



**CONSERVATION ENHANCEMENT ACTIVITY
E595D**

**CONSERVATION
STEWARDSHIP
PROGRAM**

**Increase the size requirement of refuges
planted to slow pest resistance to Bt crops**

Conservation Practice: Integrated Pest Management - 595

APPLICABLE LAND USE: Crop (Annual & Mixed)

RESOURCE CONCERN: Animals

PRACTICE LIFE SPAN: 1 Year

Enhancement Description

Bacillus thuringiensis (Bt) plant incorporated protectants are plants that have been genetically altered to produce proteins that are harmful to certain insect pests. Widespread implementation of Bt crops has decreased insecticide use and increased crop yields, but it must be used as part of an integrated pest management (IPM) approach to protect the crop from pest species that are not susceptible to the Bt toxin and to manage pest resistance.

Crop rotation, scouting and resistance management strategies, such as planting and creating refuges of non-Bt crops, are essential when farming Bt crops. Insects have developed resistance to Bt proteins. To mitigate the development of further resistance, growers are required to plant refuges of non-transgenic crops. These refuges produce numbers of susceptible insects that will help sustain populations of non-resistant insects.

The size of Refuge requirement depends on the environment, pest and strain of the crop. Size of refuge is determined by resistance risk. Most Bt corn requires that 20% of the total Bt crop planted be non-Bt. Cotton can require 50% of the crop be planted to non-Bt. A recent study published in the Journal of Integrated Pest Management revealed, compliance has been a challenge. Nearly 40% of growers surveyed did not plant the required refuge (Reisig 2017). They credit non-compliance, in part, to lack of understanding by small-scale farmers about the need for refuges.



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Criteria

- This enhancement will increase the size requirement of the required refuge by an additional 25%, resulting in a higher percentage of the non-Bt crop. Ex. If the label requires a refuge to be 20% of the entire crop, 45% would be needed for this enhancement.
- Refuge designs include strips, blocks, border rows surrounding a Bt field or random crops scattered in the field that can achieve the 25% increase.
- Refuge area must meet the proximity requirements of the BT crop type.
- If refuge are strips within a field, the strips should be at least 4 rows.
- Required refuge areas are planted to the non-Bt variety of the same Bt crop when possible. Similar non-Bt varieties can be used if the same variety is not available. This attracts susceptible insects that should be able to mate with resistant insects and dilute the frequency of resistant genes in the population.
- Monitor fields for Bt resistance and report unexpected pest damage to Bt crops.



Documentation Requirements

Participant will:

- Prior to implementation, provide documentation for review showing producer’s record of integrated pest management meeting all Conservation Practice Standard Integrated Pest Management (CPS 595) general criteria.
- During implementation, keep documentation, such as records, plans, receipts, showing the implementation of the activities selected including:
 - o Document the Bt crop and the refuge size requirement from the label.
 - o A map showing the non-Bt variety of the crop (refuge area) in relation to the Bt crops, noting the original refuge plus the additional refuge areas.
 - o Photographs of Bt and non-Bt crops planted in the field.
- After implementation, make documentation available for review by NRCS to verify implementation of the enhancement.

NRCS will:

- Prior to implementation, provide and explain NRCS Conservation Practice Standard Integrated Pest Management (CPS 595) as it relates to implementing this enhancement.
- As needed, provide technical assistance to the participant as requested.
- After implementation, verify implementation by reviewing records kept during enhancement implementation.

NRCS Documentation Review:

I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

Participant Name _____ Contract Number _____

Total Acres Applied _____ Fiscal Year Completed _____

NRCS Technical Adequacy Signature

Date