

Texas Agricultural Extension Service

Organizing An Area Wide, Producer Operated, Boll Weevil Diapause Control Program

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The fall diapause program is an effective and relatively inexpensive means of controlling boll weevils and reducing yield losses in Texas. Such programs have been very successful on the fringe areas of the geographic range of the boll weevil (Glasscock, Reagan and Upton Counties and the eastern and southern boundaries of the Texas High Plains). The success of these programs has prompted cotton producers to consider implementing control programs in other areas as well. This report outlines some steps and considerations necessary for implementation of a successful diapause boll weevil control program.

Objective of the Diapause Control Program

The objective of the diapause control program is to reduce overwintering weevil populations to the extent that damaging infestations do not occur the following year, or occur only occasionally on a few program acres within the control zone (geographic area within which the program operates).

This eliminates or reduces costly, multiple, in-season insecticide applications, and it helps maintain natural parasites and predators which aid in control of other insect pests.

Why Diapause Control Programs Work

A change occurs in boll weevil populations each year in the late summer and fall. From late August

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through mid-November, an increasing proportion of the emerging adult weevil population begins to store fat in preparation for overwintering instead of expending their energy reproducing. They spend 2 to 3 weeks feeding and resting on cotton plants in preparation for migration out of cotton fields into protected sites for overwintering. Research has shown that they must feed for at least 2 weeks in order to store enough fat to successfully overwinter and become the breeding stock for the next year's population. During this period the weevil population is vulnerable and can be controlled with insecticides. Insecticide treatments made at intervals of 10 to 14 days and continuing until weevil food and breeding sites are no longer available in cotton fields will significantly reduce the overwintering weevil population.

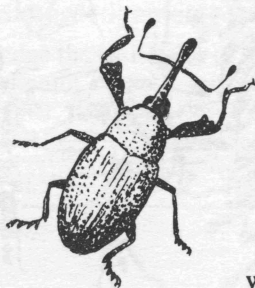
Diapause Program Organization

Feasibility Study

To organize a successful producer operated, area-wide diapause control program, a number of steps should be taken. A task force should be organized to conduct a feasibility study on a diapause control program. The task force should consist of area agriculture representatives and it should include farmers, agricultural lenders, agricultural chemical representatives, consultants, Extension and research personnel, ginners, county commissioners and any other persons involved in cotton production. This group should carefully evaluate all aspects of a boll weevil diapause program for the area.

These are some of the issues that should be addressed in the feasibility study:

1. Establish the boundaries of the diapause control zone and divide the control zone into proposed districts to facilitate operation of the program.
2. Determine how the diapause control program integrates with other boll weevil management techniques. These could include uniform delayed planting, plow up deadlines, use of early maturing varieties, in-season insecticide treatments, etc.
3. Estimate the number of acres to be treated and determine the trapping and field scouting program needed to determine acres to be treated each year.
4. Make a realistic estimate of program costs.
5. Investigate how to obtain funds (gins, farmers, bank loans, etc.).



6. Estimate the economic value of eliminating boll weevil damage and the need for in-season insecticide treatments. This should include the program's impact on other pests (impact of sprays in fall and avoidance of sprays in the summer).

7. Evaluate the biological and ecological limitations of the proposed diapause control program. These may include abundance and location of good overwintering habitat; isolation of program acres from nearby untreated cotton; and the presence of bodies of water, game preserves, communities, etc. within the control zone which would complicate area wide spraying.

8. Determine the extent of grower commitment to the program. For program success, it is critical that 95 percent or more (preferably 100 percent) of the farmers within the control zone be committed to support the program for at least 3 years. Although money from other sources may be ob-

The report should be completed at least 6 months (preferably a year) prior to initiation of the program (contracting with aerial applicators, chemical dealers, etc.).

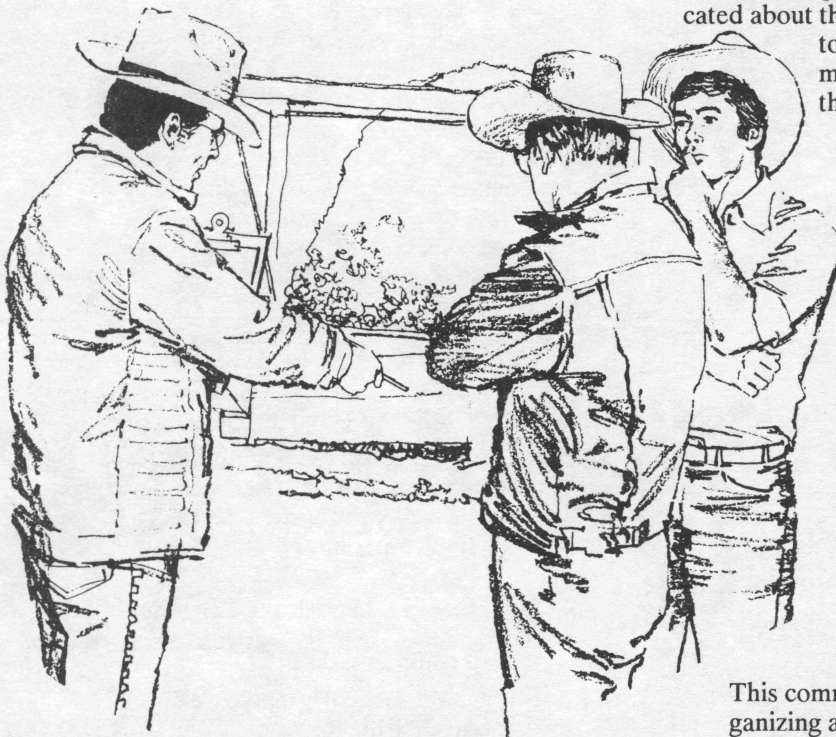
Education of Area Clientele

Upon completion of the feasibility study, the Texas Agricultural Extension Service and former task force members should begin an educational effort. The first purpose of the educational effort is to give growers in the proposed control zone training on how the diapause program works. In addition, the educational effort should explain and interpret the feasibility study report to the growers. The second objective is to educate local residents who are not necessarily involved in cotton production, but might be concerned about the insecticide treatments.

Program Decision and Election of Directors

After the producers have been thoroughly educated about the program, the decision whether or not to proceed with the program must be made. This decision can be made through a grower referendum or at an area-wide grower meeting. It should be made clear that the program will operate for at least 3 years if a commitment to conduct this program is made. The feasibility study report should be reviewed prior to the decision. If a decision is made to proceed with the diapause control program, the recommendations of the task force given in the feasibility study report regarding control zone boundaries and districts should be considered and accepted or amended. A director should be elected from each district in the control zone. These directors will form the Boll Weevil Diapause Control Program Committee.

This committee will have the responsibility of organizing and conducting the Boll Weevil Diapause Control Program. Directors should be elected to serve terms of no more than 3 years. The succession of directors should be arranged so that at least half of the committee membership is always made up of experienced directors. The initial committee of directors should be recognized leaders who have demonstrated a strong commitment to the success of the Boll Weevil Diapause Control Program.



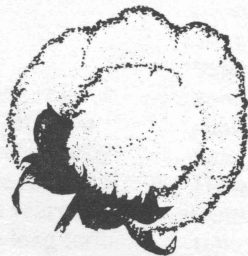
tained, the feasibility study should determine whether or not the growers have sufficient commitment to spend their own money to conduct the program.

When the fact finding has been completed, one or a few members of the task force should be selected to write a report on the findings of the feasibility study.

Conducting The Program

Collecting Funds

The committee's first concern is to collect funds to pay for the program. (The average cost in the St. Lawrence area and High Plains boll weevil diapause programs from 1986 to 1988 has been \$2.66 and \$3.07 per treated acre, respectively). The most convenient way to collect funds is through a bale assessment at gins within the diapause control zone. The limitation is that assessments must be collected at ginning time, the year before they will be used. Another common way to collect funds is by a per acre assessment to the growers in the control zone. The committee should collect at least 20 percent more money than they project will be needed in order to cover unforeseen expenses (such as the need to spray more acres than expected). Excess money can be rebated to growers or held for the diapause program for the following year. If funds run out before the program has been completed, much of the desired weevil population reduction will not be achieved.



Maps

Good maps are very helpful in the conduct of a diapause control program. In the Plains Cotton Growers Association program maps are scaled to 1 inch = 1 mile (for scouting) and 1/2 inch = 1 mile (for spraying). County ASCS offices, highway departments, county engineer offices and USDA/SCS offices are good sources of detailed maps.

Program Manager

In large programs it may be advisable to hire a program manager for the day-to-day conduct of the program. His or her responsibilities include hiring of scouts, supervision of field scouting and trapping, working with the aerial applicator to calibrate spray equipment, determining fields to be treated and deciding when to spray and when to cancel treatments, etc.

Determining The Infested Areas

Boll weevil pheromone traps should be in place throughout the diapause control zone by early August. Traps should be placed at densities of one trap for 500 to 700 acres of cotton in the areas where boll weevil populations are historically large. In less

heavily infested areas, trap densities can be gradually decreased to one trap for 1,000 to 1,500 acres of cotton. Funds should be allocated to pay salaries and mileage for at least one part-time employee to monitor traps for every 30,000 to 40,000 cotton acres. Traps should be checked weekly from August through October and a record should be kept of the locations and weekly catches of each trap.

Field scouting should be conducted from late August through about September 25. Several fields should be checked in each area of the control zone.

In each field four sites should be checked. Two of these sites should be selected at random and two should be deliberately selected in areas where weevil populations are most likely to be found. Field scouts should move at least 50 to 60 feet into fields. Sections of row (two at each site) that measure 8 feet 1 1/2 inch, should be carefully examined for adult weevils. The adult weevils should be collected and counted from all plants in the sample area. The area sampled using this technique is 1/200 acre (eight samples of 8 feet 1 1/2 inches each per field). Multiply the number of weevils found in each field by 200 to obtain the estimated weevil population per acre. A sample of the weevils collected should be dissected under a microscope to determine the percentage which are in the diapause condition.

In areas where large populations usually occur scouting should be intensified, perhaps to include every field. These areas also should be scouted first. Trap catch information can be used to help identify other areas in which infestations are more intense and scouting efforts should be increased. For a rule of thumb, at least three to five fields per 1,000 acres should be scouted.

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Blocking Of Acres To Be Treated

Areas should be blocked for spraying when weevil populations are estimated (by field scouting) to have reached 200 to 800 per acre or more and the percentage of diapausing weevils reaches 25 percent or more.

Contracting For Materials and Services

Aerial Application

Advertising for aerial application services should begin in September. The description of the job

should include the estimated number of acres to be treated and the expected dates of treatment. The advertisement also should inform applicators that they must be equipped to apply 12 to 16 ounces of ULV malathion per acre and that flaggers in radio contact with the pilots are required. Finally, aerial applicators should be informed that they will be applying the chemical from a few feet higher than a conventional application (under the direction of the program directors) and that the swath widths will be 100 feet. The advertisement should require that all bidders be inspected by the Texas Department of Agriculture to be sure that their licensing, bonding, insurance and equipment are in order.

When evaluating bids the committee should consider the amount of time in which each bidder could accomplish the job. Small planes should be able to spray 3,500 acres per day and large planes should be able to spray 6,000 acres per day. Spraying of the acreage in the program should be completed in 7 days to ensure that treatments are applied at the proper time. Keep in mind that weather often causes delays. The committee should reserve the right to refuse any and all bids.

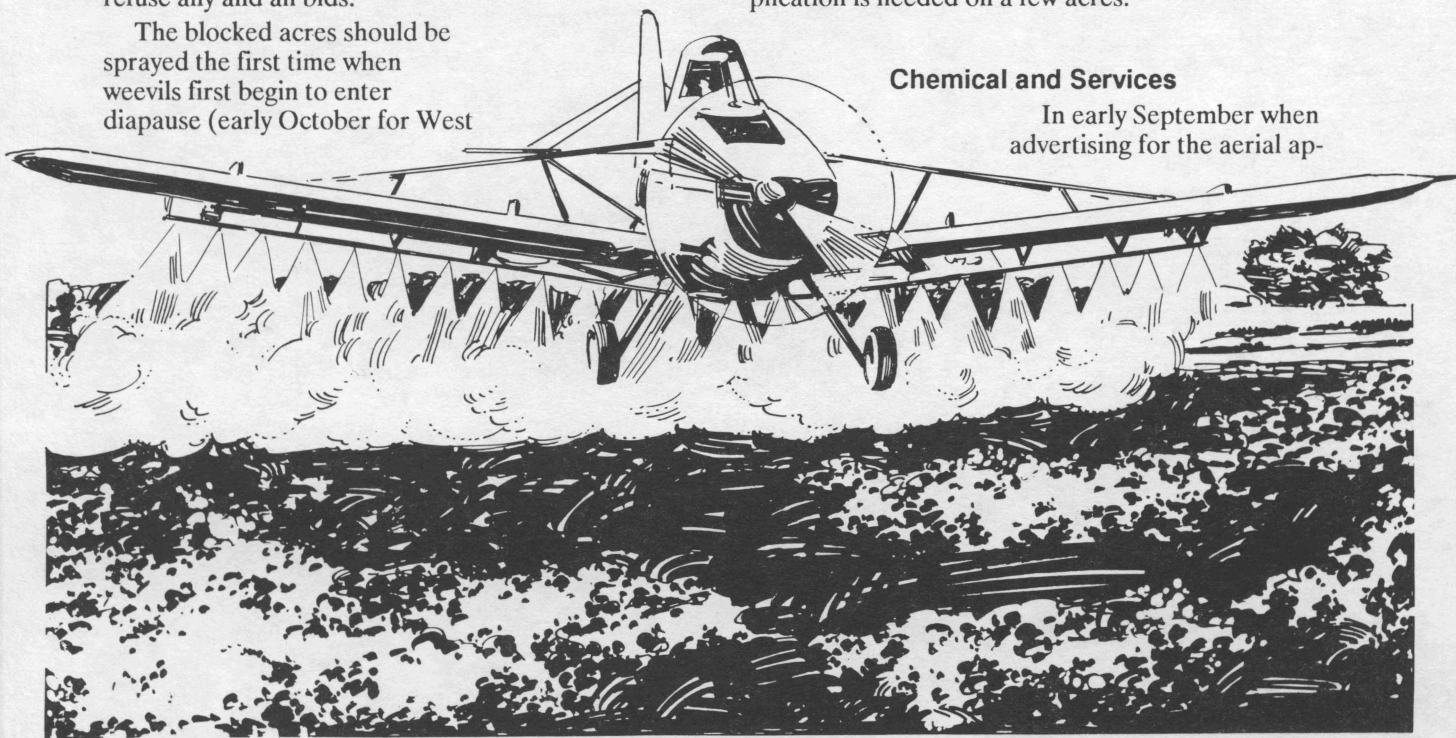
The blocked acres should be sprayed the first time when weevils first begin to enter diapause (early October for West

Texas). Field scouting should continue while spraying is in progress so that newly infested fields can be blocked and treated with second, third and fourth applications. Subsequent applications should be made only to unharvested cotton within the original blocked acreage and to newly infested, unharvested cotton. The second treatment should be applied 10 to 14 days after the first treatment. Committee members (district directors) should poll each farmer in their districts just prior to the second application to determine the acreage within the blocked portion of the control zone that has been harvested (and will not be sprayed). They can then determine the acres to be sprayed (tank loads required and the payment to the applicator).

Second and third applications may not be necessary in those years when an early freeze or drought terminates the crop, allowing an early harvest or causing a rapid decline in late October boll weevil activity. However, plans should be made for second and third applications which will be needed in most years. A third application should go out 10 to 14 days after the second treatment. Occasionally, a fourth application is needed on a few acres.

Chemical and Services

In early September when advertising for the aerial ap-



plication is done, bids for insecticide purchase also should be solicited. ULV malathion should be specified because problems relating to human health, livestock and wildlife have been associated with other insecticides. The amount of insecticide required should be calculated based on a use rate of 1 pint of ULV malathion per acre per application. Liability insurance for the diapause control program should be considered. The committee should arrange to hire an accountant to prepare the books for audit and ensure proper disposition of funds.

Evaluation

Since there are many factors that impinge on the success of a boll weevil diapause control program (e.g., winter weather, overwintering habitat, nearby untreated cotton, crop earliness, etc.), a meaningful evaluation can be made only after several years in the program. Diapause control programs are long term programs, and it is essential that growers understand that when they embark on this program they should be committed to it for at least 3 years.

Evaluations are essential each year, so that at the end of 3 or 4 years a decision can be made about whether or not the program is successful and should be continued.

A pre-program survey should be conducted to determine how many in-season insecticide treatments

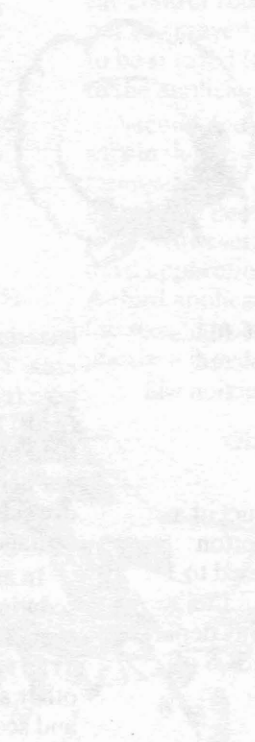
per acre were used to control boll weevil and other insects during the preceeding 2 to 3 years. Yearly surveys of the diapause control program should be

conducted to obtain similar information critical to the evaluation of the program. A reduction of in-season insecticide applications for boll weevil and secondary pests over a 3-year period is a good indicator of the program's success. Records of boll weevils captured in pheromone traps during the spring and fall are also useful in the program's evaluation. An assessment of the program's impact on the overwintering boll weevil population can be obtained after the first year by sampling overwintering habitat. Samples from overwintering habitat in the control zone, when compared with those collected from similar habitat near cotton fields outside the control zone, can provide an early indication of effectiveness. However, sampling to determine weevil numbers in winter habitat does require a large commitment of time.

The fall boll weevil diapause control program is a proven method of managing weevil populations. However, the proper organization and cooperation of virtually 100 percent of the producers within the control zone are essential for the success of the program.

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