Iowa Farm Bureau's Margin Management Webinar Series presents:

Iowa Pest Resistance Management Plan Webinar

Tuesday, December 20, 1:00 pm

Please "Enter as a Guest" shortly before the webinar time.

Speaker:
Evan Sivesind,
Program Manager,
Iowa Pest Resistance Management Plan,
Iowa State University

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Farm Bureau's Margin Management Webinar Series presents:

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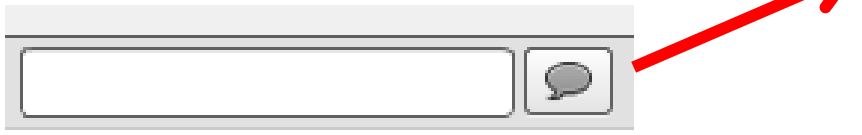
Introduction: Ed Kordick, Iowa Farm Bureau

Enter your question here and click



This webinar will be available in recorded segments for Farm Bureau members at www.iowafarmbureau.com
Copies of visuals will also be available at the site.

Iowa Pest Resistance Management Plan

Evan Sivesind

Department of Entomology

Iowa State University

U.S. Herbicide Resistance Action Committee U.S. Fungicide Resistance Action Committee

Pest Resistance Management

Resistance management:

- Slows development of pest adaptation to chemical, genetic and agronomic practices
- Fosters methods of early, resistance detection
- Mitigates resistance as it arises
- Is an on-going way of doing business
- Requires coordinated partnerships

Call for Development of Plan

- Develop a state-wide pest resistance management plan, coordinated by the state, that includes broad participation from all sectors of Iowa agriculture.

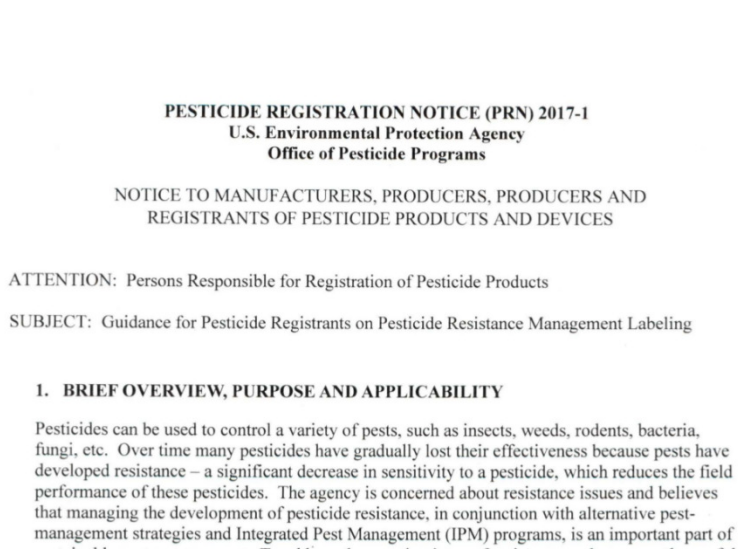
- Establish a unified, consistent message to increase awareness for action.

Principles of the IPRMP

- Pest resistance management (PRM) is the effort to slow the evolution of pest adaptation to chemical, genetic, and agronomic control practices.
- Major tenants
  - Voluntary

Signals from EPA

- New EPA Pesticide Registration Notices
  - Herbicide resistance management
  - Bt framework



PESTICIDE REGISTRATION NOTICE (PRN) 2017-1
U.S. Environmental Protection Agency
Office of Pesticide Programs

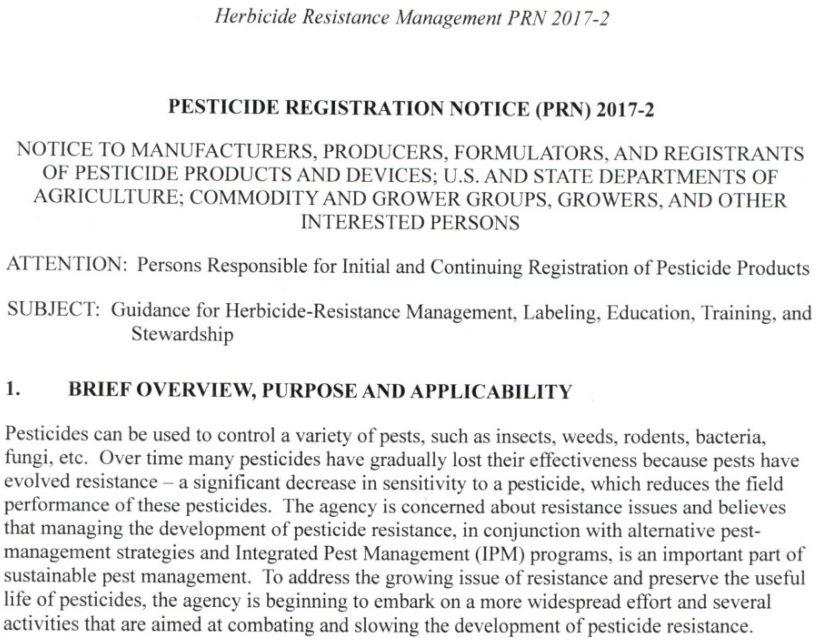
NOTICE TO MANUFACTURERS, PRODUCERS, PRODUCERS AND REGISTRANTS OF PESTICIDE PRODUCTS AND DEVICES

ATTENTION: Persons Responsible for Registration of Pesticide Products

SUBJECT: Guidance for Pesticide Registrants on Pesticide Resistance Management Labeling

1. BRIEF OVERVIEW, PURPOSE AND APPLICABILITY

Pesticides can be used to control a variety of pests, such as insects, weeds, rodents, bacteria, fungi, etc. Over time many pesticides have gradually lost their effectiveness because pests have developed resistance – a significant decrease in sensitivity to a pesticide, which reduces the field performance of these pesticides. The agency is concerned about resistance issues and believes that managing the development of pesticide resistance, in conjunction with alternative pest-management strategies and Integrated Pest Management (IPM) programs, is an important part of



Herbicide Resistance Management PRN 2017-2

PESTICIDE REGISTRATION NOTICE (PRN) 2017-2

NOTICE TO MANUFACTURERS, PRODUCERS, FORMULATORS, AND REGISTRANTS OF PESTICIDE PRODUCTS AND DEVICES; U.S. AND STATE DEPARTMENTS OF AGRICULTURE; COMMODITY AND GROWER GROUPS, GROWERS, AND OTHER INTERESTED PERSONS

ATTENTION: Persons Responsible for Initial and Continuing Registration of Pesticide Products

SUBJECT: Guidance for Herbicide-Resistance Management, Labeling, Education, Training, and Stewardship

1. BRIEF OVERVIEW, PURPOSE AND APPLICABILITY

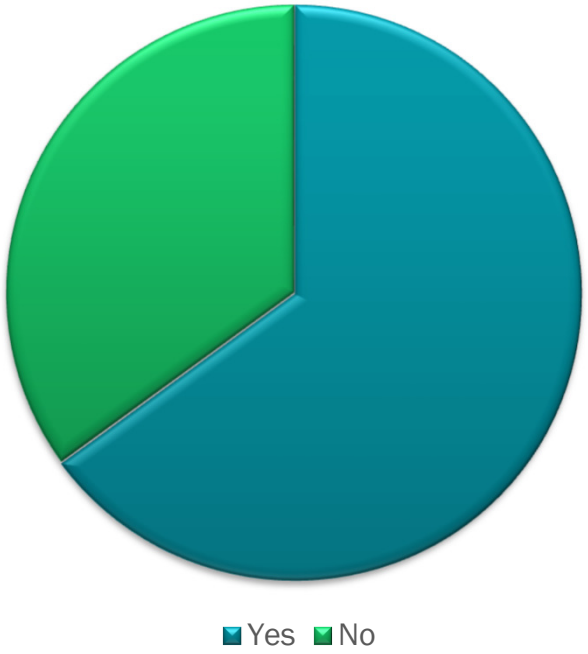
Pesticides can be used to control a variety of pests, such as insects, weeds, rodents, bacteria, fungi, etc. Over time many pesticides have gradually lost their effectiveness because pests have evolved resistance – a significant decrease in sensitivity to a pesticide, which reduces the field performance of these pesticides. The agency is concerned about resistance issues and believes that managing the development of pesticide resistance, in conjunction with alternative pest-management strategies and Integrated Pest Management (IPM) programs, is an important part of sustainable pest management. To address the growing issue of resistance and preserve the useful life of pesticides, the agency is beginning to embark on a more widespread effort and several activities that are aimed at combating and slowing the development of pesticide resistance.

Principles of the IPRMP

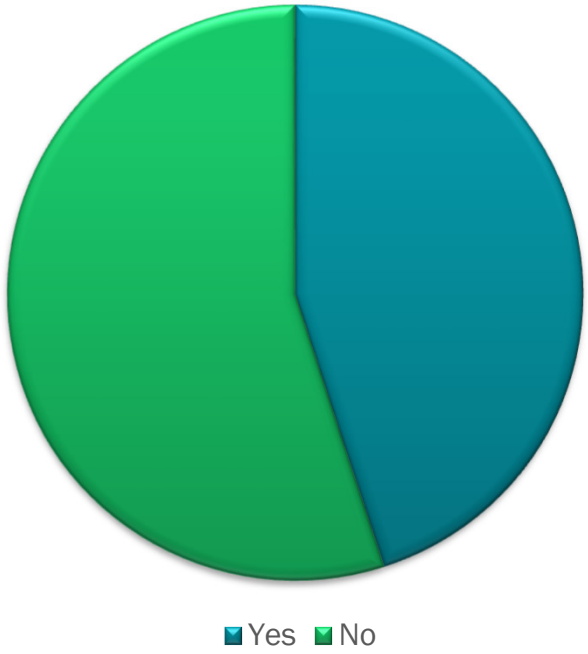
- Pest resistance management (PRM) is the effort to slow the evolution of pest adaptation to chemical, genetic, and agronomic control practices.
- Major tenants
  - Voluntary
  - Community based

Need for Community Involvement

Do you use a custom applicator?



Do you develop your own herbicide program?



Arbuckle, 2013 Iowa Farm and Rural Life Poll

Principles of the IPRMP

- Pest resistance management (PRM) is the effort to slow the evolution of pest adaptation to chemical, genetic, and agronomic control practices.
- Major tenants
  - Voluntary
  - Community based
  - Adaptive management
  - Preserve viability of pest management technologies and farm profitability for the long term

IPRMP Overview

Main Chapters

- Governance
- State of the Science
- Communication and Outreach
- Pilot Projects

State of the Science

- Common themes … details vary with pests, management practices and geographic area
- IPM vital
  - Scouting, adaptive management
- There are no ‘silver bullets’

- There is common ground to build coordinated/community approaches
- Likely short-term increase of input costs, time and production complexity that helps preserves long-term productivity and profitability

Communication and Outreach

- Audience includes farmers, ag professionals, government, and the public
- Pest resistance management and maintaining productivity
- Preserving pest management technologies and farm profitability
- Pilot projects to engage partnerships
- www.ProtectIowaCrops.org will serve as a hub to store progress, resources and news in one central location


PROTECT IOWA CROPS

your choice. your yield. our future.

PROTECTIOWACROPS.ORG

INTRODUCING THE IOWA PEST RESISTANCE MANAGEMENT PLAN

This is an Iowa-specific plan to address pests – including weeds, insects and plant diseases – that can adapt and become resistant to chemical, genetic, and agronomic control practices. The Iowa Pest Resistance Management Plan (IPRMP) outlines approaches for effective, integrated management solutions that will sustainably manage pests. By fostering methods to detect resistance, pest resistance can be delayed or even prevented, limiting its spread.

WHY DOES IOWA NEED A PEST RESISTANCE PLAN?

Pest resistance management (PRM) is the effort to delay pests from developing resistance. Pest resistance has the potential to impact yields, increase the cost of production, and limit farmers' future PRM options. With that in mind, the IPRMP was developed with a broad cross-section of Iowa agricultural partners to address this important issue while remaining flexible enough to incorporate new information.

WHAT ARE THE PLAN'S GOALS?

The Iowa plan seeks to engage farmers on the issue of pest resistance management with the goal of keeping technology and tools – including pesticides for controlling weeds, insects, and disease; seed treatments; and biotechnology products and native traits – available and effective. It is also important that farmers know they are not alone in their effort to address resistance; a wide variety of experts and resources are available to help. The Iowa plan will also include wide participation from all sectors of Iowa agriculture in order to educate and prevent broad applications that could lead to resistance.

HOW WILL THE PLAN BE IMPLEMENTED?

Iowa's 90,000 farmers will play a leading role in PRM through their stewardship of pesticide management technologies and biotechnology traits and tools. Farmers make management decisions each year on more than 23 million row-crop acres. Farmers' proactive adoption of practices is necessary to delay the development of herbicide, insecticide, and fungicide resistance, protect crop traits, and manage existing cases of resistance to help them remain competitive in the global market by maintaining the long-term productivity of Iowa agriculture while reducing pest-associated yield losses.

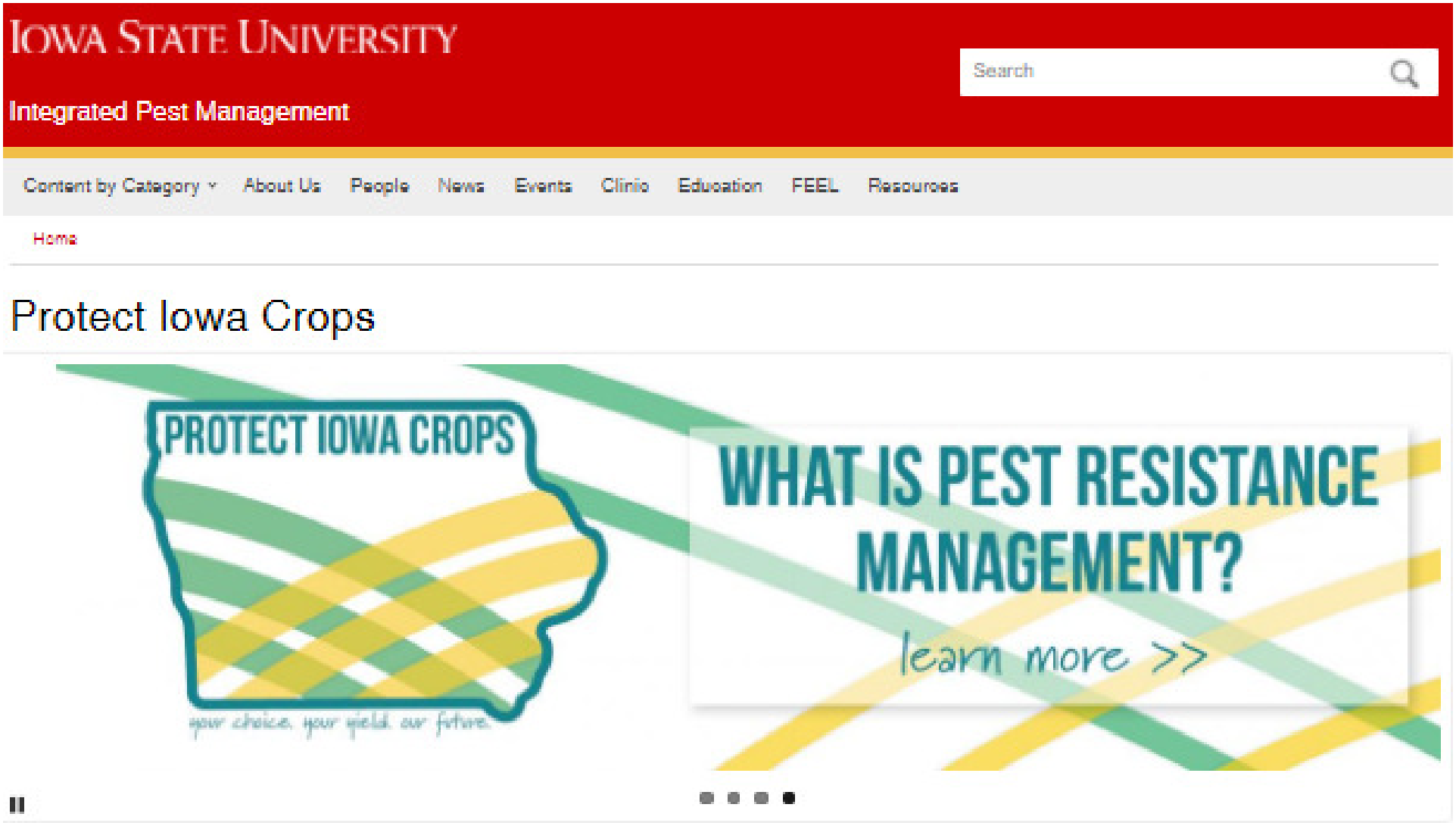
In addition, reaching agricultural professionals, such Certified Crop Advisers, Independent Crop Consultants, seed and pesticide retailers, and agronomic and farm advisors will be critical to the success of the strategy. Ag professionals who can provide multi-year plans that include PRM tactics will provide additional value to their services.

Finally, pilot projects of active PRM will be established. These projects will be focused on utilizing the latest pest resistance management tools and also examine approaches to encourage successful, voluntary PRM adoption. The pilot projects will identify key stakeholders within a defined "community" and will be inclusive, bringing all potential players to the table. The pilot projects will work to establish incentives and novel approaches to encourage the community to work together to address the identified pest-resistant problems (i.e., weeds, insects, and disease).

WHERE CAN I LEARN MORE?

Visit ***ProtectIowaCrops.org*** to see the latest news, plan updates, and to connect with experts.

www.ProtectIowaCrops.org



Pilot Projects

Criteria:

- What are the critical features of the pest pressure, and what are their impacts on farm productivity?
- How is the pest currently managed?
- Is a community-based resistance management system/team already in existence?
- Are there currently any incentives (tangible or intangible) available to encourage community participation?

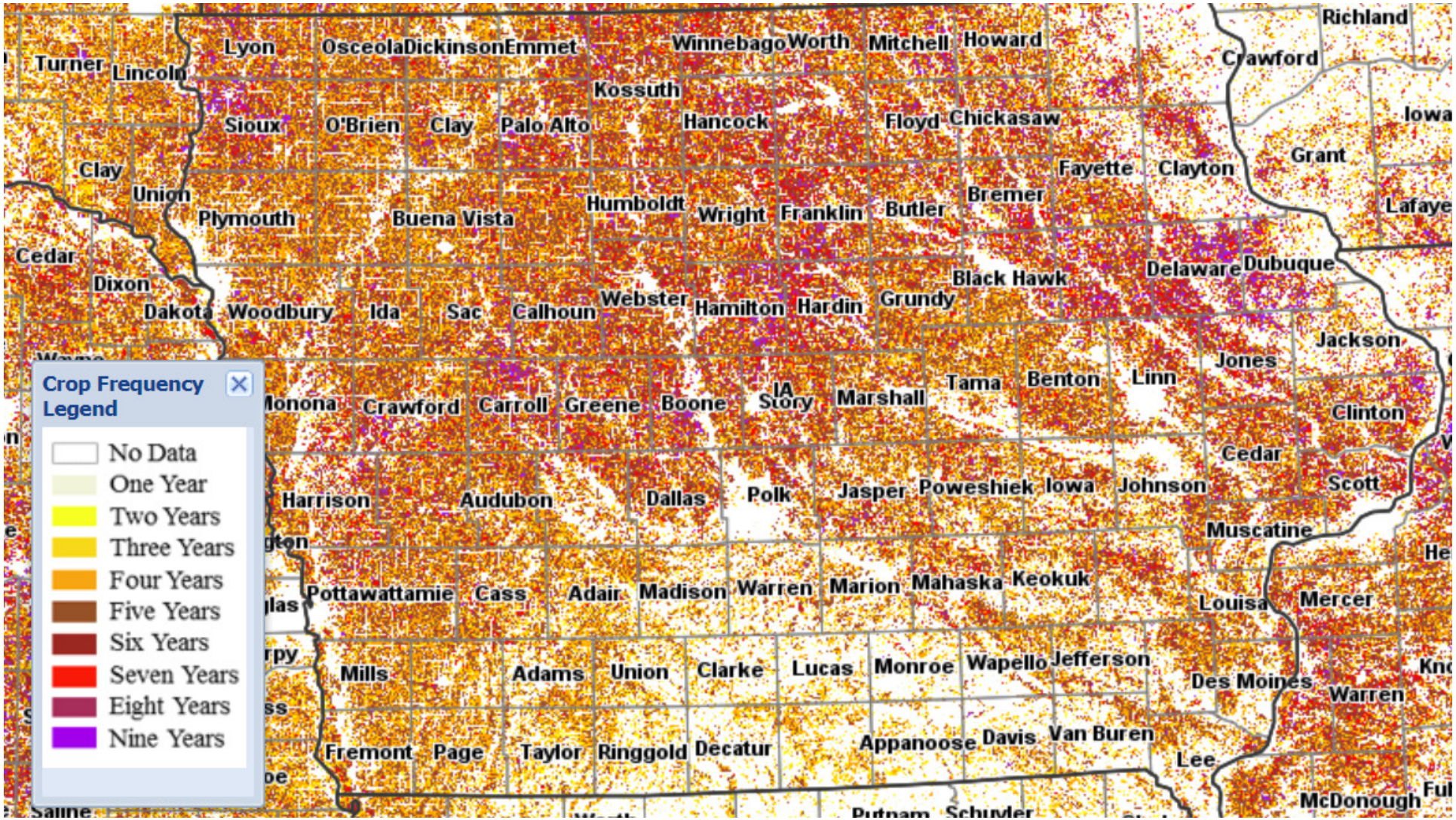
Pilot Projects

- Western Corn Rootworm in Northeast and North Central Iowa
  - Bt toxins traits
- Soybean Aphid in Northwest Iowa
  - Pyrethroids
- Palmer amaranth in Harrison County
- Waterhemp in Story County

Pilot Project

Western Corn Rootworm in North Central and Northeast Iowa

- Bt toxins traits (Cry3Bb1, mCry3A, eCry3.1Ab and Cry34/35)
- Confirmed resistance/cross-resistance to certain traits
- Risk to resistance increases with
  - Continuous corn
  - Continuous use of same Bt traits
  - High CRW populations
- Implement “Best Management Practices” (BMPs) through community-based adoption system
- Currently exploring multiple pilot locations


Crop Frequency Legend
No Data
One Year
Two Years
Three Years
Four Years
Five Years
Six Years
Seven Years
Eight Years
Nine Years
Lyon
Osceola
Dickinson
Emmet
Winnebago
Worth
Mitchell
Howard
Turner
Lincoln
Kossuth
Sioux
O'Brien
Clay
Palo Alto
Hancock
Floyd
Chickasaw
Clay
Union
Plymouth
Buena Vista
Humboldt
Wright
Franklin
Butler
Bremer
Fayette
Clayton
Cedar
Dixon
Dakota
Woodbury
Ida
Sac
Calhoun
Webster
Hamilton
Hardin
Grundy
Black Hawk
Delaware
Dubuque
Richland
Crawford
Grant
Jackson
Jones
Tama
Benton
Linn
Clinton
Monona
Crawford
Carroll
Greene
Boone
Story
Marshall
Cedar
Scott
Harrison
Audubon
Dallas
Polk
Jasper
Poweshiek
Iowa
Johnson
Muscatine
Pottawattamie
Cass
Adair
Madison
Warren
Marion
Mahaska
Keokuk
Louisa
Mercer
Mills
Adams
Union
Clarke
Lucas
Monroe
Wapello
Jefferson
Des Moines
Warren
Fremont
Page
Taylor
Ringgold
Decatur
Appanoose
Davis
Van Buren
Lee
McDonough

WCR Resistance

- 2003: Bt corn targeting rootworm
- 2009: resistance to Cry3Bb1 observed in Iowa
- Cry3Bb1, mCry3A, and eCry3.1Ab cross resistance

Scott Bauer, USDA-ARS

Richard C. Edwards, Purdue University, Bugwood.org

Corn Rootworm Best Management Practices

- Rotation to a non-host crop
- Plant hybrids containing multiple Bt traits targeting WCR (pyramid)
- Rotation with non-Bt rootworm protected corn with or without use of a soil applied insecticide

Sample Rotations

Example 1

Year 1: soybean

Year 2: non WCR-Bt corn

Example 2

Year 1: soybean

Year 2: non WCR-Bt corn

Year 3: Bt-corn pyramided for WCR

or

non WCR-Bt corn plus a soil applied insecticide (SAI)

Sample Rotations

Example 3

Year 1: soybean

Year 2: non WCR-Bt corn

Year 3: non WCR-Bt corn plus SAI

Year 4: Bt-corn pyramided for WCR

Year 5: Bt-corn pyramided for WCR

Pilot Project

Soybean Aphid in Northwest Iowa

- Pyrethroids
- Confirmed resistance in Minnesota; one confirmed case in Iowa in 2016
- Challenge: Pyrethroid resistance an emerging threat
- Two pilot options:
  - Educating farmers about the risk of pyrethroid resistant populations
  - Adopting practices that limit the spread of insecticide resistance in soybean aphids

Photo credit: Beauzay, NDSU

Soybean Aphid Resistance

- Soybean aphid detected in US in 2000
- Pyrethroid failures reported in MN since 2015
- Pyrethroid failure in NW IA in 2016

David W. Ragsdale, Texas A&M University, University, Bugwood.org

Pilot Project

Waterhemp in Story County

- Widespread herbicide-resistant weed in Iowa
- Story County
  - Has herbicide-resistant waterhemp
  - Many local, major seed companies nearby
  - Farm management companies and cooperatives
- A local team is being assembled to represent a broad cross section of stakeholders

HR weeds in IA

- Waterhemp (HG 2,5,9,14,27)
- Marestail (HG 9)
- Giant ragweed (HG 2,9, 27)
- Kochia (HG 2)
- Lambsquarters (HG 5)
- Giant foxtail (HG 1,5)
- Shattercane (HG 2)
- Pennsylvania Smartweed (HG 5)
- Cocklebur (HG 2)
- Sunflower (HG2)
- Palmer amaranth (?; HG 2,9,27 in neighboring states)

Owen, 2017. Iowa State Extension publication WC94
Heap, 2017. International Survey of Herbicide Resistant Weeds. www.weedscience.org

Waterhemp

- HR waterhemp present in virtually all fields in Iowa
  - Resistance not sufficiently recognized
- Populations most commonly resistant to
  - Group 2 ALS inhibitors (eg Pursuit, FirstRate)
  - Group 9 glyphosate
  - Group 5 PSII inhibitors (eg atrazine, simazine)
- Resistance to Group 14 PPO inhibitors (eg Cobra, Spartan) and Group 27 HPPD-inhibitors (eg Callisto, Balance Flexx) increasing

Pilot Project

Palmer amaranth in Harrison County

- First documented infestation of Palmer in 2013
- Now found in at least 50 of 99 Iowa counties
- Will also include waterhemp, marestail, and giant ragweed
- Project objectives
  - Increasing awareness of weed resistance and management
  - Gaining landowner and farmer support
  - Using resistance management as a factor in annual seed and herbicide selections (mindset shift)
- Diverse local team in place

Funding and support

Iowa Farm Bureau Federation

Iowa Soybean Association

Iowa Corn Growers Association

North Central IPM Center

ABSTC

Herbicide Resistance Action Committee (HRAC)

Insecticide Resistance Action Committee (IRAC)

Help Slow Resistance in Iowa!

For more information, or if interested in being involved in any pilot projects, please contact

Evan Sivesind

515-294-7990

sivesind@iastate.edu

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Please fill out a brief evaluation by clicking:
https://tinyurl.com/17resist

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