ERADICATING PESTS TO ELIMINATE PESTICIDE NEEDS

THE U.S. COTTON INDUSTRY TAKES THE ISSUE OF COTTON PESTS AND THEIR SAFE ELIMINATION VERY SERIOUSLY.

Every pesticide we use is assessed rigorously. Since 1970, Federal laws require the U.S. Environmental Protection Agency to assess the safety of each pesticide and its proposed use, including the single application amount and the annual amount. Restrictions and requirements to register a pesticide in the U.S. keep increasing as scientific understanding and technology advance. The U.S. is the only country in the world to systematically measure the use of pesticides over time through the NASS[1] surveys.

Applying pesticides only takes care of the symptom, not the cause. This is why the U.S. cotton industry has worked hard on controlling the spread of invasive species through alternative pest management action such as eradication programs and biotechnology to limit the use of pesticides.

1 National Agricultural Statistics Survey

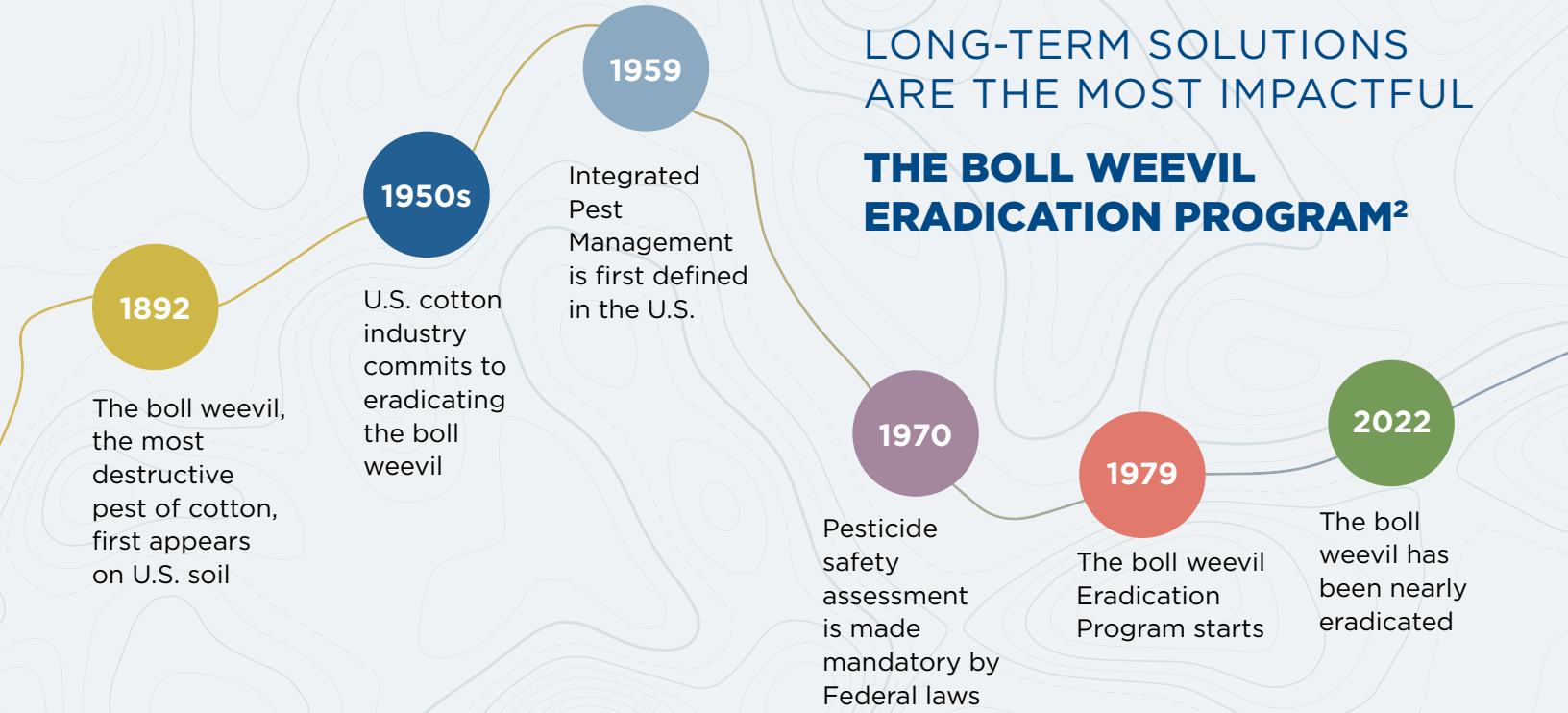
U.S. COTTON TRUST PROTOCOL®
Trust in a smarter cotton future

Get to know some of our growers and learn more about the Trust Protocol at **TrustUSCotton.org**

TIMELINE

LONG-TERM SOLUTIONS ARE THE MOST IMPACTFUL

THE BOLL WEEVIL ERADICATION PROGRAM[2]



The **boll weevil** was the first and most destructive pest to challenge the U.S. cotton industry. A nationwide eradication program was developed to eliminate the pest from U.S. soil. Other invasive pests have threatened the U.S. cotton industry and additional eradication programs have been established for the **pink bollworm**[3] – and the industry is considering a program for the newly emerged **cotton seed bug**.

The pink bollworm and the boll weevil were responsible for high volumes of cotton crop damage and for many years pesticides were the only tool available to combat their destruction. Dedicated action has successfully led to them virtually disappearing from U.S. cotton fields, thereby eliminating the need for pesticide applications to combat these pests. As these are both invasive species[2,3], their eradication has had no impact on biodiversity or surrounding ecosystem services.

The below section outlines the most common pests that threaten U.S. cotton production and the alternative methods used in managing them.

2 Raszick, T.J. (2021), Boll Weevil Eradication: A Success Story of Science in the Service of Policy and Industry, Annals of the Entomological Society of America, Vol 114(6).

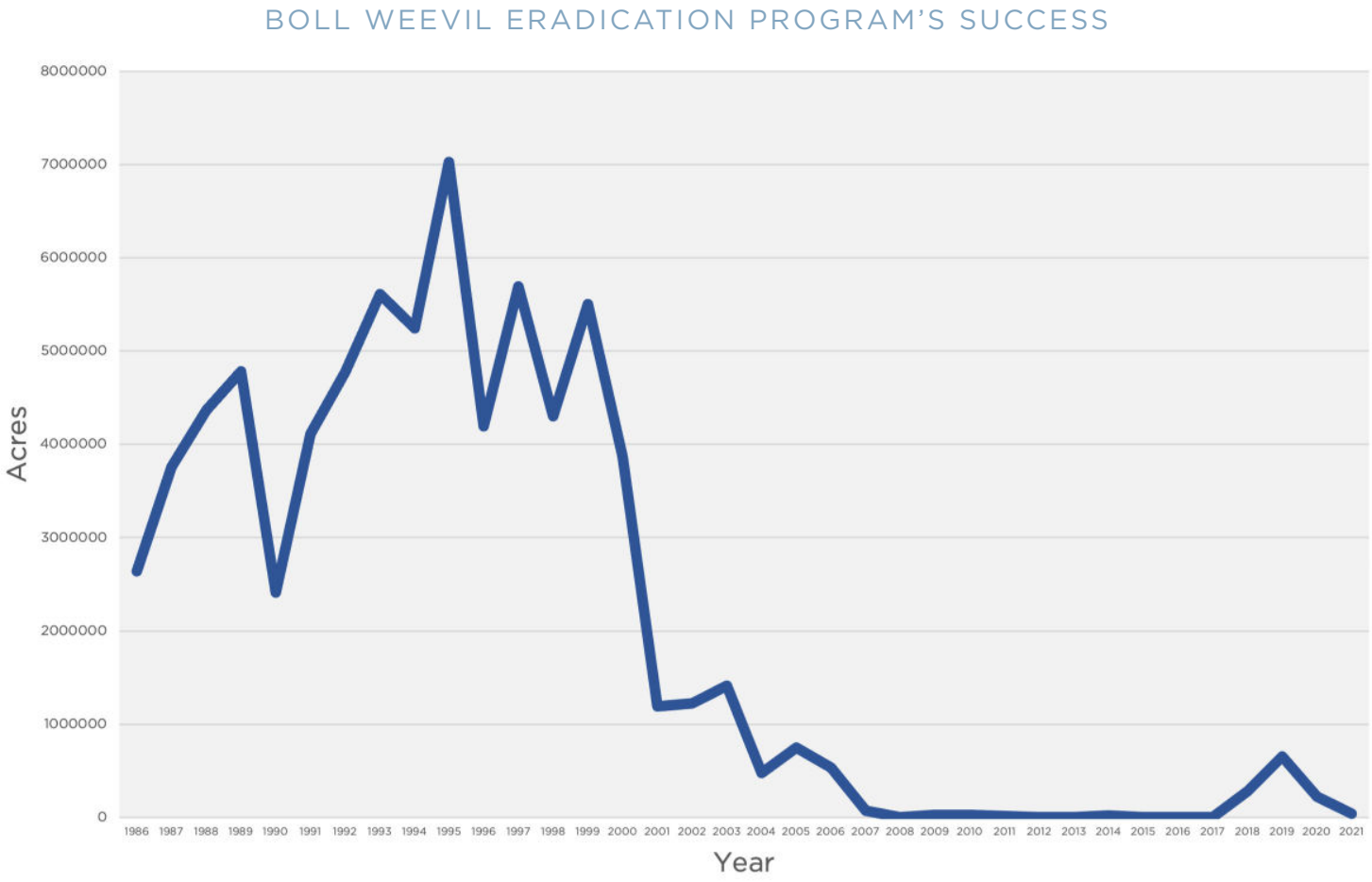
3 Pink Bollworm Eradication Plan in the US, USDA (2008).

BOLL WEEVIL

The boll weevil is a beetle of the family *Curculionidae* and is a devastating cotton pest mainly present in North and South America. The boll weevil was introduced in the U.S. in the 1890s and severely affected crop yields for 90 years, until in 1979 when the National Boll Weevil Eradication Program (BWEP) was initiated with cotton producers paying 70% of the costs in partnership with USDA-Animal and Plant Health Inspection Service (APHIS). The BWEP entailed a combination of tactics, ranging from a required host free period to the application of insecticides and the use of pheromones to trap the pests.

Photo courtesy of USDA Agricultural Research Service

The BWEP achieved impressive long-term results, reduced pesticide use thus increasing beneficial insect populations, and has nearly eradicated the boll weevil from the U.S. (final eradication focuses on a circumscribed area of the Lower Rio Grande).



Boll Weevil Eradication Program's success: *Total U.S. cotton acres treated at least once for boll weevil populations exceeding action thresholds, established by scientists, from 1986 through 2021*

PINK BOLLWORM

The **pink bollworm** *(Pectinophora gossypiella)* is among the most destructive cotton pests. The adult pink bollworm is a small grey moth while the larva is a white caterpillar with pink banding along its dorsum. It became an invasive pest in the U.S. by the end of the 1920s. By the early 2000s, estimates suggested the pink bollworm infestation was resulting in over 32 million dollars worth of yield losses.

Photo by Peggy Greb,
USDA Agricultural Research Service

With producers paying approximately 70% of the costs in partnership with USDA-Animal and Plant Health Inspection Service (APHIS), the Pink Bollworm Eradication Program used multiple approaches including a required host free period, pheromone application, *Bt* cotton plantings, sterile moth release, and chemical intervention (if necessary). In October of 2019, USDA **declared** the pink bollworm eradicated.

PINK BOLLWORM ERADICATION PROGRAM'S SUCCESS

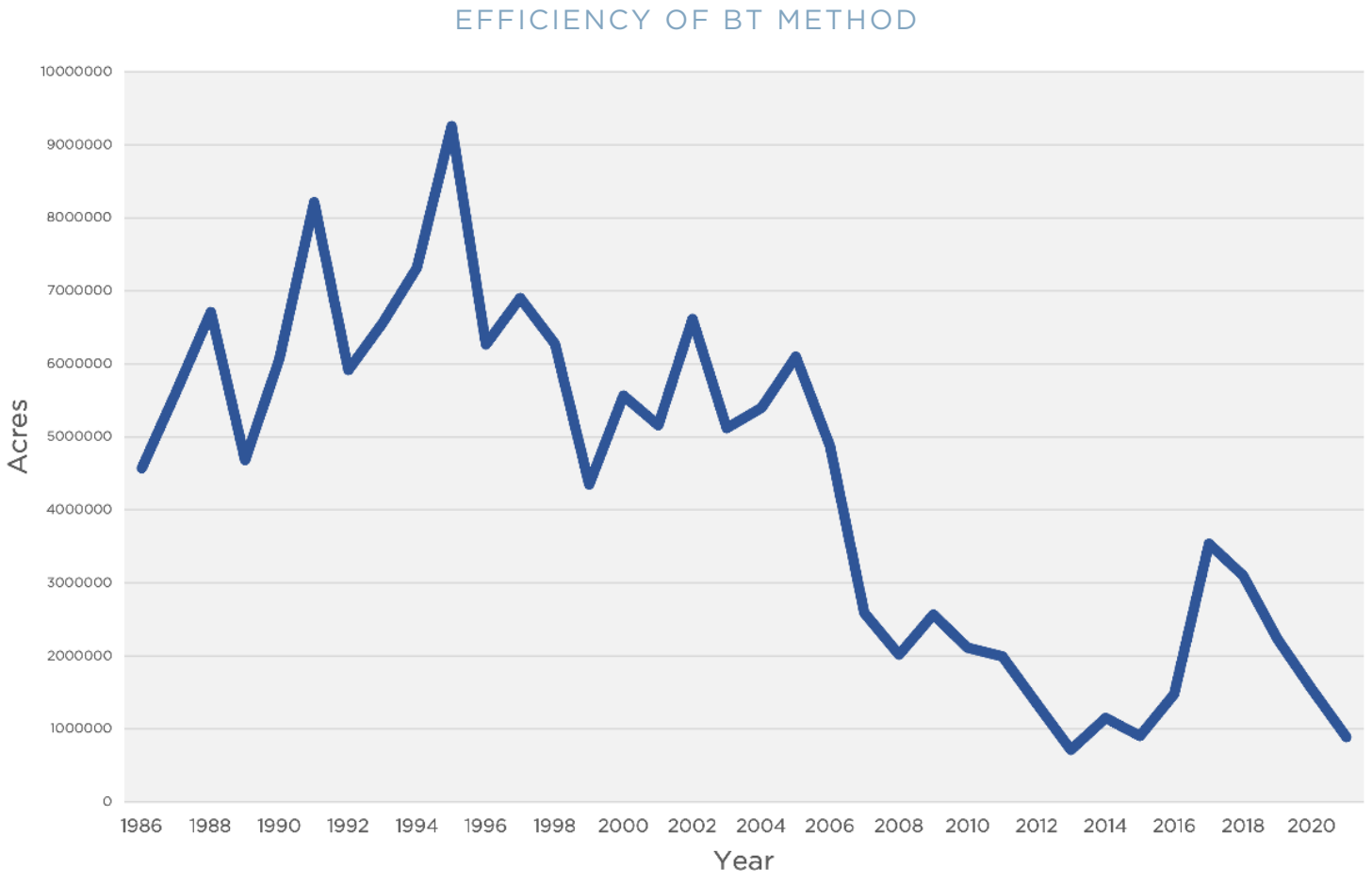
Pink Bollworm Eradication Program's success: *Total U.S. cotton acres treated at least once for control of pink bollworm population that have exceeded action thresholds, established by scientists, from 1986 through 2013.*

BOLLWORM/BUDWORM

The bollworm/budworm complex is comprised of two moth species – budworm, *Chloridea* (formerly *Heliothis*) *virescens* and bollworms, *Helicoverpa zea* – whose larval form feed on developing fruit of cotton. Historically, budworm has been more prevalent in the U.S. Mid-South and developed pesticide resistance more rapidly than bollworm.

The development of innovative technologies that allowed the use of a protein coming from the bacteria *Bacillus thuriengensis (Bt)* helped eliminate damage by budworm and greatly reduce pesticide needs. The beneficial insects are not killed by the *Bt* protein, enhancing natural control of pests.

Photo by Scott Bauer,
USDA Agricultural Research Service



Efficiency of Bt Method: *Total U.S. cotton acres treated at least once for budworm/bollworm populations exceeding action thresholds, established by scientists, from 1986 through 2021*

Cotton Seed Bug by Lucas Rubio under CC BY 4.0

COTTON SEED BUG

The *Oxycarenus hyalinipennis,* known as cotton seed bug, is a new invasive pest that has been documented in urban areas of California. The cotton seed bug can reach lengths between 3.8 and 4.3 mm and its body is black with translucent wings. Research activities have started in order to find solutions for its eradication before it reaches cotton production areas in the U.S.

TARNISHED PLANT BUG

The tarnished plant bug (TPB), *Lygus lineolaris*, is a species of plant-feeding insect native to North America and common across the eastern half of the continent. A related species, *Lygus hesperus*, is common across the western half of the continent. Both feed on the cotton squares (fruiting buds before flowering) causing the plant to abort the fruit. Additionally, they feed on small cotton bolls before opening, causing issues such as spotting, damage, deformation or rot. A new technology, ThryvOn cotton, has proven to reduce the number of pesticide applications needed to manage plant bug damage.

Photo by Scott Bauer,
USDA Agricultural Research Service

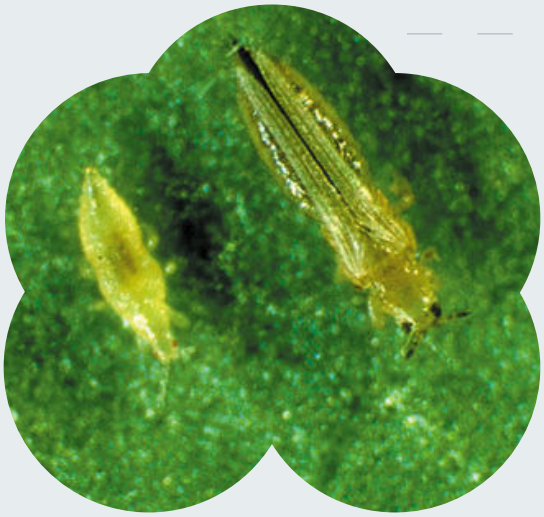


Photo courtesy of Kansas State University

THRIPS

Thrips are tiny insects, less than 2 millimeters long, which damage seedling cotton. It is a particularly challenging pest for cotton growers in the U.S. Midwest and south, causing 6.5 million dollars of economic loss in Mississippi alone. A new technology, ThryvOn cotton, has proven effective against thrips, reducing reliance on foliar sprays.

THE U.S. COTTON TRUST PROTOCOL COMMITMENT

The U.S. Cotton Trust Protocol systematically measures impact across relevant key metrics such as:

Soil Carbon | Land Use Efficiency | Soil Loss

The U.S. cotton industry remains committed to minimizing the number and population size of damaging insect pests. As the EPA continues to restrict the availability and use of pesticidal tools, the industry continues to focus on the pests of cotton and work to identify other means to address the pest such as nematode resistant traits and disease resistant traits identified through conventional breeding programs.

A greater understanding of the pest and all facets of its biology will help identify one or more weaknesses to exploit for reducing the pest population and associated yield damage with minimal negative impact to natural control and the environment. As science continues to advance, so does the IPM programs of cotton producers utilizing all options to minimize the pest population and costly pesticide inputs required to minimize losses.

www.planthealthexchange.org
www.cotton.ces.ncsu.edu
Images on p. 3-6 c/o USDA