

## **Cotton IPM: A Quiet Revolution Reduces Costs, Losses and Risks for Arizona's Cotton Growers**

University of Arizona College of Agriculture and Life Sciences 2011 Impact Report

### **Issue**

During the mid-90s, insecticide applications in cotton typically accounted for about half of all insecticide use in the United States. In 1995, nearly 100 percent of Arizona's cotton acreage was sprayed multiple times for pink bollworm, Lygus bug, and silverleaf whitefly. New technologies have enabled cotton growers to reduce their spray applications significantly while achieving among highest cotton yields worldwide. Behind only California and Australia, Arizona now produces the highest-yielding cotton in the world, nearly 1,500 pounds of fiber per acre, far exceeding the U.S. national average of about 800 pounds per acre. These technologies also help growers implement more ecologically-based, sustainable IPM programs and become less dependent on broadly toxic insecticides.

### **What has been done**

An integrated pest management program (IPM) established in Arizona in 1996, refined in 2006 and continued through today uses insect growth regulators (IGRs—effective against whiteflies), transgenic cotton (with Bt—*Bacillus thuringiensis*—effective against pink bollworms), and a reduced-risk feeding inhibitor (effective against Lygus bugs). Safe for humans, these tools kill only their target pests, allowing natural processes to play a larger role in the management of all other pest insects. Growers have been taught to deploy fully selective materials first and whenever possible. The UA College of Agriculture and Life Sciences initiated the program in collaboration with growers, USDA, Arizona Department of Agriculture, Arizona Cotton Growers' Association, Cotton Incorporated, Arizona Cotton Research & Protection Council, industry and others.

### **Impact**

The fully implemented, collaborative cotton IPM program has registered significant gains since its inception in 1996:

- Statewide averages for cotton insecticide use patterns in Arizona from 1979 through 2010 show that insecticide use on cotton for all insects combined—including whiteflies, pink bollworm, Lygus bug and others reached a 32-year low over the last 5 years, while also reducing costs to all-time lows. The estimated cumulative savings in control costs and yield (from reduced losses to insects) from 1996 through 2010 was more than \$223 million. [Source: Cotton Pest Losses \(CPL\)](#).
- Growers applied 4.15 pounds of active insecticide ingredient per acre of cotton in 1995. In 2009 and also in 2010 the amount of active ingredient applied per acre was reduced by 3.66 pounds, or 88.3 percent, to just 0.48 pounds per acre. This is the equivalent of applying less than a can of soda on an area the size of a football field just once over the cotton season (March to October). [Source: CPL, National Agricultural Statistics Service](#).

- The last 5 years have shown the lowest insecticide use in cotton on record (32 years), at just 1.5 sprays season-long, reducing insecticide loads on the environment by more than 1.6 million pounds of active ingredient annually and saving growers over \$10 million annually in combined control costs and yield savings. **Source: CPL.**
- Compared to 10 years ago, the types of insecticides used now are much safer, with high selectivity and safety for beneficial insect populations. Specifically, there has been a 95 percent reduction in organophosphate use, comparing the last 5 years to an all-time high in 1995; a 98 percent reduction in pyrethroids; 80 percent reduction in endosulfan; and 92 percent reduction in carbamates; with an 85 percent reduction overall in cotton insecticide use. By 2010, 88 percent of all cotton insecticides used were either fully (61 percent) or partially (27 percent) selective, meaning they are safer to use and safer for the natural enemies in the cotton system. The total number of sprays applied in cotton has been reduced by 85 percent. **Source: 1080 database.**
- For Lygus control, the percentage of cotton growers choosing reduced-risk insecticides over standard broad-spectrum options increased from 0 percent in 2005, 52 percent in 2007 and 75 percent in 2008 to 81 percent in 2009, the most recent year measured. One grower reported adopting this feeding inhibitor on 1,200 acres, resulting in 0 percent loss to Lygus in 2007 and again in 2010. **Source: Risk Avoidance and Mitigation Program grant.**
- For the first time in over 40 years, Arizona cotton growers did not apply a single spray against pink bollworm in the years 2008 through 2010. Through statewide grower-coordinated strategic uses of Bt cotton, sterile moth releases and pheromones, farmers are close to eradicating this pest from our borders. **Source: CPL.**
- The percentage of cotton acres never sprayed for insects in 2010 was 29.3 percent, the highest level ever measured. Overall, cotton acreage in Arizona is expanding, from 150,000 acres in 2009, to 201,000 in 2010, and close to 250,000 acres in 2011 (projected), indicating a health in the industry that can be attributed at least in part to higher yields and lower pest control costs. **Source: CPL.**
- The cotton IPM plans developed in Arizona have been exported for use in California, Texas, northern Mexico, Australia and Latin America.

**Web: Arizona Cotton Insect Losses**

<http://cals.arizona.edu/crops/cotton/insects/cil/cil.html>

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