



# NIFA IPM Programs: Legacy and Impacts



United States  
Department of  
Agriculture

National Institute  
of Food  
and Agriculture

# Enhancing Capacity for IPM Practice and Assessment in Arizona

P.C. Ellsworth, A. Fournier, W. Dixon, J.C. Palumbo, D.H. Gouge, K. Umeda and J. Peterson

Maricopa Agricultural Center, Forbes 410, P. O. Box 2100: (36), University of Arizona, Tucson, Arizona, USA, 85721-0036 • peterell@ag.arizona.edu • (520) 381-2225

**Measuring and communicating environmental, economic and social impacts of IPM are key to recruiting and leveraging support for our IPM programs, and to maximizing future impacts.** Arizona IPM programs are planned, developed and implemented by teams organized under the Arizona Pest Management Center (APMC). Our major areas of emphasis are in vegetable crop IPM, agronomic crops IPM, community IPM and IPM assessment. *Our programs are highly leveraged through federal and state grants and partnerships to maximize impact of our IPM programs.* For FY 2010 we secured about \$1.1 million in competitive grants and other resources directly related to IPM research and outreach. This included over \$900,000 in federal grants, \$37,200 in Western IPM Center grants, over \$98,000 in state grants, and nearly \$60,000 in other resources.

**We have made major investments in IPM assessment, which are paying dividends in increased capacity to document program impacts** (Fig. 1). The IPM Assessment Leadership Team, which includes dedicated faculty (IPM Program Manager & an Assistant in Extension) partially funded through EIPM, oversees development of evaluation data and documentation of IPM outcomes and impacts for all program areas. Two main sources of data inform assessments for our agricultural IPM programs. The first of these is a long-standing Crop Pest Losses and Impact Assessment stakeholder

## Arizona Pest Management Center—Impacts

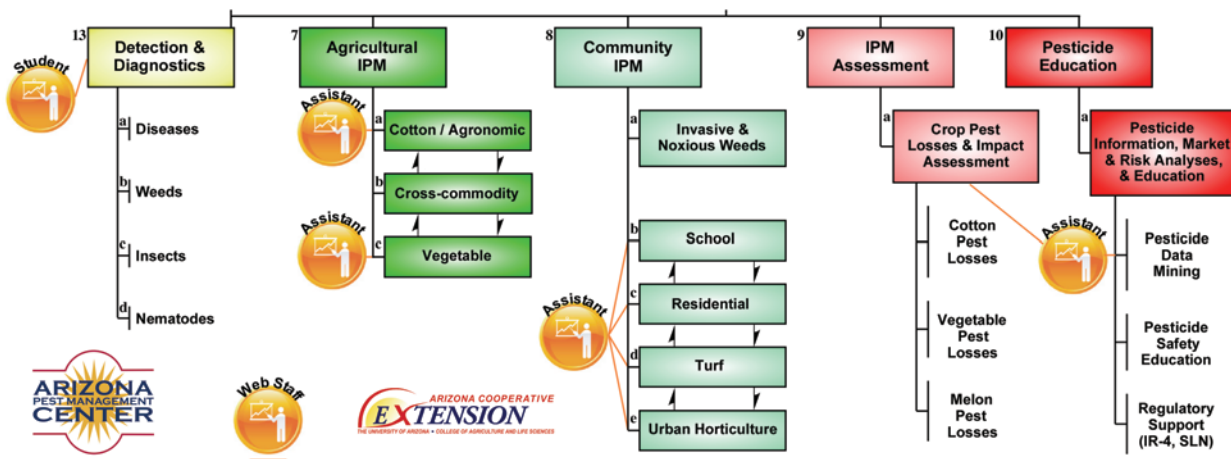


Figure 1. The Arizona Pest Management Center invests resources into formal focal areas of IPM Assessment & Pesticide Education that help us develop quantitative and qualitative measurements of stakeholder behaviors, including the establishment of a 20-yr historical Arizona Pest Management Center Pesticide Use Database, a 32-yr Cotton Pest Losses Database, & a 10-yr Vegetable Pest Losses Database. Orange assets are 50% leveraged through EIPM dollars.



work group funded by the Western IPM Center to conduct surveys of pest control advisor practices on key crops (cotton, lettuce and melons) in Arizona and arid regions of southern California. End-users quantify the impact of insect, weed and disease pests on crop yields and economic outcomes and also provide data on pesticide use, pest trends and emerging IPM needs (Fig. 3). A second, complimentary resource is the Arizona Pest Management Center Pesticide Use Database developed in partnership with Arizona Department of Agriculture and supported through a series of Specialty Crops Block and other grants. The database contains over 20 years of use reports integrated with other resources such as EPA product look-up tables. Our analyses indicate dramatic reductions in the use of most broad-spectrum insecticides and rapid adoption and increased use of reduced-risk chemistries for insect pest management in cotton and lettuce (Figs. 2 & 4). For example, Arizona cotton growers have reduced broadly toxic insecticide inputs by 74% compared to pre-2005 levels, much of this due to grower implementation of Lygus management recommendations developed and extended as a collaborative EIPM / USDA–Risk Avoidance Mitigation Program (RAMP) effort. Our cotton IPM program, including adoption of Bt cotton and whitefly-specific insect growth regulators since 1996 and a selective Lygus feeding inhibitor since 2006, has reduced risks to human health and the environment by eliminating over 1.6 million pounds of insecticides annually. Cotton’s contribution to the Arizona economy includes 9,000 jobs and \$700 million in 2011.

**We have also documented IPM impacts in urban environments.** The Community IPM team has helped Arizona’s participating schools to reduce pesticide applications an average of 71% and pest complaints by 78%. Over 775,305 residents and thousands more tourists tee off each year for nearly 12 million rounds of golf in Arizona. Active children

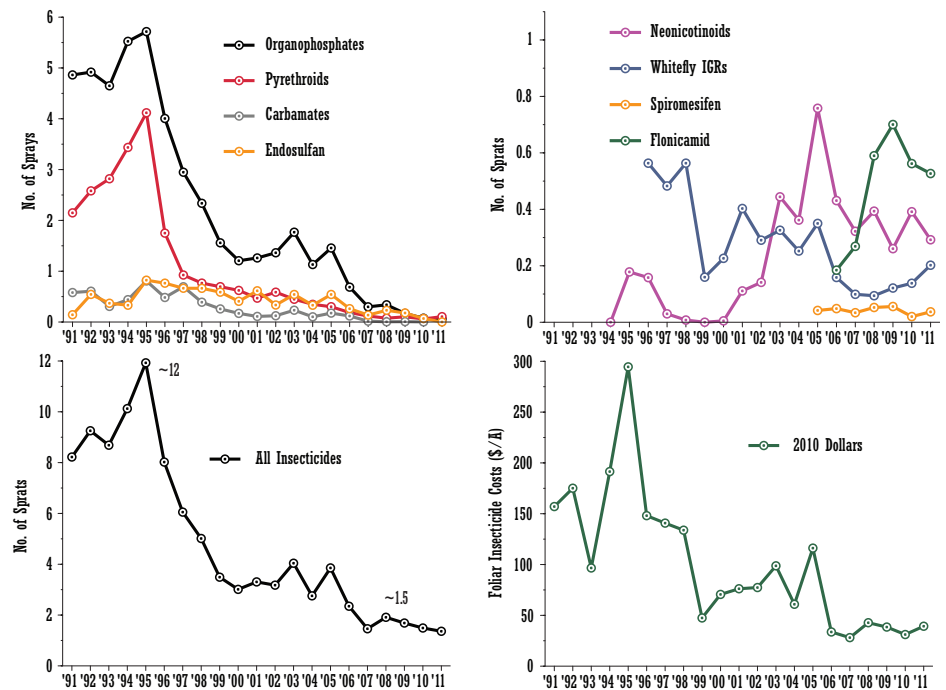


Figure 2. Statewide average cotton insecticide use patterns in Arizona, 1991–2011. Broad spectrum & reduced-risk insecticides (upper left & right) in use during this period. All insecticides & their costs (including application costs) (lower left & right) reached a 33-yr low over the last 6 years. Comparing the last 5 yrs to 1995 (an all-time high), pyrethroids have been reduced by 97%, organophosphates by 95%, carbamates by 97%, and endosulfan by 82% with an overall reduction of cotton insecticide use of 86%. By 2011, 88% of all cotton insecticides were either fully (61%) or partially (27%) selective and safer for natural enemies. Source: APMC Pesticide Use Database & Cotton Insect Losses Database, Arizona Pest Management Center, Ellsworth & Fournier, unpubl., Ellsworth et al. 2009.

and athletes play on turf at home, parks, and on professionally managed sports fields. By showing turf managers where and when their uses of insecticides are unnecessary or ineffective, the elimination of up to 2–3 sprays each year has been possible. This lowers risks of human exposure to pesticides and increases value of leisure industries that generate over \$3 billion to the local economy.

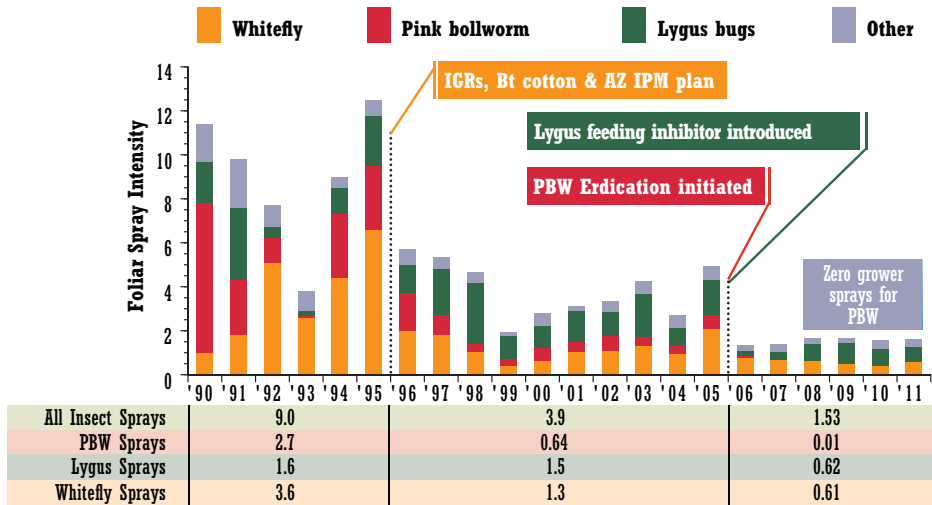


Figure 3. Statewide average cotton insecticide use patterns in Arizona, 1990–2011, by key pest. Over 1.6 million lbs a.i. annual reduction in the last 6 yrs compared to the 32-yr high in 1995; est. cumulative savings in control costs & yield in excess of \$237M. Source: Cotton Insect Losses Database, Arizona Pest Management Center, Ellsworth et al. 2009.

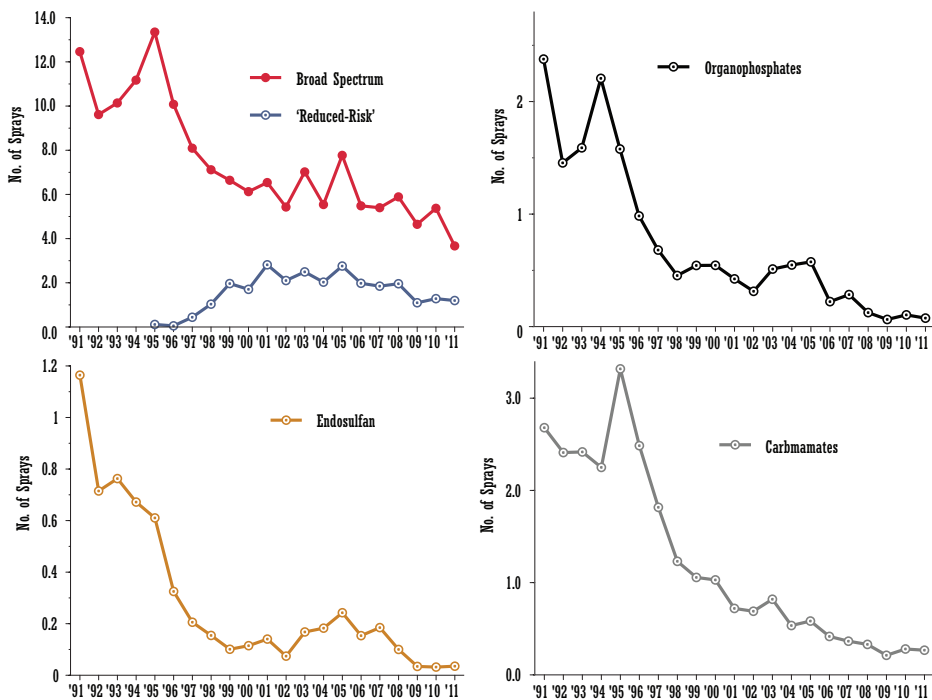


Figure 4. Statewide average lettuce insecticide use patterns in Arizona, 1991–2009. Broad-spectrum insecticide use has declined 66% from a high of over 13 sprays (1995) to less than 5 sprays over the last 3 years; reduced-risk insecticides have increased 10-fold over this same period (upper left). Large declines in key broad-spectrum insecticides have been seen for organophosphates (–95%, upper right), endosulfan (–94%, lower left) and carbamates (–92%, lower right). Source: Pesticide Use Reporting Data, Arizona Pest Management Center, Palumbo et al., unpubl.