



SOY SUSTAINABILITY

Examining U.S. Soy's Land Use Change

Understanding the Impact of Soy Production on U.S. Landscapes



The U.S. soybean industry continues to meet the growing global demand for soy as a high-quality protein source for human consumption, aquaculture and livestock feed while simultaneously reducing its environmental impact.

THE FACTS

U.S. soybean farmers **Increased Land Use Efficiency by 25%** from 2000 to 2020.³

U.S. forestlands (non-federal) increased by 742 thousand hectares while **cropland decreased by 3.6 million hectares** between 1997 and 2017.⁴

CRP programs included 9 million hectares in 2021, including specific grassland programs.⁵

Current year **enrollment in CRP is outpacing expiring contracts**.⁷



- **Modern tools and practices** like climate-smart agriculture, enhanced seeds, moisture sensors, smart irrigation, autonomous and GPS-enabled tractors, drones and satellite imagery help U.S. Soy growers produce more soy from the same amount of land, even as they reduce the use of natural resources.
- U.S. Soy has the **lowest carbon footprint, including Land Use Change (LUC)**, versus soy of other origins.¹
- FEFAC has confirmed that the **U.S. Soy Sustainability Assurance Protocol (SSAP)** passed stringent, independent benchmarking against its FEFAC Soy Sourcing Guidelines in 2021, including criteria to confirm “conversion-free” soy or crops that are produced without the need to convert forestland or natural habitats to farmland.
- **SSAP has earned Silver Level Equivalence** when benchmarked with the Sustainable Agriculture Initiative Platform (SAI Platform)’s Farm Sustainability Assessment (FSA) 3.0.
- In contrast to other reports, a peer-reviewed study analyzed data and satellite imagery from 1985 to 2020 of the soy-producing states of the Great Plains. Results indicate that much of the land that 2008 to 2020 satellite datasets classified as natural-to-cropland change was, in fact, idle cropland.²
- The **fluctuations in cropland indicate the land is continuously going in and out of production** based on demand and revenue opportunities, and that the actual area devoted to crops is larger than what can be calculated in a year or even in several years.
- The **United States Department of Agriculture (USDA) Conservation Reserve Program (CRP)** allows farmers to enroll their productive agricultural ground into conservation programs for a set amount of time (average 10-15 years) in exchange for payment from USDA. As contracts expire, CRP land may return to production.
- Given these factors, there is greater accuracy in measuring the impacts of conversion of natural lands to crop if long-term historical **land cover/land use is analyzed in combination with high resolution data and imagery** to distinguish native grasslands from any other grasses or natural lands that are part of an agricultural production rotation.⁶

¹ Mérieux NutriSciences | Blank.

² Combining Tabular and Satellite-Based Datasets to Better Understand Cropland Change by Kenneth Lee Copenhaver Land | Free <https://www.mdpi.com/2073-445X/11/5/714>.

³ Field to Market: The Alliance for Sustainable Agriculture, 2021. Environmental Outcomes from On-Farm Agricultural Production in the United States (Fourth Edition). ISBN: 978-0-578-33372-4.

⁴ 2017 National Resources Inventory Summary Report, U.S. Department of Agriculture’s Natural Resources Conservation Service, <https://www.nrcs.usda.gov/nri>.

⁵ Gardner Policy Series: Conservation Reserve Program’s Evolving Mission. Illinois State University <https://farmdocdaily.illinois.edu/2022/02/conservation-reserve-programs-evolving-mission.html>.

⁶ Examining the Characteristics of the Cropland Data Layer in the Context of Estimating Land Cover Change IJGI | Free <https://www.mdpi.com/2220-9964/10/5/281>.

⁷ USDA Farm Service Agency Conservation Reserve Program (CRP) Enrollment Statistics <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/#:~:text=2022%20Enrollment&text=This%20means%20more%20than%205.12%20Grassland%20Signup%20news%20releases>.

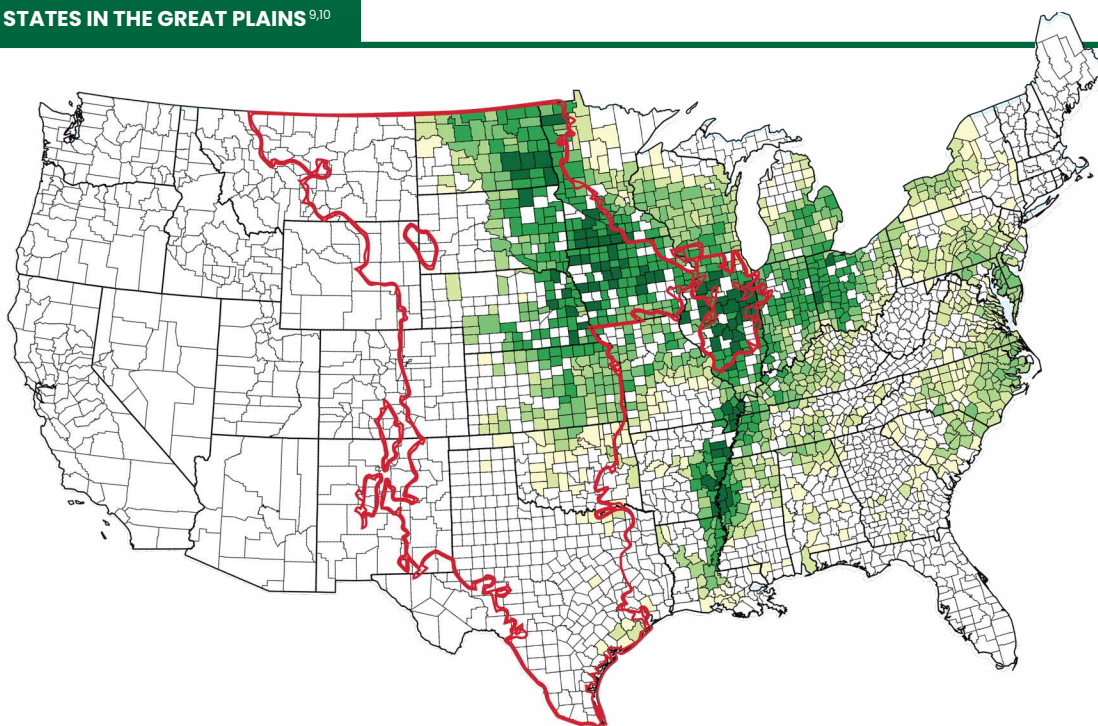
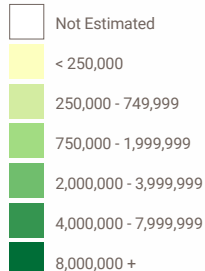
LAND USE CHANGE METHODOLOGIES COMPARED

METHODOLOGY	Combining Tabular and Satellite-Based Datasets to Better Understand Cropland Change ²	WWF (World Wildlife Fund) Plowprint Report ⁸
DATA SOURCE(S)	USDA's National Resources Inventory, USDA Census and USDA NASS Statistical Datasets and High-Resolution USDA Aerial Imagery, LandTrendr Spectro-temporal curves from Landsat satellite images, and the CDL as a guide to potential change locations	USDA's annual Cropland Data Layer for U.S. geography
RESOLUTION	Combined satellite datasets with tabular datasets to pinpoint counties most at risk of conversion to crop and USDA 2 meter aerial imagery to assess potential change	Moderate-resolution (30 meter) satellite imagery
TIME PERIOD	1985-2020	2016-2021
GEOGRAPHY	U.S. soybean-producing states in the Great Plains	Great Plains of Canada, U.S., Mexico
LAND TYPE	Native grasslands and forests	Grasslands without distinction between intact and native
CROP(S)	Multiple	Multiple
ACCURACY	Greater resolution equals greater accuracy	Lower resolution equals lower accuracy

SOY PRODUCING STATES IN THE GREAT PLAINS^{9,10}

Figure 1. Identifies the soy-producing states in the Great Plains by number of bushels.

BUSHELS



² Combining Tabular and Satellite-Based Datasets to Better Understand Cropland Change by Kenneth Lee Copenhaver <https://www.mdpi.com/2073-445X/11/5/714>.

⁸ WWF (World Wildlife Fund) 2023 Plowprint Report <https://www.worldwildlife.org/publications/2024-plowprint-report>.

⁹ USDA National Agricultural Statistics Service https://www.nass.usda.gov/Charts_and_Maps/Crops_County/sb-pr.php.

¹⁰ <https://www.fs.usda.gov/research/treesearch/58630>.

U.S. CROPLAND DECREASED WHILE FORESTLAND INCREASED (Cropland Change 1997-2017)⁴

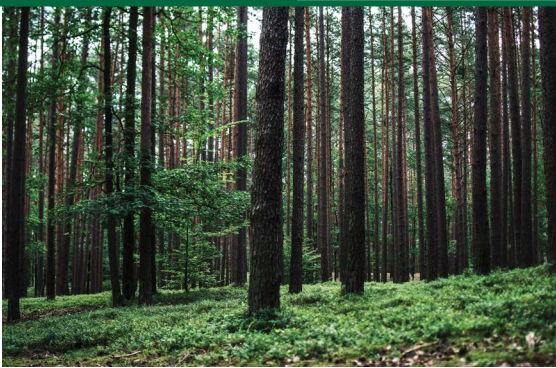
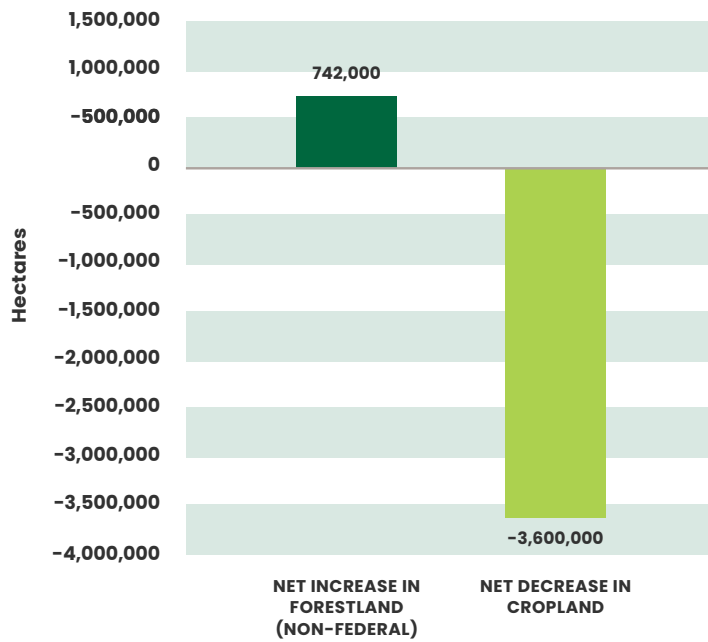


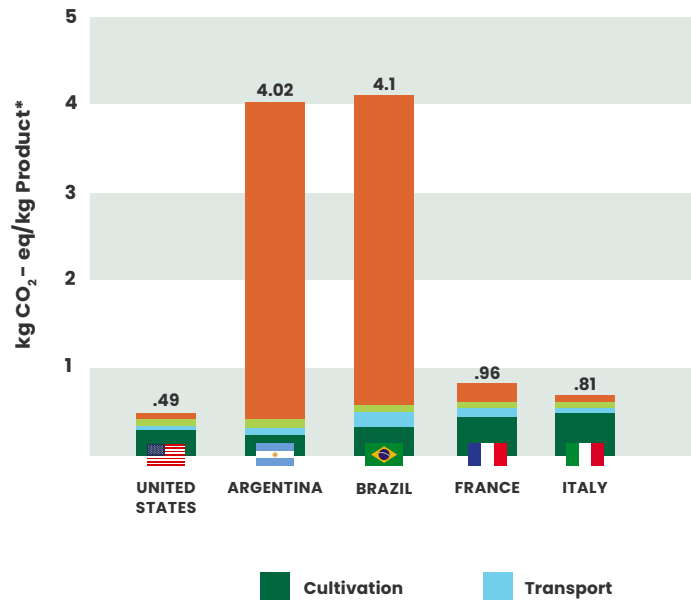
Figure 2. Identifies the soy-producing states in the Great Plains by number of bushels.



U.S. Soy has the Lowest Carbon Footprint Versus Soy of Other Origins Including Land Use Change (Cropland Change 1997-2017)¹

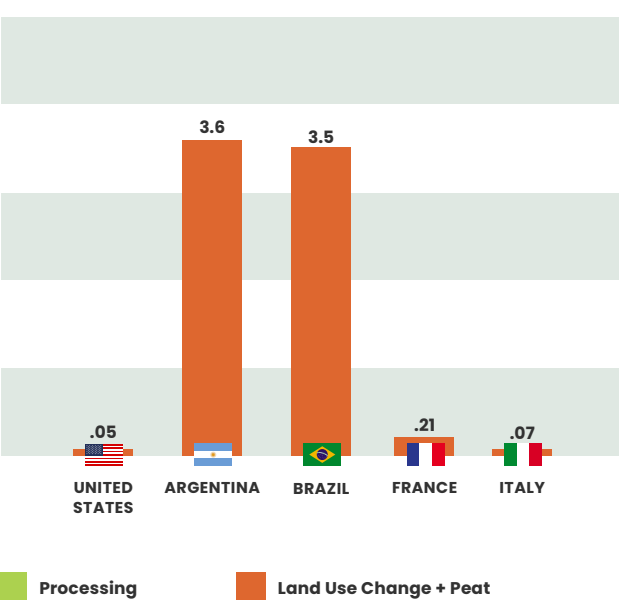
CARBON FOOTPRINT (Including Land Use Change and Peat)

Figure 3. Illustrates the carbon footprint of whole soybeans imported from various countries including land use change and peat.



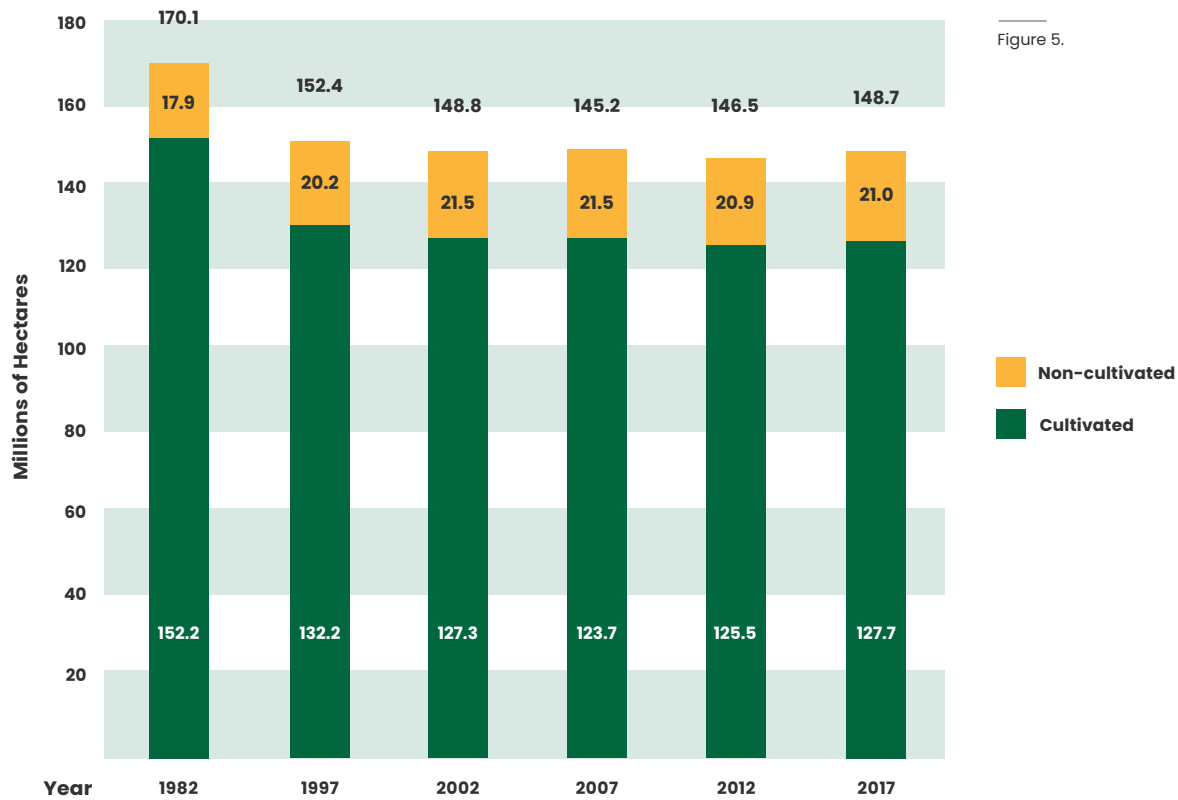
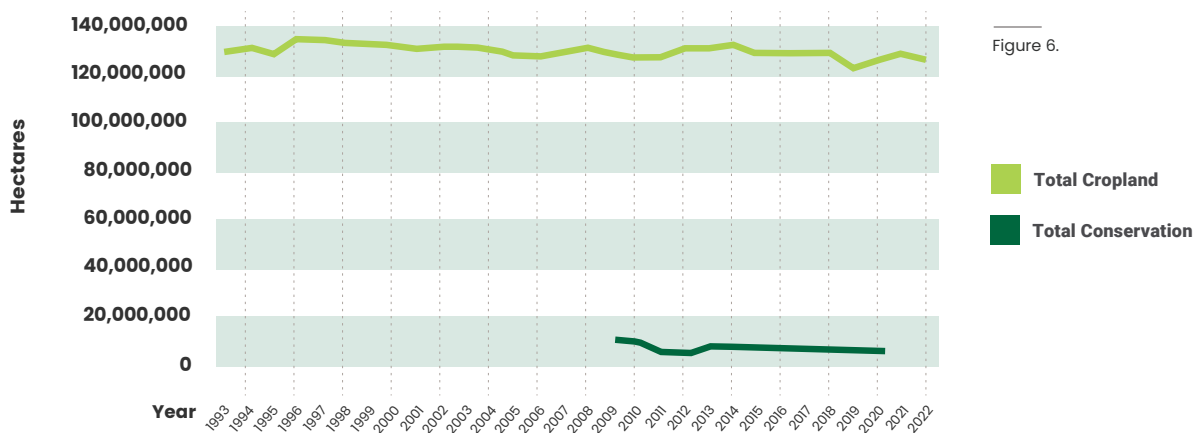
LAND USE CHANGE AND PEAT ONLY

Figure 4. Illustrates the carbon footprint of whole soybeans imported from various countries including land use change only.



¹ Mérieux NutriSciences | Blonk.
⁴ 2017 National Resources Inventory Summary Report, U.S. Department of Agriculture's Natural Resources Conservation Service, <https://www.nrcs.usda.gov/nri>

*Results based on default emission modeling, including land use change emissions, according to the rules of the PEFCR-Feed guidance document (European Commission, 2018) as implemented in the Agri-footprint™ 6.3 database. Input data rely on country average FAO statistics and other secondary sources. Supplier-specific information would improve data quality and may provide differing results. Comparisons have not been reviewed in the context of ISO 14040/14044 compliance.

CROPLAND CHART COMPARING CULTIVATED WITH NON-CULTIVATED⁴CROPLAND AND CONSERVATION PROGRAM HECTARES BY YEAR¹¹

⁴ 2017 National Resources Inventory Summary Report, U.S. Department of Agriculture's Natural Resources Conservation Service, <https://www.nrcs.usda.gov/nri>.

¹¹ USDA NASS Survey Data, Field Crop Totals, Principal, Incl Potatoes [Accessed on January 26th, 2023] <https://quickstats.nass.usda.gov/>.

¹² https://www.nass.usda.gov/Research_and_Science/Cropland/sarsfaqs2.php#Section4_3.0.



LAND USE CHANGE KEY TAKEAWAYS



The pasture and grass-related cover categories have traditionally had very low classification in the CDL.¹²



Multiple data sets from credible sources provide higher resolution and accuracy of findings.



When estimating change to cropland, land cover from previous years (as far back as 10 years or more) needs to be considered as the crop footprint is dynamic.



Risk determinations should be based on data timelines consistent with cutoff dates.

**For more information
about U.S. Soy, visit**

➤ [USSOY.ORG](https://ussoy.org)



About U.S. Soybean Export Council

The U.S. Soybean Export Council (USSEC) focuses on differentiating, elevating preference and attaining market access for the use of U.S. Soy for human consumption, aquaculture and livestock feed in 80+ countries internationally. USSEC members represent the soy supply chain, including U.S. Soy farmers, processors, commodity shippers, merchandisers, allied agribusinesses and agricultural organizations. USSEC is funded by the U.S. soybean checkoff, USDA Foreign Agricultural Service matching funds and industry.

Visit www.ussec.org for the latest information on [U.S. Soy solutions](#) and [news](#) about USSEC and U.S. Soy internationally.

