

Pink Bollworm Eradication



**A Window
of Opportunity**

Pink Bollworm Eradication: A Window of Opportunity

The pink bollworm is a very destructive cotton insect pest. The National Cotton Council estimates pink bollworm costs Western cotton producers an estimated \$21.6 million annually for prevention, control and yield losses. Fortunately, U.S. cotton producers now have access to the tools for eradicating the pink bollworm from this country.

Increasing regulations governing chemical control practices and the need to improve cotton production profitability more than justify eradication. Absent this pest, cotton producers will see increased yields, reduced insecticide use and improved profitability. This plan promises to provide a

permanent solution to the pink bollworm problem. The plan includes coordinated efforts by cotton producer communities and federal, state, regional, county and local entities to combat and eliminate the “pinkie” from where it is inflicting damage — West Texas, New Mexico, Arizona, California and northern Mexico.



The pink bollworm is one of cotton's most destructive insect pests.

Chronology of Pink Bollworm Control Efforts

- Pink bollworm was detected first in Robertson County, TX, in 1917, presumably entering the U.S. from northeast Mexico. The pest gradually migrated westward.
- Pink bollworm became established in southern California, western Arizona and northwestern Mexico by 1965.
- The National Cotton Council estimates that U.S. cotton producers' annual losses to pink bollworm are \$21 million due to prevention, control costs and lower yields due to plant damage.
- Investments in USDA's Agricultural Research Service (ARS) work led to discovery of the pink bollworm pheromone and its subsequent use for detecting and monitoring the insect, and disrupting its mating.
- USDA-ARS and USDA's Animal & Plant Health Inspection Service (APHIS) developed areawide sterile insect technologies. Included were mass rearing, sterilization, delivery and moth release.

- A sterile pink bollworm moth release program was initiated in California's San Joaquin Valley in 1970 and has protected the region's cotton acreage for 30 years. The program costs California growers about \$6 million annually, and USDA provides about \$1 million.
- From 1990 to 1999, numerous areawide experimental programs in California and Arizona validated and perfected the suppression potential of mating disruption systems utilizing pink bollworm pheromone applications.
- Since 1996, transgenic Bt cotton has provided one of the most powerful tools for pink bollworm control.
- USDA-APHIS and California growers invested in expanding pink bollworm rearing facilities and capacity in 1994, and the NCC's Pink Bollworm Action Committee confirmed the goal of eradication and approved an areawide action plan.
- In 1999, the International Cotton Pest Work Committee established a goal of areawide approaches to pink bollworm control.
- A key bi-national boll weevil and pink bollworm eradication planning meeting was held in Chihuahua, Mexico, in February 2001.
- Trans-Pecos/El Paso, TX, growers approved dual boll weevil and pink bollworm eradication programs. Pink bollworm activities will begin in 2001 with pheromone applications followed by sterile moth releases in 2002.



A pink bollworm colony egg production room, left, and an irradiation machine in which chilled moths are placed for sterilization are part of the expanded "factory-like" Pink Bollworm Rearing Facility in Phoenix, AZ, that is vital to supporting an eradication program.

Eradication Justification

The pink bollworm's migratory nature and reproductive capability seriously challenge a cotton grower's control efforts. Effective control requires a proven areawide management strategy similar to those employed in California's San Joaquin Valley pink bollworm control program and the highly successful National Boll Weevil Eradication Program. Pink bollworm technologies implemented in a managed system over a wide area include a cultural control base, Bt cotton, pheromones applied for mating disruption, sterile insect release and targeted use of insecticides if necessary.

Eradication, though, presents a more economically and environmentally viable solution than facing the pink bollworm on an annual basis. The National Cotton Council's Pink Bollworm Action Committee provides grower direction and the International Cotton Pest Work Committee provides coordination with Mexico. A bi-national organization will coordinate this project, which is a cost-share effort combining significant grower contributions and federal assistance. USDA and state government and extension research specialists provide technical and operational assistance.

Elimination of the pink bollworm will rid the U.S. cotton industry of a pest that annually costs producers more than \$21 million for prevention, control and yield losses. Insecticide use in agriculture is under increased regulatory scrutiny with implementation of the Food Quality Protection Act, and ongoing re-registration of older products threatens current pink bollworm control products. Effective pink bollworm products already are limited, and no new control products are in development.



El Paso, TX, cotton producer William Lovelady chairs the National Cotton Council's Pink Bollworm Action Committee, which provides grower direction to pink bollworm eradication efforts.

Eradication Goals and Objectives

There are two program goals that, when reached, will enhance the potential for producer profitability: 1) develop and execute strategies for the areawide eradication of pink bollworm in West Texas, southern New Mexico, Arizona, California and northern Mexico and 2) maintain eradication status and continue to prevent the establishment of pink bollworm in California's San Joaquin Valley.

These goals can be reached by achieving the following objectives:

- Prevent serious economic and environmental losses by using proven bio-rational technology to suppress and, ultimately, eradicate pink bollworm on approximately 200,000 acres of cotton in West Texas, southern New Mexico and northern Mexico;
- Expand incrementally throughout the pest's range, continuing westward into Arizona (400,000 acres), California (915,000 acres) and northwest Mexico (200,000 acres);
- Prevent Bt resistance and preserve that technology's effectiveness in managing pink bollworm; and
- Reduce reliance on insecticides, thereby enhancing the potential use of biological control of other pests while protecting the environment.

Technologies For Achieving Eradication

Program technologies will be applied areawide over a four-to-five-year period. Anchoring this effort will be an array of cultural controls, particularly implementation of plowdown regulations. Other technologies include: 1) mapping of all cotton fields, 2) extensive trapping to monitor populations, 3) maximum use of transgenic Bt cotton varieties, 4) pheromone applications for mating disruption, 5) sterile pink bollworm moth releases, 6) bloom and boll surveys, 7) monitoring for Bt resistance and 8) comprehensive data analysis.

Low cost, effective eradication is dependent on growers' continued, widespread use of transgenic Bt cotton varieties. Resistance management and prevention are highly important to eradication and to the sustainability of the region's agriculture.

Monitoring pink bollworm resistance to Bt cotton is an integral part of the operation. All non-Bt cotton will receive season-long pink bollworm control using pheromone applications for mating disruption.

Pheromone applications alone reduced pink bollworm populations to near zero in a six-year areawide program in Parker, AZ.



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Once pink bollworm populations are suppressed to low levels, the final control measure to achieve eradication is the daily release of sterile pink bollworm moths over all cotton fields. Sterile insect technology has been used for more than 30 years in the San Joaquin Valley program and has successfully prevented the pink bollworm from becoming established in that key cotton-producing area. This not only is an important component for control, but it also prevents the development of insect resistance in Bt cotton.

Placement of Sterile Release Apparatus in the Release Aircraft



Sterile pink bollworm moths are flown from the Pink Bollworm Rearing Facility in Phoenix, AZ, to Shafter, CA, six days a week and kept in 40-degree cold storage before being released over San Joaquin Valley cotton fields to mate with virile moths.

Administration and Operation

USDA-APHIS will be responsible for technical support and coordination of the bi-national program and for the administration of the sterile pink bollworm moth component through a centralized management system. Local grower communities comprised of committees and/or foundations will be responsible for the daily implementation of program operations, including mapping all cotton fields, tracking the distribution of all transgenic Bt cotton fields, detection surveys and timely applications of pheromones on non-Bt cotton.

The map below shows cotton production areas in the U.S. and northern Mexico. Program expansion would depend on producer approval, funding assistance and pink bollworm rearing capacity. Considering these factors, the projected timetable is to initiate Phase I (shown in blue) in the Trans-Pecos and El Paso area on 80,000 acres in 2001 with pheromone applications, followed by release of sterile insects in 2002. New Mexico and northern areas of Chihuahua, Mexico, would be brought into the program within one to three years. Phase II (shown in red), a 150,000-acre area in western New Mexico and the eastern two-thirds of Arizona, would begin in 2003. Phase III (shown in yellow) would be in western Arizona and the lower desert valleys in California and likely would start in 2005. Anticipated total program cost is \$50 per acre annually for four years. The cost of rearing millions of moths for daily releases will be significant. Therefore, federal cost-sharing will be sought to support the rearing and sterile moth releases.



Pink Bollworm Eradication Program expansion depends on grower participation, funding assistance and pink bollworm rearing capacity.

Strategy for a Profitable Future

An areawide approach to pink bollworm eradication is designed to enable cotton producers to move into programs based on principles of integrated pest management (IPM). The eradication program embraces the concept of IPM technologies. Successful elimination of the pink bollworm will facilitate the adoption of more environmentally sound insect control practices, preserve Bt cotton efficacy and help put producers in a position to grow cotton profitably by increasing yields and reducing chemical inputs.



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