# PINK BOLLWORM MANAGEMENT

Newsletter of the Pink Bollworm Action Committee
A Project of The Cotton Foundation

Volume 1, Number 1
**Initial Issue**

*The National Cotton Council's Pink Bollworm Action Committee recommended that a newsletter be developed to provide growers with general information on pink bollworm biology and how growers can put this information to use on the farm. This newsletter is designed to supplement existing local recommendations for pink bollworm management. The Cotton Foundation provided initial startup funds to develop the newsletter. Plans are to produce* 6–12 *issues per year. Newsletter coordinators are Leon Moore, Extension Entomologist-Emeritus, University of Arizona; and Frank Carter, Manager, Pest Management, National Cotton Council. Please forward any comments on content, organization, or subjects for future issues to Frank at* 901/274-9030.

## Season-Long Pink Bollworm Management

**Leon Moore, Theo Watson, Eric Natwick, Charles Allen, Tom Henneberry, Frank Carter**

### Introduction

The pink bollworm (PBW) has been a major pest of cotton produced in the southwestern United States for many years. Several factors determine the extent of infestations in a given year. Important factors include weather conditions during the winter and during the cotton production season. Warmer than normal winters and wetter than normal summers often result in increased problems from the PBW. In years when populations are high in the southwest, infestations also tend to increase in other infested areas of the cotton belt. The years 1991 and 1992 were relatively light for PBW infestations in most areas and this may, as has occurred in the past, create a false sense of security regarding the need for continuing management practices. A year such as 1990, when the PBW did devastating damage, can occur at any time and is especially likely when growers become less timely in carrying out key cultural practices that are detrimental to the insect

The best insurance against a year such as 1990 is a continuing season-long multi-component control program conducted on a community-wide basis. This type of program uses cultural, biological, chemical, and other control components to attack biological weaknesses of the PBW over relatively large geographical areas. Emphasis in these programs is placed on attacking the PBW at spring emergence and at fall diapause, the two most obvious weaknesses in the pest's life history.

This newsletter outlines and briefly discusses season long approaches to manage the PBW. Subsequent newsletters will discuss each component in more detail on a timely basis. It is important to recognize that each community will need to make program adjustments as required to accommodate the weather conditions and pest complex of the area. For example, pinhead square treatments are effective in some areas but may not be recommended or advisable in other areas.

### Community Action

A community can be defined in different ways. Obviously the cleanest and simplest would be an area of cotton production isolated by large non-crop areas on the four sides. Rarely does this occur but the benefits of community action can be achieved from less well defined areas. The important factor is that a group of growers collectively decide to work together to put maximum pressure on the PBW's biological weaknesses. There is no question that the PBW benefits greatly when the growers of an area act individually regarding such important cotton production activities as planting dates, irrigation termination dates, and plow down dates. It is suggested that a community group appoint or elect a grower steering committee and work closely with county and state extension and research personnel in the establishment and conduct of the program. Others that may be involved include USDA research personnel, pest control advisors, ginners, regulatory agency personnel, and industry personnel.

### Planting Date, Variety Selection and Heat Units

It is suggested that the community decide upon a common starting date for planting within the area. Pima and full season upland varieties should be planted first when these are grown in the area. Medium or short season varieties should follow or these may be the varieties of choice within an area and therefore planted at the starting date as chosen for the community. The most important aspects are that all growers agree on the starting date and that all agree to complete the planting operation in the shortest possible time. A compact planting window generally leads to a compact season and, as a result, adversely impacts the PBW by reducing the time available for development of generations.

Scientists have developed heat unit (HU) models that help predict growth and developmental stages for both

National Cotton Council OF AMERICA

cotton and the PBW. The appropriate model for an area should be used in determining the optimal planting window for a community considering the potential for yield and the impact upon the early season PBW emergence weakness. The most important aspect is when the cotton will reach susceptible square (about 10 days old) and how this relates to the completion of PBW emergence from overwintering. A good goal is to shoot for 95 percent or greater PBW emergence prior to unprotected susceptible square. Seventy five percent or more of this can be accomplished by carefully selecting the planting window and the remainder can be the result of protecting susceptible squares through "pinhead square" treatments.

## Pinhead Square Treatments

Based on the 55/86° model used in Arizona, insecticide and/or pheromone treatments initiated at about 850 HU after planting help to protect susceptible squares from PBW infestation until the 95 percent level of emergence is reached (about 1950 HU after Jan. 1). Insecticide treatments also help to protect the cotton from all insects and therefore ensure an early fruiting mode and a more compact growing season that is detrimental to the PBW. The number of treatments needed in a given field will depend on the date of planting and the time required after susceptible square to reach the 95 percent PBW emergence goal. Pheromone traps placed in each quadrant of a field provide data on the intensity of moth populations. Average nightly catches of 5 or fewer during the 10 days prior to pinhead square probably do not justify treatments for PBW while numbers higher than that generally justify one or more treatments.

It should be noted pinhead square treatments carry a risk of causing outbreaks of beet armyworm, bollworm, budworm, spider mites, whiteflies and possibly other pests. Treatments should not be made unless necessary and the number in a given field should be held to the minimum required to reach the 95 percent emergence level. In addition, insecticide selection should consider the effectiveness against PBW and the potential effect on other pests. It is also important for growers to consider the number of treatments that may be required in setting the beginning date of the planting window. In general, the appropriate treatments should be applied within the shortest reasonable time period to permit maximum natural enemy repopulation and effectiveness during mid-season.

## In-Season Control

Once the pinhead square treatment program is completed, the objective switches to carefully monitoring the crop through the middle part of the season when PBW activity should be low. The key during this period is to prevent the occurrence of another pest problem such as lygus bugs but at the same time to apply insecticides only when necessary. This permits the buildup of parasite and predator populations that help to control all pests. A regular boll sampling program should be initiated for PBW during this period and continued until the crop is matured. When sampling indicates the need for control, choose the chemical carefully with consideration of effectiveness against PBW and other pests present and any environmental hazards that might exist.

From the standpoint of PBW management it is best to avoid any plant stress that delays production of an optimum crop during the shortest period of time following the initiation of squaring. It is suggested that irrigation and fertility programs developed by agronomists and other scientists be followed that discourage plant stress and aim for maximum cotton production during a one fruit-set period.

## Crop Termination

Cotton that has been protected from insect, water, fertility or other stress will produce a good crop in a relatively short period of time and then go into a cut-out phase. It is important to recognize cut-out and the time for irrigation termination because of the relationship these have to PBW management. The pink bollworm spends the winter in the larval stage in diapause which is induced largely by photoperiod. Between September 15 and October 15, the percentage of larvae entering diapause increases from approximately 5 percent to about 90 percent. It is very important to terminate the crop as early as possible during the diapause phase as a way of attacking this biological weakness in the PBW. In irrigated areas, a crop that is in cut-out and the last water is applied on August 25 or earlier will usually have few squares and small bolls for PBW infestations after mid September. Harvest aid chemicals can be effectively used to destroy unwanted squares and small bolls that would otherwise serve as food and shelter for an overwintering PBW population. PBW control with insecticides should be continued as needed until the last harvestable bolls are at least about three weeks old.

## Harvest, Shred and Plow

Timely termination of the cotton crop reduces costs for inputs such as insecticides and water and permits early harvest, shredding, and plowing. Earliness in these operations reduces PBW populations during the current season and also reduces population levels during the subsequent spring. Effectiveness is dramatic when practiced in a community-wide program. Shredding immediately behind the last picking operation is critically important because it destroys any food and shelter available for additional PBW development. Plow-down to destroy the crop is required by law in most PBW infested areas. The date when plowing is required varies from state to state and even within the state in most cases. Plowing should be accomplished prior to the required date. Whenever harvesting is completed earlier, as is often the case, growers are encouraged to immediately plow and add additional pressure to the PBW's ability to survive the winter. Flood irrigation, especially when applied during the early stage of winter, has been shown to greatly reduce PBW populations and spring emergence. In some colder areas of the cotton belt infested with PBW it may be advantageous to delay plowing and leave the insect exposed to kill by weather conditions. In stripper harvest areas, cleanup of green bolls is critical to limit PBW survival. Ideally, green bolls should be burned. Do not leave green bolls piled on turn

rows since this allows strong PBW overwintering survival. If green bolls cannot be burned or ginned, it is best to tie the boxes open and let the green bolls fall back onto the field where cold temperatures, tillage and irrigation practices can reduce PBW populations.

## Summary

Several steps are suggested for developing effective long range PBW management. The most important may be to establish community-wide programs where growers collectively attack the PBW biological weaknesses at spring emergence and fall diapause as a way of putting additional pressure on the insect. These community programs can use multi-component control strategies based on heat units and developed to accommodate the weather conditions and pest complex of a given area. Control components that may be included are planting windows, pinhead square treatments, biological control, in-season sampling and control of all pests as needed, timely crop termination and early harvest, shredding and plowing. These programs are designed to produce an early, relatively quick crop of cotton with effective PBW control in the current crop and reduced potential for damage in subsequent crops.

## The Authors

*Theo F. Watson, Entomologist, University of Arizona; Tom J. Henneberry, Laboratory Director, Western Cotton Research Lab, USDA, ARS; Charles T. Allen, Extension Entomologist, Texas A&M University, Fort Stockton; Eric T. Natwick, Farm Advisor-Entomology, University of California, Holtville; Leon Moore, Extension Entomologist Emeritus, University of Arizona; Frank L. Carter, Manager Pest Management/Regulatory, National Cotton Council.*

## Pink Bollworm Facts

### Suicidal Emergence:

The first generation in the spring emerges from diapausing (resting) caterpillars sheltered in bolls or seeds left in cotton fields and other areas, or within cocoons in the soil. Pink bollworm development is dependent on temperature and moisture conditions that stimulate the caterpillar to enter the pupal stage. In lower desert valleys of Arizona and California, moth emergence begins in early to late March and continues into July, with the peak in April and early May. In eastern Arizona, New Mexico and Texas, this occurs 2-3 weeks later. Female moths lay their eggs within 10 days after emergence. During most years, 60-80% of the moths emerge and die before squaring cotton is available for infestation. This is known as "suicide emergence" and is the basis for community-wide planting dates as a management practice.

This newsletter is a project of

The Cotton Foundation