

67979-9

5/25/2010

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



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

EPA Reg. Number: 67979-9
Date of Issuance: MAY 25 2010

Term of Issuance: Conditional, Time-Limited

Name of Pesticide Product: COT102 x COT67B (VipCot) Cotton

NOTICE OF PESTICIDE:
 Registration
 Reregistration (under FIFRA, as amended)

Name and Address of Registrant (include ZIP Code):

Syngenta Seeds, Inc.
P.O. Box 12257
3054 East Cornwallis Road
Research Triangle Park, NC 27709

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 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 comply with the following terms and conditions.

- I. The subject registration, if approved, will automatically expire at midnight on September 30, 2011.
- II. 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.

Continued on page 2

Signature of Approving Official:

WMM

W. Michael McDavit, Acting Director, Biopesticides and Pollution Prevention Division (7511P)

Date:

MAY 25 2010

EPA Form 8570-6

CONCURRENCES

SYMBOL	7511P	7511P				
SURNAME	GROSS	<i>Gross</i>				
DATE	5/24/10	5/24/10				

III. Gene Flow

- A. The following information regarding commercial production must be included in the grower guide for VipCot Cotton:
 - 1. No planting of VipCot cotton is permitted south of Route 60 (near Tampa) in Florida.
 - 2. Commercial planting of VipCot cotton is prohibited in Hawaii, Puerto Rico, and the U.S. Virgin Islands.

- B. The following information regarding test plots and seed production must occur on bags of VipCot cotton intended for these purposes:
 - 1. Test plots or breeding nurseries, regardless of plot size, established in Hawaii must not be planted within 3 miles of *Gossypium tomentosum*.
 - 2. Experimental plots and breeding nurseries of VipCot cotton are prohibited on the U.S. Virgin Islands, and
 - 3. Test plots or breeding nurseries, regardless of plot size, established on the island of Puerto Rico must not be planted within 3 miles of feral cotton plants.

- C. Upon approval by EPA, test plots and/or breeding nurseries in Hawaii, the U.S. Virgin Islands, and Puerto Rico may be established without restrictions if alternative measures, such as insecticide applications, are shown to effectively mitigate gene flow.

IV. Insect Resistance Management

- A. VipCot *Bt* cotton is not permitted to be planted in the following counties of the Texas panhandle: Dallam, Sherman, Hansford, Ochiltree, Lipscomb, Hartley, Moore, Hutchinson, Roberts, and Carson.

- B. The required IRM program for VipCot cotton must have the following elements:
 - 1. Requirements relating to creation of a non-*Bt* cotton refuge in conjunction with the planting of any acreage of VipCot cotton in the states of Arizona, California, and New Mexico and in the following Texas counties: Brewster, Crane, Crockett, Culberson, El Paso, Hudspeth, Jeff Davis, Loving, Pecos, Presidio, Reeves, Terrell, Val Verde, Ward, and Winkler;
 - 2. Requirements for Syngenta to prepare and require VipCot cotton users to sign "grower agreements" which impose binding contractual obligations on the grower to comply with the refuge requirements;
 - 3. Requirements for Syngenta to develop, implement, and report to EPA on programs to educate growers about IRM requirements;
 - 4. Requirements for Syngenta to develop, implement, and report to EPA on programs to evaluate and promote growers' compliance with IRM requirements in the states of Arizona, California, and New Mexico and in the following Texas counties: Brewster, Crane, Crockett, Culberson, El Paso, Hudspeth, Jeff Davis, Loving,

Pecos, Presidio, Reeves, Terrell, Val Verde, Ward, and Winkler;

- 5. Requirements for Syngenta to develop, implement, and report to EPA on programs to evaluate whether there are statistically significant and biologically relevant changes in susceptibility to the Vip3Aa19 and modified Cry1Ab proteins in the target insects;
- 6. Requirements for Syngenta to develop, and if triggered, to implement a “remedial action plan” which would contain measures Syngenta would take in the event that any insect resistance was detected as well as to report on activity under the plan to EPA.
- 7. Annual reports on or before January 31st of each year.

C. Refuge Requirements for Pink Bollworm Resistance Management only in the states of Arizona, California, and New Mexico and in the following Texas counties: Brewster, Crane, Crockett, Culberson, El Paso, Hudspeth, Jeff Davis, Loving, Pecos, Presidio, Reeves, Terrell, Val Verde, Ward, and Winkler.

All growers of VipCot cotton must employ one of the following structured refuge options:

1. External, Unsprayed Refuge

Ensure that at least 5 acres of non-*Bt* cotton (refuge cotton) is planted for every 95 acres of VipCot cotton. The size of the refuge must be at least 150 feet wide, but preferably 300 feet wide. This refuge may not be treated with sterile insects, pheromone, or any insecticide (except listed below) labeled for the control of tobacco budworm, cotton bollworm, or pink bollworm. At the pre-squaring cotton stage only, the refuge may be treated with any lepidopteran insecticide to control foliage feeding caterpillars. The refuge may be treated with acephate or methyl parathion at rates which will not control tobacco budworm or the cotton bollworm (equal to or less than 0.5 lbs active ingredient per acre). The variety of cotton planted in the refuge must be comparable to VipCot cotton, especially in the maturity date, and the refuge must be managed (e.g., planting time, use of fertilizer, weed control, irrigation, termination, and management of other pests) similarly to VipCot cotton. Ensure that a non-*Bt* cotton refuge is maintained within at least 1/2 linear mile (preferably adjacent to or within 1/4 mile or closer) from the *Bt* cotton fields.

2. External, Sprayed Refuge

Ensure that at least 20 acres of non-*Bt* cotton are planted as a refuge for every 80 acres of VipCot cotton (total of 100A). The variety of cotton planted in the refuge must be comparable to *Bt* cotton, especially in the maturity date, and the refuge must be managed (e.g., planting time, use of fertilizer, weed control, irrigation, termination, and management of other pests) similarly to VipCot cotton. The non-*Bt* cotton may be treated with sterile insects, insecticides (excluding foliar *Bt kurstaki* products), or pheromones labeled for control of the tobacco budworm, cotton bollworm, or pink bollworm. Ensure that a non-*Bt* refuge is maintained within at least 1 linear mile (preferably within 1/2 mile or closer) from the *Bt* cotton

fields.

3. Embedded Refuge (for pink bollworm only)

Refuge cotton must be planted as at least one single non-*Bt* cotton row for every six to ten rows of VipCot cotton. The refuge may be treated with sterile insects, any insecticide (excluding foliar *Bt kurstaki* products), or pheromone labeled for the control of pink bollworm whenever the entire field is treated. The in-field refuge rows may not be treated independently of the surrounding *Bt* cotton field in which it is embedded. The refuge must be managed (fertilizer, weed control, etc.) identically to the VipCot cotton. There is no field unit option.

D. Natural Refuge Requirements for Tobacco Budworm and Cotton Bollworm Resistance Management only in the states of Alabama, Arkansas, Florida, Georgia, Kansas, Kentucky, Louisiana, Maryland, Missouri, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas (excluding the following counties: Brewster, Crane, Crockett, Culberson, El Paso, Hudspeth, Jeff Davis, Loving, Pecos, Presidio, Reeves, Terrell, Val Verde, Ward, and Winkler), and Virginia.

1. Syngenta Seeds, Inc. must submit data to EPA by January 31, 2012, and every five years thereafter, to support an EPA reassessment of the natural refuge and to confirm its effectiveness with tobacco budworm and cotton bollworm. The data must include: resistance monitoring data, cropping pattern analysis, and simulation modeling to reexamine levels of effective refuge in the states of Alabama, Arkansas, Florida, Georgia, Kansas, Kentucky, Louisiana, Maryland, Missouri, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. Both cropping and land use patterns can change over time, which could have an impact on the amount of natural refuge available to tobacco budworm and cotton bollworm relative to cotton. If, based on this reassessment, EPA determines that additional tobacco budworm and/or cotton bollworm sampling, gossypol analysis, statistical analysis, and simulation modeling are needed to justify continuation of the natural refuge, Syngenta must submit these data within the EPA requested timeframe. If EPA's assessment concludes that the natural refuge is no longer scientifically supported, Syngenta agrees to submit an application to amend the registration to restore the structure refuge requirements previously required for tobacco budworm and cotton bollworm uses.

E. Grower Agreements

The following provisions regarding grower agreements are required for VipCot:

1. Persons purchasing the VipCot cotton 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. Syngenta must continue to implement a system which is reasonably likely to assure that persons purchasing the *Bt* cotton product will affirm annually that they are contractually bound to comply with the requirements of the IRM program.
- 4. Syngenta must use an approved grower agreement and must submit to EPA within 90 days from the date of registration a copy of that agreement and any specific stewardship documents referenced in the grower agreement. If Syngenta wishes to change any part of 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, Syngenta must submit to EPA the text of such changes to ensure the agreement is consistent with the terms and conditions of this registration.
- 5. Syngenta Seeds must continue to implement an approved system which is reasonably likely to assure that persons purchasing VipCot cotton sign grower agreement(s).
- 6. Syngenta shall maintain records of all VipCot cotton grower agreements for a period of three years from December 31 of the year in which the agreement was signed.
- 7. Beginning on January 31, 2011 and annually thereafter, Syngenta shall provide EPA with a report on the number of units of the VipCot cotton seed 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 October through September.
- 8. Syngenta 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 the names, personal information, and grower license number will be kept as confidential business information.

F. IRM Education and IRM Compliance Monitoring Programs

Syngenta must implement the following IRM education and compliance monitoring programs:

- 1. Syngenta must design and implement a comprehensive, ongoing IRM education program designed to convey to VipCot cotton users the importance of complying with the IRM program. The program shall include information encouraging *Bt* cotton users to pursue optional elements of the IRM program relating to refuge configuration and proximity to *Bt* cotton fields. The education program shall involve the use of multiple media, e.g. face-to-face meetings, mailing written materials, and electronic communications such as by internet or television commercials. Copies of the materials, including the Grower Guide or other technical bulletins, must be submitted to EPA for their records. The program shall involve at least one written communication annually to each VipCot cotton grower separate from the grower agreement. Syngenta shall coordinate its education

program with the educational efforts of other organizations, such as the National Cotton Council and state extension programs.

2. Annually, Syngenta shall revise, and expand as necessary, its education program to take into account the information collected through the compliance survey required under paragraph 6 below and from other sources. The changes shall address aspects of grower compliance that are not sufficiently high.
3. Beginning January 31, 2011 and annually thereafter, Syngenta shall provide a report to EPA summarizing the activities it carried out under its education program for the prior year and its plans for its education program during the current year.
4. Syngenta shall continue to implement an ongoing IRM compliance assurance program in the states of Arizona, California, and New Mexico and in the following Texas counties: Brewster, Crane, Crockett, Culberson, El Paso, Hudspeth, Jeff Davis, Loving, Pecos, Presidio, Reeves, Terrell, Val Verde, Ward, and Winkler. The program is designed to evaluate the extent to which growers are complying with the IRM program and to which Syngenta 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 VipCot cotton. Other required features of the program are described in paragraphs 5 - 12 below.
5. Syngenta shall establish and publicize a "phased compliance approach," i.e., a guidance document that indicates how Syngenta 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 VipCot cotton 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 purchase of the product the next year.
6. The IRM compliance assurance program shall include an annual survey of a statistically representative sample of VipCot cotton growers conducted by an independent third party. 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. Syngenta shall provide a written summary of the results of the prior year's survey to EPA by January 31st of each year. Syngenta Seeds shall confer with EPA on the design and content of the survey prior to its implementation.
7. Annually, Syngenta shall revise, and expand as necessary, its compliance assurance 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. Syngenta will confer with EPA prior to adopting any changes.
8. Syngenta must conduct an annual on-farm assessment program. Syngenta shall train its representatives who make on-farm visits with VipCot cotton growers to perform assessments of compliance with IRM requirements. In the event that any of these visits results in the identification of a grower who is not in compliance with the IRM program, Syngenta shall take appropriate action, consistent with its "phased compliance approach," to promote compliance.

9. Syngenta shall carry out a program for investigating “tips and complaints” that an individual grower or growers is/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, Syngenta shall take appropriate action, consistent with its “phased compliance approach.”
10. If a grower who purchases VipCot cotton for planting was specifically identified as not being in compliance during the previous year, Syngenta shall visit the grower and evaluate whether that the grower is in compliance with the IRM program for the current year.
11. Beginning January 31, 2011 and annually thereafter, Syngenta shall provide a report to EPA summarizing the activities it carried out under its compliance assurance program for the prior year and its plans for its compliance assurance program during the current year. Included in that report will be the percent of growers using each refuge option (or combination of options) by region, the approximate number or percent of growers visited on farm by Syngenta and the results of these visits, the number of tips investigated, the percent of growers not in compliance with each refuge option (both size and distance), and the follow-up actions taken.
12. Syngenta must allow a review of the compliance records by EPA or by a State pesticide regulatory agency if the State agency can demonstrate that the names, personal information, and grower license number of the growers will be kept as confidential business information.

G. Insect Resistance Monitoring.

The registration of Vip3Aa19 and modified Cry1Ab PIPs expressed in VipCot cotton is conditioned on Syngenta carrying out appropriate programs to detect the emergence of insect resistance as early as possible. Resistance monitoring programs include surveying insects for potential resistance and collection of information from growers about events that may indicate resistance. Syngenta should coordinate its monitoring efforts for VipCot with the current resistance monitoring programs for other registered *Bt* cotton products. The following resistance monitoring terms will be required for VipCot:

1. Syngenta must submit a revised VipCot cotton (Vip3Aa19 and modified Cry1Ab toxins) resistance monitoring plan for *Heliothis virescens* (tobacco budworm) *Helicoverpa zea* (cotton bollworm) to EPA by September 1, 2010. A revised resistance monitoring plan approved by EPA must be used beginning in the 2011 growing season. The monitoring program must include increased sampling for tobacco budworm and cotton bollworm in the areas that have the greatest variability and potentially lowest levels of effective natural refuge. Sampling efforts should include all of the “worst-case” counties identified in the 2004 to 2006 analyses of natural refuge in the states of Texas, Tennessee, Mississippi, Louisiana, Arkansas, Alabama, Georgia, and North Carolina. BPPD believes that resistance monitoring for tobacco budworm and cotton bollworm resistance to Vip3Aa19 and modified Cry1Ab will have added importance with adoption of a natural refuge as a resistance management strategy.

2. Syngenta will continue to develop and ensure the implementation of a plan for resistance monitoring for *Pectinophora gossypiella* (pink bollworm). The plan shall include provision for conducting annual studies to evaluate any potential change in susceptibility of pink bollworm population to Vip3Aa19 and modified Cry1Ab proteins. Collection sites must be focused in areas of high adoption, with the goal of including all states where pink bollworm is an economic pest.
3. The following testing scheme for survivors of the diagnostic or discriminating concentrations (or identified survivors of any resistance detection method) must be implemented: 1) Determine if the observed effect is heritable; 2) Determine if the increased tolerance can be observed in the field (i.e., survive on VipCot cotton plants); 3) Determine if the effect is due to resistance, 4) Determine the nature of resistance (dominant, recessive), 5) Determine the resistance allele frequency, 6) Determine, in subsequent years, whether the resistance allele frequency is increasing, and 7) Determine the geographic extent of the resistance allele (or alleles) distribution. Should the resistance allele frequency be increasing and spreading, a specific remedial action plan should be designed to mitigate the extent of *Bt* resistance. See Section H (“Remedial Action Plans”) below.
4. Syngenta must also follow up on grower, extension specialist or consultant reports of less than expected results or control failures (such as increases in damaged squares or bolls) for the target lepidopteran pests (*Heliothis virescens* (TBW) and *Helicoverpa zea* (CBW), *Pectinophora gossypiella* (PBW)) as well as for cabbage looper, soybean looper, saltmarsh caterpillar, black cutworm, fall armyworm, southern armyworm, and European corn borer. Syngenta will instruct its customers (growers and seed distributors) to contact them (e.g., via a toll free customer service number) if incidents of unexpected levels of tobacco budworm, cotton bollworm, or pink bollworm damage occur. Syngenta will investigate all damage reports. See Remedial Action Plans (Section H) below.
5. Syngenta must provide to EPA for review and approval any revisions to the tobacco budworm, cotton bollworm, and pink bollworm resistance monitoring plans prior to their implementation.
6. A report on results of resistance monitoring and investigations of damage reports must be submitted to the Agency annually by September 1st each year for the duration of the conditional registration.

H. Remedial Action Plans

Specific remedial action plans are required for VipCot cotton for the purpose of containing resistance and perhaps eliminating resistance if it develops. One remedial action plan is for the areas where pink bollworm is the predominate pest and the other is for the areas where tobacco budworm and cotton bollworm are the predominate pests.

1. Remedial Action Plan for Pink Bollworm

If resistance involves the pink bollworm (*Pectinophora gossypiella*), Syngenta must implement the Arizona *Bt* Cotton Working Group’s Remedial Action Plan.

Syngenta must obtain approval from EPA before modifying the Arizona *Bt* Cotton Working Group's Remedial Action Strategy. The Arizona *Bt* Cotton Working Group's Remedial Action Plan can be found in Enclosure 1.

2. Remedial Action Plan for Tobacco Budworm and Cotton Bollworm

If resistance involves the tobacco budworm (*Heliothis virescens*) and/or the cotton bollworm (*Helicoverpa zea*), Syngenta must implement a Remedial Action Plan approved by EPA. Once approved, Syngenta must obtain approval from EPA before modifying the Remedial Action Plan for tobacco budworm and cotton bollworm. This remedial action plan must include definitions of "suspected" and "confirmed" resistance and steps to take in the event of confirmed resistance. The plan should be based on the steps described in Syngenta's IRM submission, and include:

- a. Notifying the Agency within 30 days of resistance confirmation;
- b. Notifying affected customers and extension agents about confirmed resistance;
- c. Encouraging affected customers and extension agents to employ alternative lepidopteran control measures;
- d. Ceasing sale and distribution of VipCot cotton in affected area;
- e. Devising long-term resistance management action plan according to characteristics of resistance event and local agronomic needs.

V. Annual Reporting

The annual reporting requirements for VipCot are as follows:

- A. Annual Sales: reported and summed by state (county level data available by request), January 31st each year, beginning in 2011;
- B. Grower Agreements: 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 2011;
- C. Grower Education: substantive changes to education program completed previous year, January 31st each year, beginning in 2011;
- D. Compliance Assurance Plan: Compliance Assurance Program activities and results, January 31st each year, beginning in 2011;
- E. Compliance Survey Results: to include annual survey results and plans for the next year; full report January 31st each year, beginning in 2011;
- F. Insect Resistance Monitoring Results: results of monitoring and investigations of damage reports, September 1st each year, beginning in 2011.

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,



W. Michael McDavit, Acting Director
Biopesticides and Pollution Prevention Division
(7511P)

Enclosures

ACCEPTED

11/13

MAY 25 2010

Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide registered under EPA Reg. No. 67979-9

COT102 x COT67B Cotton Seed

(Alternate name: VipCot)

Plant-incorporated protectant:

Vip3Aa19 and modified Cry1Ab proteins for control of lepidopteran insects

This product is effective at controlling feeding damage by tobacco budworm, cotton bollworm, pink bollworm and other lepidopteran insects in cotton.

Active Ingredients:

Bacillus thuringiensis Vip3Aa19 protein and the genetic material necessary for its production (elements of vector pCOT1) in COT102 X COT67B cotton (OECD Unique Identifier: SYN-IR102-7).....0.001912 – 0.003570%*

Bacillus thuringiensis modified Cry1Ab protein and the genetic material necessary for its production (elements of vector pNOV4641) in COT102 X COT67B cotton (OECD Unique Identifier: SYN-IR67B-1).....0.002363 – 0.004068%*

Inert Ingredient:

A marker protein and the genetic material necessary for its production (vector pCOT1) in COT102 x COT67B cotton (OECD Unique Identifier: SYN-IR102-7 and SYN-IR67B-1)..... < 0.0000355 = 0.000046%*

*Percent protein on a dry weight basis as expressed in cotton plant cells (whole plant)

CAUTION
KEEP OUT OF REACH OF CHILDREN.

EPA REGISTRATION NUMBER: 67979-9

EPA ESTABLISHMENT NUMBER 66736-NC-01

Syngenta Seeds, Inc.
P. O. Box 12257
3054 East Cornwallis Rd.
Research Triangle Park, NC
27709

NET CONTENTS: _____ pounds of cotton seed

STORAGE AND DISPOSAL

Storage: Store in a cool dry place inaccessible to children. Do not contaminate water, food, or feed by storage or disposal.

Pesticide disposal: Any seed not used in these experiments must be returned to the seed provider or disposed of as specified in the field protocols.

Container disposal: Do not reuse bag. Ensure that the bag is completely empty of seeds before destroying.

INSECT RESISTANCE MANAGEMENT

Growers of VipCot cotton in the states of Arizona, California, and New Mexico and in the following Texas counties: Brewster, Crane, Crockett, Culberson, El Paso, Hudspeth, Jeff Davis, Loving, Pecos, Presidio, Reeves, Terrell, Val Verde, Ward, and Winkler must employ one of the following structured refuge options:

1) External, Unsprayed Refuge

Ensure that at least 5 acres of non-Bt cotton (refuge cotton) is planted for every 95 acres of VipCot cotton. The size of the refuge must be at least 150 wide, but preferably 300 feet wide. This refuge may not be treated with sterile insects, pheromone, or any insecticide (except listed below) labeled for the control of tobacco budworm, cotton bollworm, or pink bollworm. At the pre-squaring cotton stage only, the refuge may be treated with any lepidopteran insecticide to control foliage feeding caterpillars. The refuge may be treated with acephate or methyl parathion at rates which will not control tobacco budworm or the cotton bollworm (equal to or less than 0.5 lbs active ingredient per acre). The variety of cotton planted in the refuge must be comparable to VipCot cotton, especially in the maturity date, and the refuge must be managed (e.g., planting time, use of fertilizer, weed control, irrigation, termination, and management of other pests) similarly to VipCot cotton. Ensure that a non-Bt cotton refuge is maintained within at least $\frac{1}{2}$ linear mile (preferably adjacent to or within $\frac{1}{4}$ mile or closer) from the Bt cotton fields.

2) External, Sprayed Refuge

Ensure that at least 20 acres of non-Bt cotton are planted as a refuge for every 80 acres of VipCot Cotton (total of 100A). The variety of cotton planted in the refuge must be comparable to Bt cotton, especially in the maturity date, and the refuge must be managed (e.g., planting time, use of fertilizer, weed control, irrigation, termination, and management of other pests) similarly to VipCot cotton. The non-Bt cotton may be treated with sterile insects, insecticides (excluding foliar Bt kurstaki products), or pheromones labeled for control of the tobacco budworm, cotton bollworm, or pink bollworm. Ensure that a non Bt refuge is maintained within at least 1 linear mile (preferably within $\frac{1}{2}$ mile or closer) from the Bt cotton fields.

3) Embedded Refuge

Ensure that at least 5 acres of non-Bt cotton (refuge cotton) are planted for every 95 acres of VipCot cotton (total of 100A). The refuge cotton must be embedded as a contiguous block within the VipCot field, but not at one edge of the field (i.e., refuge block(s) surrounded by Bt cotton). For very large fields, multiple blocks around the field may be used. For small or irregularly shaped fields, neighboring fields farmed by the same grower can be grouped into blocks to represent a larger field unit, provided the block exists within one mile squared of the Bt cotton and the block is at least 150 wide, but preferably 300 feet wide. Within the larger field unit, one of the smaller fields planted to non-Bt cotton may be utilized as the embedded refuge. The variety of cotton planted in the refuge must be comparable to Bt cotton, especially in the maturity date, and the refuge must be managed (e.g., planting time, use of fertilizer, weed control, irrigation, termination, and management of other pests) similarly to VipCot cotton. The non-Bt cotton may be treated with sterile insects, insecticides (excluding foliar Bt kurstaki products), or pheromones labeled for control of the tobacco budworm, cotton bollworm, or pink bollworm whenever the entire field is treated. The refuge may not be treated independently of the surrounding VipCot field in which it is embedded (or fields within a field unit).

4) Embedded Refuge (for pink bollworm only)

Refuge cotton must be planted as at least one single non-Bt cotton row for every six to ten rows of VipCot cotton. The refuge may be treated with sterile insects, any insecticide (excluding foliar Bt kurstaki products), or pheromone labeled for the control of pink bollworm whenever the entire field is treated. The in-field refuge may not be treated independently of the surrounding Bt cotton field in which it is embedded. The refuge must be managed (fertilizer, weed control, etc.) identically to the VipCot cotton. There is no field unit option.