524-606 7/10/2013 1/14

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, D.C. 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

JUL 10 2013

Diane Ruezinsky, Ph.D.
Regulatory Affairs Manager
Monsanto Company
1300 I Street, NW, Suite 450 East
Washington, DC 20005

Re: MON 89034 x MON 88017 Seed Blend
EPA Registration No. 524-606
Amendment to conditions of registration, label and csf
Amendment to extend expiration date of registration
Submissions dated 03/26/2013 and 6/28/2013
Decisions No. 477190 and 480704

Dear Dr. Ruezinsky:

The amendment referred to above, submitted in connection with registration under Section 3(c)(7)(A) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), is acceptable only as an extension to the current conditional, time-limited registration and provided that you comply with the updated terms and conditions as described in this letter.

1) The subject registration will automatically expire on midnight on September 30, 2015.

2) The subject registration will be limited to a field corn seed blend containing up to 90% MON 89034 x MON 88017 and a minimum of 10% non-*Bt* seed that when planted creates an interspersed refuge within the field.

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) Submit or cite all data required to support MON 89034 x MON 88017 plant-incorporated protectant products within the timeframes required by the terms and conditions of EPA Registration Number 524-576.

5) Submit an interim report providing the following data and information within one year and a final report within two years.

To address the potential for resistance development in European Corn Borer (ECB) and Southwestern Corn Borer (SWCB)

• Submit revised modeling incorporating the structural elements recommended by the SAP (explicit larval movement, switch from a frequency-based model to one including density dependent larval mortality, epistatic mechanisms for resistance in target pests), with separate analyses for SWCB and ECB. Monsanto must include non-uniform oviposition in the modeling for both ECB and SWCB, especially (but not only) for the second generation of adults, which will more likely lay eggs on *Bt* rather than on damaged (or crowded out) non-*Bt* refuge plants in seed blends.

• Submit biological research on adult movement (related to mating and movement from refuges), larval movement, larval feeding (i.e., selective feeding within corn ears or on pollen), survival of heterozygote genotypes on MON 89034 x MON 88017 (markers may need to be determined for heterozygotes), and the potential for epistatic mechanisms of resistance (particularly with older instars).

To address the potential for resistance development in Corn Earworm (CEW)

• CEW can have up to six generations per year in the southern U.S. and may be at greater risk for resistance in a seed blend environment. Submit CEW modeling for product durability that addresses the following concerns:

a. CEW will encounter a mosaic of *Bt* expression in kernels of refuge corn ear as well as in *Bt* corn ear. Seed blends containing *Bt* and non-*Bt* seeds may actually accelerate resistance in ear-feeding Lepidoptera including corn earworm and fall armyworm. *Bt* ingestion has shown to promote wandering in larvae, and individuals that receive a sublethal dose may move to another kernel. Horner et al. 2003 evaluated feeding patterns of CEW in MON810 and non-*Bt* maize and determined that larvae had greater movement on *Bt* ears and essentially sampled kernels at greater frequency than their counterparts who fed exclusively and in a more compact fashion on non-*Bt* corn ears. This ability to move to another source of kernel in this mosaic of toxins (lethal vs. sublethal) and also to a non-toxin environment will give heterozygous individuals a great fitness advantage: the functional dominance of the resistance allele will increase. (Porter 2011, personal communication)

b. Horner and Dively (2003) found that CEW exposed to Cry1Ab had reduced cannibalistic behavior which, they hypothesize, could serve as a mechanism to increase the selective differential between susceptible and resistant CEW and essentially lead to greater resistance evolution. (Cannibalistic behavior results "in partially resistant larvae feeding on nontoxic food [their fellow intoxicated larvae], thus temporarily providing escape from exposure to the *Bt* endotoxin.")

c. CEW development on *Bt* corn is delayed (Sims et al. 1996, Storer et al. 2001). This could enable a fraction of adult CEW to mate with CEW emerging from *Bt* cotton. Discretely breeding populations could become continuously breeding for part of the year in this scenario. This may be an important aspect to incorporate into IRM models of the south where corn and cotton are host plants of the same pest. Theoretical explorations are needed to assess effects of this delayed development on corn on the resistance evolution in CEW.

6) Implement the following Insect Resistance Management (IRM) Program for MON 89034 x MON 88017 Seed Blend:

a) **Refuge Requirements for MON 89034 x MON 88017 Seed Blend**

The following information must be included on the product bag or bag tag:

This product is a seed mixture containing MON 89034 x MON 88017 and a minimum of 10% non-Bt seed that when planted creates an interspersed refuge within the field. There are no requirements for a separate structured refuge for MON 89034 x MON 88017 Seed Blend corn when planted in the U.S. corn growing area, including Alaska and Hawaii, because the refuge seed is contained within the bag/container.

The interspersed refuge can only be used by planting seed corn specifically generated by qualified seed producers/conditioners licensed by the registrant. The seed producer must ensure a minimum of 10% non-PIP refuge seed included with the MON 89034 x MON 88017 in each lot of seed corn. The refuge seed in the seed mixture may not be treated with seed-applied insecticides for corn rootworm (CRW) control unless the MON 89034 x MON 88017 seed in the seed mixture receives an equivalent seed treatment for CRW control.

The seed mix refuge option for MON 89034 x MON 88017 Seed Blend satisfies the refuge requirements in all regions other than in the cotton-growing area where corn earworm is a significant pest as defined below.

Additional refuge requirements in the cotton growing area where corn earworm is a significant pest.

In the cotton-growing area where corn earworm is a significant pest, MON 89034 x MON 88017 Seed Blend requires the planting of an additional 20% structured refuge), i.e. 20 acres of *non-Bt* corn for every 80 acres of MON 89034 x MON 88017 Seed Blend planted).

The 20% refuge must be planted with corn hybrids that do not contain *Bt* technologies for the control of corn rootworms or corn borers. The refuge and the MON 89034 x MON 88017 Seed Blend 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. The structured refuge may be planted as an in-field or adjacent (e.g., across the road) refuge or planted as a separate block that is within *1/2* mile of the MON 89034 x MON 88017 Seed Blend field. In-field refuge options include blocks, perimeter strips (i.e., strips around the field), or in-field strips. If perimeter or in-field strips are implemented, the strips must be at least 4 consecutive rows wide.

The cotton-growing area requiring the additional 20% refuge consists of the following states: Alabama, Arkansas, Georgia, Florida, Louisiana, North Carolina, Mississippi, South Carolina, Oklahoma (only counties of Beckham, Caddo, Comanche, Custer, Greer, Harmon, Jackson, Kay, Kiowa, Tillman, and 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, and Sussex) and Missouri (only the counties of Dunklin, New Madrid, Pemiscot, Scott, and Stoddard). All other states and counties are considered to be in the corn-growing area where no structured refuge is required.

The following information must be included in the IRM Grower guide:

The refuge can be protected from lepidopteran damage by use of *non-Bt* insecticides if the population of one or more target pests of MON 89034 x MON 88017 Seed Blend in the refuge exceeds economic thresholds. In addition, the refuge can be protected from corn rootworm (CRW) damage by an appropriate seed treatment or

soil insecticide. Economic thresholds will be determined using methods recommended by local or regional professionals (e.g., Extension Service agents, crop consultants).

b) **Grower Agreement for MON 89034 x MON 88017 Seed Blend**

1) Monsanto must require that persons purchasing MON 89034 x MON 88017 Seed Blend corn sign a grower agreement. The term "grower agreement" refers to any grower purchase contract, license agreement, or similar legal document.

2) Monsanto's grower agreement and any specific stewardship documents referenced in the grower agreement must clearly set forth the terms of the current IRM program. Monsanto must write the grower agreement such that, by signing the grower agreement, a grower will be contractually bound to comply with the requirements of the IRM program.

3) Monsanto must implement a system (equivalent to that already approved for previously registered Monsanto *Bt* corn products) that is reasonably likely to assure that persons purchasing MON 89034 x MON 88017 Seed Blend corn will affirm annually that they are contractually bound to comply with the requirements of the IRM program.

4) Monsanto must continue to use a grower agreement for MON 89034 x MON 88017 Seed Blend corn. If Monsanto 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 by Monsanto of the provisions of the agreement relating to the IRM program, Monsanto must submit to EPA 30 days prior to implementing a proposed change the text of such changes to ensure that it is consistent with the terms and conditions of this registration.

5) Monsanto shall maintain records of all MON 89034 x MON 88017 Seed Blend corn grower agreements for a period of three years from December 31st of the year in which the agreement was signed.

6) Monsanto shall make available to the Agency upon request records of the number of units of MON 89034 × MON 88017 Seed Blend corn seed sold or shipped and not returned, and the number of such units that were sold to persons who have signed grower agreements for the previous growing season, within three months of the request.

7) Monsanto 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.

c) **IRM Education and IRM Compliance Monitoring Program for MON 89034 x MON 88017 Seed Blend**

1) Monsanto must design and implement a comprehensive, ongoing IRM education program designed to convey to MON 89034 x MON 88017 Seed Blend corn users the importance of complying with the IRM program. 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. The program shall involve at least one written communication annually to each MON 89034 x MON 88017 Seed Blend corn user separate from the grower technical guide. The communication shall inform the user of the current IRM requirements. Monsanto shall coordinate its education program with the educational efforts of other registrants and other organizations, such as the National Corn Growers Association and state extension programs.

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

3) Within three months of EPA request, Monsanto shall provide copies of grower education materials and information on grower education activities including any substantive changes to these materials and activities conducted either individually or as part of a report from the industry working group, Agricultural Biotechnology Stewardship Technical Committee (ABSTC).

4) Monsanto must submit use the existing compliance assurance program (CAP) for Monsanto's other Cry3Bb1 seed blend products.

5) Monsanto will continue to conduct and support grower education (e.g. corn clinics, certified crop advisor training, etc.) that demonstrates the economic and technology-preserving value of crop rotation as a best agronomic practice. Monsanto will submit to EPA a report with evidence of the 2012 grower education program (specifically including the number of education sessions/trainings held, locations, number of attendees, examples of presentation materials and grower survey results if available) by July 31, 2013. For the following seasons, Monsanto will submit a similar report upon the request of the agency within three months of the request.

d) Insect Resistance Monitoring and Remedial Action Plans for MON 89034 x MON 88017 Seed Blend

Existing programs for resistance monitoring and remedial action for lepidopteran target pests (e.g. European corn Borer, corn earworm, southwestern corn borer) required for SmartStax RIB (EPA Registration No. 524-595) are applicable and are required for MON 89034 x MON 88017 Seed Blend corn.

Corn Rootworm (CRW) insect resistance monitoring for MON 89034 x MON 88017 are as follows:

i. Monsanto must monitor for Cry3Bb1 resistance and/or trends in increased tolerance for corn rootworm utilizing the current corn rootworm resistance monitoring plan for MON 89034 x MON 88017. Sampling should be focused in those areas in which there is the highest risk of resistance development.

ii. The resistance monitoring plan must include the following: baseline sensitivity data, sampling (number of locations, samples per locations), sampling methodology and life stage sampled, bioassay methodology, standardization procedures (including quality assurance/quality control provisions), detection technique and sensitivity, statistical analysis of the probability of detecting resistance, and a revised description of rootworm damage guidelines.

iii. Monsanto must develop and utilize a functional "on-plant" diagnostic assay[1] for corn rootworm resistance monitoring to detect potentially resistant individuals and incorporate this assay into the annual resistance monitoring program.

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[1] Examples of on-plant bioassays include:
Nowatzki T, Lefko SA, Binning RR, Thompson SD, Spencer TA, Siegfried BD. 2008. Validation of a novel resistance monitoring technique for corn rootworm (Coleoptera: Chrysomelidae) and event DAS-59122-7 maize. *J. Appl. Entomol.* 132:177–188 and
Gassmann A.J., J.L. Petzold-Maxwell, R.S. Keweshan, and M.W. Dunbar, 2011. Field-evolved resistance to *Bt* maize by western corn rootworm. *PLOS one*, Vol. 6 (7): 1-7.

iv. Monsanto must work to develop a proactive resistance monitoring program for northern corn rootworm (*Diabrotica barberi*). This program should include a proposal for annual sampling and testing of northern corn rootworm susceptibility to Cry3Bb1. As part of the effort, Monsanto may need to investigate novel techniques for rearing and conducting bioassays with northern corn rootworm. A report on Monsanto's progress towards this requirement must be included in the annual resistance monitoring report to EPA.

v. Monsanto must follow-up on grower, extension specialist, or consultant reports of unexpected damage or control failures for corn rootworm (as described in section *(a)* below).

vi. Monsanto must provide EPA with a resistance monitoring report on or before August 31st of each year, reporting on populations collected the previous year.

(a) Investigation of Reports of Unexpected Levels of Damage by Corn Rootworm (CRW): Performance Inquiries

a) Investigation

Monsanto is required to investigate "performance inquiries" (i.e., reports of unexpected corn rootworm damage to MON 89034 x MON 88017 Seed Blend corn) from growers. Fields with unexpected damage that meet both of the criteria below must be subjected to the follow-up actions described in section b) below:

1. The affected plants are confirmed to be MON 89034 x MON 88017 Seed Blend plants and not to be adjacent to a refuge plant; **and**

2. Corn rootworm feeding caused root damage with the Node Injury Scale (NIS) > 1.0 on at least 50% of plants sampled.

b) Follow-up actions (performance inquiries)

For MON 89034 x MON 88017 Seed Blend fields meeting the criteria in part a) above, Monsanto must take the following actions:

- Take leaf samples to determine the presence of the *Bt* protein.

- Collect at least 250 (ideally 500 or more) CRW adult individuals from field in question. Collected populations must be subjected to the steps described for "investigation of populations of concern" (section *(b)* below).

- Visit affected farm or field the following year (assuming repurchase) and attempt to collect corn rootworm adults, if collections are unsuccessful.

- Review with the grower their CRW management practices and provide CRW management recommendations. Options include, but are not limited to the following:

- Rotation to non-host crop
- Use of pyramided products
- Use of additional corn rootworm control tools (e.g., soil insecticides, seed-applied insecticides, chemigation)
- Use of an alternative corn rootworm-active plant incorporated protectant

- Include information on unexpected damage reports in its annual CRW monitoring submission to EPA.

(b) Investigation of Populations of Concern:

Monsanto must conduct investigations of all CRW populations collected as part of the performance inquiry process in section ***(a)*** above. A CRW population will be considered resistant to Cry3Bb1 if the following criteria are met and additional collections and testing are not deemed to be necessary (see below):

1. An initial performance inquiry investigation results in a finding of Unexpected Damage; **and**
2. Where green tissues are available and plants are unusually stressed, *Bt* protein levels in affected plants are found to be within the documented range for that hybrid (if data are available); **and**
3. Single, on-plant bioassays of insect collections from the affected fields show the following:
   - A statistically significant difference in measures of either lethality/mortality or sublethal effects (growth/development) between the field population and the control population on *Bt* corn **and**
   - A lack of a statistically significant difference in the same measures of the field population raised on *Bt* corn and non-*Bt* corn plants.

Mitigation, as detailed in section *(c)* below, is required for any CRW population/ MON 89034 x MON 88017 Seed Blend field that meets the above resistance criteria, unless the circumstances described below are applicable.

To minimize the potential for incorrectly reaching a conclusion of resistance, another year of CRW adult collections and additional testing would be needed to determine resistance if:

- The results of the single, on-plant bioassays are inconclusive (e.g., the results of the statistical analysis are unclear because of low sample sizes) or
- Another reasonable explanation for the unexpected damage exists (e.g., high pest pressure and/or high plant stress).

In these cases, Monsanto and EPA will discuss and align on next steps before any resistance conclusion is reached.

If CRW collections are not possible in the current year or subsequent years due to successful management practices, then no further investigation is needed. The population would be considered "mitigated" meaning, in

this case, that the population is suppressed or extirpated in this location. However, EPA recommends that Monsanto continue to be vigilant in areas where CRW populations were successfully mitigated.

(c) Mitigation of Resistant CRW Populations

For any CRW population found to be resistant under the criteria described in section ***(b)*** above, Monsanto must take the following steps:

- Monsanto must inform EPA of the results of the on-plant bioassays as soon as possible, but at least within 30 days if measures appear to be triggered

- Resistance may affect a single field, multiple fields in a localized area, or affect fields across larger areas. The geographic extent of resistance will be determined based upon product performance in surrounding areas, using information available from follow-up investigations of other performance inquiries in the area. Additional rootworm population collections and bioassays may be conducted to establish the geographic scope of confirmed resistance. These investigations will determine the Remedial Action Zone. Because this enhanced resistance monitoring program is designed to be highly responsive to changes in product performance and to implement protective measures even in the absence of confirmed resistance, it is expected that resistant populations will be limited in geographic scope and size at the time of confirmation.

- In situations where Resistance is confirmed, the product is expected to no longer reliably provide economic levels of control of corn rootworm populations. Upon confirmation of resistance, stakeholders in the Remedial Action Zone, including customers, extension agents and crop consultants and other registrants, as appropriate, will be informed so that best management practices can be followed. Management of resistant populations in the Remedial Action Zone will involve the integration of multiple pest management practices (i.e. "IPM") that are already used in the absence of the product, such as:

    - crop rotation,

    - pyramided products,

    - pest population monitoring,

    - soil-applied and seed-applied insecticides,

    - insecticides to control corn rootworm adults, and

    - alternative corn rootworm-active traits.

- The goal of the resistant corn rootworm management program will be to manage the rootworm population economically while reducing the probability or rate that the resistant population spreads to surrounding areas. Depending on the characteristics of the resistant population, the product may or may not fit within the management program. For example, if the level of rootworm survival on the product conferred by resistance is low (e.g., if resistant insects still show reduced fitness on the product), then continued use of the product in combination with other pest management tools may be an effective approach for reducing the local population. On the other hand, if the level of corn rootworm survival on the product that is conferred by resistance is high, the product would not be expected to contribute significantly to population reduction and ceasing its use in the Remedial Action Zone may allow the population to return to susceptibility.

- Research will be conducted to understand the resistance, with the intention of using information generated to refine the management program. Such research may include characterizing the genetics of resistance (e.g., number of genes, functional dominance, mechanism of resistance, and cross-resistance) and the biology of resistant insects (e.g., fitness in the presence and absence of the product, and other control tactics).

- The corn rootworm population in the Remedial Action Zone will continue to be monitored annually for reversion to susceptibility. This monitoring may include continued investigation into product performance as well as sampling and bioassays of the local corn rootworm population. If population susceptibility returns to baseline levels, the remedial actions can be lifted and growers can resume the use of the product as a primary tool for corn rootworm management.

e) **Annual Reporting Requirements for MON 89034 x MON 88017 Seed Blend**

Monsanto must submit to the Agency by January 31st of each year, beginning in 2014 (except where otherwise specified), the following information:

(1) Compliance Assurance Program: compliance assurance program activities, including IRM Grower Survey and on-farm assessment results, for the prior year and plans for the compliance assurance program for the current year on or before January 31st of each year;

2) Insect Resistance Monitoring Results: results of monitoring and investigations of damage reports, by August 31st of each year, beginning in 2014.

f) **Refuge Assurance Program for MON 89034 x MON 88017 Seed Blend**

Monsanto and Monsanto's seed company licensees must continue to implement a blended seed refuge assurance program designed to ensure MON 89034 x MON 88017 Seed Blend corn products are formulated with the appropriate rate of refuge seeds.

The program must include the following four elements:

1. Trait purity check on seed lots prior to blending (Monsanto and Monsanto Licensees);

2. Standard Operating Procedures for the blending process;

3. Calibration of blending equipment; and

4. Records and data retention records for seed blend products, as follows:

• Calibration records - Monsanto and Monsanto's Licensees will retain documentation for three (3) years on the equipment calibration including the procedure, when it was conducted and the results.

• Blend proportion records (weight and kernel based) -- Monsanto and Monsanto Licensees will retain documentation for three (3) years on the kernel per pound data of the components, the calculations to determine the proportions based on weight and the actual weights that are blended together to make up an MON 89034 x MON 88017 Seed Blend seed blend corn product by seed lot. All records must be maintained at the Monsanto and Monsanto Licensees blending facility and must be available for the EPA review upon request.

Should Monsanto or Monsanto's Licensees be notified by the USDA/AMS or State Seed Control Officials that your seed blend products have been found to have a lower percentage of the refuge component than is represented on the label, they must notify EPA within 30 days. This would constitute information reportable under FIFRA section 6(a)(2).

If these conditions are not complied with, the registration will be subject to cancellation in accordance with FIFRA section 6(e).

The basic confidential statement of formula (CSF) dated 7/3/13 is acceptable and supersedes all previous basic CSFs. A copy has been placed in the file jacket for this registration.

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

Sincerely,

Kimberly Nesci, Chief
Microbial Pesticides Branch
Biopesticides and Pollution
Prevention Division (7511P)

Enclosure

11/14

Plant-Incorporated Protectant Label

MON 89034 × MON 88017 Seed Blend

Insect-Protected, Herbicide-Tolerant Corn

(Alternate Brand Name: Genuity® VT Triple PRO® RIB Complete®) ‡

(OECD Unique Identifier: MON-89Ø34-3 × MON 88Ø17-3)

Active Ingredients:

Bacillus thuringiensis Cry1A.105 protein and the genetic material necessary for its production (Vector PV-ZMIR245) in MON 89034 × MON 88017 corn (OECD Unique Identifier: MON-89Ø34-3 × MON-88Ø17-3) ..... ≤0.0024%*

Bacillus thuringiensis Cry2Ab2 protein and the genetic material necessary for its production (Vector PV-ZMIR245) in MON 89034 × MON 88017 corn (OECD Unique Identifier: MON-89Ø34-3 × MON-88Ø17-3) ..... ≤0.0057%*

Bacillus thuringiensis Cry3Bb1 protein and the genetic material necessary for its production (Vector PV-ZMIR39) in MON 89034 × MON 88017 corn (OECD Unique Identifier: MON-89Ø34-3 × MON-88Ø17-3) ..... ≤0.0070%*

Other Ingredients:

CP4 EPSPS protein (5-enolpyruvylshikimate-3-phosphate synthase) and the genetic material necessary for its production (Vector PV-ZMIR39) in MON 89034 × MON 88017 corn (OECD Unique Identifier: MON-89Ø34-3 × MON-88Ø17-3) ..... ≤0.0069%*

*Percentage (wt/wt) on a dry weight basis whole plant (forage)

‡ MON 89034 x MON 88017 Seed Blend with this refuge configuration contains up to 90% MON 89034 × MON 88017 mixed with at least 10% non-*Bt* corn within a single lot of seed.

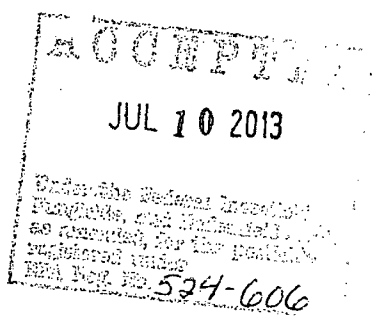
KEEP OUT OF REACH OF CHILDREN

CAUTION

EPA Registration No. 524-606
EPA Establishment No. 524-MO-002

Monsanto Company
800 North Lindbergh Blvd.
St Louis, MO 63167

NET CONTENTS:_____



DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling. This product must be used as specified in the terms and conditions of the registration.

MON 89034 × MON 88017 Seed Blend protects corn crops from leaf, stalk, and ear damage caused by lepidopteran corn pests listed on this label and root damage caused by corn rootworm larvae listed on this label. In order to minimize the risk of these pests developing resistance to MON 89034 × MON 88017 Seed Blend corn, an insect resistance management plan must be implemented as defined in the registration terms and conditions.

Grower agreements will specify that growers must adhere to the refuge requirements that will be described on the bag or bag-tag for MON 89034 × MON 88017 Seed Blend corn or other applicable product use documents.

Sales of corn hybrids that contain Monsanto's *Bt* corn plant-incorporated protectants must be accompanied by information on planting, production, and insect resistance management. This information may appear on either an IRM/Grower Guide or on the corn seed bag or bag tag.

Corn seed bags or bag tags for products containing MON 89034 × MON 88017 Seed Blend must include the refuge requirement.

INSECT RESISTANCE MANAGEMENT

Growers are instructed to read information on insect resistance management in the IRM Grower Guide or the bag or bag-tag.

The seed producer must ensure a minimum of 10% non-*Bt* refuge seed is included with the MON 89034 × MON 88017 in each lot of seed corn.

The IRM Grower Guide for MON 89034 × MON 88017 Seed Blend, and comparable information presented on the product bag or bag-tag, must contain the following information:

This product is a seed mixture containing up to 90% MON 89034 × MON 88017 and a minimum of 10% non-*Bt* seed that when planted creates an interspersed refuge within the field. The interspersed refuge can only be used by planting seed corn specifically generated by qualified seed producers/conditioners licensed by the registrant. The refuge seed in the seed mixture may not be treated with seed-applied insecticides for corn rootworm (CRW) control unless the MON 89034 × MON 88017 seed in the seed mixture receives an equivalent seed treatment for CRW control.

The seed mix refuge option for MON 89034 × MON 88017 Seed Blend satisfies the refuge requirements in all areas other than in the cotton-growing area where corn earworm is a significant pest as defined below.

Additional refuge requirements in the cotton-growing area where corn earworm is a significant pest

In the cotton-growing area where corn earworm is a significant pest, as defined below, MON 89034 × MON 88017 Seed Blend requires the planting of an additional 20% structured refuge (i.e. 20 acres of non-*Bt* corn for every 80 acres of MON 89034 × MON 88017 Seed Blend planted).

The 20% refuge must be planted with corn hybrids that do not contain *Bt* technologies for the control of corn rootworms or corn borers.

The 20% refuge and the MON 89034 × MON 88017 Seed Blend 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.

The 20% refuge may be planted as an in-field or adjacent (e.g., across the road) refuge or planted as a separate block that is within ½ mile of the MON 89034 × MON 88017 Seed Blend field. In-field refuge options include blocks, perimeter strips (i.e., strips around the field), or in-field strips. If perimeter or in-field strips are implemented, the strips must be at least 4 consecutive rows wide. The refuge can be protected from lepidopteran damage by use of non-*Bt* insecticides if the population of one or more target pests of MON 89034 × MON 88017 Seed Blend in the refuge exceeds economic thresholds. In addition, the refuge can be protected from CRW damage by an appropriate seed treatment or soil insecticide. Economic thresholds will be determined using methods recommended by local or regional professionals (e.g., Extension Service agents, crop consultants).

The cotton-growing area requiring the additional 20% refuge consists 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, and 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, and Sussex) and Missouri (only the counties of Dunklin, New Madrid, Pemiscot, Scott, and Stoddard).

Corn Insects Controlled

European corn borer (ECB)	*Ostrinia nubilalis*
Southwestern corn borer (SWCB)	*Diatraea grandiosella*
Southern cornstalk borer (SCSB)	*Diatraea crambidoides*
Corn earworm (CEW)	*Helicoverpa zea*
Fall armyworm (FAW)	*Spodoptera frugiperda*
Stalk borer	*Papaipema nebris*
Lesser corn stalk borer	*Elasmopalpus lignosellus*
Sugarcane borer (SCB)	*Diatraea saccharalis*
Western corn rootworm (WCRW)	*Diabrotica virgifera virgifera*
Northern corn rootworm (NCRW)	*Diabrotica barberi*
Mexican corn rootworm (MCRW)	*Diabrotica virgifera zeae*

MON 89034 × MON 88017 Seed Blend is a product of Monsanto's research program, offering unique genetic characteristics for specific grower needs and may be protected by one or more of the following U.S. patents: 5717084, 5728925, 6025545, 6051753, 6063597, 6083878, 6489542, 6645497, 6713063, 6825400, 6962705, 7064249, 7070982, 7250501, 7304206, 7544862, 7582434, 7618942, 7700830, 7927598, 8034997, 8212113, and 78273959.

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