

Integrated Pest Management



Protecting Arizona's Environment,
Human Health and Economic Vitality



Protecting Arizona's Environment

Arizona's unique and sensitive environment—with desert and alpine extremes—requires not only protection from the ravages of pests but also from risks due to practices designed to control them. For example, our people and programs help protect forests from pine beetle attack, prevent the establishment of invasive weeds and help farmers deliver a safe and abundant food supply.

- ➲ We show users how to manage pests with less pesticide and reduce risks to the environment. Managing proper tree stand densities has helped reduce the need for pesticides in controlling bark beetles in our forests, parklands and in home landscapes.

Measurable improvements in air quality have been noted since implementation of IPM in Arizona's K-12 schools. Pests have been controlled with a 55 to 90% reduction in pesticide sprays.

In the last decade, in Arizona's cotton fields—by following IPM recommendations—growers have reduced their use of pesticides by over 60%. One result has been the conservation of "good" predatory insects, contributing to improved biodiversity on agricultural lands.

- ➲ When pesticides are needed, IPM practices minimize environmental risks through the use of less toxic compounds at lower rates than conventional sprays. In addition, precise application methods minimize movement into sensitive areas. Along with spot treatments, this has enabled pest managers to control weeds or insects without spraying entire areas leading to pesticide application reductions of up to 33%.

Using global positioning systems (GPS) guidance and geographical information systems, growers can reduce pesticides by over 50%—more than 10,000 gallons—and still manage crop-damaging nematode pests, which are microscopic parasitic worms found in the soil.

- ➲ Invasive plants found in agriculture, open spaces and along waterways choke out native or cultivated plant communities. They also can lead to fire and other environmental hazards and reduce biodiversity. Efforts in partnership with state agencies and private industry recently led to the discovery and eradication of a new weed, kudzu, and coordinated action against buffelgrass, a threat to native saguaros and the fragile Sonoran desert ecosystem.

Integrated Pest Management (IPM) is a scientifically-based, worldwide standard for managing pests. It encourages the use of multiple and flexible strategies for the control of insects, weeds, rodents and other vertebrates and plant, animal and human diseases.

The goal of University of Arizona (UA) IPM programs is the development and use of safe, sustainable and effective control methods that also increase farm profitability, reduce environmental and human health risks and protect natural resources for future generations.

Working with community members to identify priorities, these programs are developed and delivered through a statewide network of IPM specialists, researchers and educators.

What follows is a look at some of the ways in which Arizona Cooperative Extension's IPM programs protect the environment, human health and the economic welfare of our citizens in diverse environments.

40
years of
IPM
HIGHLIGHTS

1967

• "IPM" defined
• Pink bollworm spreads to California cotton from Arizona

1968

• Arizona places moratorium on DDT
• Borlaug receives Nobel Peace Prize for "Green Revolution"
• Nixon forms US-EPA
• 1st Earth Day

1969

1970

1971

• 1st Federal extension IPM project, cotton in Arizona
• DDT banned in U.S.
• State Cooperative Extension IPM projects begin
• FEPICA, pesticide applicator certification

1972

1973

1974

1975

1976

• "Practical Insect Management" published; emphasizes UA's Watson, Ware & ...
• Heptachlor & chlordane

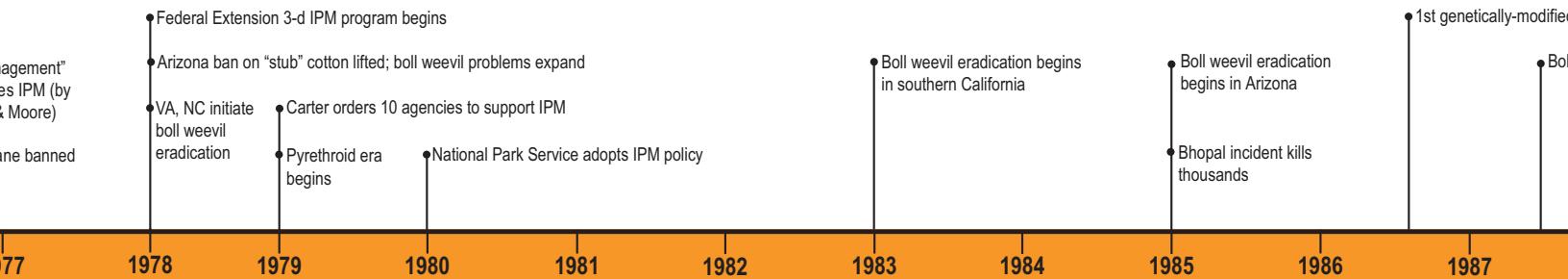
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Protecting the Health of All

Pests—like cockroaches in schools—can be sources of allergens that trigger asthma and other respiratory conditions. Fungi can be sources of cancer-causing contaminants in the food supply, such as aflatoxin in milk. Mosquitoes and ticks can vector debilitating diseases such as West Nile virus and Lyme disease. Safeguarding human health is central to IPM.

- ➲ Children are among the most vulnerable when it comes to exposure, absorption and potential harm from pesticides. The urban IPM team has helped Arizona's participating schools to reduce pesticide applications an average of 71% and pest complaints by 78%. It started small, with just a handful of students benefiting in 2001, to current numbers of over 303,600 K-12 students statewide.
- ➲ With over 200,000 acres in production, Arizona cotton is among the most productive and because of its high quality is highly prized throughout the world for the fine fabric it produces for tailored clothing. Large-scale adoption of IPM programs by cotton growers led to reduced insecticide usage and lowered exposure risks to farm workers, growers and the public. In 1995, cotton growers sprayed with toxic insecticides on average 12.5 times totaling 1,709,000 pounds. By 2006, cotton growers sprayed with safer compounds just 1.3 times totaling less than 80,000 pounds, a 20-fold reduction in insecticide use.
- ➲ Over 775,305 residents and thousands more tourists tee off each year for nearly 12 million rounds of golf in Arizona. Active children 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.
- ➲ The Colorado River Basin is the winter “salad bowl” of the country, producing 90% of the winter supply of lettuce. Targeted to growers, IPM programs promote the use of reduced-risk alternatives to conventional pesticides including biopesticides, which are based on natural organisms or natural substances that control pests in a non-toxic manner. These strategies effectively manage vegetable diseases and insect pests while reducing potential health risks to not only produce and pesticide handlers, but the salad-eating public as well.

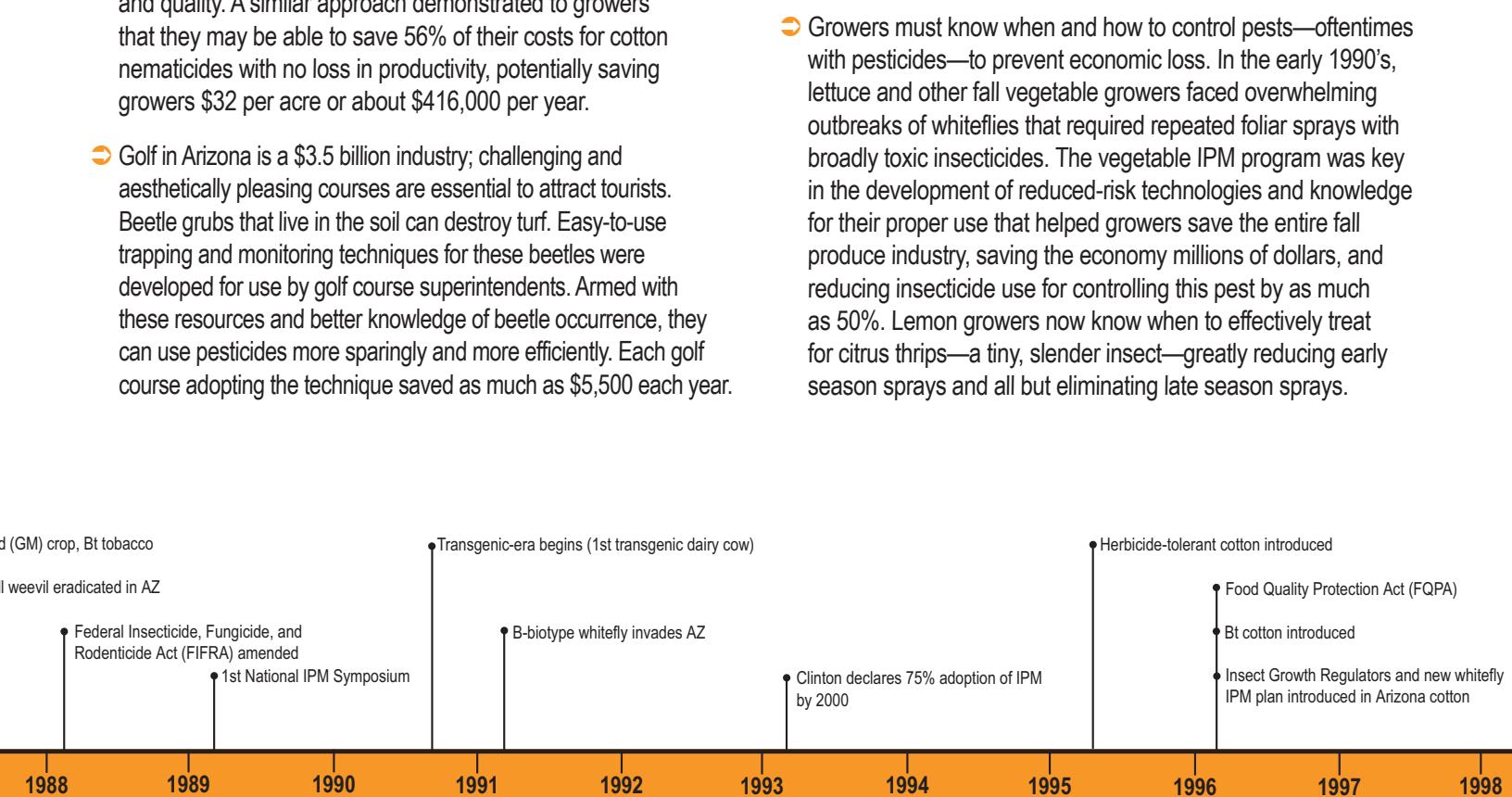
- ➲ In the home and at work—in urban and rural communities—people are looking for ways to control pests around the home and landscapes safely and effectively. With diagnostic services and IPM advice, UA IPM professionals—along with hundreds of master gardener volunteers statewide—provide solutions to pest problems in sustainable ways that reduce risks to human health.



Good for Arizona's Economy

Arizona's agriculture contributes \$6.6 billion to the local economy. A productive and profitable harvest requires protection from numerous insects, mites, fungi and other disease agents, and vertebrate pests, such as birds, rabbits and javelina. With input costs high and the need to always limit risks to human health and the environment, IPM defines when and how to best "take action". Working directly with producers, researchers develop and deliver IPM systems that maximize economic returns for local growers.

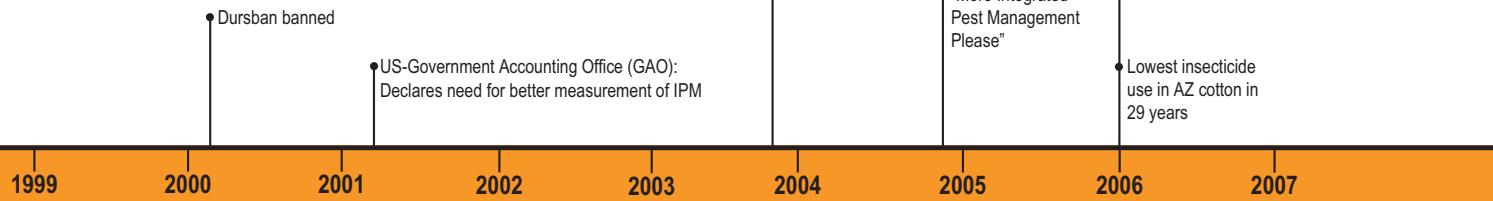
- ➲ Bringing better, safer technologies to the marketplace helps growers save millions of dollars. Each year teams of IPM scientists develop and independently test new pest control technologies to provide research-based solutions to pest management professionals. One example of this is Bt cotton, engineered to carry with it the bacterial protein *Bacillus thuringiensis* that naturally kills worm pests. Its use has saved growers over \$28 per acre in insecticide costs, improved yields by over 3%, and all but eliminates the need for broadly toxic insecticides for worm control. Insect growth regulators, which disrupt insect hormonal systems save growers over \$34 per acre in whitefly control. The combined impact of these two technologies has been a savings of over \$142 million or about \$13 million per year in insecticide costs while saving over \$72 million in yield for the cotton industry of Arizona.
- ➲ Through precision-placement technologies, we can show growers how to reduce costs and usage of pre-plant herbicides in vegetables by 8% with up to 10% greater yields, uniformity, and quality. A similar approach demonstrated to growers that they may be able to save 56% of their costs for cotton nematicides with no loss in productivity, potentially saving growers \$32 per acre or about \$416,000 per year.
- ➲ Golf in Arizona is a \$3.5 billion industry; challenging and aesthetically pleasing courses are essential to attract tourists. Beetle grubs that live in the soil can destroy turf. Easy-to-use trapping and monitoring techniques for these beetles were developed for use by golf course superintendents. Armed with these resources and better knowledge of beetle occurrence, they can use pesticides more sparingly and more efficiently. Each golf course adopting the technique saved as much as \$5,500 each year.



Science-Based Education Makes a Difference

Arizonans who live, work and play in its unique environment often seek information on the special flora and fauna. Our IPM teams conduct continuing education seminars, workshops, field days, Web sites and classes—all directed toward changing human perceptions of pests, potential pest problems and related issues—helping people make better, well-informed decisions, reducing panic-based reactions to potential pest problems, and guiding industry and policy-makers in the development and optimal use of new technologies.

- Community involvement often means working closely with community members so that they will properly recognize and respond to pest threats. Noxious and invasive weeds are just one example. They can choke out native wildlife and pose a fire risk to homeowners and ranchers. University-trained volunteer groups concerned about over 4 million acres in central Arizona and in west Yavapai County have increased citizen awareness of invasive species and how to prevent or reduce their injurious effects. For example, over 100 public and private sector land managers learn how to better manage and prevent invasive plant introductions through an annual short course.
- Often it's necessary to inform the public when situations are not pest-related and therefore cannot be solved using pesticides. For example, 22% of the problems in turf samples brought to the Maricopa County Cooperative Extension office for diagnosis were found to be related to non-pest factors like watering, fertility or traffic and treatment with fungicides was not needed.
- Pesticides can play an important role in pest management, and applicators need professional training to use them safely and effectively. In partnership with state agencies, pesticide applicator training is offered to agency personnel, tribal members and individuals who manage invasive species, especially in remote and traditionally underserved areas. Each year these trained professionals treat thousands of acres of salt cedar—a pest tree that poses a major ecological threat to native species in riparian areas—at Lake Mead and other national parks and recreation areas in the Southwest.
- Different groups need and perceive information differently. Administrators and facilities managers from nearly 100 different school districts access information from the school IPM team to learn how to reduce pests in schools. School facility managers and health care agencies ask about the environmental health benefits of IPM, while school district administrators want to know how IPM can increase academic achievement. We work with pest management professionals to develop competitive business models based on IPM strategies. Policymakers develop legislation based on our research-based IPM technologies.
- Our cotton IPM team has played a key advisory role to grower organizations and state and federal agencies including the development of Bt cotton. This assisted in its successful registration in 1996 by the Environmental Protection Agency (EPA).



IPM is federal policy:

The goals of the National IPM Program revolve around a theme of risk-reduction in three environments—production agriculture, natural resources, and residential and public areas: 1) to improve economic benefits related to the adoption of IPM practices (economic risk); 2) to reduce potential human health risks from pests and the use of IPM practices; and 3) to minimize adverse environmental effects from pests and the use of IPM practices (environmental risk).



Our mission is to support the development and delivery of IPM programs that address the needs of Arizona citizens in diverse settings — agriculture, urban and natural.

The Arizona Pest Management Center (APMC) is a collaborative

organization that brings together university researchers and educators, state agencies and associations, and agricultural and urban clientele statewide.

We Listen. The APMC tailors IPM programs, based on stakeholder input, to meet the priority pest management needs of the public.

The 2006 APMC Summit brought together over 100 people from urban, agricultural and natural resource sectors in a forum to identify Arizona's most urgent pest management needs. The priorities we develop not only focus our programs on what's important, they also make us more competitive for federal funding.

We Partner. The APMC connects with other universities, associations, organizations, and state and federal agencies to

maximize limited resources, and provide better visibility and accessibility of our IPM programs for all citizens.

The APMC recently coordinated a successful \$2.5 million grant to research and implement multi-state, multi-crop strategies for reducing damage from Lygus bugs, an agricultural pest of many Western crops. This project involves growers in developing real world solutions and educating their peers.

We Evaluate Progress. It's not enough to deliver information to clientele and hope for the best. We help faculty develop tools and techniques to measure the adoption and impact of IPM.

An ongoing dialog with growers, pest control advisors and industry representatives helps us measure pest effects on crop yields, production costs, and pesticide use statewide. These data are used to quantitatively measure the impact of our programs on end-users.

The APMC targets our limited resources, improves relationships and communications with diverse clientele, and develops effective partnerships to improve pest management in all settings statewide. Adoption of IPM leads to economic benefits for all Arizonans, sustainable production systems and communities, and reduced risks to human health and the environment.

The Arizona Pest Management Center

cals.arizona.edu/apmc
Al Fournier
(520) 381-2240

Many IPM related publications are available online
at cals.arizona.edu/pubs and cals.arizona.edu/crops.

Arizona Cooperative Extension
cals.arizona.edu/extension
(520) 621-7205

Agricultural Experiment Station
cals.arizona.edu/aes
(520) 621-7201



May 2007

Produced by ECAT (Educational Communications and Technologies)

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, James A. Christenson, Director, Cooperative Extension, College of Agriculture & Life Sciences, The University of Arizona.

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