

# impact

of the College of Agriculture and Life Sciences



## Competitive Agricultural Systems in Global Economy Cotton IPM: Reducing Insecticide Use

### Issue

Insecticide applications in cotton typically account for about half of all insecticide use in the United States. New materials on the market are now enabling cotton growers to reduce their spray applications while maintaining competitive yields. These technologies also help growers implement more ecologically-based IPM programs and become less dependent on broadly toxic insecticides.

### What has been done?

An integrated pest management program in Arizona implemented two new tools in 1996 and continued their use through 2002: insect growth regulators (IGRs, effective against whiteflies) and transgenic cotton (containing Bt effective against pink bollworms). The University of Arizona College of Agriculture and Life Sciences collaborated with growers, the USDA, the Arizona Department of Agriculture, the Arizona Cotton Growers' Association, Cotton Incorporated, industry and others. Both of these tools are highly effective against pests, but safe to humans and the environment. Based

on insect hormones, growth regulators disrupt the growth and development of insects. Transgenic cotton is genetically engineered to carry its own biological insecticide, targeting lepidopterous pests, within the plant tissues.

### Impact

Nearly 100 percent of the cotton acreage in Arizona was sprayed multiple times for pink bollworm and silverleaf whitefly in 1995; however, from 1999 through 2001 the majority of acres were never sprayed even once for these two pests. Comparing averages for 1990-1995, a period before the IPM education and technologies were introduced in cotton production, with averages for 1996-2002, the following reductions in spray applications were realized:

For silverleaf whitefly, the average number of chemical sprays dropped from 3.58 sprays per season in 1990-1995 to 1.15 in 1996-2002, representing a 68 percent reduction and over \$72.4 million in cumulative control savings, or about \$10 million annually. For pink bollworm, the average number of sprays per season decreased from

2.72 sprays per season to 0.72 sprays, a 74 percent reduction, representing \$39 million in cumulative savings. For Lygus bug, sprays have decreased only slightly, from 1.57 sprays to 1.52 sprays, a 3 percent decrease; however, due to inflation and other increases in costs of insecticides, there has been a \$24.3 million increase in cumulative control costs. Yet the total for all three pests, and other minor pests, reduced from 9.03 sprays to 3.84 sprays, or a 58 percent reduction overall and a cumulative control savings of \$103.2 million over the seven-year period of 1996-2002. Annual cotton acreage in Arizona is usually over 250,000 acres.

Along with resistance management, these IPM efforts reduced insecticide use, conserved biological control agents, and enhanced sustainability and profitability. The availability of these selected technologies, which are harmless to predaceous insects, has provided growers the opportunity to employ IPM practices that enhance the population levels of beneficial insects in the field and created area-wide benefits for all producers. Furthermore, these plans have been exported for use in California, northern Mexico, and Australia.

### Funding

Hatch Act  
Smith-Lever 3(b) & (c)  
Special Research Grants Smith-Lever 3(d) (e.g., IPM)  
Other CSREES: Western Region IPM; Pest Management Alternatives Program)  
Commodity: Cotton Incorporated  
State: Arizona Cotton Growers Association  
Other Industry: Agrochemical

### Contact

Peter Ellsworth, IPM specialist  
The University of Arizona  
Maricopa Agricultural Center  
37860 W. Smith-Enke Road  
Maricopa, AZ 85239-3010  
Tel: (520) 568-2273; FAX: (520) 568-2556  
peterell@ag.arizona.edu