

***Bacillus thuringiensis* Cry34Ab1 and Cry35Ab1 proteins and the genetic material necessary for their production (plasmid insert PHP 17662) in Event DAS-59122-7 corn (006490) Fact Sheet**

I. Description of the Plant-Incorporated Protectant

- **Pesticide Name:** *Bacillus thuringiensis* Cry34Ab1 and Cry35Ab1 proteins and the genetic material necessary for their production (plasmid insert PHP 17662) in Event DAS-59122-7 corn

- **Date Registered:** August 31, 2005

- **Registration Numbers:** 68467-5, 29964-4

- **Trade and Other Names:** Event DAS-59122-7 corn, Herculex Rootworm, Herculex RW

- **OPP Chemical Code:** 006490

- **Basic Manufacturers:**
 - Mycogen Seeds c/o Dow AgroSciences LLC
330 Zionsville Road, Indianapolis, IN 46268

 - Pioneer Hi-Bred International, A Dupont Company
7250 N.W. 62nd Ave., P.O. Box 552, Johnston, IA

- **Type of Pesticide:** Plant-Incorporated Protectant

- **Uses:** Field Corn

- **Target Pest(s):** Corn Rootworm

II. Background

EPA has conditionally registered Mycogen Seeds c/o Dow AgroSciences LLC and Pioneer Hi-Bred International's new active ingredient, *Bacillus thuringiensis* Cry34Ab1 and Cry35Ab1 proteins and the genetic material necessary for their production (plasmid insert PHP 17662) in Event DAS-59122-7 corn. The Agency has determined that the use of this pesticide is in the public interest and that it will not cause any unreasonable adverse effects on the environment during the time of conditional registration.

The new products are the second PIP to offer protection against corn rootworm (CRW), and they are expected to result in a further reduction of chemical insecticide use by growers. The reduced chemical pesticide use will benefit the environment directly and can mean less exposure to people who apply chemical pesticides to corn. The availability of multiple CRW-protected corn products will also increase grower choice and price competition, likely resulting in lower seed prices for consumers and higher adoption rates.

The new corn plant-incorporated protectant, Event DAS-59122-7 Corn, produces its own insecticide within the corn plant derived from *Bacillus thuringiensis* (Bt), a naturally occurring soil bacterium. The Bt proteins used in this product, called Cry34Ab1 and Cry35Ab1 (Cry 34/35), control corn rootworm, a highly destructive pest responsible for the single largest use of conventional insecticides in the United States.

In order to reduce the possibility of corn rootworm developing resistance to Bt, EPA is requiring Mycogen and Pioneer to ensure that 20 percent of the planted acreage of this product be set aside where non-CRW-protected Bt corn will be grown to serve as a "refuge." These refuge areas will support populations of corn rootworm not exposed to the Cry34Ab1 and Cry 35Ab1 proteins. The insect populations in the refuges will help prevent resistance development when they cross-breed with insects in the Bt fields. This resistance management strategy was developed as a condition of the registration, and EPA will require routine monitoring and documentation that these measures are followed. The submitted insect resistance management data support a 5-year registration until 2010.

A tolerance exemption under 40 CFR Part 174.457 has also been approved for *Bacillus thuringiensis* Cry34Ab1 and Cry35Ab1 proteins and the genetic material necessary for their production in corn.

III. Science Assessment

Product Characterization

Cry34Ab1 and Cry35Ab1 proteins are from *Bacillus thuringiensis* PS149B1 and have activity against certain beetles.

B.t. Cry34/35Ab1 corn was produced by *Agrobacterium tumefaciens*-mediated transformation of a corn line with the T-DNA from plasmid PHP17662, which contains cry34Ab1, cry35Ab1, pat, and regulatory sequences necessary for the expression of the genes. The cry34Ab1 and cry35Ab1 transgenes were optimized for expression in maize, but the amino acid sequence of the expressed proteins is identical to the native proteins from B.t. Characterization of the DNA isolated from B.t. Cry34/35Ab1 corn using restriction enzyme digests and Southern blot analysis indicated that the T-DNA from plasmid PHP17662 inserted as a single, intact copy into the corn genome. In addition, DNA analysis indicated stability and inheritance of the inserted DNA within and across several generations.

Protein characterization data demonstrate that the plant-produced proteins have characteristics and activities that are equivalent to those of the proteins produced in *Pseudomonas fluorescens* transformed to produce Cry34Ab1 and Cry35Ab1.

Studies on the mode of action of Cry34Ab1 and Cry35Ab1 indicate that similar to other B.t. delta-endotoxins, Cry34Ab1 and Cry35Ab1 appear to target midgut epithelial cells in susceptible larvae. Cry34Ab1 appears to cause pore formation in phospholipid membranes, and addition of Cry35Ab1 resulted in pores remaining open longer and improved membrane permeability. Ribosomal inhibition activity was also investigated. The results demonstrated that the insecticidal activity of Cry34Ab1 and Cry35Ab1 is not associated with the inhibition of protein synthesis.

Human Health Assessment

Based upon the human health data provided, the risk of toxic and/or allergenic effects to humans or animals due to exposure to the Cry34Ab1 and Cry35Ab1 proteins is minimal and there is a reasonable certainty of no harm to humans and animals posed by the aggregate exposure to residues of these proteins.

Three acute oral toxicity studies on Cry34Ab1 and Cry35Ab1 in mice were submitted, which indicated that these proteins are non-toxic to humans. In addition, a study was submitted where the amino acid sequences of the Cry34Ab1 and Cry35Ab1 proteins were compared with protein sequences in publicly available sequence databases to identify any potential similarities with known toxins. No similarities were identified that would raise a safety concern. Toxic proteins typically act as acute toxins with low dose levels. Therefore, since no effects were shown to be caused by the plant-incorporated protectants, even at relatively high dose levels, the Cry34Ab1 and Cry35Ab1 proteins are not considered toxic.

Regarding allergenicity potential, 1) Cry34Ab1 and Cry35Ab1 originate from a non-allergenic source; 2) Cry34Ab1 and Cry35Ab1 have no overall sequence similarities or homology at the level of 8 contiguous amino acid residues with known allergens; 3) Cry34Ab1 and Cry35Ab1 will only be present at low levels in food; 4) Cry35Ab1 is rapidly digested in simulated gastric fluid, and

Cry34Ab1 is digested at a moderate rate in simulated gastric fluid; and 5) Cry34Ab1 and Cry35Ab1 are not glycosylated when expressed in maize. EPA has concluded that the potential for the Cry34Ab1 and Cry35Ab1 proteins to be food allergens is minimal.

A tolerance exemption exists under 40 CFR Part 174.457 has also been approved for *Bacillus thuringiensis* Cry34Ab1 and Cry35Ab1 proteins and the genetic material necessary for their production in corn that includes Event DAS-59122-7 corn.

Environmental Assessment

The Agency is using a Maximum Hazard Dose Tiered system for biopesticide non-target wildlife hazard assessment. When no adverse effects at the maximum hazard dose are observed, the Agency concludes that there are no unreasonable adverse effects from the use of the pesticide. From all of the required and voluntarily developed indicator and host range species test data on Cry34/35Ab1 corn, the Agency concludes that the levels of Cry34/35Ab1 protein in Event DAS-59122-7 corn will not pose unreasonable adverse effects to corn field flora and fauna. Available data also indicate that there should be minimal short-term accumulation of Cry34/35Ab1 protein in agricultural soil. In addition, no adverse effect on endangered and threatened species listed by the US Fish and Wildlife Service is expected from the Event DAS-59122-7 corn registration.

At present, the Agency is aware of no identified significant adverse effects of Cry34/35Ab1 proteins on the abundance of non-target beneficial organisms in any population in the field, whether they are pest parasites, pest predators, or pollinators. Field testing and field census data submitted to the Agency show minimal to undetectable changes in the beneficial insect abundance or diversity. To date, available field test data show that compared to crops treated with conventional chemical pesticides, the transgenic crops have no detrimental effect on the abundance of non-target insect populations.

The Agency believes that cultivation of Event DAS-59122-7 corn may result in fewer adverse impacts to non-target organisms than result from the use of chemical pesticides. Under normal circumstances, Event DAS-59122-7 corn requires substantially fewer applications of chemical pesticides. This should result in fewer adverse impacts to non-target organisms because application of nonspecific conventional chemical pesticides is known to have an adverse effect on non-target beneficial organisms found living in the complex environment of an agricultural field. Many of these beneficial organisms are important integrated pest management controls (IPM) for secondary pests such as aphids and leafhoppers. The overall result of cultivation of corn expressing Cry34/35Ab1 proteins is that the number of chemical insecticide applications for non-target pest control is reduced for management of multiple pest problems.

The movement of transgenes from Cry34/35Ab1 host plants into weeds and other crops has also been considered. The Agency has determined that there is no significant risk of gene capture and

expression of Cry34/35Ab1 protein by wild or weedy relatives of corn in the U.S., its possessions, or territories. The fate of Cry34/35Ab1 protein in soils and indirect effects on soil biota have also been evaluated. Test data show that most of the Cry protein deposited into soil is quickly degraded, although a residual amount may persist in biologically active form for a much longer period of time. It is also reported that the same degree of Bt Cry protein persistence takes place in soils that have been exposed to repeat Bt spray applications when compared to soil exposed to growing Bt crop. Limited data do not indicate that Cry proteins have any measurable effect on microbial populations in the soil. Horizontal transfer of genes from transgenic plants to soil bacteria has not been demonstrated. Published studies of Bt Cry protein in soil show no effect on bacteria, actinomycetes, fungi, protozoa, algae, nematodes, springtails or earthworms. In addition, new plants planted in Bt Cry protein containing soil do not take up the Bt protein.

The Agency finds no hazard to the environment at the present time from cultivation of Event DAS-59122-7 corn for a time-limited registration.

Insect Resistance Management

Dow and Pioneer proposed a Cry34/35 Event 59122-7 corn durability plan has the following elements: 1) structured refuge, 2) resistance monitoring, 3) remedial action plan, and 4) compliance and education. Simulation models were used to assist in evaluating and comparing structured refuge options. In order to reduce the possibility of corn rootworm developing resistance to Bt, EPA is requiring Mycogen and Pioneer to ensure that 20 percent of the planted acreage of this product be set aside where non-CRW-protected Bt corn will be grown to serve as a "refuge." These refuge areas will support populations of corn rootworm not exposed to the Bt bacterium. The insect populations in the refuges will help prevent resistance development when they mate with insects in the Bt fields. This resistance management strategy was developed as a condition of the registration, and EPA will require routine monitoring and documentation that these measures are followed. The submitted insect resistance management data support a 5-year registration until 2010.

Benefits

In assessing the potential benefits from Event DAS-59122-7 corn, EPA compared the efficacy of Event DAS-59122-7 corn to other chemical controls for CRW, evaluated the human health and environmental benefits compared to registered alternatives, estimated the grower benefits, and estimated the chemical pesticide use reduction from adoption of Event DAS-59122-7 corn. EPA made a determination that the registration of Event DAS-59122-7 corn was in the public interest and that the benefits outweigh the risks.

Cry34/35Ab1-protected corn provides effective control of key rootworm pests of field corn and may prove more efficacious than chemical insecticides presently registered for this purpose.

Economic models suggest that, under conditions of high rootworm pressure, use of Cry34/35Ab1-protected corn will provide greater net returns to farmers. Cost benefits include reduced expenditures on insecticides, application equipment, and personnel, complimented by greater potential corn yields. Under high rootworm pressure, these benefits are expected to outweigh the higher cost of seed.

Registration of Cry34/35Ab1-protected corn is expected to result in further reduction of chemical insecticide use by growers. This is of special importance since many pesticides registered for CRW control are highly toxic to humans and the environment, while Cry34/35Ab1 expressing corn poses no foreseeable human health or environmental risks.

Cry34/35Ab1 corn is the second CRW-protected corn PIP to be registered (the first was Cry3Bb1). The availability of multiple CRW-protected corn products will increase grower choice and price competition, resulting in lower seed prices for consumers and higher adoption rates.

The Cry34/35Ab1 CRW-protected corn will provide a different mode of action and extend the durability of other CRW control measures, including other Bt CRW-protected corn hybrids.

IV. Terms and Conditions of the Registration

1. The subject registrations will automatically expire on midnight September 30, 2010. Based on the Agency's review of the data submitted and cited in support of this application, the Agency anticipates at this time that an expiration date five years from the initial date of registration for this product would be appropriate.
2. The subject registrations 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.
3. Submit/cite all data required for registration of your product under FIFRA § 3(c)(5) when the Agency requires registrants of similar products to submit such data.
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.
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 registrants 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 registrants to develop, implement, and report to EPA on programs to educate growers about IRM requirements;
- d. Requirements for the registrants 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 registrants 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 registrants to develop, and if triggered, to implement a "remedial action plan" which would contain measures the registrants 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.

- 8. Refuge size. The use of Cry34/35 corn from event DAS 59122-7 requires an accompanying 20% refuge
- 9. Refuge location. The rootworm refuge is required to be planted within or adjacent (e.g. across the road) to the Cry34/35 corn field

10. 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

11. 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.

12. 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.

13. 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.

14. 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 either registrant 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.

15. 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.

16. 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.
17. 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.
18. 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

19. The registrants 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. The registrants shall coordinate their education programs with educational efforts of other registrants and other organizations, such as the National Corn Grower Association and state extension programs.
20. 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.

21. 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.
22. 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.
23. 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.
24. 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.
25. 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.

26. The survey shall be designed to obtain grower feedback on the usefulness of specific educational tools and initiatives.
27. 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.
28. 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.
29. 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.
30. 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, consistent with its "phased compliance approach."
31. 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.
32. Beginning January 31, 2007 and annually thereafter, The registrants 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.

33. 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 registrants 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.

34. The registrants 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.
35. The registrants 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.
36. You must finalize rootworm damage guidelines and submit these to BPPD by January 31, 2010.

37. The registrants must follow-up on grower, extension specialist or consultant reports of unexpected damage or control failures for corn rootworm.

38. The registrants 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 the registrants 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.

39. 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 registrants 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.

40. 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":

- . 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)

- a. 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;

- b. the ability to survive is heritable;

- c. Cry34/35Ab1 plant assays determine that damage caused by surviving insects would exceed economic thresholds

- d. if subsequent collections in the affected field area demonstrate similar bioassay results.

41. Response to Confirmed Resistance: When resistance is "confirmed", the following steps will be taken: EPA will receive notification within 30 days of confirming resistance

- . affected customers and extension agents will be notified about confirmed resistance;

- a. affected customers and extension agents will be encouraged to employ alternative CRW control measures;

- b. sale and distribution of Cry34/35Ab1 corn in the affected area will cease immediately

- c. 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.

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 Bt 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 Monitoring Development of diagnostic dose assay/high through-put screen
January 31, 2008

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

V. Additional Contact Information

Ombudsman, Biopesticides and Pollution Prevention Division (7511P)
Office of Pesticide Programs
Environmental Protection Agency
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Washington, D.C. 20460