Regulating Resistance

JACK E. HOUSENGER, DIRECTOR
OFFICE OF PESTICIDE PROGRAMS
U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA’s Perspective on Herbicide Resistance in Weeds

Palmer amaranth, A. Hager, Univ. of IL
Discussion Topics

• Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
• EPA’s Approach to Managing Resistance
  ▪ Current
  ▪ Future
• Resistance Management for Biological Pesticides
Legal Authority Under FIFRA

• EPA registers pesticides under FIFRA (Federal Insecticide, Fungicide, Rodenticide Act) - a risk and benefit statute
  ▪ Risk of resistance may be considered part of the regulatory decision
• EPA licenses the pesticide for use on conventionally bred or genetically modified crops
  ▪ USDA/APHIS/Biotechnology Regulatory Services makes deregulation decision on genetically modified crops
• EPA licenses Plant Incorporated Protectants (e.g., Bt crops)
Approach to Managing Resistance

• EPA’s goal is to extend the useful life of registered products used for pest control by slowing the development of resistance to fungicides, herbicides, and insecticides
  ▪ Effective resistance plans should retain flexibility for growers

• Fungicides, Herbicides, and Insecticides
  ▪ Some registrants have specified practices for resistance management

• Plant Incorporated Protectants (PIPs)
  ▪ EPA requires resistance management practices
Approach to Managing Resistance

• Herbicides used on Herbicide Resistant Crops – EPA has developed a new approach to resistance management

• First required for Enlist Duo
  ▪ Label directions
  ▪ Training and educational information
  ▪ Early identification, investigation, and remediation of likely resistant weeds
  ▪ Registrant must report resistant weeds to EPA and stakeholders
Approach on Herbicide Registration for Herbicide Resistant Crops -- Label Elements

• Label must contain Mechanism of Action
• Include generally agreed upon best management practices
• Because early identification of problem is critical to managing resistance, the following items will be placed with the directions for use so that they are clearly visible:

  **User or consultant:**
  - Scout before application to identify weed and size
  - Scout after application to determine if application was effective
  - Report of poor performance/likely resistance to registrant or their representative
Approach on Herbicide Registration for Herbicide Resistant Crops – MOA and Best Management Practices

• Modes of action for both 2,4-D and glyphosate
  • Groups 4 and 9

• BMPs
  • Developed by the Herbicide Resistance Action Committee, Weed Science Society of America, CropLife America
  • Most elements of the BMPs describe cultural and mechanical practices to slow the spread of resistant weeds
Approach on Herbicide Registration for Herbicide Resistant Crops -- Best Management Practices

• Some examples of BMPs:
  ▪ Herbicides - use broad spectrum soil-applied herbicide and rotate this product herbicides with different modes of action (i.e., non group 4 and 9)
  ▪ Non chemical weed control practices - mechanical cultivation, cover crops, crop rotation, weed-free crop seeds
  ▪ Manage weeds in/around fields both during and after harvest
Approach on Herbicide Registration for Herbicide Resistant Crops -- Scouting

- **Scouting Requirements:**
  - Before application to determine weed species/size
  - After application to detect escapes
  - Report incidence of non-performance to Dow
  - Control weed through mechanical means or use of another herbicide with a different MOA
Approach on Herbicide Registration for Herbicide Resistant Crops – Terms of Registration

• Develop a Stewardship Program for resistance management
• Develop Training and Education materials
• Investigate cases of non-performance
  ▪ Use Norsworthy et al. 2012 criteria for determining likely herbicide resistance
• Develop a Remediation Plan for use if resistance is suspected
  ▪ Registrant must take immediate action to control likely resistant weeds
Approach on Herbicide Registration for Herbicide Resistant Crops – Terms of Registration

• Annual reporting of likely and confirmed resistance to EPA
  ▪ Enough information to describe nature and extent of infestation
  ▪ Early notification is important

• Reporting of likely and confirmed resistance to other stakeholders
• Work to develop a rapid diagnostic system for resistance
Registration Review and Resistance Management

• EPA conducts Registration Review for health, safety, and environmental risk of registered pesticides every 15 years
• Resistant management is one area of focus for many of the currently registered herbicides
• Glyphosate registration review this summer
OPP Regulation of Plant Incorporated Protectants

• Resistance management is required for every registered Bt PIP (terms and conditions of registration)
  ▪ Bt cotton: 1996
  ▪ Bt corn: 1996

• Stewardship program

• Key components:
  ▪ Refuges (structured, seed blend)
  ▪ Grower Education
  ▪ Compliance Assurance Program
  ▪ Resistance Monitoring
  ▪ Remedial Action

• Resistance would have evolved much faster without these requirements
Importance of Managing Insecticide Resistance

- Higher selection pressure for resistance with PIPs than conventional insecticides
  - Season-long expression of Bt toxins at high levels
  - Target pests have multiple generations per year (up to 6)
  - Some pests feed almost exclusively on corn or cotton (ex. European corn borer, pink bollworm)

- Preservation of Bt susceptibility
  - Benefits for the environment and human health
Corn Rootworm (CRW) Monitoring – Next Steps

- Draft proposal to enhance CRW Insect Resistance Management submitted to industry (ABSTC) in September
- Areas for improvement:
  - Integrated Pest Management (IPM) as a component of CRW resistance management
  - Responses to unexpected damage in Bt corn fields
  - Elimination of requirement for annual random sampling of CRW from the Corn Belt
  - Use of on-plant assays for resistance determinations
  - Enhancements to current remedial action plans
- Proposal available online:
  - Docket# EPA-HQ-OPP-2014-0805 (regulations.gov)
  - Public comment period closed April 15, 2015
Questions?