

AGENDA
US ENVIRONMENTAL PROTECTION AGENCY (EPA)
FIFRA SCIENTIFIC ADVISORY PANEL (SAP)
OPEN MEETING

DECEMBER 4-6, 2013

FIFRA SAP WEB SITE <http://www.epa.gov/scipoly/sap/>

Docket Number: EPA-HQ-OPP-2013-0490

U.S. Environmental Protection Agency

Conference Center Lobby Level

One Potomac Yard (South Bldg.)

2777 S. Crystal Drive, Arlington, VA 22202

**Scientific Uncertainties Associated with Corn Rootworm Resistance Monitoring for Bt
Corn Plant Incorporated Protectants (PIPs)**

Please note that all times are approximate (see note at end of Agenda).

Day 1

Wednesday, December 4, 2013

- 9:00 A.M. Opening of Meeting and Administrative Procedures**
Fred Jenkins, Ph.D., Designated Federal Official, Office of Science Coordination and Policy, EPA
- 9:05 A.M. Introduction and Identification of Panel Members**
Daniel Schlenk, Ph.D., FIFRA Scientific Advisory Panel Chair
- 9:10 A.M. Welcome and Opening Remarks**
Steven Bradbury, Ph.D., Director, Office of Pesticide Programs (OPP), EPA
Robert McNally, Director, Biopesticides and Pollution Prevention Division (BPPD), OPP
- 9:25 A.M. Scientific Uncertainties Associated With Resistance Monitoring for Corn Rootworm**
Alan Reynolds, OPP, Biopesticides and Pollution Prevention Division
- 10:30 A.M. Break**
- 10:45 A.M. Scientific Uncertainties Associated With Resistance Monitoring for Corn Rootworm (Cont'd)**
Alan Reynolds, OPP, Biopesticides and Pollution Prevention Division
- 11:45 A.M. Lunch**
- 1:00 P.M. Public Comments**
- 2:30 P.M. Break**

2:45 P.M. Public Comments (Cont'd)

**3:45 P.M. Panel Discussion of Charge Questions
Charge Question 1.**

- a. The panel is asked to comment on sampling approaches for conducting annual CRW resistance monitoring that support early resistance detection. Please discuss the strengths and limitations of BPPD's proposal for a focused (risk based) sampling approach for the Corn Belt, supplemented with samples from lower risk "fringe" areas for comparison.
- b. How many CRW populations should be collected from within a sampling region to adequately assess susceptibility?

**4:30 P.M. Panel Discussion of Charge Questions
Charge Question 2.**

- a. The panel is asked to comment on methods for investigating CRW populations causing unexpected damage to Bt corn. Specifically, please comment on:
 - ii. The use of field damage ratings (NIS) as a screen for potentially resistant populations. What sampling triggers should be used for single toxin and pyramided Bt products? Should alternate techniques be considered?
 - iii. The use of transect sampling in damaged areas or random sampling throughout the affected field to assess root damage ratings.

5:00 P.M. Adjourn

Day 2
Thursday, December 5, 2013

- 9:00 A.M. Opening of Meeting and Administrative Procedures**
Fred Jenkins, Ph.D., Designated Federal Official, Office of Science Coordination and Policy, EPA
- 9:05 A.M. Introduction and Identification of Panel Members**
Daniel Schlenk, Ph.D., FIFRA Scientific Advisory Panel Chair
- 9:10 A.M. Follow-up from the previous day discussions**
- 9:40 A.M. Panel Discussion of Charge Questions**
Charge Question 2. (Cont'd)
- iv. Appropriate sampling locations (i.e., in the vicinity of the damage and/or surrounding areas) for collections of adults if field damage triggers are exceeded.
 - v. The deployment of sentinel plots in the vicinity of damaged fields in subsequent seasons to 1) assess the resistance allele frequency in the area, and/or 2) collect insects if no adults were present at time of the field investigation.
- 10:40 A.M. Break**
- 11:00 A.M. Panel Discussion of Charge Questions**
Charge Question 3.
- a. Please comment on the strengths and limitations of diet bioassay methodologies for early resistance detection with CRW, considering that the currently-registered toxins are less than high dose. What improvements could be made to these bioassays to make them more effective and proactive resistance detection tools?
 - b. The panel is asked to discuss the relative merits and limitations of the two on-plant assays (Gassmann et al. 2011 and Nowatzki et al. 2008). Please discuss the extent to which these assays have different sensitivities to make early corn rootworm resistance determinations? Should other on-plant assay approaches be considered?
- 12:00 P.M. Lunch**
- 1:00 P.M. Panel Discussion of Charge Questions**

Charge Question 4.

- a. The Panel is asked to discuss the merits and shortcomings of the proposed approaches to defining resistance using on-plant assays. What sets of comparisons in the assays are most likely to add value to a weight-of-evidence approach to determining resistance?
- b. What resistance allele frequency should constitute field resistance for toxins with less than high dose expression? Please discuss the criteria that should be used for these types of toxins (as opposed to high dose toxins) given that a portion of heterozygous insects will survive Bt exposure and drive the evolution of resistance.
- c. What statistical tests, criteria, and significance levels would be best suited for early resistance detection with the proposed assays? Please discuss how to best avoid false negatives and/or false positives.

2:30 P.M. Break

2:45 P.M. Panel Discussion of Charge Questions Charge Question 4 (Cont'd)

- d. Please comment on the extent to which incomplete resistance can be identified with on-plant test systems. How should resistance definitions be adjusted to address these scenarios?
- e. Please discuss the viability of resistance ratios as an option for determining resistant populations, considering the generally low susceptibility of CRW to Bt toxins and the lack of susceptible wildtype populations (i.e., due to widespread adoption of Bt corn). What ratio could be considered as an indicator of resistance for corn rootworm using on-plant assays?

Charge Question 5.

- a. Please comment on the strengths and limitations of BPPD's proposal to use resistance allele gradients to define the geographic extent of a resistant population.
- b. What other tools or strategies could be employed to define the remediation zone?

5:00 PM Adjourn

Day 3
Friday, December 6, 2013

- 9:00 A.M. Opening of Meeting and Administrative Procedures**
Fred Jenkins, Ph.D., Designated Federal Official, Office of Science Coordination and Policy, EPA
- 9:05 A.M. Introduction and Identification of Panel Members**
Daniel Schlenk, Ph.D., FIFRA Scientific Advisory Panel Chair
- 9:10 A.M. Follow-up from the previous day discussions**
- 9:30 A.M. Panel Discussion of Charge Questions (Cont'd)**

Charge Question 6.

- a. What remediation approaches could be taken for localized vs. area-wide resistance scenarios?
- b. Which mitigation measures would be more effective in containing and/or extirpating resistant CRW populations?
- c. Please comment on the value of theoretical models in designing remedial action strategies for various resistance scenarios.
- d. The current deterministic and stochastic simulation models used for IRM purposes contain many of the following attributes: ecology, population biology, behavior, and genetics of pest, grower behavior (refuge compliance, insecticide spraying, etc), explicit spatial and probability analyses. What other modeling attributes would help improve the analysis of remediation strategies?

12:00 P.M. Adjourn

Please be advised that agenda times are approximate; when the discussion for one topic is completed, discussions for the next topic will begin. For further information, please contact the Designated Federal Official for this meeting, Dr. Fred Jenkins, via telephone: (202) 564-3327; fax: (202) 564-8382; or email: jenkins.fred@epa.gov

