

# Herculex™ XTRA Insect Protection

Active Ingredient:

*Bacillus thuringiensis* Cry1F protein and the genetic material necessary for its production (plasmid insert PHI8999; event TC1507) in corn .....0.000288 – 0.001740%\*\*

*Bacillus thuringiensis* Cry34Ab1 insecticidal crystal protein and the genetic material necessary for its production (plasmid insert PHP17662; event DAS-59122-7) in corn.....0.006480 – 0.016840%

*Bacillus thuringiensis* Cry35Ab1 insecticidal crystal protein and the genetic material necessary for its production (plasmid insert PHP17662; event DAS-59122-7) in corn.....0.001950 – 0.006760%

Inert Ingredient:

Substance produced by a marker gene and its controlling sequences in corn .....0.000003 – 0.001510%

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\*\*% total protein on a dry wt. basis as expressed in corn plant cells (whole plant)

**KEEP OUT OF REACH OF CHILDREN  
CAUTION**

EPA Reg. No. 68467-6

EPA Est. 029964-IA-001

Mycogen Seeds  
c/o Dow AgroSciences LLC  
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## 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 at midnight on midnight October 15, 2008.

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

Herculex XTRA combines the insect protection features of Herculex I and Herculex RW in the same corn hybrid (inbred). Herculex XTRA hybrids protect corn crops from leaf, stalk and ear damage caused by Lepidopteran corn pests such as the European corn borer, and root damage caused by corn rootworm larvae. In order to minimize the risk of the corn pests developing resistance to Herculex XTRA corn, an insect resistance management plan must be implemented.

Grower agreements will specify that growers must adhere to the refuge requirements that will be described in the Product Use Guide for Herculex XTRA corn or other applicable product use documents.

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

The use of Cry1F x Cry34/35Ab1 corn requires accompanying refuge corn for both the Cry1F and Cry34/35Ab1 components that meets the requirements of the individual traits, described below. The refuge for both traits may be combined by planting non-*Bt* corn as the refuge (see C below), or the refuge for each trait may be planted separately (see A. and B. below)

For the separate refuges, corn rootworm-resistant *Bt* corn (e.g., Herculex RW) may be planted in the lepidopteran refuge for the Cry1F component and lepidopteran-resistant *Bt* corn (e.g., Herculex I) may be planted in the corn rootworm refuge for the Cry34/35Ab1 component. Depending on cropping practices, pest problems, and pest management options employed on any given farm, growers may need to choose different refuge arrangements for different fields. Possible options include: two refuge blocks (one for rootworm, one for Lepidoptera) can be planted within one field, or strips can be used for either refuge. Alternatively, a block of Herculex RW corn can serve as an in-field lepidopteran refuge for one field planted to Cry1F X Cry34/35Ab1 and an external lepidopteran refuge for separate fields planted to Cry 1F X Cry34/35Ab1, while the rootworm refuge is planted as Herculex I corn in an external adjacent field. In all options, size and management of each individual refuge must be followed as described in A. and B. below.

Other refuge designs and combinations are permissible as long as in all cases the size and management of each refuge are described in A., B., and C., below.

### A. Lepidopteran refuge for the Cry1F component.

1. *Refuge size, Corn-Growing Areas* (= corn belt and other non corn/cotton-growing regions). The use of Cry1F x Cry34/35Ab1 corn requires an accompanying 20% refuge consisting of non-*Bt* corn or non-lepidopteran resistant *Bt* corn.
2. *Refuge size, (Corn/Cotton-growing areas)*. \* The use Cry1F x Cry34/35Ab1 corn requires an accompanying 50% refuge consisting of non-*Bt* corn or non-lepidopteran resistant *Bt* corn.
3. *Refuge location*.
  - The lepidopteran refuge can be planted in a separate field not more than ½ mile (1/4 mile preferred) of the Cry1F x Cry34/35Ab1 field.
  - The lepidopteran refuge can be planted within the Cry1F x Cry34/35Ab1 field as blocks (e.g. along the edges or headlands)

- The lepidopteran refuge can be planted within the Cry1F x Cry34/35Ab1 field as strips across the field at least four rows wide (six preferred)

4. *Refuge management.*

- Insecticide treatments for control of European corn borer, corn earworm, southwestern corn borer, fall armyworm, black cutworm, western bean cutworm, lesser corn stalk borer, sugarcane borer and southern corn stalk borer may be applied only if economic thresholds are reached for one or more of these target pests. Economic thresholds will be determined using methods recommended by local or regional professionals (e.g. Extension Service Agents, crop consultants). Microbial *Bt* insecticides must not be applied to lepidopteran resistant refuges.

\* Cotton growing areas consist of the following states Alabama, Arkansas, Georgia, Florida, Louisiana, North Carolina, Mississippi, South Carolina, Oklahoma (only the counties of Beckham, Caddo, Comanche, Custer, Greer, Harmon, Jackson, Kay, Kiowa, Tillman, Washita), Tennessee (only the counties of Carroll, Chester, Crockett, Dyer, Fayette, Franklin, Gibson, Hardeman, Hardin, Haywood, Lake, Lauderdale, Lincoln, Madison, Obion, Rutherford, Shelby, and Tipton), Texas (except the counties of Carson, Dallam, Hansford, Hartley, Hutchinson, Lipscomb, Moore, Ochiltree, Roberts, and Sherman), Virginia (only the counties of Dinwiddie, Franklin City, Greensville, Isle of Wight, Northampton, Southampton, Suffolk City, Surrey, Sussex) and Missouri (only the counties of Dunkin, New Madrid, Pemiscot, Scott, Stoddard).

B. Corn rootworm refuge for the Cry34/35Ab1 component.

1. *Refuge size.* The use of Cry1F x Cry34/35Ab1 corn requires an accompanying 20% refuge consisting of non-Bt corn or non-corn rootworm-resistant *Bt* corn.
2. *Refuge location.* The rootworm refuge is required to be planted within or adjacent (e.g. across the road) to the Cry1F x Cry34/35Ab1 corn field.
3. *Refuge management options.* The rootworm refuge can 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 rootworm 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 Cry1F x Cry34/35Ab1 and rootworm refuge corn are not permitted.
  - If the rootworm refuge is planted on rotated ground, then Cry1F x Cry34/35Ab1 corn must also be planted on rotated ground.
  - If the rootworm refuge is planted in continuous corn, the Cry1F x Cry34/35Ab1 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 rootworm refuge.
  - Seed treatment is permitted in the rootworm refuge, either at a rate for rootworm protection or at a rate for controlling secondary soil pests.
  - If aerial insecticides are applied to the rootworm refuge for control of CRW adults, the same treatment must also be applied in the same time-frame to Cry1F x Cry34/35Ab1 corn.
  - Pests other than adult corn rootworms can be treated on the rootworm refuge acres without treating the Cry1F x Cry34/35Ab1 acres only if treatment occurs when adult corn rootworms are not present or if a pesticide without activity against adult corn rootworms is used. Pests on the Cry1F x Cry34/35Ab1 acres can be treated as needed without having to treat the rootworm 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 rootworm refuge and Cry1F x Cry34/35Ab1 corn should be sown on the same day, 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.

C. For the combined refuge option (i.e. the lepidopteran refuge combined with the rootworm refuge by planting non-Bt corn), the refuge must be planted and managed such that it is consistent with the requirements of the two individual traits, as follows

1. *Refuge size* shall be 20% in corn-growing areas and 50% in cotton-growing areas (see list labeled with “ \* “ under A).
2. *Refuge location.* The combined refuge is required to be planted within or adjacent (e.g. across the road) to the Cry1F x Cry34/35Ab1 corn field.
3. *Refuge management options*
  - The in-field refuge options must be planted as a single block or as a series of strips measuring at least four (4) rows wide (six rows preferred).
  - Seed mixtures of Cry1F x Cry34/35Ab1 and refuge corn are not permitted.
  - If the combined refuge is planted on rotated ground, then the Cry1F x Cry34/35Ab1 corn must also be planted on rotated ground.
  - If the combined refuge is planted on continuous corn, the Cry1F x Cry34/35Ab1 field may be planted on either continuous or rotated land (option encouraged where WCRW rotation-resistant biotype may be present).
  - Application of soil insecticide for corn rootworm control is permitted in the combined refuge.
  - Seed treatment is permitted in the combined refuge, either at a rate for rootworm protection or at a rate for controlling secondary soil pests.
  - If aerial insecticides are applied to the combined refuge for control of CRW adults, the same treatment must also be applied in the same timeframe to Cry1F x Cry34/35Ab1 corn.
  - Insecticide treatments in the combined refuge for control of European corn borer, corn earworm, southwestern corn borer, fall armyworm, black cutworm, western bean cutworm, sugarcane borer, lesser corn stalk borer, or southern corn stalk borer may be applied only if economic thresholds are reached for one or more of these target pests. Economic thresholds will be determined using methods recommended by local or regional professionals (e.g. Extension Service Agents, crop consultants). These pests can be treated with CRW-labeled insecticide on the combined refuge acres without treating the Cry1F x Cry34/35Ab1 acres only if treatment occurs when adults corn rootworms are not present. Microbial *Bt* insecticides must not be applied to the common refuges.
  - Pests other than adult corn rootworms can be treated with CRW-labeled insecticide on the combined refuge acres without treating the Cry1F x Cry34/35Ab1 acres only if treatment occurs when adults corn rootworms are not present. Pests on the Cry1F x Cry34/35Ab1 acres can be treated as needed without having to treat the refuge.
  - The combined refuge can be planted to any corn hybrid that does not express PIPs for lepidopteran or rootworm control (i.e. herbicide tolerant corn or conventional corn).
  - The combined refuge and Cry1F x Cry34/35Ab1 corn should be sown on the same day, or with the shortest window possible between planting dates, to ensure that corn root development is similar among varieties.

**Use Pattern**

| <b>Crop</b> | <b>Pests</b>  |
|-------------|---|
| Field corn  | black cutworm<br>corn earworm<br>European corn borer<br>fall armyworm<br>Mexican corn rootworm<br>northern corn rootworm<br>southwestern corn borer<br>western bean cutworm<br>western corn rootworm<br>lesser corn stalk borer<br>southern corn stalk borer<br>sugarcane borer |

EPA Accepted: 10/27/05