

**Stakeholder Workshop**  
**“Future Directions & Research Priorities for the**  
**USDA Biotechnology Risk Assessment Grants Program”**  
**Washington, DC**  
**June 9-10, 2003**

Research Needs & Priorities for  
**Plants: Pest Resistance Development and Management<sup>1</sup>**

**Highest Priorities in rank order**

- 1. Biology and Ecology Relative to Refuge Efficacy**
  - a. Host range (crops versus alternate hosts)
    - i. Distribution of alternate hosts (source potential); Percentage of population on each host (e.g. stable isotope analyses)
    - ii. Survivorship, fecundity and phenology
    - iii. Fitness cost of resistant insects on alternate hosts
    - iv. Behavioral or life history effects of alternate hosts (e.g., lower survival of WCRW-variant feeding on soybeans)
  - b. Effect of adult movement, mating and oviposition behavior on refuge efficacy, considering relative abundance of Bt crops (source-sink effects)
  - c. Assess effect of distance and size of refuges on immigration in Bt crops (e.g. mark-recapture, neutral markers, GIS studies)
  
- 2. Testing and Validation of Resistance Management Strategies**
  - a. Test and validate refuge strategy (e.g., link GIS mapping of Bt crop fields and refuges and resistance allele frequency from DNA markers or bioassays)
  - b. Compare empirically the value of different resistance management strategies under realistic conditions, including management strategies other than refuges (e.g., biological control, cultural practices, prescriptive use based on scouting for use of a transgenic crop [e.g., CRW-protected Bt corn], inducible expression).
  
- 3. Modeling Linked to Key Biological Questions and Data Gaps**

Use simulation models to compare the effectiveness of different resistance management strategies (e.g. mosaics of single toxins and pyramids, landscape effects, source-sink effects, etc.)
  
- 4. Resistance Monitoring**

Research to improve efficiency, data quality and statistical reliability of data that are collected

<sup>1</sup> Some of the research needs and priorities listed in this document may be outside the scope of the USDA Biotechnology Risk Assessment Grants Program. This document was prepared by one or more of the individuals listed below. USDA program staff did not edit the content of this document. The USDA Biotechnology Risk Assessment Grants Program supports risk assessment and risk management research projects regarding the safety of introducing into the environment genetically modified animals, plants, and microorganisms. More information is available at: [www.reeusda.gov/crgam/biotechrisk/biotech.htm](http://www.reeusda.gov/crgam/biotechrisk/biotech.htm). Questions regarding the suitability of research proposals should be discussed with the Program Director ([dhamernik@csrees.usda.gov](mailto:dhamernik@csrees.usda.gov)).

A list of people that attended this workshop is available at: [www.isb.vt.edu/brarg\\_meeting.htm](http://www.isb.vt.edu/brarg_meeting.htm). The following individuals contributed to the discussion of this topic at the workshop and/or preparation of this document after the workshop:

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