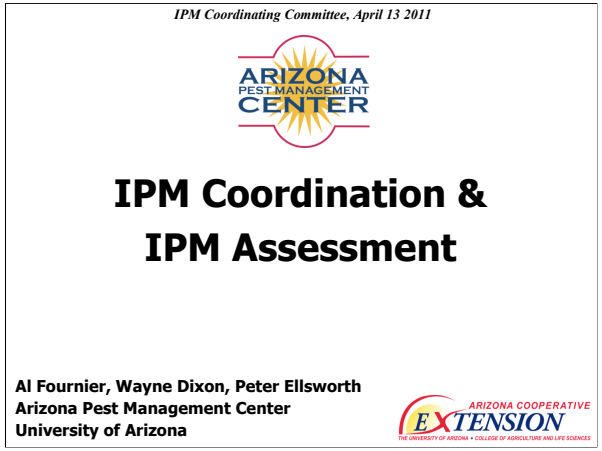
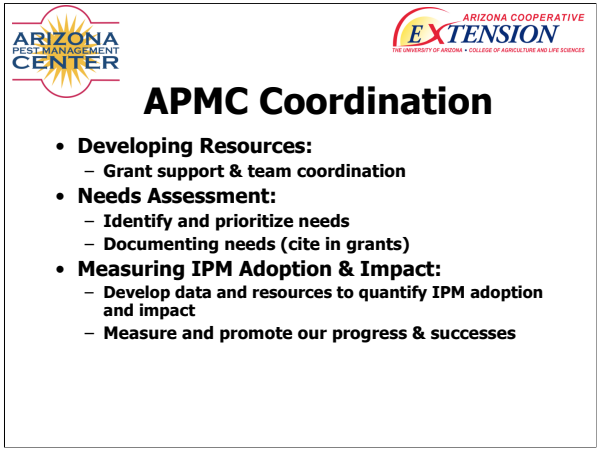


As IPM Program Manager, I am responsible for Coordination of the APMC and our IPM Assessment and Pesticide Education focal areas. My Co-presenter, Wayne Dixon has been working with me since November, developing a historical pesticide use (1080) database and user interface. Today we will talk about our recent efforts in IPM Assessment and some of the tools we have developed for measuring IPM adoption and impacts.



These are 3 important coordination functions of the APMC: (1) We help develop resources (funding) for IPM research and outreach, working with faculty and assist with or collaborate on IPM-related proposals. This could mean calls for proposals and discussing projects, reviewing grants, or developing evaluation plans. Sometimes this includes brining the right team together to address an issue. (2) Another function of the APMC is needs assessment: identifying and documenting the IPM needs of various clientele groups. Often, these identified needs are cited in grant proposals and contribute to their success. (3) Another aspect of IPM assessment is developing tools and approaches to measure IPM adoption and impact.

IPM Coordination: Leverage Report

Source	#Grants	Term	Amount	2010 Amt.
Extension IPM	2	2010-2013	**706,000**	**175,000**
APMC Foundation	7	2010-2013	**429,259**	**151,137**
Stakeholder Engagement	1	2010	**2,201**	**2201**
Research & Outreach	10	2006-2013	**3,391,276**	**942,777**
TOTAL LEVERAGE, 2010				**1,096,115**
Federal grants				**$900,652**
State grants				**$98,402**
WIPMC grants				**$37,201**
Other leverage				**$59,860**
Total				**$1,096,115**

This chart shows an overview of leveraged resources that contribute to IPM research and outreach, currently about 20 grants. The E-IPM program does not fully pay for anything we do. We have partial salary lines that need to be back filled, often through competitive grants. The 2010 column summarizes the portion of these resources that contributed in the recent year, excluding E-IPM funding. The highlighted area of the chart breaks it down by the source of funds. The top portion shows the category of activity in the APMC.

Needs Assessment

- **Agronomic Crops IPM**
  - **Team formed, survey implemented, data analysis**
  - **Survey conducted in 2009-10 informed 2010-13 EIPM proposal**
- **Soil fumigation education needs**
  - **I.D. products used, locations, and end users (1080 data)**
  - **Develop and deliver training accordingly**

Two examples of recent needs assessments: (1) In our 2009-10 E-IPM grant we secured funds to conduct an IPM needs assessment for field crops (exclusive of cotton); we pulled together a team that developed the survey, which was implemented at Extension meetings across the state. The needs identified will help direct the activities of the new Agronomic Crops IPM Team. (2) We received special funds from EPA to put together a series of soil fumigant trainings. Again, a team was formed to develop the program. We used pesticide use reporting data to help us identify who needed training on which products and in what part of the state.

Measuring IPM Adoption and Impact

- **Crop Pest Losses and Impact Assessment Working Group**
- **APMC 1080 Database: historical agricultural pesticide use data**

Today I will talk about 2 main tools used to measure the impact of our IPM programs: the Crop Pest Losses and Impact Assessment Working Group and a historical pesticide use database that we call the 1080 database.

Crop Pest Losses and Impact Assessment Working Group

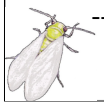
Goal:

To develop "real world" data:

- crop pest losses
- control costs, yields, pesticide use & related information

for AZ & low desert regions of CA

-- Cotton, melons, head lettuce



Funding: Western IPM Center

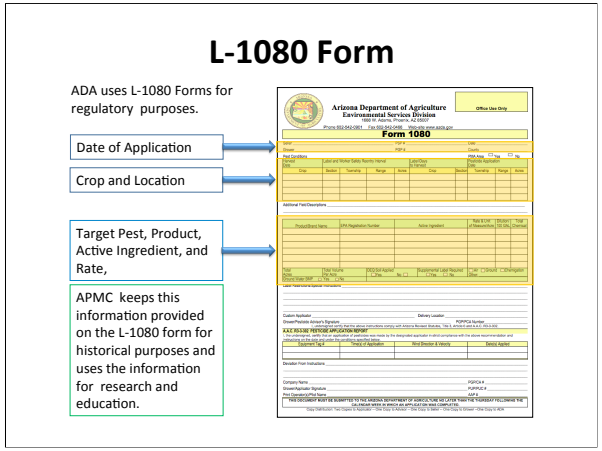
The Crop Pest Losses and Impact Assessment working group has been funded continously by the Western IPM Center since 2004. Our goal is to develop "real world" data on crop pest losses, control costs, yields and pesticide use.

We conduct a series of workshops each year. We meet with pest control advisors face-to-face and guide them through a survey process. The data developed provide a broad statewide view of pest management practices in 3 key crops: cotton, head lettuce and melons. This started as a process focused on insects, but now we collect data on weeds and diseases too. I will share some of this data with you later.

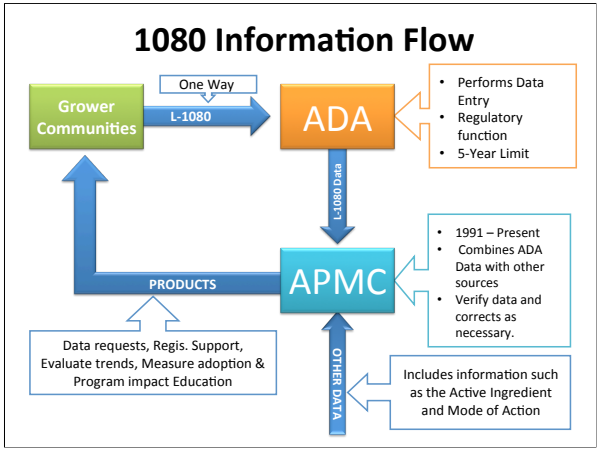
"1080" Pesticide Use Database

- **Goals:**
  - Reliable, timely data to support research, education & registration needs of AZ agriculture
  - Measure and promote our progress & successes
- **Partners:**
  - Arizona Dept. of Agriculture
  - Industry stakeholder advisory committee
- **Funding:**
  - Specialty Crops Block Grant (50%)
  - Extension IPM (50%)

Another important tool used in IPM Assessment is the 1080 database. We have partnered with Arizona Department of Agriculture and stakeholder advisory committee in this project to develop timely access to reliable pesticide use data to support research, education and registration needs in Arizona. Currently, this project is funded 50% by E-IPM and 50% through a series of Specialty Crop Block Grants.



This slide reproduces the L-1080 form that growers, PCAs and applicators submit to the Arizona Dept. of Ag. after an application has been made.



After grower communities submit the data to ADA, it gets entered into their local 5-year database, used for regulatory purposes. We have tapped into their data and expanded it with historical 1080 data back to 1991. We verify their data, correct errors and integrate other data sources, including tables from EPA. We can use the data to produce products that bring information back to grower communities.

What is the APMC 1080 Database?

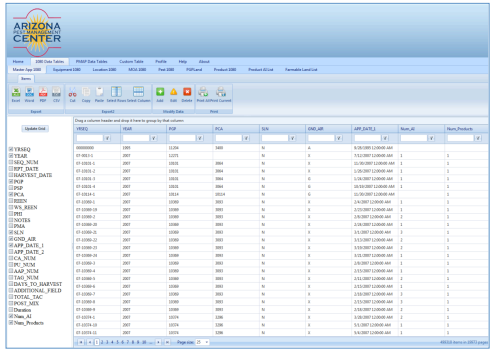
- The database consists of several tables containing the information L-1080 forms.
- Currently the APMC Database consists of approx. 500,000 L-1080 forms
- 800,000+ sprayed locations

How is this data accessed?

- A user interface is in the process of being developed

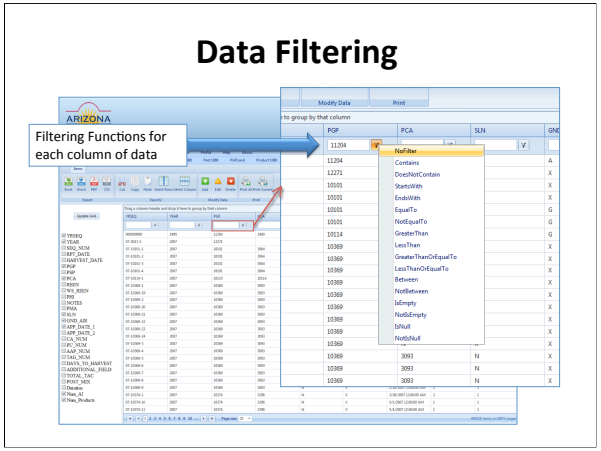
Our APMC database combines over 800,000 historical 1080 records with other useful information sources that help us understand pesticide use patterns over time. Wayne is currently developing a secure online user interface program that makes it easy to view and combine data from various sources. For now the interface is available at MAC and is password protected.

APMC 1080 User Interface



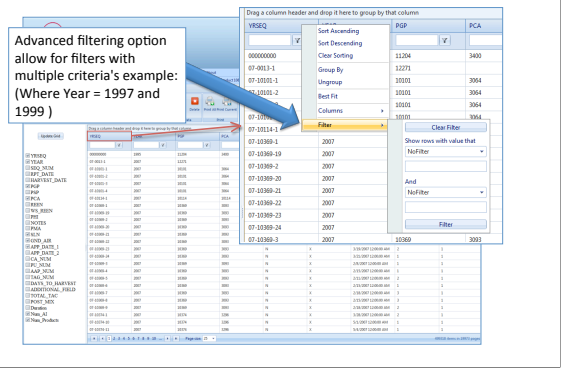
What follows is a series of screen shots that highlight certain functions of the user interface. This slide shows the “home page” for the 1080 Master Table.

Data Filtering



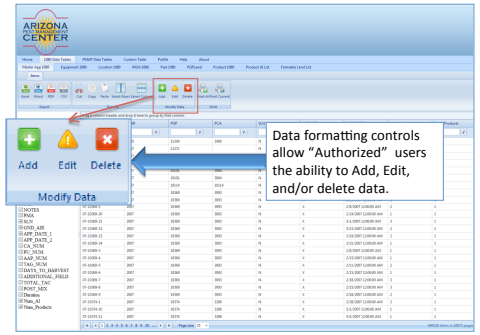
The user can filter data for each column (field) independently.

Advanced Filtering



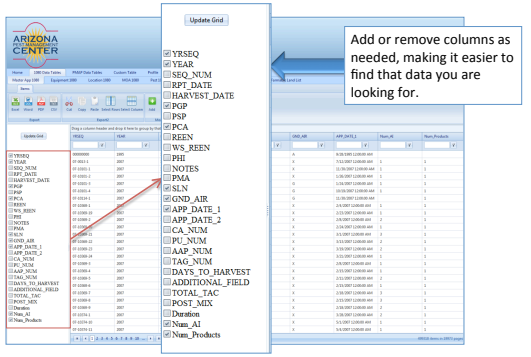
Advanced filtering is also available.

Data Formatting



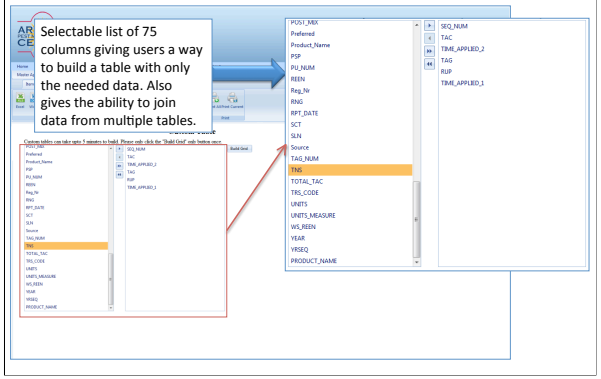
We have added editing features on the menu bar.

Data Selection



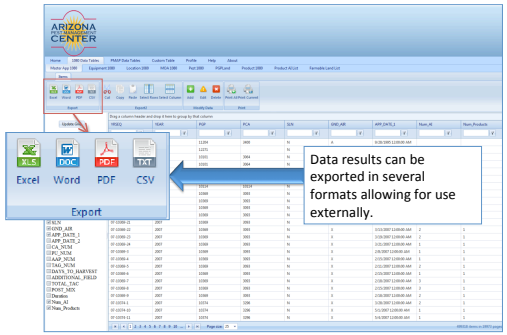
In each table view, the user can select which columns to include in the output table.

Custom Table



The user can select various fields (columns) from multiple tables and join tables to develop a customized output table.

Data Exporting

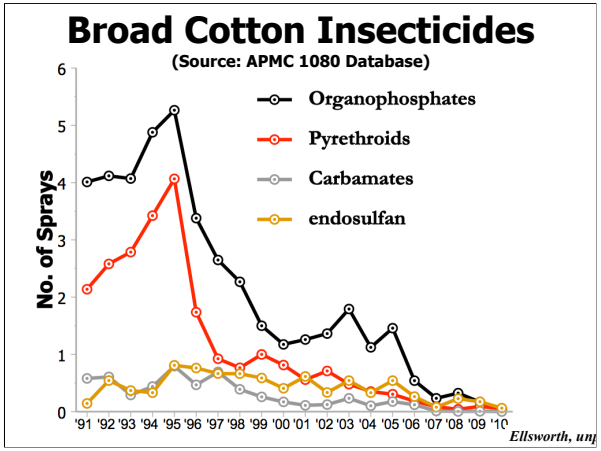


Finally, the data can be exported to Excel or other applications for data analysis, graphing, etc.

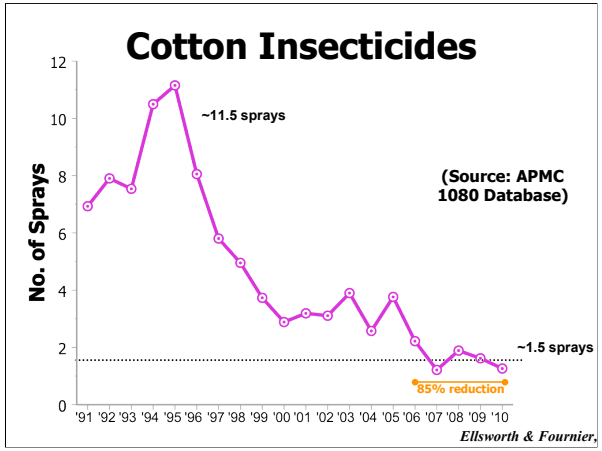
How the data are used

- **Federal & Local information requests**
- **Registration support**
- **Evaluate pesticide use trends**
- **Evaluate Extension program adoption and impact**
- **Educate clientele, administrators, funding agencies & policy makers about Arizona agricultural practices and needs**
- **Examples…**

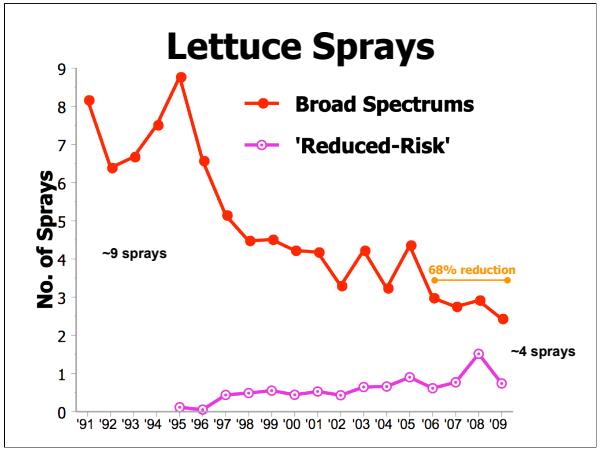
We respond on behalf of the desert southwest states to Federal information requests related to pesticide use. We have responded to local information requests, such as one from the Arizona Cotton Growers which resulted in a lowering of tech fees in Arizona for the use of Bt cotton in 2011. Data have been used to support special pesticide registrations and to extend regular registrations where we have demonstrated a clear need exists. We can use the data to evaluate pesticide use trends (examples will follow). We have evaluated adoption of cross-commodity guidelines for whitefly management. These data can have a power impact on clientele, funding agencies and pesticide policy makers.



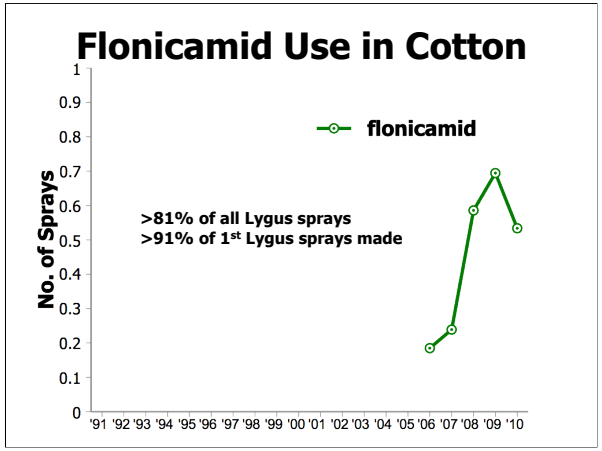
The 1080 data show a sharp decline in the use of broad-spectrum insecticides on cotton.



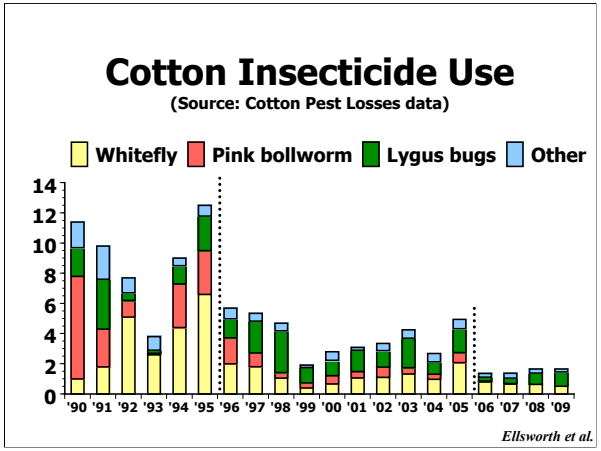
From a 30-yr high in 1995 of nearly 11 sprays used on average statewide for arthropod control to just 1.5 sprays in recent years. And virtually all pyrethroids, most organophosphates, all carbamates, and nearly all endosulfan uses have been eliminated in cotton in favor of reduced risk chemistries, mainly neonicotinoids, flonicamid (feeding inhibitor), ketoenols (lipid inhibitors, i.e., spiromesifen or Oberon), and IGRs, all of course, used over the top of Bt cottons.



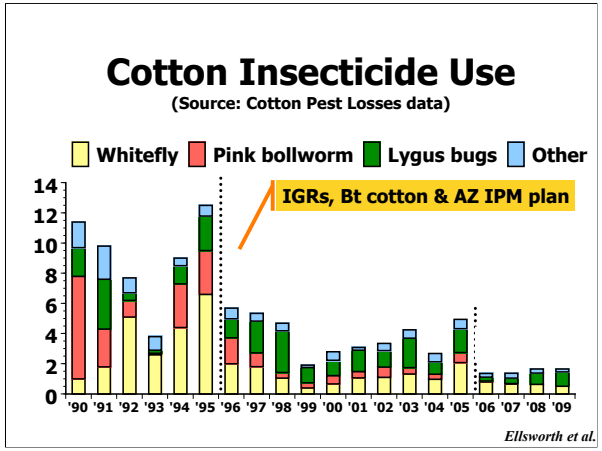
Over the last 20 years, spraying in lettuce has gone down significantly from about 9 sprays to only about 4 sprays against all arthropod pests.
The character of those sprays has also changed drastically. Reduced-risk chemistries are now a larger and larger share of the insecticides used by lettuce growers.



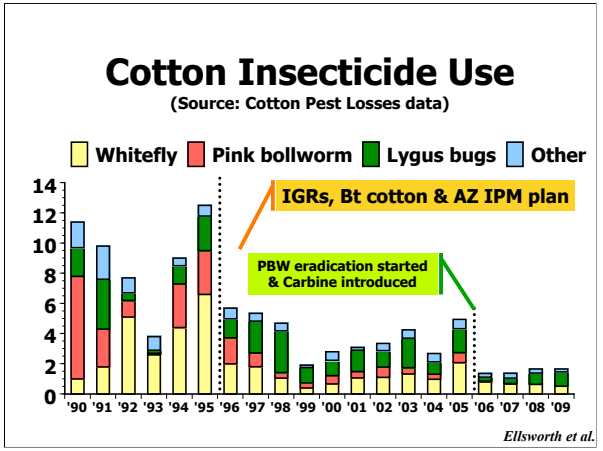
This slide shows the rapid adoption of a reduced-risk product, Carbine (flonicamid), used to selective control Lygus bug in cotton.



Using Cotton Pest Losses data, we can review the history of deployment of selective tactics against key pests in our Arizona system. It is a striking history, where we can see the number of foliar insecticides used to control each of 3 key pests over time, whitefly, pink bollworm and Lygus bugs.

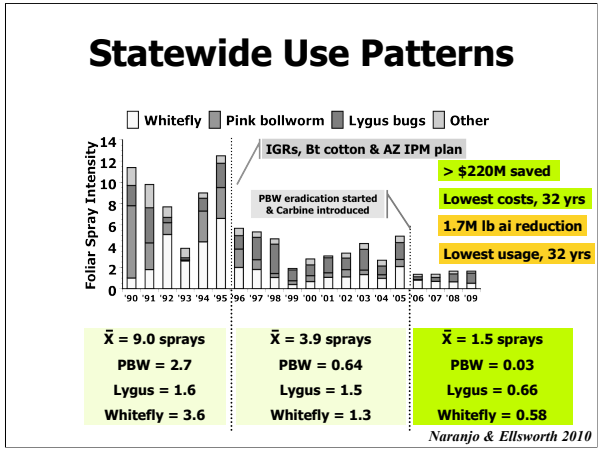


The results have been striking. A watershed of change occurred in 1996 with the introduction of very safe and selective Insect Growth Regulators (IGRs) for whitefly control, and transgenic Bt cotton, along with an IPM plan for whitefly management and comprehensive outreach campaign that consisted of extensive grower and pest manager education.



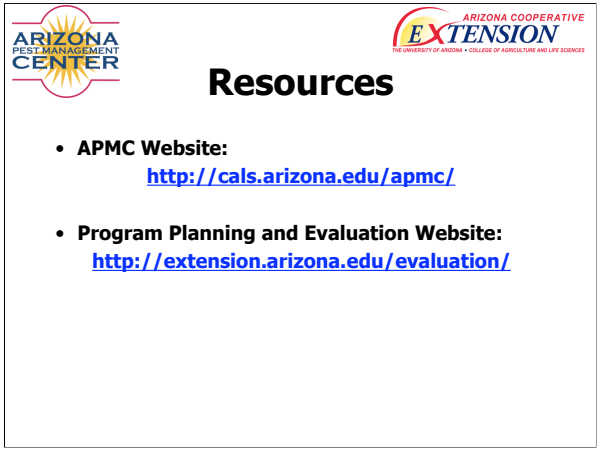
More recently, growers in collaboration with state agencies began PBW eradication in 2006. At the same time, we introduced flonicamid (Carbine) in 2006 as our first fully selective control agent, a feeding inhibitor, for Lygus.

(Adapted from Naranjo & Ellsworth 2009.)



If we draw out information from these critical periods, we can see rather dramatic declines in overall insecticide use, as well as huge declines in PBW sprays made by growers. Bt cotton adoption rose to 94% over this last period, and even higher over the last 2 years shown, ca. 98.25%.

The point of these slides is to show the power of resources like the Crop Pest Losses data and the 1080 database for demonstrating quantitative changes in our pest management systems over time. Using these data we can calculate savings to growers and the reduction of broad-spectrum pesticide use in our systems. The development of these valuable tools has been a primary focus of the IPM Assessment and Pesticide Education team.



At the APMC website, you can find an inventory of current and historical funded IPM projects, Working Group or Team pages used to facilitate communication and host links to program outputs, notes from every IPM Coordinating Committee meeting, and much more.

In January 2010, working with the Extension Program Evaluation Working Group, we launched the Extension Program Planning and Evaluation Website. I mention this in part because of all the new faculty here today. Here you can resources and examples related to all aspects of program planning, needs assessment and program evaluation. Many of these resources were developed by UA colleagues. We also have links to other helpful resources on the web.