equipment, which stipulates that employers shall instruct every employee in the safe operation and servicing of all covered equipment with which they are or will be involved.[41]

12. Growers recognize the value of Integrated Pest Management (IPM), support efforts to increase its effectiveness, and adopt it on their farms as appropriate.

    a. Title 7, Chapter 6, Section 136r-1 of the Code of Federal Regulations, requires the U.S. Department of Agriculture (USDA) to implement research, demonstration, and education programs to support adoption of IPM.[42]

    b. Growers work with USDA and other federal agencies by participating in trainings and adopting the best solutions for managing pests that combine biological, cultural, physical, and chemical tools, as appropriate to their farms and operations.

13. Growers work with fertilizer retailers to appropriately understand and follow product labels and adhere to federal and state regulations and guidance on storage, mixing, and handling to prevent exposure and risk to people and the environment.

    a. Growers follow EPA, OSHA, and Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) guidance (EPA 550-F-15-001) on fertilizer safe storage, handling, and management, as well as other OSHA regulations and industry guidelines.

    b. Growers follow FIFRA regulations regarding adherence to label directions and precautions for each pesticide they use, and comply with the Worker Protection Standard (WPS-U.S. Code of Federal Regulations Title 40, Chapter I Subchapter E Part 170), which establishes standards to reduce the risks of illness or injury resulting from workers' and handlers' occupational exposures to pesticides used in sorghum production, and also from the accidental exposure of workers and other persons to such pesticides.

        i. Growers comply with the Code of Federal Regulations (CFR) § 170.240 and § 170.250, which regulate the adequate use and cleaning of personal protective equipment, decontamination, storage, and other procedures to minimize risk to people and the environment.[43]

Crop health and agricultural best management practices

Continuous improvement goals:

- **Continued adoption and access to sustainability-enhancing agricultural practices, technologies, and innovations to increase plant and crop health.**
- **Increased implementation of new and existing best agricultural management practices.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are encouraged to use best management practices to protect and improve the quality of plant stocks and crops, including:
    a. Providing an up-to-date, documented management plan that, where possible, has definite and measurable targets and is reviewed annually or whenever new crops or farming techniques are adopted
    b. Having a written business plan available to demonstrate knowledge of risks, financial planning, planned and future yields, and market forecasting
    c. Implementing measures which contribute to the long-term economic viability of the farm
    d. Maintaining records to show cash flow to help justify and explain economic decisions
    e. Being able to justify and explain economic decisions based on consideration of risks
    f. Having a clear plan of crop rotation to introduce break crops into the production system
    g. Ensuring the selection of the best varieties available for specific biotic and abiotic conditions
    h. Managing disease and genetic purity issues by getting planting material from reputable sources
    i. Maintaining records of growing material used, down to the field level, as part of a comprehensive recording system
    j. Using the optimum seed rate or planting density
    k. Implementing a program for keeping workers up to date in all aspects of the farm business
    l. Keeping machines and equipment in good working condition with service records and maintenance logs up to date
2. is no transgenic sorghum currently or previously subject to USDA's biotechnology regulations that are for sale or in commercial production in the United States for food or feed use at the time of publication.
3. The U.S. Department of Agriculture's (USDA) National Seed Storage Laboratory maintains the genetic diversity of crop seed stock important to agricultural production and works to develop and maintain unique germplasm.
4. U.S. sorghum seed commerce complies with the Federal Seed Act[44] regarding fair trade and proper labeling.

   a. Growers are ensured by the Federal Seed Act that suppliers provide seed that is of high-quality, compliant with all applicable laws and regulations, and correspondent to their labels and marketing.
   b. Growers work with their suppliers to ensure the availability of records, including any applied treatment, certified status, or phytosanitary certificates, for local or imported seed, or propagation material.

5. Growers evaluate options and work with their seed providers to select the varieties that better adapt to their soil, climate, environmental, and socio-economic factors
6. Growers are required to comply with Plant Protection Act[45] regulations regarding the import of plants and plant products.

   a. Growers support use of naturally occurring processes in developing plant / crop improvements for agricultural purposes within appropriate guidelines (e.g., enhanced ploidy, gene editing, Ribonucleic acid interference [RNAi], biologicals, etc.)

7. Growers' crops are grown under the federal government's coordinated framework for regulation of biotechnology, which is a coordinated, risk-based system to ensure that new biotechnology products are safe for the environment and human and animal health.[46]

   a. The USDA's Animal and Plant Health Inspection Service (APHIS)[47] is responsible for protecting agriculture from pests and diseases, including regulatory oversight over products of modern biotechnology that could pose such a risk.
   b. The Environmental Protection Agency (EPA) utilizes a registration process that regulates the sale, distribution and use of pesticides in order to protect health and the environment, regardless of how the pesticide was made or its mode of action. This includes regulation of those pesticides that are produced by an organism through techniques of modern biotechnology.

c. The Food and Drug Administration (FDA) is responsible for ensuring the safety and proper labeling of all plant-derived food and feed, including those developed through genetic engineering.

8. Sorghum growers participate in trainings and apply best practices to ensure the safety and quality of their products.

   a. USDA provides growers, temporary, seasonal, and migrant workers with training through entities such as the National Institute of Food and Agriculture (NIFA)[48], to ensure that sorghum is grown safely; that scientific knowledge is applied to enhance stewardship of land, water, and ecosystems; that food contamination is reduced; and that there is an appropriate use of water and chemicals (herbicides, pesticides, fertilizers) for crops. Sorghum growers also participate in NIFA farm safety training programs, which are provided in collaboration with cooperative extension service programs that train workers in appropriate field practices and equipment use and maintenance.

   b. The National Institute for Occupational Safety and Health (NIOSH) conducts programs that promote farm safety, illness, and injury prevention[49], while the Occupational Safety and Health Administration (OSHA) provides standards and guidelines for addressing emergency preparedness, accidents, and hazards for farm workers.[50]

   c. The EPA provides guidance and documentation on regulations, programs and certifications related to agricultural operations by farm activity, including crop production; farm facilities, fuel, and equipment; chemical handling; air emissions; hazardous substances and waste releases.[51]

9. Growers ensure that their land is suitable for current and planned farming activities, in accordance with existing federal and state laws and regulations.

   a. Growers participating in Farm Service Agency (FSA) programs comply with land use reporting requirements.

   b. Growers have access to and use the Natural Resource Conservation Service (NRCS) Web Soil Survey, in order to understand the inherent characteristics of the native soil types at a specific location and improve land use and management decisions.

10. Growers avoid the deliberate introduction, cultivation, and use of known invasive species.

    a. Growers abide by NRCS and FSA regulations and guidance regarding invasive species and participate in related technical assistance programs.

    b. Growers follow APHIS) regulations and guidance to prevent the introduction of invasive species into the U.S.

Growers utilize best management practices to maintain or improve soil quality and to avoid erosion.

Soil health and productivity

Continuous improvement goal:

- **Continued reduction in soil erosion on all U.S. croplands.**

BEST PRACTICES, REGULATIONS AND COMPLIANCE CRITERIA:

1. Growers are expected to utilize best management practices appropriate to their soils, topography, and climate conditions to maintain or improve soil quality and soil carbon and to avoid erosion.
    a. Growers should adopt conservation practices like crop rotation, cover crops, and nutrient management to improve soil health.
    b. Growers should adopt conservation and no-till methods suited for their land in order to increase soil health and organic matter, increase infiltration and moisture retention, and reduce soil compaction and soil erosion.
    c. Growers should implement a wide variety of conservation practices such as terraces, riparian buffers, strip cropping, contour farming, filter strips, waterways, and other strategies to minimize soil erosion.

2. Growers shall monitor and maintain or improve soil health.
    a. The Natural Resources Conservation Service (NRCS) recommends soil testing every three to five years and more frequently if manure is applied or if attempting to make large nutrient or pH changes in the soil. Soil sampling is provided as a free or low-cost service by most county extension offices and state university cooperative extension services. Soil sampling data is generally maintained by the producer.
    b. Precision farming techniques utilizing global positioning system (GPS) help growers implement grid soil sampling.
    c. If utilized, all treated sludge, slurry, and manure is tested when applied to the land to avoid:
        i. Pollution of ground and surface water
        ii. Health risks to workers, the community, and customers
        iii. Heavy-metal contamination of the crop, water, and/or soil
        iv. Application of treated sludge, slurry, and manure to a crop after flowering
3. Growers are required to comply with the Highly Erodible Land Conservation and Wetland Conservation Provisions.[52]
    a. Highly erodible land is defined as soils that have an erodibility index of eight or more. The U.S. Department of Agriculture (USDA) will keep records of highly erodible land. Growers may obtain aerial imagery of their farms and a printout of their farm and tract records from the local USDA office that administers their farm.
    b. Growers will maintain compliance with highly erodible land regulations by creating and implementing a required conservation system plan.
    c. Growers file Form AD-102623 with USDA Farm Service Agency (FSA) certifying adherence to Highly Erodible Lands Conservation provisions.
    d. Growers planning to make changes which could impact highly erodible land must notify USDA for appropriate technical determination.
4. Growers are required to comply with the USDA Sodsaver provisions[53] which helps protect native sod in Minnesota, Iowa, North Dakota, South Dakota, Montana, and Nebraska.
5. Growers are required to follow all local regulations pertaining to burning crop residue and leaving crop residue in place to provide desirable agronomic advantages, including water storage and soil fertility.
6. Growers participate in federal, state, and industry initiatives to implement production practices that preserve and enhance soil health and permeability, reduce erosion, increase drought resistance, improve water quality, reduce nutrient loss, and lower input costs.
    a. USDA funds research on soil health projects in partnership with academic institutions and producer associations, through programs such as the Agriculture and Food Research initiative and the Climate Smart Partnerships program. Industry-led initiatives include partnerships such as Farmers for Soil Health.

Sensitive habitats and biodiversity

Continuous improvement goal:

- **Support of diverse species and ecosystems by conserving and enhancing habitats across U.S. agricultural landscapes.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are expected to adopt conservation practices such as enhancing pollinator habitats, early successional habitat development, cover crops, vegetated buffer strips, ponds, and riparian buffers to improve wildlife habitat.
2. Growers are encouraged to implement a biodiversity plan and take part in training on biodiversity at a farm scale, including following the mitigation hierarchy as well as the principle of continuous improvement to reduce direct and indirect negative impacts on biodiversity.
3. Growers should maintain or enhance and protect on-farm biodiversity through the preservation of native vegetation, where possible.
4. Growers are encouraged to participate in conservation programs that provide incentive for the preservation of native vegetation and to adjust management practices to benefit species biodiversity.
5. Growers are required to comply with U.S. Endangered Species Act[54] to protect listed animal and plant species from extinction by preserving the ecosystems in which they survive.
6. Growers are required to comply with Federal Migratory Bird Treaty for protection of shared migratory bird resources.
7. Growers are required to comply with U.S. laws that prohibit altering the habitat of endangered or threatened species in such a way that disrupts essential behavioral patterns, including but not limited to breeding, feeding, and sheltering.
    a. Growers follow guidance from federal and state-level authorities to prevent illegal hunting, fishing, or extraction of flora and fauna from their lands, including endangered species, in accordance with relevant legislation and customary laws.
8. Growers develop a Habitat Conservation Plan[55] if required as part of an application for private entities undertaking projects that might result in the destruction of an endangered or threatened species.

Sorghum stalks provide critical habitat and ideal winter cover for pheasants and quail.

Working conditions and labor relations

Continuous improvement goals:

- **Improved worker economic and hiring protections, and improved labor productivity.**
- **Continued compliance with prevailing laws and regulations.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are required to follow the Fair Labor Standards Act[56] which prescribes standards for basic minimum wage and prohibits the employment of children under age 16 during school hours and in certain jobs deemed dangerous.
2. Growers are required to comply with the Federal Equal Employment Opportunity Law[57] which provides the following protections:
    a. Prohibits employment discrimination based on race, color, religion, sex, or national origin
    b. Protects men and women who perform substantially equal work in the same establishment from sex-based wage discrimination
    c. Protects individuals who are 40 years of age or older
    d. Prohibits employment discrimination against qualified individuals with disabilities
    e. Prohibits employment discrimination based on genetic information
    f. Prohibits employment discrimination based on sexual orientation and gender expression
    g. Provides guidelines on employee selection procedures
3. Growers are required to comply with the Migrant and Seasonal Agricultural Worker Protection Act[58] which provides safeguards to migrant and seasonal agricultural workers.
    a. Section 524 stipulates that in general, it is unlawful for a person or other entity to hire, or to recruit or refer for a fee, any migrant or seasonal agricultural worker for any activity related to obtaining employment.[59]
    b. Title 29, Subtitle B, Chapter V, Subchapter A, Section 500.51-g of the Code of Federal Regulations, stipulates the penalties applicable to Farm Labor Contractors for hiring, recruiting, or referring for a fee, for employment in the United States, any migrant or seasonal agricultural worker.[60]
    c. In accordance with U.S. legislation, the Migrant and Seasonal Agricultural Worker Protection Act (Section 504), and in alignment with International Labour Organization (ILO) conventions, agricultural workers are entitled to file a complaint with the U.S. Department of Labor's Wage and Hour Division, initiate a private legal action, and provide testimony or cooperate in an investigation or lawsuit, without facing any form of threats, termination, or discriminatory actions.
4. Growers are required to comply with the Abolition of Forced Labor Act[61] in that they do not make use of any type of forced or compulsory labor including:
    a. As a means of political coercion or education or as a punishment for holding or expressing political view or views opposed to the established political, social or economic system
    b. As a method of mobilizing and using labor for purposes of economic development
    c. As a means of labor discipline

   d. As a punishment for having participated in strikes
   e. As a means of racial, social, national, or religious discrimination

5. Growers comply with Occupational Safety and Health Standards for Agriculture 1928.110 Subpart I, which stipulates the requirements regarding the availability of potable water and sanitation for field workers.
6. Growers are required to comply with Victims of Trafficking and Violence Protection Act[62] providing protection and assistance for victims of trafficking, regardless of immigration status.
7. Growers recognize the Right of Association for workers, including the right to unionize or engage in collective bargaining in accordance with applicable federal and state laws.[63]
   a. Growers recognize the importance of ensuring that worker complaints are confidentially handled and investigated in a fair and transparent manner, abiding by relevant federal and state regulations.
8. Growers are expected to actively support ongoing efforts to seek, recruit, and promote women in leadership positions throughout state and national organizations.
9. Growers abide by the provisions of the Fair Labor Standards Act (FLSA) for agricultural employment, which sets standards for minimum wage, overtime, recordkeeping, maximum hours worked, youth employment, and child labor to protect the educational opportunities of minors.
10. Growers comply with all relevant federal and state labor legislation, as well as with international conventions and commitments in which the U.S. is a party to, guaranteeing that workers do not exceed the maximum number of maximum working hours per day, consecutive working days, and other applicable regulations in accordance with each type of farming operation.

Worker and public safety

Continuous improvement goals:

- **Improved worker, public safety, and well-being.**
- **Continued compliance with prevailing laws and regulations.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are expected to utilize best management practices regarding worker safety in addition to complying with all local, state, and federal regulations and requirements, including:
    a. Having a clear policy that encourages workers to have health insurance
    b. Having a clear policy that encourages workers not to return to work if their injury or illness will put themselves, food safety, or the safety of colleagues at risk
    c. Promoting good hygiene and prevention of disease.
    d. Ensuring consistent availability of safe drinking water and hygienic toilet facilities
    e. Providing accommodation that meets the requirements of workers and their families
    f. Offering on-farm training in different languages (if necessary) and warning signs that are understandable by everybody on the farm
    g. Having a health and safety risk assessment covering all activities on the farm
    h. Performing compulsory health and training sessions to ensure good awareness of health and safety requirements relevant to individual roles on the farm
    i. Making appropriate first aid supplies available and easily accessible and having a person trained or experienced in first-aid, available on the farm.
    j. Having a process for reporting and recording accidents and the treatment received
    k. Providing medical checks for workers that have a higher risk of health issues
    l. Having a back-to-work policy to ensure workers do not return to work if their injury or illness will put themselves, food safety. or the safety of colleagues at risk
2. Growers are expected to utilize best management practices regarding food safety and quality in addition to complying with all local, state, and federal regulations and requirements, including:
    a. Having a trained staff member responsible for food safety and quality
    b. Having a record of potential food safety and quality hazards, as well as methods for monitoring and managing these hazards.
    c. Using a properly designed and verified traceability plan to enable tracking of production back to the farm or field of origin

Growers follow regulations and implement best practices to guarantee farm employee safety.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d. Communicating with buyers about plans regarding:

   i. Preferred varieties
   ii. Timing of harvest
   iii. Post-harvest storage and delivery

3. Growers are required to comply with the U.S. Environmental Protection Agency (EPA) Worker Protection Standard for Agriculture Pesticides[64] meeting regulations for: pesticide safety training, notification of pesticide application, use of personal protective equipment, restricted-entry intervals after pesticide application, decontamination supplies and emergency medical assistance.

   a. An application exclusion zone of 100 feet horizontally from application equipment is required whether the pesticide is applied by air blast application, as a spray or fumigant, mist, or fog. Applicators must suspend application if they are aware of any person in the application exclusion zone per regulation in Worker Protection Standard by EPA.

4. Growers are required to comply with Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)[65] maintaining compliance with agricultural chemical handling, storage, and application regulations.
5. Growers are required to comply with Occupational Health and Safety Act (OSHA)[66] to ensure safe and healthful working conditions including workplace violence guidelines. OSHA provides the following protections:

   a. Employees may request an OSHA inspection of the workplace.
   b. Employees may use their rights under law without retaliation and discrimination.
   c. Employees receive training, in a language they understand, about hazards, methods to prevent harm, and the OSHA standards that apply to their workplace.

6. Employees can be terminated for noncompliance with OSHA safety regulations.

   a. Growers are required to follow federal and state regulations prohibiting assault and battery.
   b. Growers are required to comply with the Clean Air Act and its amendments to protect and enhance air resources to promote public health and welfare.[67]
   c. Growers are required to comply with the Resource Conservation and Recovery Act which controls hazardous waste, non-hazardous solid waste, and underground storage tanks.[68]
   d. Growers are required to comply with the Safe Drinking Water Act to protect public health by preventing contamination of surface and ground sources of drinking water.[69]

7. Growers follow regulations and implement best practices to guarantee farm employee safety and the handling of foreseeable emergency situations as appropriate for each type of farm.

   a. Growers comply with the Migrant and Seasonal Agricultural Worker Protection Act (MSAWP) provisions that require farm employers to have available the name and telephone number of the contact that shall be notified of a workers' injury or death.
   b. Growers recognize the importance of following OSHA guidance in reference to agricultural safety and emergency preparedness for farmworkers. This includes the development of an Emergency Action Plan (EAP) that ensures emergency response procedures are established for before, during, and after an emergency.[70]

c. Guidance for EAP includes developing emergency escape procedures and routes, procedures to account for workers, emergency communication equipment, workers' next-of-kin emergency phone numbers and contacts, needed supplies, and the location of primary and secondary areas to relocate farm assets and workers.

8. Growers comply with the final rule of the Agricultural Worker Protection Standard that requires employers to post pesticide application information and a safety data sheet (SDS) for each pesticide used on the establishment (known together as pesticide application and hazard information) at a central location on the establishment (the "central display"). Employers must also maintain and make available to workers and handlers, their designated representatives, and treating medical personnel upon request, the pesticide application-specific information and the SDSs for pesticides used on the establishment for two years.
    a. Availability of this information will contribute to ensure that permanent, temporary, and seasonal workers who may be vulnerable or whose immune systems may be compromised, use or refrain from handling plant protection products or hazardous substances in accordance with their conditions.
    b. Growers must ensure that applicators are properly trained and, wherever necessary, certified to use restricted use pesticides and are using appropriate personal protective equipment.
    c. Federal law requires any person who applies or supervises the use of restricted-use pesticides (RUPs) to be certified in accordance with EPA regulations and state, territorial, and tribal laws. Pesticide applicators must know how to apply RUPs properly, effectively, and safely.[71]
9. Growers follow OSHA regulation standard 1910 Subpart J, which stipulates the requirements to ensure that permanent, temporary, and seasonal workers and their families have access to clean, safe accommodation and sanitation.[72]
10.. Growers comply with Title 29, Subtitle B, Chapter XVII, Part 1928 of the Code of Federal Regulations, which stipulates the occupational safety and health standards for agriculture, which includes field sanitation requirements.[73]
    a. Growers comply with OSHA's Occupational Safety and Health Standard 1910 Subpart J, which includes provisions regarding the availability of adequate handwashing and bathing facilities.[74]
11. Growers comply with the Resource Conservation and Recovery Act (RCRA), which regulates the generation, transportation, treatment, storage, and disposal of hazardous waste, and requires growers to follow the appropriate requirements for handling and disposing of it, as well as of non-hazardous solid waste such as agricultural plastics and packaging materials.[75]
    a. Growers comply with OSHA Standard 1910 Subpart H pertaining to Hazardous Materials, which stipulates requirements in terms of facilities, operations, and procedures for proper storage, transportation, and disposal of hazardous materials.[76]
12. Where required, growers comply with relevant federal and state legislation regarding compensation of permanent, temporary, and seasonal workers for work-related accidents or illnesses.
13. Growers support and work with temporary and seasonal workers to provide timely access to information and understanding of the availability of health insurance, as applicable.

Community relations

Continuous improvement goal:

- **Promoting and maintaining good relationships between sorghum producers and the communities.**

BEST PRACTICES, REGULATIONS, AND COMPLIANCE CRITERIA:

1. Growers are expected to utilize best practices for community relations by:
    a. Respecting the rights of individuals and communities, and avoiding violation of land use rights
    b. When acquiring land, ensuring relevant groups were informed of their rights, as well as the scope and nature of the land development and potential consequences
    c. Ensuring Free Prior Informed Consent (FPIC) is obtained
    d. Engaging with the community on matters that may impact the community
    e. Taking actions to avoid disturbance or, if unavoidable, having a plan in place to inform relevant members of the community about potential disturbance
2. Growers are encouraged to have documentation of land ownership, leases, or other legal agreements to utilize land for purpose of sorghum production.
    a. The Federal Land Policy Management Act protects public lands from exploitation without authorization or rental agreement.[77]
    b. Land use contracts are governed by state statutory and U.S. common law. The U.S. court system is the mechanism for mediating land use disputes.
3. Growers have access to information about farmland protection and stewardship through the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and American Farmland Trust's Farmland Information Center,[78] which provides statistics, laws, organization links, literature, and technical tools, as well as state-specific resources.
4. Additionally, the USDA NRCS provides funds to help purchase development rights to keep productive farmland in agricultural uses through the Agricultural Land Easement Program (ACEP),[79] and the American Farmland Trust[80] establishes programs and policy for protecting agricultural land through conservation easement programs, planned growth with agriculture in mind, and stewardship and conservation practices.
5. The Emergency Planning and Community Right-to Know Act supports community awareness and response to hazardous substances used in society.[81]
6. USDA cooperative extension system is a nationwide educational network that provides research-based information regarding standard agricultural practices.
7. The Environmental Protection Agency (EPA) Water Data Tool "How's My Waterway"[82] provides information about potential watershed contamination.
8. Growers support the publishing and maintenance of publicly available information on the regulatory status of products developed with plant breeding innovations by all federal agencies charged with oversight responsibilities.
9. Growers support the development of local resource planning groups composed of agricultural landowners and growers, such as soil and water conservation districts to address local conservation and environmental issues.

10. Growers engage with local communities to ensure that communications of concerns, complaints, or other grievances between community members and growers are understood and addressed in a collaborative manner.
11. Via tax dollars, growers support free public education for all children grades K-12.
12. Growers support agricultural-related education programs through the USDA cooperative extension system, a nationwide educational network that provides research-based information regarding agricultural practices.
13. At the local level, growers support the 4-H youth education program[83] whose mission is to give all youth equal access to opportunity. 4-H provides young people with community, mentors, and learning opportunities to develop the skills they need to create positive change in their lives and communities, including a focus on STEM (Science, Technology, Engineering and Math) programs, healthy living, and civic engagement. 4-H membership now exceeds six million, with some 50,000 volunteers.
14. Growers support the Future Farmers of America (FFA).[84] FFA is the youth organization preparing members for leadership and careers in the science, business, and technology of agriculture. Currently, there are 760,000 members in 8,739 local chapters in all 50 states and Puerto Rico.
15. The USDA Foreign Agriculture Service (FAS)[85] administers programs that help developing countries advance their agricultural systems and trade capacity.
16. The USDA Food and Nutrition Service administers federal nutrition assistance programs to reduce hunger in the U.S. by providing food and healthful diet and nutrition education to children and low-income people. Programs include the Women, Infants, and Children (WIC) Program, the Supplemental Nutrition Assistance Program, school meals, and summer food service.
17. Growers generally support continued U.S. membership in the World Trade Organization (WTO) and support the authority of the WTO to arbitrate trade disputes and implement enforcement actions.

Tiered Assurances Framework and Sustainable Sorghum Volumes

BASELINE AND VERIFIED ASSURANCES

The legal and regulatory assurances compiled and outlined in the first section of the Sorghum Assurances Protocol, establish the foundation upon which to develop the operational supply chain systems that provide traceability and control for the specific product attributes that are relevant and demanded by sorghum supply chain stakeholders.

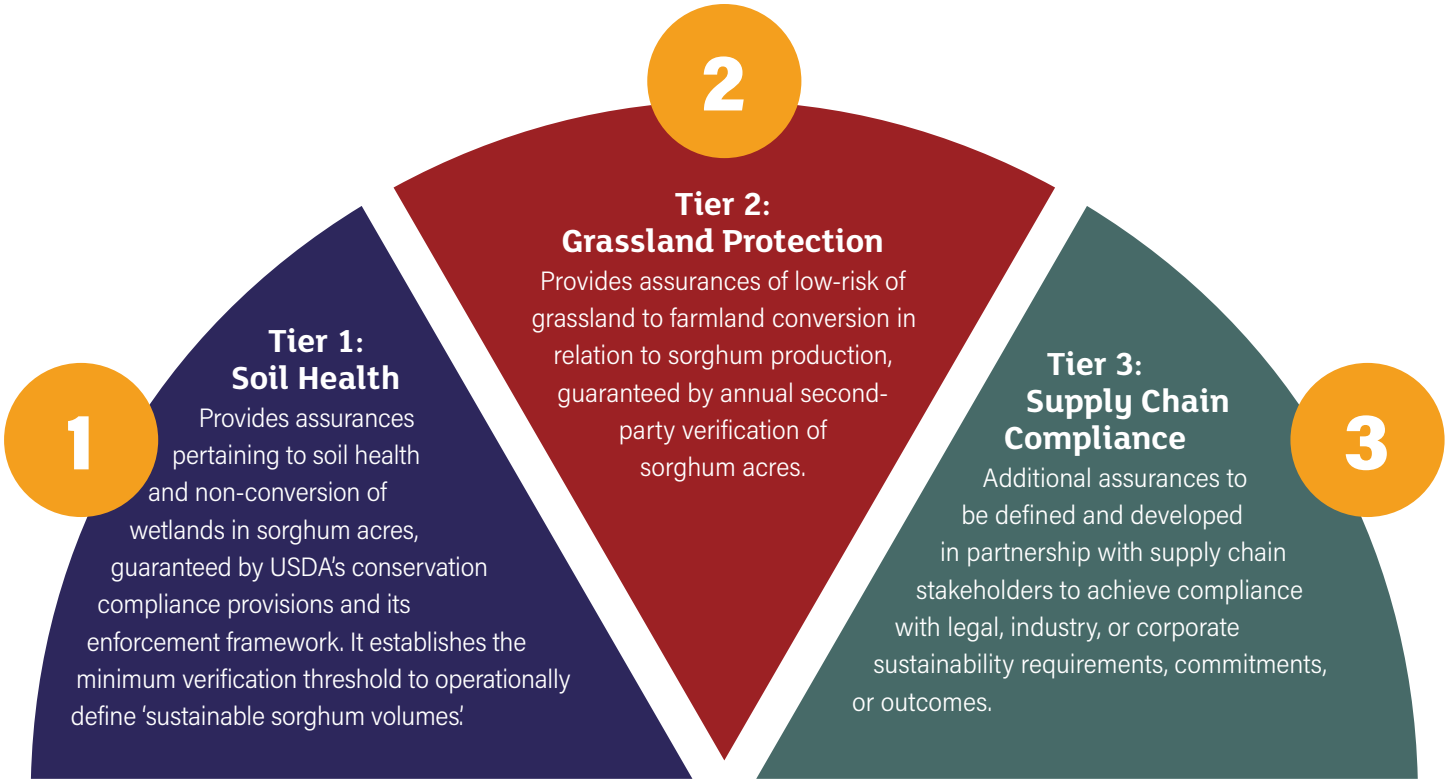
To develop these systems, the Sorghum Assurance Protocol focuses on a limited set of sustainability attributes, structured under a tiered system. The justification for this lies in the technical, logistical and economic challenges associated to developing an all-encompassing, industry-wide sustainability system that can cost-effectively monitor, report and verify a large set of criteria, for which stakeholders have not yet defined standardized baselines, goals, or measurement methodologies.

The first two tiers of the Sorghum Assurances Protocol provide government and industry verified assurances for specific elements of soil health, land use, and non-conversion, which have been identified as amongst the most material in relation to U.S. sorghum production and the supply chains stakeholders which are utilizing sorghum for food, feed, and fuel production.

The third tier sets up the framework under which the sorghum industry is open to work with supply chain stakeholders to develop the required standards, criteria, and verification systems that recognize the economic contribution and risk undertaken by growers implementing sustainable sorghum production practices; as well as the issues that are material for companies integrating U.S. sorghum as an input in their production processes, and for the ecosystems on which sorghum is produced.

Tiered assurances framework and sustainable sorghum volumes

The compliance framework established under the U.S. Sorghum Assurances Protocol is determined as follows:



Tier 1: Sorghum Conservation Compliance

Tier 1 defines 'sustainable sorghum volumes' as the aggregate amount of product that is derived from acres for which U.S. growers have reported compliance with USDA's Conservation Provisions for a given marketing year. Growers producing under the Conservation Compliance framework commit to:

1. If producing on Highly Erodible Land, a Conservation Plan approved by the local soil conservation district and the Natural Resources Conservation Service is in place
2. Not planting on converted wetlands or converting wetlands for crop production

As such, the Conservation Compliance framework provides assurances pertaining to soil health (conservation criteria related to highly erodible land) and non-conversion of key ecosystems (wetland protection), which are among the most material environmental issues related to crop growing areas where sorghum is produced.

DATA COLLECTION AND VERIFICATION

U.S. sorghum producers annually report acres in compliance with USDA's conservation provisions via form AD-1026. This report is audited/reviewed by USDA through the Farm Service Agency (FSA) and the Natural Resources Conservation Service (NRCS). For verification, each year NRCS focuses on soil map units that can erode at excessive rates (highly erodible land) and established wetland determinations, selecting at random a group of producers to verify compliance with conversation provisions (audit rates range from 1% to 5% of total reported acres).

Failure to comply with conservation provisions can result in loss of most benefits administered by USDA (FSA and NRCS) and participation in many farm bill programs, including Federal crop insurance premium subsidies (7, CFR, Part 12). Conservation compliance has been required for participation in many farm bill programs since the 1985 Farm Bill, including safety net and conservation programs.

Under Tier 1, the FSA/NRCS audit/review process is established as the minimum verification threshold of 'sustainable sorghum volumes.'

SUPPLY CHAIN INTEGRATION

With the goal of supporting stakeholders across global supply chains to leverage the assurances associated to U.S. sorghum and contribute to achieving their compliance, sourcing, or other corporate goals, the industry will utilize the Sustainable Sorghum Exports Platform to establish an annual national level of 'sustainable sorghum volumes.'

Sustainable sorghum volumes will be defined each marketing year by determining the total amount of U.S. sorghum eligible for allocation under the Sorghum Assurances Protocol. For the purpose of calculating these volumes, a Sorghum Assurances Committee (SAC) will be set up with the oversight of USCP. The SAC will calculate the sustainable sorghum volume by using the number of qualified sorghum acres reported to USDA and subject to conservation compliance in a given marketing year, and the corresponding average yield recorded for these acres in that period.

The product of these two factors will result in each marketing year's 'sustainable sorghum volume', which is to be utilized through the Sustainable Sorghum Exports Platform by sorghum exporters, importers and other supply chain users in international markets. It will be managed under a mass balance chain of custody methodology that considers the point of export as the first point of aggregation. Issued documentation will provide traceability from U.S. exporters to importers and other supply chain users.

Tier 2: Sorghum Low-risk Grassland Conversion

The second tier of the Sorghum Assurances Protocol is developed in recognition of the importance of ensuring that crop production is not driving conversion of key natural ecosystems such as grasslands, for which supply chain stakeholders in various geographies and sectors require specific assurances.

Grassland protection is linked to biodiversity conservation, carbon sequestration, soil health, species protection, water regulation, among other environmental and ecosystem benefits. Grassland conversion can be driven by various social, environmental, and economic factors such as urban development, climate change and agricultural expansion, causing habitat loss and diminished ecosystem services.

The U.S. sorghum industry acknowledges the importance of providing supply chain stakeholders with robust assurances for the low risk of grassland conversion in relation to U.S. sorghum acres. Consequently, Tier 2 builds upon the assurances associated to 'sustainable sorghum volumes' and integrates an additional verified component, consisting of an annual survey of sorghum acres that allows monitoring and verification of a low-risk level of grassland-to-farmland conversion.

DATA COLLECTION AND VERIFICATION

To develop the Tier 2 complimentary grassland conversion assurance, the Checkoff adopts a baseline of grasslands and sorghum acres in the U.S, from which to effectively monitor yearly variations and develop a performance-based categorization of grassland conversion associated to sorghum acres for each marketing year.

Risk of grassland to farmland conversion will be assessed via a statistically significant annual second party conducted/audited survey of sorghum acres for each harvest on a marketing year basis. Survey results will provide the marketing year's estimated grassland to cropland conversion rate and be used to determine whether acres linked to 'sustainable sorghum volumes' complied with the 'minimal level' conversion range defined in this protocol.

Based on the effective yearly surveying of grassland to cropland conversion rates, 'sustainable sorghum volumes' will be considered to align with a low-risk level if they are found to be within an annual conversion lower bound percentage range. In such cases, documentation issued under this protocol and providing U.S. sorghum assurances will include the low risk of grassland to cropland conversion assurance.

Grassland protection is linked to biodiversity conservation, carbon sequestration, soil health, species protection, water regulation, and other environmental and ecosystem benefits.

This protocol adopts the Accountability Framework Initiative's definition of "Minimal Conversion": A small amount of deforestation or conversion that is negligible in the context of a given site because of its small area and because it does not significantly affect the conservation values of natural ecosystems or the services and values they provide to people". https://accountability-framework.org/use-the-accountability-framework/definitions/

The specific ranges for annual conversion, lower bound and higher bound percentages, will be determined from the statistical analysis of the Sorghum Checkoff second-party auditor verification survey.

The specific ranges for annual conversion, lower bound and higher bound percentages, will be determined from the statistical analysis of the Sorghum Checkoff second-party auditor verification survey.

In the case that the grassland to cropland conversion rates are found to be within the 'medium risk' or 'high risk' annual conversion lower and higher bound percentage ranges, the sustainable sorghum volumes documentation for that marketing year's harvest will not incorporate assurances of non-conversion.

SUPPLY CHAIN INTEGRATION

As a commitment and contribution to supply chain transparency, the Checkoff will publish the results of its grassland to cropland conversion survey on an annual basis and will include the determination of each harvest's compliance with the established low risk level. Please see Appendix I for key definitions, parties and methodologies related to the surveying process described under Tier 2.

The assurance of non-grassland conversion will be an additional attribute that complements the assurances associated to 'sustainable sorghum volumes' calculated under Tier 1. It will be made available to supply chain stakeholders on an operational basis via the documentation issued through the Sustainable Sorghum Exports Platform.

The non-grassland conversion assurance will follow the same mass balance chain of custody methodology established under Tier 1, offering traceability from the U.S. point of export to importers and other supply chain users in international markets.

Tier 3: Sorghum Bespoke Supply Chain Partnerships

Within the U.S., approximately eight million acres of sorghum were planted in 2024, mostly in the South and Southeast. Multiple factors influence where and how much sorghum is planted each year, including soil type, climate conditions, rainfall, topography, geology, crop rotation requirements, commodity grain prices and the type of equipment used on farm.[87]

Sorghum-planted acres are expected to continue to grow due to the crop's inherent beneficial attributes, including:

- Improved soil health through nutrient retention[88]
- Exceptional water efficiency, with 91% of acres rain-fed[89] and minimal irrigation
- Reduced reliance on pesticides and insecticides
- Natural protection against soil erosion from harsh winter winds, and
- Effective carbon removal from the atmosphere, with emissions stored underground

These factors play into the different day-to-day decisions that sorghum growers make in their operations, which result in different crop production impacts. Many sorghum growers are willing or implementing production practices that have positive environmental impacts, but there are challenges associated to the lack of standardized measurement of outcomes or economic recognition of the risks and costs that go into implementing them.

Through the establishment of Tier 3 within the Sorghum Assurances Protocol, the sorghum industry is laying out the framework to build partnerships with supply chain stakeholders, to develop additional assurances as required. This will require bespoke partnerships to define the measurement metrics, data collection, analysis, and verification that specific markets, industries, supply chains or companies require.

Organizations interested in exploring a Tier 3 partnership should contact Sorghum Assurances Committee (SAC) at information@sorghumcheckoff.com

Sustainable Sorghum Platform

The Sustainable Sorghum Platform is a tool that provides sorghum supply chain stakeholders in international markets with a means to receive the documentation and assurances associated to the sustainable sorghum volumes that are produced in the U.S. and that fall within the scope of the Sorghum Assurances Protocol.

Each marketing year, the Sorghum Assurances Committee (SAC) establishes the total volume of sustainable sorghum produced in the U.S. under the criteria established in the Sorghum Assurances Protocol. This volume is included in the Sustainable Sorghum Exports Platform to enable the issuance of shipment-specific Records of Assurance (ROA).

Records of Assurance are issued by U.S. exporters based on company-specific allocations and transferred to international supply chain stakeholders and importers. They provide documentary attestation of the assurances offered under the different tiers established under the Sorghum Assurances Protocol.

Each ROA allows sorghum exporters and importers to record and track within a common platform the volumes of sustainable sorghum traded within their supply chains, using a mass-balance approach that has as first point of aggregation the U.S. point of export. The platform and ROA documentation provides traceability from the U.S. point of export to importers and other supply chain users in international markets.

ISSUANCE OF RECORD OF ASSURANCE (ROA)

- Shippers using the Sustainable Sorghum Platform will establish and maintain a firm-specific record that will provide the necessary information for a uniquely identified ROA to accompany individual U.S. sorghum exports.
- Any shipper or exporter desiring to transport sorghum covered by a ROA must:
    - Register as a user of the Sustainable Sorghum Platform
    - Establish a shipper-specific, secure record on the database
    - Document shipment-specific information on the shipper-specific, secure record
    - Ensure that the record created and maintained by the shipper includes, at a minimum, the volume and date of shipment of sorghum from the U.S., with the option for inclusion of additional information
    - Agree to allow SAC access to the volume and date of shipment of sorghum from the U.S.
- The ROA for each shipment of U.S. sorghum covered by Tier 1 (Sorghum Conservation Compliance) will be accompanied by a uniquely identified (numbered) shipment-specific document containing selected information from the shippers' record, and a validation of the mass-balance accounting method chain of custody from a volume of Tier 1-compliant sorghum meeting the minimum sustainability verification threshold.

- The ROA for each shipment of U.S. sorghum covered by Tier 2 assurances (Sorghum Low-risk Grassland Conversion) will include a Checkoff attestation that the corresponding sustainable sorghum volumes covered by the document complied with the industry-defined category of low-risk for the respective marketing year.
- The ROA for each shipment of U.S. sorghum covered by Tier 3 assurances (Sorghum Bespoke Supply Chain Partnerships) will explicitly state the additional assurances offered to supply chain stakeholders, and include a reference (hyperlink, website, QR code, etc.) for the latter parties to validate the scope and methodologies associated to the additional assurances provided.
- Under the logic of a mass-balance approach, the total volume of records of assurance issued each year will never exceed the annual volume of compliant sorghum entered into the database.
- The Sorghum Assurances Committee (SAC) will use the volume and date of shipment of sorghum from the U.S. to manage and provide necessary reporting on the volumes and assurances covered under this protocol. SAC will also oversee website maintenance and an alternative/back-up system for document issuance and recordkeeping if the web-based system is not available.
- There is no cost to any of the parties for the use of the Sustainable Sorghum Platform or for the issuance and use of the respective ROA.

Sorghum Assurances Protocol Governance and Continuous Improvement

GOVERNANCE

The Sorghum Assurances Protocol was developed with broad industry stakeholder involvement, which included growers, state grower association representatives, and traders. Representatives from these constituencies were convened by USCP and USGC under an Advisory Council, which was responsible for guiding and steering the development of the principles and assurances that would be provided to relevant supply chain stakeholders through this document.

The Advisory Council was entrusted with the following responsibilities:

1. Advise on a draft operational definition of "sustainable sorghum volumes" and provide recommendations on a draft chain of custody model
2. Review and refine supporting documentation on the vision of the U.S. sorghum industry and this protocol

The current version of the Sorghum Assurances Protocol reflects the inputs and insights provided by the Advisory Council, which recognized the importance of this document to continuously evolve as additional high-quality data, new best practices and technological advancements become available, and new supply chain requirements emerge. Regular review by stakeholders will ensure the Sorghum Assurances Protocol remains relevant, actionable, and aligned with industry and market goals.

The Sorghum Assurances Committee (SAC), with the oversight of USCP, is responsible for the annual review process, governance and verification of the U.S. Sorghum Assurances Protocol.

Any references of federal regulations, legal requirements and U.S. agency information will be updated on an annual basis.

During each review period SAC will bring recommendations to USCP outlining edits to this protocol and USCP is responsible for approval/denial of each recommended action.

A full compilation of roles and responsibilities for each entity involved in the U.S. Sorghum Assurances Protocol is outlined below.

THE SORGHUM ASSURANCES COMMITTEE (SAC)

The SAC is a part of the legal entity constituted to operate the Sustainable Sorghum Exports platform (Sustainable Corn Exports, LLC) and issue assurances for exporters, importers and other users of U.S. sorghum. The SAC will be open to representatives of diverse segments of the U.S. sorghum industry, including sorghum growers, aggregators and processors, sorghum input providers, members of academia, grains exporters, downstream customers, and the U.S. Grains Council.

SAC will be responsible for:

- Bringing recommendations of refinement for this protocol to USCP
- Overall management of U.S. Sorghum Assurances Protocol
- Specific to the Sustainable Sorghum Exports Platform:
  - Stewarding the Sustainable Sorghum Exports Platform
  - Overseeing the establishment of the total volume of sustainable sorghum produced in the U.S. under the criteria established in the Sorghum Assurances Protocol
  - Overseeing the inclusion of the above-mentioned volume in the Sustainable Sorghum Platform to enable the issuance of shipment-specific Records of Assurance (ROA)
- Analyzing all data for Tiers 1, 2 & 3:

  Specific to Tier 1:

  - Oversight of the calculation of the sustainable sorghum volume by using the number of qualified sorghum acres reported to USDA, subject to conservation compliance in a given marketing year, and the average yield recorded for these acres in that period

  Specific to Tier 2:

  - Coordination with USCP the work of the second-party auditor that conducts the annual survey that establishes the marketing year's estimated grassland to cropland conversion rate
  - Determining whether acres linked to 'sustainable sorghum volumes' complied with the 'minimal level' conversion range defined in this protocol

  Specific to Tier 3:

  - Responding to Tier 3 partnership requests
  - Coordination with USCP of the terms and conditions of established Tier 3 partnerships including defining the measurement metrics, data collection, analysis, and verification that is required within that established partnership

UNITED SORGHUM CHECKOFF (USCP)

The USCP is responsible for:

- Overall oversight and verification of the U.S. Sorghum Assurances Protocol
- Review, response, refinement and approval of the recommendations that SAC brings forward
- Publishing the results of its grassland to cropland conversion survey on an annual basis and including the determination of each harvest's compliance with the established low risk level

U.S. GRAINS & BIOPRODUCTS COUNCIL (USGBC)

- Operating and maintaining the web platform on which Sorghum Records of Assurance will be issued and transferred
- In coordination with the SAC and USCP, participate in established Sorghum Assurances Protocol review processes
- Support USCP and the SAC in convening governance body meetings and guiding review and discussion of strategic and operational issues associated to the Protocol and the web platform

THE SECOND PARTY AUDITOR

The second party auditor hired by USCP and is responsible for:

- Conducting an annual survey to determine the risk of grassland to farmland conversion

HARVEST HORIZONS

Harvest Horizons, a sustainability project developer that leads data-driven projects connecting farm-level sustainability outcomes with downstream demand for ecosystem services offsets or insets.

Harves Horizons is responsible for:

- Any administration efforts in relation to established Tier 3 partnerships

U.S. sorghum industry commitment to continuous improvement

U.S. sorghum growers are committed to the ongoing process of improving their production practices, analyzing performance, identifying opportunities, and making incremental changes to achieve better results over time.[90] Relevant assurances for stakeholders to be aware of and understand include:

1. Growers carry out business with the highest standards of transparency, integrity, and openness; ensuring all business transactions are properly recorded and accounted for.
2. Growers are encouraged and incentivized to utilize best management practices as appropriate for their soils, topography, climate, and equipment to optimize yield, water use, agrochemical use, soil health, and water quality and improve wildlife habitat.
    a. The Natural Resources Conservation Service (NRCS) assesses conservation practice outcomes and administers several programs to incentivize improvements in soil erosion, soil health, carbon sequestration, wildlife habitat, wetland restoration, nutrient efficiency, water quality, irrigation efficiency, groundwater protection, and reforestation.[91]
3. Growers are expected to continue to adopt and support the development of innovations that improve crop production.

a. and biotechnology: Advances have allowed growers to reduce tillage, pesticide usage, fuel consumption, and greenhouse gas (GHG) emissions per bushel while maintaining or improving yields.
b. Equipment: Innovations like improved no-till drills, air seeders, and Y Drops for applying fertilizer in-season have improved efficiency by increasing the speed and accuracy of planting and harvesting.
c. Technology and data: Precision agriculture technology, global positioning system (GPS), yield monitors, and other technological improvements have improved management data and helped growers optimize costs and yields.
d. Weather forecasting: More accurate weather forecasting and improved technology that provides access to forecast data in the field or remotely enables growers to improve decision making, reduce risk, and more accurately provide what their crops need.

4. Growers are encouraged to continue to adopt and support the development of innovations that improve crop management, such as:
    a. Cloud platforms support increased data storage, management, and remote access to improve crop management decisions.
    b. Scalable software allows growers to model and compare different management options for their fields.
    c. Blockchain technology enables precise tracking of where and how crops were managed.
    d. Robotics systems can assist with labor management, post-harvest processing, supply chain logistics, and equipment operation.
    e. Satellite imagery allows growers to remotely monitor crops and make management decisions.
    f. Improvements in hyperspectral imaging spectroscopy (HIS) and the development of the Global Hyperspectral Imaging Spectral library of Agricultural-Crops (GHISA)[92] will improve modeling, mapping, and monitoring of agricultural crops globally.
    g. Smart drainage systems, infield sensors, subsurface irrigation, and on-farm irrigation storage and re-use allow for improved water management and irrigation.
5. Growers are expected to continue to adopt and support the development of innovations that improve the sustainable production of sorghum, such as:
    a. Adoption, as possible, of clean energy technologies, energy storage, energy efficiency, and carbon dioxide capture measures to reduce energy use and GHG emissions
6. Continuous improvement is supported by a variety of regulated conservation programs and technology transfer systems, including:
    a. The Conservation Reserve Program protects the most sensitive areas by providing financial assistance to set aside on a long-term basis cropland vulnerable to soil erosion or critical to wildlife habitat (8.4 million hectares enrolled as of 2019).[93]
    b. The Conservation Stewardship Program rewards growers for overall conservation performance across entire operations (18.2 million hectares enrolled as of 2021).[94]
    c. The Environmental Quality Incentive Program provides financial and technical assistance to increase environmental quality of farmland still in production (21 million hectares enrolled in 2017, 2018, and 2019).[95]

d. The Regional Conservation Partnership Program provides financial and technical assistance for locally identified projects funded by both federal and partnering entities (10 million hectares benefited through 375 local projects with over 3,000 partners at the end of 2019).[96]

e. The Conservation Effects Assessment Project quantifies the environmental effects of conservation practices and programs on the environment and develops the science base for managing the agricultural landscape for environmental quality.[97]

f. Landscape initiatives are used to accelerate the benefits of voluntary conservation programs, such as cleaner water and air, healthier soil, and enhanced wildlife habitat. In 2022, NRCS operated 11 landscape initiatives across the U.S. for wildlife, water, ecosystems, pollinators, and forestry.[98]

g. Growers engage in education, technology transfer, and practice adoption through numerous informational mechanisms such as interactions with certified crop advisors, tours of discovery farms, university experimental field and research field days, farmer-to-farmer programs, tactical agriculture programs, and participation in USDA, state, and local conservation programs.

h. NRCS field office technical guides (FOTG) customized for local soil and conditions are available to enable better production and conservation measures by growers.[99]

7. Growers comply with Title 18, Section 201 of the U.S. Code of Federal Regulations, which makes it illegal to bribe a public official or witness, where bribery implies giving or receiving anything of value in exchange for an official act.[100] Furthermore, growers abide by the Foreign Corrupt Practices Act (FCPA), which prohibits the payment of bribes to foreign officials to assist in obtaining or retaining business.

8. Growers keep informed of changes to legislation and regulations relevant to their activities through various means.

   a. The U.S. Department of Agriculture (USDA) publishes official press releases of regulatory modifications and policies that are disseminated through media, websites, newsletters, and social media channels. USDA Farm Service Agency Service Centers[101] are located at over 4,500 locations, providing growers with access to information and staff advisory services in practically every agricultural county in the U.S.

   b. Through the National Institute of Food and Agriculture (NIFA), USDA provides training to help sorghum growers understand the implications of public policy on their operations.

   c. U.S. regulators such as the Food and Drug Administration (FDA), the Environmental Protection Agency (EPA), and its Animal and Plant Health Inspection Service (APHIS) also facilitate access to proposed, modified, or newly published regulations through press releases and communications on their official websites, newsletters, and social media channels.

   d. Growers also have access to the Federal Register, which is the official journal of the U.S. government, and provides legal notice of administrative rules, notices, and Presidential documents in a comprehensive and uniform manner.

   e. Through participation in national, state, and local sorghum grower associations and extension service programs, sorghum growers also receive information, training, and analysis of new legislation and regulations.

9. The U.S. Internal Revenue Service (IRS) requires that growers follow specific recordkeeping rules for their farming activities, which include the maintenance of accurate documentation of inputs, expenses, earnings, deductions, profits, and assets for taxation purposes. The IRS Publication 225 (Farmer's Tax Guide) provides a detailed explanation of the federal tax laws that apply to farming and outlines the required recordkeeping system to adequately calculate profits, losses, and taxes due.[102]
10. Growers negotiate their harvest using different types of contracts in which quality, price, volume, payment terms and conditions are addressed. Contract types include cash contracts, forward contracts, futures contracts, and options contracts.
11. Growers continuously assess and incorporate new technologies to optimize crop yield and reduce their environmental impacts, as appropriate to their growing conditions, needs, and operational and economic capabilities. These include the adoption of yield and soil maps, automated guidance systems, and the use of variable rate technologies that allow the optimization of seed rates, plant spacing, volumes of crop nutrients and plant protection products, as well as the reduction of fossil fuel consumption. Growers are also adopting digital agriculture information technologies, which can support inventory tracking and optimize the use of assets, farm inputs, and activities, which enable data-driven decision-making on farm operations.

Appendix I

Tier 2 definitions and methodologies related to the second-party auditor surveying process

BACKGROUND

While in the United States the levels of deforestation and land conversion associated with crop production are minimal, as noted by data from the U.S. Department of Agriculture related to the stability of forest and cropland areas over the past decade; food and feed manufacturers are often mandated to go through compliance and due diligence reporting processes for any supply chain ingredients that constitute a significant share of their final product.

In order to support sorghum supply chain stakeholders in providing robust assurances to comply with sustainability due diligence and disclosure requirements related to conversion free supply chains, the U.S. sorghum industry makes available a baseline and yearly assessment of grasslands conversion, to provide assurances of low risk for U.S. sorghum production areas.

GRASSLANDS DEFINITION

This baseline will assess grasslands as per the U.S. government's Multi-Resolution Land Characteristics (MRLC) Consortium's Land Cover Database Cropland Data Layer (NLCD), which defines grasslands as:

> 'areas dominated by graminoid (grass) or herbaceous vegetation (non-grass perennials), generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling but can be utilized for grazing".

and to the extent possible, will articulate with USDA FSA reported base acres, which for 2024 were recorded at 8,492,819 sorghum acres.[86]

U.S. sorghum growers are committed to the ongoing process of improving their production practices

Second-party auditor

A second-party auditor, hired by the Checkoff, will annually audit 377 of the approximately 20,000 U.S. sorghum growers for verification of the grassland conversion threshold. This is in-line with the recommended sample size at a 95% Confidence level with a margin of error of +/- 5% in a population of 20,000, as outlined by ISEAL best practices.[104]

A recreation of the ISEAL Sample sizes at a given confidence level and population size table is shown below.

Sample Size Required								
	95% Confidence Margin of error				99% Confidence Margin of error			
Population Size	+/- 25%	+/- 10%	+/- 5%	+/- 1%	+/- 25%	+/- 10%	+/- 5%	+/- 1%
10	6	9	10	10	7	9	10	10
20	9	17	19	20	12	18	19	20
50	12	33	44	50	18	39	47	50
100	13	49	80	99	21	63	87	99
200	14	65	132	196	24	91	154	198
500	15	81	217	475	25	125	285	485
1,000	15	88	278	906	26	143	399	943
2,000	15	92	322	1,655	26	154	498	1,785
5,000	15	94	357	3,288	26	161	586	3,842
10,000	15	95	370	4,899	27	134	622	6,239
20,000	15	96	377	6,489	27	165	644	9,084
50,000	15	96	381	8,056	27	166	655	12,455

METHODOLOGIES

Risk of grassland to farmland conversion will be assessed via a statistically significant annual second party conducted/audited survey of sorghum acres for each harvest on a marketing year basis.

Data collected via statistical surveying will allow for the calculation of the minimal level conversion rate range (e.g., 1–5%), establishing the low-risk threshold for sorghum acres eligible for allocation under Tier 2: Sorghum Low-risk Grassland Conversion of the U.S. Sorghum Assurances Protocol.

USDA assessment of Agricultural Driven Deforestation, https://www.usda.gov/sites/default/files/documents/USDA-Assessment-of-Ag-driven-Deforestation.pdf

This protocol adopts the Accountability Framework Initiative's definition of "Minimal Conversion": A small amount of deforestation or conversion that is negligible in the context of a given site because of its small area and because it does not significantly affect the conservation values of natural ecosystems or the services and values they provide to people". https://accountability-framework.org/use-the-accountability-framework/definitions/

The specific ranges for annual conversion, lower bound and higher bound percentages, will be determined from the statistical analysis of the Sorghum Checkoff second-party auditor verification survey.

***The specific ranges for annual conversion, lower bound and higher bound percentages, will be determined from the statistical analysis of the Sorghum Checkoff second-party auditor verification survey.

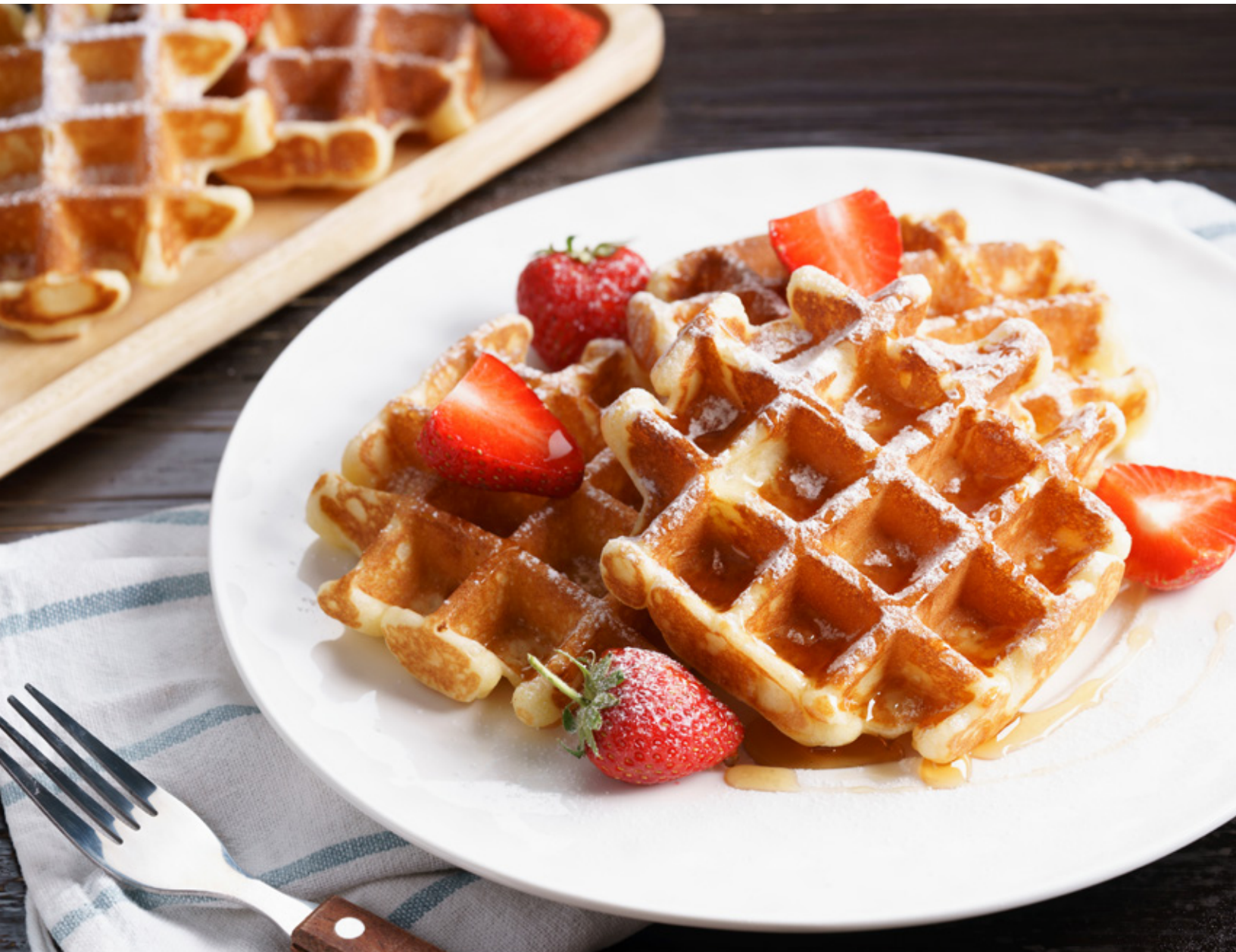
Surveying results will serve to define low-risk, medium-risk, and high-risk of grassland conversion for a particular marketing year. Each range, will be determined from the statistical analysis of the USCP second-party auditor verification survey.

Annual survey results will provide each marketing year's estimated grassland to cropland conversion rate and be used to determine whether acres linked to 'sustainable sorghum volumes' complied with the 'minimal level' conversion range defined in this protocol.

Based on the effective yearly surveying of grassland to cropland conversion rates, 'sustainable sorghum volumes' will be considered to align with a low-risk level if they are found to be within an annual conversion lower bound percentage range.

In such cases, documentation issued under this protocol and providing U.S. sorghum assurances will include the low risk of grassland to cropland conversion assurance.

In the case that the grassland to cropland conversion rates are found to be within the 'medium risk' or 'high risk' annual conversion lower and higher bound percentage ranges, the sustainable sorghum volumes documentation for that marketing year's harvest will not incorporate assurances of non-conversion.



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