



U.S. ENVIRONMENTAL PROTECTION AGENCY  
Office of Pesticide Programs  
Biopesticides and Pollution Prevention Division (7511C)  
1200 Pennsylvania Avenue NW  
Washington, DC 20460

EPA Reg. Number:  
29964-4

Date of Issuance:  
AUG 31 2005

NOTICE OF PESTICIDE:

- Registration
- Reregistration

(under FIFRA, as amended)

Term of Issuance: Conditional

Name of Pesticide Product:  
Herculex Rootworm Insect Protection

Name and Address of Registrant (include ZIP Code):

Pioneer Hi-Bred International  
7250 N.W. 62nd Avenue  
P.O. Box 552  
Johnston, IA 50131-0552

Note: Changes in labeling differing in substance from that accepted in connection with this registration must be submitted to and accepted by the Biopesticides and Pollution Prevention Division prior to use of the label in commerce. In any correspondence on this product always refer to the above EPA registration number.

On the basis of information furnished by the registrant, the above named pesticide is hereby registered/reregistered under the Federal Insecticide, Fungicide and Rodenticide Act.

Registration is in no way to be construed as an endorsement or recommendation of this product by the Agency. In order to protect health and the environment, the Administrator, on his motion, may at any time suspend or cancel the registration of a pesticide in accordance with the Act. The acceptance of any name in connection with the registration of a product under this Act is not to be construed as giving the registrant a right to exclusive use of the name or to its use if it has been covered by others.

The registration application referred to above, submitted in connection with registration under § 3(c)(7)(C) of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, is acceptable provided that you do the following terms and conditions.

- 1) Submit/cite all data required for registration of your product under FIFRA § 3(c)(5) when the Agency requires all registrants of similar products to submit such data.
- 2) The subject registration will automatically expire on midnight September 30, 2010. EPA will determine prior to September 30, 2010 whether or not to extend the expiration date or to convert the registration to a non-expiring registration.
- 3) The subject registration will be limited to *Bacillus thuringiensis* Cry34Ab1 and Cry35Ab1 proteins and the genetic material necessary for their production (plasmid insert PHP17662) in Event DAS-59122-7 corn use in field corn.
- 4) Provide to the EPA laboratory (Ft. Meade, MD) methodology and/or reagents necessary for validation of a Cry34/35Ab1 analytical method within 6 months of the date of registration.

Signature of Approving Official:

(See Signature on Page 10)

Date:

8/31/05

- 5) Submit field degradation studies evaluating accumulation and persistence of Cry34/35Ab1 in several different soils in various strata. Representative fields must have been planted with Cry34/35Ab1 corn and include both conventional tillage and no-till samples and be harvested under typical agronomic conditions. Sampling must continue until the limit of detection is reached. Studies should include soils with high levels of a variety of clays. Both ELISA and insect bioassays need to be conducted and compared to determine if Cry34/35Ab1 is accumulating or persisting in soil samples. A protocol is due within 90 days of the date of registration. A final report regarding data from fields that have had three continuous years of cultivation of Event DAS-59122-7 corn is due by January 31, 2010.
- 6) Submit laboratory toxicity tests with *Orius insidiosus* (minute pirate bug); carabid (ground beetle), within 24 months of the date of registration. Protocols are due within 120 days of the date of registration.
- 7) Additional 3 year full-scale field or semi-field studies for evaluation of Cry34/35Ab1 Event DAS-59122-7 corn exposure on non-target invertebrates must be conducted. Full-scale field experiments must be appropriately designed to provide a measure of ecological impacts (larger fields, more replicates, more samples per plot based on recommendations of the August, 2002 SAP). The previously submitted two-year field study is not sufficient to determine if Cry34/35Ab1 corn will have long term impact on non-target invertebrates. A protocol is due within 90 days of the date of registration. A final report is due September 30, 2009.
- 8) The following insect resistance management data are recommended.

Additional research on corn rootworm pest biology and ecology, genetics and mechanisms of resistance, functional dominance, fitness costs, cross-resistance potential, dose (including the role of density-dependence), and mode of action are recommended to evaluate the sustainability of the insect resistance management durability plan and confirm the assumptions made in the simulation models. Research reports should be provided to the Agency once the research is completed and at least nine months prior to the expiration of this registration.

Should you wish to amend the refuge treatment option to allow independent treatment of the refuge for pests other than corn rootworms, data would be required regarding the impact of independent treatment of the refuge for other pests (not corn rootworm, e.g., corn borers, spider mites) on corn rootworm resistance management.

- 9) You must commit to do the following Insect Resistance Management Program which has the following elements:
  - a) Requirements relating to creation of a non-(corn rootworm-protected PIP) corn refuge in conjunction with the planting of any acreage of commercial Cry34/35Ab1 *Bt* corn;
  - b) Requirements for the registrant to prepare and require Cry34/35Ab1 *Bt* corn users to sign "grower agreements" which impose binding contractual obligations on the grower to comply with the refuge requirements;

c) Requirements for the registrant to develop, implement, and report to EPA on programs to educate growers about IRM requirements;

d) Requirements for the registrant to develop, implement, and report to EPA on programs to evaluate and promote growers' compliance with IRM requirements (the Cry34/35Ab1 Compliance Assurance Program (CAP) must integrate with the Cry1 CAPs);

e) Requirements for the registrant to develop, implement, and report to EPA on monitoring programs to evaluate whether there are statistically significant and biologically relevant changes in target insect susceptibility to Cry34/35Ab1 proteins in the target insects;

f) Requirements for the registrant to develop, and if triggered, to implement a "remedial action plan" which would contain measures the registrant would take in the event that any insect resistance was detected as well as to report on activity under the plan to EPA;

g) Submit annual reports on units sold by state (units sold by county level will be made available to the Agency upon request), IRM grower agreements results, compliance assurance program including the education program, and resistance monitoring on or before January 31st each year beginning in 2007.

9a. Refuge Requirements

Grower agreements (also known as stewardship agreements) will specify that growers must adhere to the refuge requirements as described in the grower guide/product use guide and/or in supplements to the grower guide/product use guide.

1. *Refuge size.* The use of Cry34/35 corn from event DAS 59122-7 requires an accompanying 20% refuge
2. *Refuge location.* The rootworm refuge is required to be planted within or adjacent (e.g. across the road) to the Cry34/35 corn field.
3. *Refuge management options.* The rootworm refuge may be managed in such a way that there is little or no yield loss to rootworms, but must be managed in a way that it is sufficiently productive of susceptible rootworm adults.

- The in-field refuge options may be planted as a single block or as a series of strips measuring at least four (4) crop rows wide.
- Seed mixtures of Cry34/35 and refuge corn are not permitted.
- If the refuge is planted on rotated ground, then Cry34/35 corn must also be planted on rotated ground.
- If the refuge is planted in continuous corn, the Cry34/35 field may be planted on either continuous or rotated land (option encouraged where WCRW rotation-resistant biotype may be present).
- Application of soil insecticide is permitted in the refuge.

- Seed treatment is permitted in the refuge, either for rootworm protection or for controlling secondary soil pests.
- If aerial insecticides are applied to the refuge for control of CRW adults, the same treatment must also be applied in the same time-frame to Cry34/35 corn.
- Pests other than adult corn rootworms can only be treated with CRW-labeled insecticide on the refuge acres without treating the Cry34/35 acres if treatment occurs when adult corn rootworms are not present. Pests on the Cry34/35 acres can be treated as needed without having to treat the refuge.
- The rootworm refuge can be planted to any corn hybrid that does not express PIPs for rootworm control (e.g. lepidopteran-protected Bt corn, herbicide-tolerant corn, or conventional corn).
- The refuge and Cry34/35 corn should be sown on the same date, or with the shortest window possible between planting dates, to ensure that corn root development is similar among varieties.
- Growers are encouraged to plant the rootworm refuge in the same location each year, as it allows the rootworm population to remain high and the durability of the trait is extended. This option may be preferable to growers who wish to only think of their refuge design once and for growers who grow continuous corn. However, for those growers who need to employ crop rotation, a fixed refuge would be impractical.

9b. Grower Agreements

- 1] Persons purchasing the *Bt* corn product must sign a grower agreement. The term "grower agreement" refers to any grower purchase contract, license agreement, or similar legal document.
- 2] The grower agreement and/or specific stewardship documents referenced in the grower agreement must clearly set forth the terms of the current IRM program. By signing the grower agreement, a grower must be contractually bound to comply with the requirements of the IRM program.
- 3] The registrant must develop a system (equivalent to what is already approved for Cry1F Bt corn) which is reasonably likely to assure that persons purchasing the *Bt* corn product will affirm annually that they are contractually bound to comply with the requirements of the IRM program. The proposed system will be submitted to EPA by January 31, 2006.
- 4] The registrant must use grower agreements and submit to EPA by January 31, 2006 a copy of that agreement and any specific stewardship documents referenced in the grower agreement. If Pioneer Hi-Bred International wishes to change any part of the grower agreement or any specific stewardship documents referenced in the grower agreement that would affect either the content of the IRM program or the legal enforceability of the provisions of the agreement relating to the IRM program, thirty days prior to implementing a proposed change, the registrant must submit to EPA the text of such changes to ensure that it is consistent with the terms and conditions of the amendment.
- 5] The registrant must establish a system (equivalent to what is already approved for Cry1F Bt Corn) which is reasonably likely to assure that persons purchasing the *Bt* corn sign grower agreement(s), and must provide by January 31, 2006 a written description of that system.

6] The registrant shall maintain records of all *Bt* corn grower agreements for a period of three years from December 31st of the year in which the agreement was signed.

7] Beginning on January 31, 2007 and annually thereafter, the registrant shall provide EPA with a report showing the number of units of its Cry34/35Ab1 corn seeds sold or shipped and not returned, and the number of such units that were sold to persons who have signed grower agreements. The report shall cover the time frame of the twelve-month period covering the prior August through July.

8] The registrant must allow a review of the grower agreements and grower agreement records by EPA or by a State pesticide regulatory agency if the State agency can demonstrate that confidential business information, including names, personal information, and grower license number, will be protected.

9c. IRM Education and IRM Compliance Monitoring Programs

1] Pioneer Hi-Bred International must implement a comprehensive, ongoing IRM education program designed to convey to *Bt* Cry34/35Ab1 corn users the importance of complying with the IRM program. The program shall include information encouraging *Bt* Cry34/35Ab1 corn users to pursue optional elements of the IRM program relating to refuge configuration and proximity to *Bt* Cry34/35Ab1 corn fields. The education program shall involve the use of multiple media, e.g. face-to-face meetings, mailing written materials, EPA reviewed language on IRM requirements on the bag or bag tag, and electronic communications such as by Internet, radio, or television commercials. Copies of the materials will be provided to EPA for its records for the first year of commercialization (2006 growing season) by January 31, 2007. The program shall involve at least one written communication annually to each *Bt* Cry34/35Ab1 corn user separate from the grower technical guide. The communication shall inform the user of the current IRM requirements. Pioneer Hi-Bred International shall coordinate its education programs with educational efforts of other registrants and other organizations, such as the National Corn Grower Association and state extension programs.

2] Annually, the registrant shall revise, and expand as necessary, its education program to take into account the information collected through the compliance survey required under paragraph 6] and from other sources. The changes shall address aspects of grower compliance that are not sufficiently high.

3] Beginning January 31, 2008 and annually thereafter, the registrant must provide EPA any substantive changes to its grower education activities as part of the overall IRM compliance assurance program report. The required features of the compliance assurance program are described in paragraphs 4]-15] below.

4] The registrant must design and implement an ongoing IRM compliance assurance program designed to evaluate the extent to which growers purchasing its Cry34/35Ab1 *Bt* corn product are complying with the IRM program and that takes such actions as are reasonably needed to assure that growers who have not complied with the program either do so in the future or lose their access to the Cry34/35Ab1 *Bt* corn product. The registrant shall coordinate with other *Bt* corn registrants in designing and implementing its compliance assurance program and integrate the Cry34/35Ab1 CAP with the Cry1 CAPs. The registrant must prepare and submit by January 31, 2006 a written description of their compliance assurance program including a summary of the program implemented in the 2006 growing season. Other required features of the program are described in paragraphs 5] - 15] below.

5] The registrant must establish and publicize a "phased compliance approach," i.e., a guidance document that indicates how the registrant will address instances of non-compliance with the terms of the IRM program and general criteria for choosing among options for responding to any non-compliant growers. The options shall include withdrawal of the right to purchase Cry34/35Ab1 Bt corn for an individual grower or for all growers in a specific region. An individual grower found to be significantly out of compliance two years in a row would be denied sales of the product the next year. Similarly, seed dealers who are not fulfilling their obligations to inform/educate growers of their IRM obligations will lose their opportunity to sell Cry34/35Ab1 Bt corn.

6] The IRM compliance assurance program shall include an annual survey conducted by an independent third party of a statistically representative sample of Cry34/35Ab1 Bt corn growers who plant the vast majority of all corn in the U.S. and in areas in which the selection intensity is greatest. The survey shall consider only those growers who plant 200 or more acres of corn in the Corn-Belt and who plant 100 or more acres of corn in corn-cotton areas.. The survey shall measure the degree of compliance with the IRM program by growers in different regions of the country and consider the potential impact of non-response. The sample size and geographical resolution may be adjusted annually, based upon input from the independent marketing research firm and academic scientists, to allow analysis of compliance behavior within regions or between regions. The sample size must provide a reasonable sensitivity for comparing results across the U.S.

7] The survey shall be designed to provide an understanding of any difficulties growers encounter in implementing IRM requirements. An analysis of the survey results must include the reasons, extent, and potential biological significance of any implementation deviations.

8] The survey shall be designed to obtain grower feedback on the usefulness of specific educational tools and initiatives.

9] The registrant shall provide a written summary of the results of the prior year's survey (together with a description of the regions, the methodology used, and the supporting data) to EPA by January 31 of each year, beginning with 2007. The registrant shall confer with EPA on the design and content of the survey prior to its implementation.

10] Annually, the registrant shall revise, and expand as necessary, its compliance assurance program to take into account the information collected through the compliance survey required under paragraphs 6] through 8] and from other sources. The changes shall address aspects of grower compliance that are not sufficiently high. The registrant must confer with the Agency prior to adopting any significant changes.

11] The registrant shall conduct an annual on-farm assessment program. The registrant shall train its representatives who make on-farm visits with Cry34/35Ab1 Bt corn growers to perform assessments of compliance with IRM requirements. There is no minimum corn acreage size for this program. Therefore, growers will be selected for this program from across all farm sizes. In the event that any of these visits result in the identification of a grower who is not in compliance with the IRM program, the registrant shall take appropriate action, consistent with its "phased compliance approach," to promote compliance.

12] The registrant shall carry out a program for investigating legitimate "tips and complaints" that its growers are not in compliance with the IRM program. Whenever an investigation results in the identification of a grower who is not in compliance with the IRM program, the registrant shall take

appropriate action, consist<sup>e</sup> with its "phased compliance approach."

13] If a grower, who purchases Cry34/35Ab1 Bt corn for planting, was specifically identified as not being in compliance during the previous year, the registrant shall visit with the grower and evaluate whether that the grower is in compliance with the IRM program for the current year.

14] Beginning January 31, 2007 and annually thereafter, Pioneer Hi-Bred International shall provide a report to EPA summarizing the activities carried out under their compliance assurance program for the prior year including changes to the grower education program, and the plans for the compliance assurance program during the current year. The report will include information regarding grower interactions (including, but not limited to, third-party grower survey, on-farm visitation program, verified tips and complaints, education programs (e.g., grower meetings and letters), the extent of non-compliance, corrective measures to address the non-compliance (phased-compliance program), and any follow-up actions taken.

15] The registrant and the seed corn dealers for the registrant must allow a review of the compliance records by EPA or by a State pesticide regulatory agency if the State agency can demonstrate that confidential business information, including the names, personal information, and grower license number of the growers will be protected.

9d. Insect Resistance Monitoring

The Agency is imposing the following conditions for this product:

The registrant must monitor for Cry34Ab1/35Ab1 resistance and/or trends in increased tolerance for corn rootworm. Sampling should be focused in those areas in which there is the highest risk of resistance development.

- 1] The registrant must provide EPA its resistance monitoring plan for approval. A preliminary plan must be submitted to the Agency by January 31, 2006 consisting of a description of the steps to be taken to establish corn rootworm baseline sensitivity and damage guidelines. A detailed resistance monitoring plan must be submitted to the Agency for review by January 31, 2008. This plan must include: baseline sensitivity data, sampling (number of locations, samples per locations), sampling methodology and life-stage sampled, bioassay methodology, standardization procedures (including QA/QC provisions), detection technique and sensitivity, the statistical analysis of the probability of detecting resistance, and an interim description of rootworm damage guidelines.
- 2] The registrant must develop and validate an appropriate discriminating or diagnostic dose assay by January 31, 2010. Further you must provide BPPD with a detailed explanation and validation (steps for) of the "high-throughput diagnostic screen" if it is to be considered an acceptable diagnostic dose assay.
- 3] You must finalize rootworm damage guidelines and submit these to BPPD by January 31, 2010.
- 4] The registrant must follow-up on grower, extension specialist or consultant reports of unexpected damage or control failures for corn rootworm.

- 5) The registrant must provide EPA with an annual resistance monitoring report by January 31st of each year beginning with 2008, reporting on populations collected the previous year.

**9e. Remedial Action Plans**

The remedial action plan is designed as a tiered approach for mitigating WCRW, NCRW, and MCRW resistance development to the Cry34/35Ab1 protein. The following program summary describes, in order of events, the steps that must be taken to implement a remedial action plan if resistance to target pests is confirmed. However, the levels of "expected" damage cannot be identified until baseline sensitivity is determined. EPA requires that Pioneer Hi-Bred International establish the baseline sensitivity by January 31, 2008, so that expected levels of crop damage and target pest resistance can be established, and a remedial action plan initiated when needed.

**1] Definition of Suspected Resistance:** Resistance will be suspected if investigations of unexpected damage reports show that:

- a. implicated corn plant roots were expressing Cry34/35Ab1 proteins at the expected levels;
- b. the seed used was not mixed with non-Cry34/35Ab1 seed;
- c. alternative causes of damage or lodging, such as non-target pest insect species, weather, physical damage, larval movement from alternate hosts, planting errors, and other reasonable causes for the observations, have been ruled out;
- d. the level of damage exceeds guidelines for expected damage.

If resistance is "suspected", the registrant will instruct affected growers to use alternate pest control measures such as adulticide treatment, crop rotation the following year, or use of soil or seed insecticides the following year. These measures are intended to reduce the possibility of potentially resistant insects contributing to the following year's pest population.

**2] Confirmation of Resistance:** Resistance will be confirmed if all of the following criteria are met by progeny from the target pest species sampled from the area of "suspected resistance":

- a. the proportion of larvae that can feed and survive on Cry34/35Ab1 roots from neonate to adult is significantly higher than the baseline proportion (currently being established);
- b. the LC50 of the test population exceeds the upper limit of the 95% confidence interval for the LC50 of a standard unselected population, and/or survival in the diagnostic assay is significantly greater than that of a standard unselected population, as established by the ongoing baseline monitoring program;
- c. the ability to survive is heritable;
- d. Cry34/35Ab1 plant assays determine that damage caused by surviving insects would exceed economic thresholds;
- e. if subsequent collections in the affected field area demonstrate similar bioassay results.

**3] Response to Confirmed Resistance:** When resistance is "confirmed", the following steps will be taken:

- a. EPA will receive notification within 30 days of confirming resistance;
- b. affected customers and extension agents will be notified about confirmed resistance;
- c. affected customers and extension agents will be encouraged to employ alternative CRW control measures;



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- d sale and distribution of Cry34/35Ab1 corn in the affected area will cease immediately;
- e a long-term resistance management action plan will be devised according to the characteristics of the resistance event and local agronomic needs.

10) Annual Reports:

The registrant must provide annual reports to EPA on its Cry34/35Ab1 PIP expressed in corn based on the following table.

Report	Description	Due Date
Annual Sales	Units sold by state (county information is available upon request by the Agency)	January 31st each year beginning in 2007
Grower Agreement	Number of units of <i>Bt</i> corn seeds shipped or sold and not returned, and the number of such units that were sold to persons who have signed grower agreements	January 31st each year beginning in 2007
Grower Education (part of the Compliance Assurance Program Report, except for the 2006 growing season)	Education program for the 2006 growing season. Subsequent changes to the grower education program must be included in the annual compliance assurance program report.	January 31, 2007. Annual changes January 31st, each year beginning in 2008 as part of the Compliance Assurance Program Report
Proposed Compliance Plan	Written description of Compliance Assurance Program	January 31, 2006
Compliance Assurance Program	Compliance Assurance Program Activities and Results: third-party grower survey, on-farm visitation program, phased-compliance report, tips and complaints, and grower education programs	January 31st each year starting in 2007
Insect Resistance Monitoring Plan	Description of the steps to be taken to establish corn rootworm baseline sensitivity and damage guidelines	January 31, 2006
Insect Resistance Monitoring Plan	Submission of plan. Description of the program including baseline sensitivity, sampling (number of locations and samples per locations), sampling methodology, bioassay methodology, standardization procedures, detection technique, sensitivity, and the statistical analysis of the probability of detecting resistance, and an interim description of rootworm damage guidelines	January 31, 2008
Insect Resistance Monitoring	Submission of rootworm damage guidelines	January 31, 2010
Insect Resistance	Development of diagnostic dose assay/high	January 31, 2008

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Monitoring	ough-put screen	
Insect Resistance Monitoring	Annual report of the insect resistance monitoring program. Results of monitoring and investigations of damage reports	August 31st each year beginning in 2008

Additional reports are due as described in the following table:

IRM Grower Agreements	Proposed system to assure growers sign grower agreements	January 31, 2006
IRM Affirmation Plan	System to assure annual affirmation by growers of their IRM obligations	January 31, 2006
Changes to Grower Agreement and/or IRM documents	Current grower agreement(s) and any specific stewardship documents	At least 30 days before any changes related to IRM are expected to be imposed.
Grower Agreement	Submission of grower agreement and any specific stewardship documents referenced in the grower agreement	January 31, 2006

If these conditions are not complied with, the registration will be subject to cancellation in accordance with FIFRA sec. 6(e). Your release for shipment of the product constitutes acceptance of these conditions.

A stamped copy of the label is enclosed for your records.

Sincerely,



Phil Hutton, Acting Director  
Biopesticides and Pollution  
Prevention Division (7511C)

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### Herculex<sup>®</sup> Rootworm Insect Protection

Active Ingredients:

*Bacillus thuringiensis* Cry34Ab1 insecticidal crystal protein and the genetic material necessary for its production (plasmid insert PHP17662) in event DAS-59122-7 corn. 0.000867 – 0.0088%\*

*Bacillus thuringiensis* Cry35Ab1 insecticidal crystal protein and the genetic material necessary for its production (plasmid insert PHP17662) in event DAS-59122-7 corn. 0.000413 – 0.00181%\*

Inert Ingredient:

A substance produced by a marker gene and its controlling sequences in corn 0.00 – 0.000058%\*

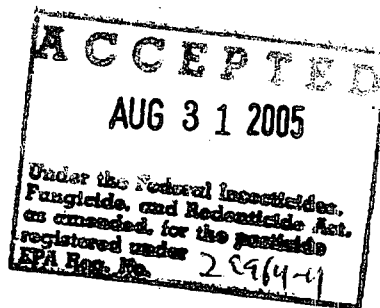
\*% total protein on a dry weight basis in plant cells (whole plant)

**KEEP OUT OF REACH OF CHILDREN  
CAUTION**

REGISTRATION NUMBER: 029964-4

EPA ESTABLISHMENT NUMBER: 029964-IA-001

Pioneer Hi-Bred International, Inc.  
7250 NW 62<sup>nd</sup> Avenue  
Johnston, IA 50131



\*Herculex Rootworm Insect Protection by Dow AgroSciences and Pioneer Hi-Bred. Herculex is a trademark of Dow AgroSciences LLC.

**DIRECTIONS FOR USE**

It is a violation of federal law to use this product in any manner inconsistent with its labeling.

The subject registration automatically expires midnight on September 30, 2010.

The plant-incorporated protectant product must be used as specified in the terms and conditions of the registration.

Corn has been transformed to express *Bacillus thuringiensis* strain PS149B1 Cry34/35Ab1 insecticidal crystal proteins (ICP) for the control of western corn rootworm (*Diabrotica vigifera*), northern corn rootworm (*Diabrotica berberis*) and Mexican corn rootworm (*Diabrotica virgifera zea*) pests.

Routine application of insecticides to control western corn rootworm, northern corn rootworm, or Mexican corn rootworm are unnecessary for corn containing *B.t.* Cry34/35Ab1 ICP.

Growers are instructed to read information on insect resistance management. The following information regarding commercial production must be included in the Grower Guide.

1. Refuge size. The use of Cry34/35 corn from event DAS 59122-7 requires an accompanying 20% refuge.
2. Refuge location. The rootworm refuge is required to be planted within or adjacent (e.g. across the road) to the Cry34/35 corn field.
3. Refuge management options. The rootworm refuge may be managed in such a way that there is little or no yield loss to rootworms, but must be managed in a way that it is sufficiently productive of susceptible rootworm adults.
  - The in-field refuge options may be planted as a single block or as a series of strips measuring at least four (4) crop rows wide.
  - Seed mixtures of Cry34/35 and refuge corn are not permitted.
  - If the refuge is planted on rotated ground, then Cry34/35 corn must also be planted on rotated ground.
  - If the refuge is planted in continuous corn, the Cry34/35 field may be planted on either continuous or rotated land (option encouraged where WCRW rotation-resistant biotype may be present).
  - Application of soil insecticide is permitted in the refuge.
  - Seed treatment is permitted in the refuge, either for rootworm protection or for controlling secondary soil pests.
  - If aerial insecticides are applied to the refuge for control of CRW adults, the same treatment must also be applied in the same time-frame to Cry34/35 corn.
  - Pests other than adult corn rootworms can only be treated with CRW-labeled insecticide on the refuge acres without treating the Cry34/35 acres if treatment occurs when adult corn rootworms are not present. Pests on the Cry34/35 acres can be treated as needed without having to treat the refuge.

\*Herculex Rootworm Insect Protection by Dow AgroSciences and Pioneer Hi-Bred. Herculex is a trademark of Dow AgroSciences LLC.

- The rootworm refuge can be planted to any corn hybrid that does not express PIPs for rootworm control (e.g. lepidopteran-protected Bt corn, herbicide-tolerant corn, or conventional corn).
- The refuge and Cry34/35 corn should be sown on the same date, or with the shortest window possible between planting dates, to ensure that corn root development is similar among varieties.
- Growers are encouraged to plant the rootworm refuge in the same location each year, as it allows the rootworm population to remain high and the durability of the trait is extended. This option may be preferable to growers who wish to only think of their refuge design once and for growers who grow continuous corn. However, for those growers who need to employ crop rotation, a fixed refuge would be impractical.

**USE PATTERN**

<b>CROP</b>	<b>PESTS</b>
Field corn	western corn rootworm northern corn rootworm Mexican corn rootworm

EPA Accepted: \_\_/\_\_/\_\_

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