Biopesticides Registration Improvement Course

Integrated Pest Management (IPM)

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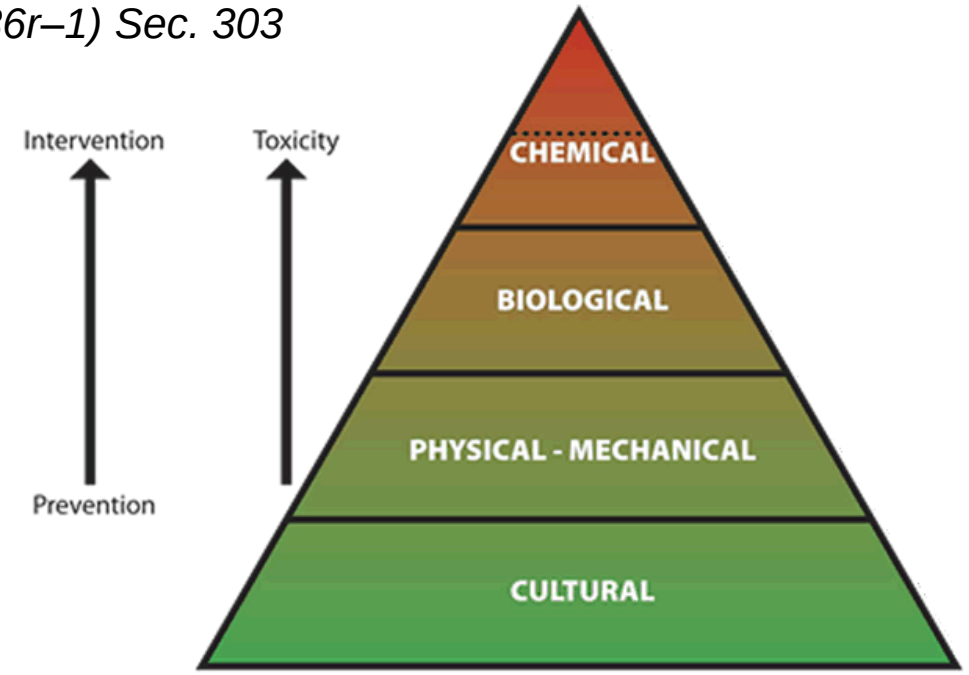
Presentation Outline

- IPM
  - Definition
  - Importance
  - How it works in OPP
  - Impacts
  - Implementation
- Resistance Management
- EPA/IR-4 Biopesticide Demonstration Grant Program
- Biopesticides for Resistance Management
- Take-Away Message

What is IPM?

"…**Integrated Pest Management** is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks..."

- Food Quality Protection Act (7 USC 136r–1) Sec. 303



Penn State University

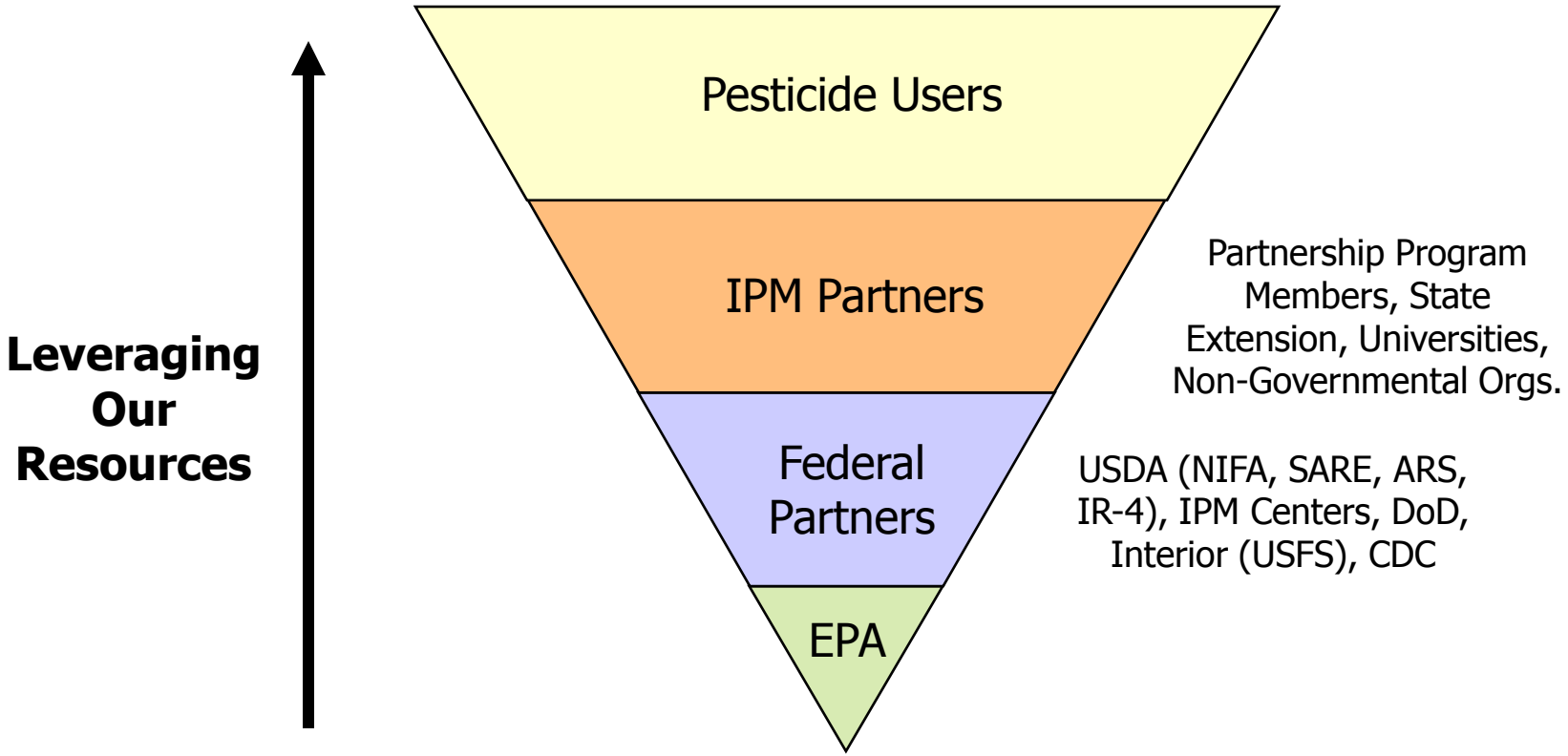
Why IPM?

- Statutory Authority Directing EPA to Further IPM
  - Federal Insecticide Fungicide and Rodenticide Act
  - Food Quality Protection Act
- IPM is Beneficial
  - Protects human health - controls pests while reducing potential exposure to pesticide
  - Protects the environment - reduces reliance on pesticides for control of pests
  - Provides for the appropriate use of pesticides
- IPM is Relevant
  - Applicable where we Live, Work, Play and Farm

How IPM Works in OPP

- Offer grants and technology transfer initiatives to encourage IPM adoption
- Provide technical assistance for transitioning to IPM practices
- Increase public understanding of pests and pesticide risk and demand for sustainable approaches to pest control
- Coordinate IPM efforts within OPP and with other federal agencies
- Collaborate with IPM practitioners and growers at regional/state/local level

How IPM Works within OPP - Magnifying Resources



IPM Impacts Where We Live

Live - food we eat, water we drink, where we live

Prominent impacts where we live:

- With 20,000 new cases annually, **Lyme Disease Association** is developing outreach network to reduce incidence rate
- 200,000 miles (321,870 km) of U.S. high-voltage transmission lines moving toward Integrated Vegetation Management through **Edison Electric Institute's** leadership
- Pollinators are critical for ⅓ of human food and reproduction of >90% of flowering plants and the **North American Pollinator Protection Campaign** is facilitating pollinator awareness through extensive partner outreach

IPM Impacts Where We Work

Work – work sites, schools, and pest management services

Prominent impacts where we work:

- 200,000 students and staff in 15 pilot schools under verifiable IPM through **IPM Institute of North America** effort to implement IPM in all schools by 2015
- 4,600 pest control companies moving toward IPM adoption under the leadership of **National Pest Management Association**
- >4,000 **Wal-Mart** retail and distribution facilities may eliminate routine rodenticide use and reduce overall pesticide through pilot IPM program

IPM Impacts Where We Play

Play - public areas, recreational areas, shopping centers, and sports venues

Prominent impacts where we play:

- >2,000 golf course members of **Audubon International's Cooperative Sanctuary Program** changing the culture of golf industry
- 22,000 **Golf Course Superintendents Association of America** members being surveyed on baseline golf courses pesticide use, setting path forward for turf IPM
- >10,000 acres (4,050 ha) of recreational woodlands, streams and countryside, serving 1.5M residents, under **Northern Virginia Regional Parks Authority's** comprehensive pesticide use policy

IPM Impacts Where We Farm

Farm - growers, grower associations, food processors, and agricultural researchers

Prominent impacts where we farm:

- >1.5M lbs (680,000 kg) AI of pesticides were avoided by **Sysco Corporation**, global leader in foodservice industry, using IPM and other tactics
- With five-year plan to develop weather-based disease forecasting for vegetable crops to reduce pesticide use, **Campbell Soup Company** is world's leading maker and marketer of soup
- 11,000 acres (4,450 ha) of wine grapes are applying **Central Coast Vineyard Team's** sustainable vineyard practices

Implementing IPM in America – OPP Programs

- Pesticide Environmental Stewardship Program
  - Reducing risks of pests and pesticides through IPM and other innovations in a partnership challenge/commitment program
- IPM in Schools
  - Protecting children from unnecessary exposure to pests and pesticides by implementing IPM in schools
  - Grant program (beginning in FY11) focusing on implementation of school IPM
- PESP Regional Grants
  - Promoting IPM practices in the agricultural community
- PRIA2 Partnership Grants
  - Reducing pesticide risk by demonstrating innovative IPM practices and technologies and outreach/education
- Biopesticide Demonstration Grants
  - Collaboration with USDA and PMRA - Demonstrating use of biopesticides within IPM systems

Implementing IPM in America - Coordination

- Interagency Coordination
  - Federal IPM Coordinating Committee
  - National IPM Evaluation Group
  - EPA Tools for Schools & Healthy Homes Programs
  - Interagency Agreement with USDA/NIFA
  - *www.ipm.gov* – federal IPM projects
  - IPM^3, consortium of federal agencies and land-grant institutions delivering IPM training
- Regional and Local Coordination
  - USDA Regional IPM Centers
  - Regional IPM in Schools Working Groups
  - Regional USDA/SARE Panels
  - Regional Ag and School IPM Coordinators

Background – Resistance

- Extent and nature of problem
  - Resistance is a worldwide problem
  - High volume chemicals affected
    - glyphosate, strobilurins
  - Few new chemistries being developed
- Some adverse effects of resistance
  - Reduced conservation tillage
  - Increased crop production costs and possible yield loss
  - Increased environmental loading of pesticides
  - Emergency exemption requests

Inherent Factors

- Pesticide
  - persistent activity
  - single-site mode of action
  - monogenic resistance
  - ease of metabolism
- Target pest
  - short life cycle/many generations
  - high fecundity/widespread distribution of progeny
  - high inherent genetic variability
  - existence of a mechanism in the pest to metabolize a range of active substances
  - existence of cross resistance
  - high fitness of resistant strains

Agronomic Factors

- Widely grown crop with short rotations
- Monocropping or continuous cropping
- Application techniques
- Other cultural practices (e.g. fertilizers, cultivation)
- Need for high numbers of applications or long exposure to obtain control
- Use of transgenic plants with genes expressing pesticidal activity
- Use of cultivars susceptible to the pest(s)
- Geographic isolation of populations preventing the re-entry of sensitive forms
- Environmental conditions favoring more frequent generations or higher population densities of the pest
- Exclusive reliance on a single active substance
- Lack of diversity of available control measures

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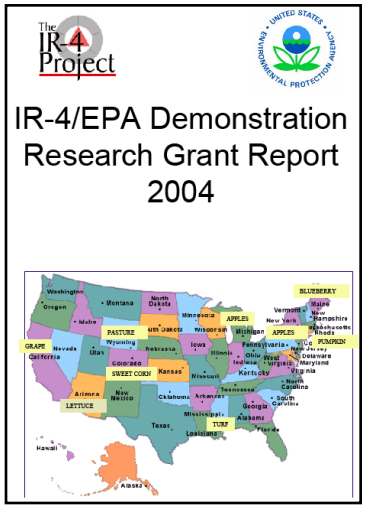
EPA/IR-4 Biopesticide Demonstration Grant Program

- Competitive grants program, begun in 2004, to reduce barriers to the adoption of biopesticides within IPM systems
- Barriers include:
  - Lack of awareness
  - Efficacy and spectrum of control concerns
  - Uncertainties regarding effective use
  - Lack of company resources for growers training

EPA/IR-4 Biopesticide Demonstration Grant Program

- 85 grants = $1.2 million funded
- >70% of projects successful
- Biopesticides efficacious in resistance management programs in over 20 projects

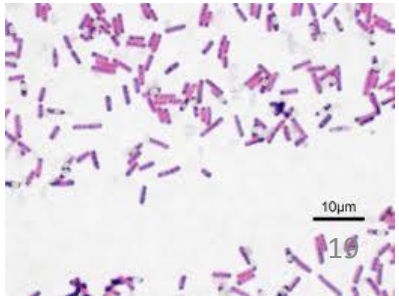


Biopesticides for Resistance Management

- Dollar Spot (*Sclerotinia homoeocarpa*)
  - Serious disease of turfgrass worldwide
  - Resistant to many conventional fungicides
- Usually controlled with fungicide applications every 7-10 days
- *Bacillus licheniformis* (EcoGuard®)
  - 95% control alone and in rotation with chlorthalonil

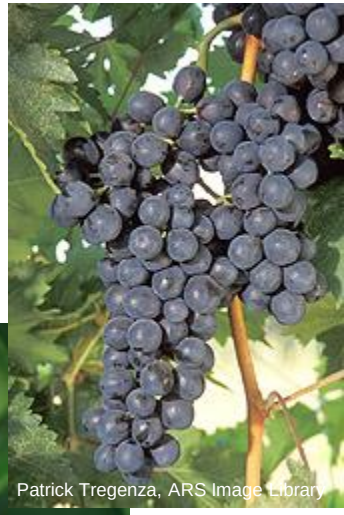
Biopesticides for Resistance Management

- Dollar Spot Technology Transfer Project
  - Five study sites in Eastern and Central U.S.
  - *Bacillus licheniformis* (EcoGuard®)
    - mixed with conventional fungicides out-performed standard fungicide program on bermuda grass
    - in alternation with conventional fungicides provided excellent visual quality on creeping bentgrass
    - mixed with conventional fungicide provided equivalent control and high quality ratings in creeping bentgrass



Biopesticides for Resistance Management

- Phosphites for Disease Management
  - Blueberry root and foliar diseases
    - controls *Pythium*, *Rhizoctonia*, and *Septoria* for in blueberries for less cost than conventional fungicides
  - *Phytophthora* blight in Cucurbits
  - Powdery Mildew in Grapes
  - Pecan Scab


Patrick Tregenza, ARS Image Library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Biopesticides for Resistance Management

- Biointensive IPM for Codling Moth in Apples
  - Includes pheromone mating disruption, codling moth granulosis virus, and reduced risk insecticide
  - Effective in major U.S. apple growing regions
  - 95% reduction in fruit injury in 3,000 acres (1,214 ha) over 4 years
  - 65% reduction in organophosphate use
  - Cost-effective - returns exceeded costs 2 to 1


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IPM Take Away Messages

- EPA has marching orders to promote IPM
- Partnership and grants are our tools
- Human health, protecting the environment, and resistance management are our drivers
- IPM is effective in many settings
- Specific success with biopesticide demonstrations grants