A STRATEGY FOR THE MANAGEMENT AND CONTAINMENT OF THE BOLL WEEVIL IN THE LOWER RIO GRANDE VALLEY OF TEXAS

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Abstract

The boll weevil eradication effort of 1995 in the Lower Rio Grande Valley of Texas (LRGV) that followed the Frisbie-Brazzel Plan contributed to the massive crop failure. The reasons why the eradication program, as implemented, was such a complete and dismal failure are discussed. These include the spring start, flagrantly disregarding Integrated Pest Management (IPM) practices developed for the LRGV, the absence of a host-free period in the LRGV, the close proximity to Mexico, boll weevil host plants, lack of a buffer zone, and the long range movement of the boll weevil. A strategy for the management and containment of the boll weevil in the LRGV is advanced. This strategy consists of a complete stalk destruction program, fall diapause sprays, and pre-emptive sprays in the spring. This boll weevil containment strategy is a realistically obtainable goal. It is a strategy which would serve well the LRGV cotton producers in addition to those across the cotton belt.

Introduction

In the spring of 1995 the Texas Boll Weevil Eradication Foundation (TBWEP) began their ill-fated program in the four LRGV counties. This spring starting of the eradication program, following the 1990 Frisbie-Brazzel Plan, in which suppression of boll weevil is totally dependent on malathion, contributed to the massive crop failure that resulted in a loss of 160 million dollars to the cotton industry in the four counties comprising the LRGV.

A total of 232,093 gallons (2,151,502 lbs.) of malathion were sprayed on approximately 370,000 acres. These sprays were begun when plants had ⅓ grown squares and boll weevils were present in perimeter pheromone traps. The sprays were not always "triggered" by the pheromone traps catches. The widespread spraying in May by TBWEP flagrantly violated an established basic IPM practice for the LRGV.

In late May, 1995, an infestation of beet armyworm, Spodoptera exigua (Hubner) enveloped the entire area and suppression with labeled chemicals was not possible. Finally, in late June, an Emergency Use Permit (EUP) was obtained for the use of Confirm, which was effective in controlling this pest. However, by this time the cotton in the entire area had been defruited and a second generation of beet armyworms had already begun. When this infestation was brought under control, it was too late to set a crop and many fields were abandoned.

Following rains, these abandoned fields produced a late crop of squares that in turn produced massive numbers of boll weevil adults; therefore, before the end of the growing season a record number of boll weevil adults were present. The few growers that attempted to carry the crop reported losing the top crop to boll weevils. This is in spite of the massive amount of malathion applied by the TBWEP. This program contributed to the total disaster for cotton farmers in the LRGV, as only 54,101 bales of cotton were harvested from the 374,000 planted acres.

There were numerous meetings held to explain this disaster, but all attempts to label this a natural phenomena and a mere coincidence defied logic. The cotton acreage just across the Rio Grande River in Tamaulipas, Mexico, was not part of the eradication program. In spite of limited irrigation water, Northern Tamaulipas, Mexico, produced a good crop with beet armyworm present but not a problem. This was well documented by Rod Summy, Jim Raulston, and coworkers. They studied the beneficial and pest insect populations in the LRGV of Texas and Tamaulipas, Mexico. The results of this study were hotly contested by the Texas Boll Weevil Eradication Foundation and this delayed the presentation and publication of the study. Even the USDA contributed to this charade. However, they have recently received a justly deserved merit award from USDA-ARS for this work.

In many respects events of 1995 mirrored those of twenty-five years before when highly resistant tobacco budworm threatened cotton production in the LRGV. This resulted in the development and implementation of the Integrated Pest Management (IPM) programs in Texas. It is therefore ironic that the senior author of the Boll Weevil Eradication Plan in the LRGV was the same person who was in charge of IPM programs in Texas for many years. One can only wonder how these basic IPM practices were so flagrantly disregarded by those with input and control of boll weevil eradication efforts in the LRGV in 1995. The Technical Advisory Committee of the TBWEP, with 5 Ph.D. entomologists, apparently concurred with the TBWEP as implemented in 1995 in the LRGV.

Discussion

There are several reasons why the program in the LRGV was destined to fail.

Stalk Destruction and Field Sanitation:

The LRGV is the only cotton producing area of the U.S. located in a subtropics and many years a frost-free area. In most years, the cotton plants continue to produce fruiting structures during the entire winter months. Therefore, a thorough and complete cotton stalk destruction is essential

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for the management of the boll weevil, as even non-diapausing adults survive the non- growing season.

Texas Department of Agriculture regulations mandates that all cotton stalks must be destroyed by August 31. If this goal is accomplished, a six-month host free period will exist. This would effectively reduce boll weevil populations. In reality, the situation is that in the last twenty-five years there have been only a few years where a thorough stalk destruction program was achieved. The principle reason is that only Texas Department of Agricultural has the authority to enforce this regulation. Over the years, this has allowed politics and the interplay of the Cotton Administrative Committee to simply not accomplish stalk destruction in the LRGV. The Texas Department of Agriculture/Cotton Administrative Committee has lacked the will and/or the resources to enforce the regulations.

Another contributing factor is that a number of cotton growers simply do not place stalk destruction at a high priority. Even some of the best growers find it difficult to be in compliance every year. The combination of a mild climate, historic high rainfall from mid-August through September, and poor regulatory enforcement provides a continuous source of food for reproduction and (or) boll weevil survival during the non-growing season.

The common practice of "double cropping" in the LRGV is also a major factor in the area not having a host-free period. The planting of a second crop following cotton results in volunteer cotton in thousands of acres of popcorn, seed corn, vegetables, sugarcane, etc. Many of these plants remain until the second crop is harvested.

Another problem in obtaining the host-free period is cotton growing in non-crop areas. These include road rights of way, ditch banks, brushy areas along field margins, gin yards, oil mill yards, farm equipment areas, etc. An example of this in 1996 was on the right of way of Expressway 83 from Harlingen to Mercedes. This cotton had blooms until it was killed by the freeze of December 19.

If the host plant is not eliminated, the opportunity to regulate the development of boll weevil populations is not possible. This factor alone makes it unrealistic to even attempt an eradication program in the LRGV.

Close Proximity to Mexico:
The Rio Grande River is the boundary between U.S. and Mexico and in the LRGV this boundary zone is less than 50 yards wide. Cotton fields on the Texas-Mexican side of the river often abut each other. The Mexican regulatory agencies are notoriously lax in enforcing their field sanitation laws; therefore, there is no effective barrier between the cotton zones in the U.S. and Mexico. Going south from the LRGV, there is no more than 40 miles separating cotton growing areas for 200 miles.

The TBWEP officials never secured the cooperation of Mexico before starting the eradication program in the LRGV of Texas. Whole fields of standing cotton stalks remained in Mexico as late as December in 1994. In 1995, there was approximately 60,000 acres of cotton located less than 40 miles from the U.S. border. Surely the eradication program officials could not have hoped for a successful program while having this large reservoir area to reinfest the cotton area on the Texas side of the river.

Boll Weevil Host Plants:
The coastal counties, from the Rio Grande River northward for 200, are home to an indigenous reproductive host plant Cienfuegosia drummondii, (A. Gray) Lawt. for the boll weevil. This is the only important native host plant of the boll weevil in the continental U.S. This plant grows on range land. While it has a discontinuous distribution, it is sufficiently abundant to provide a reservoir for the development of the boll weevil to reinfest cotton fields. The rainy season in south Texas begins in August and this perennial plant produces an abundance of flower buds and capsules on which the weevil reproduces. Since this plant is located in inaccessible areas, its presence provides a continuous source of weevils to reinfest cotton.

As mentioned above the coastal belt from the Rio Grande River northward is primarily range land. It is a common practice for ranchers to feed whole cotton seed to the cattle. This seed is dropped on the ground. While most is consumed by the cattle, a sufficient amount of seed germinates to provide fruiting cotton plants. These plants are often found around the periphery of mesquite and brush where they are somewhat protected from animals. Since this feeding practice occurs on thousands of acres of range land, this is also a potential source for boll weevil reproduction all year.

While C. drummundii and range land cotton are not considered a threat to cultivated cotton in normal production, they would have to be considered as a potential threat for reinfestation during any eradication program for the LRGV.

The importance of these plants were not given any consideration in developing or implementing the Frisbie-Brazzel Eradication Plan. When asked about these potential problems there were two responses: (a) it is not a problem or (b) we gained a lot of experience with programs in the southeast U.S. so we can handle this if it becomes a problem.

Lack of a Barrier Zone in the Rio Grande Valley Eradication Program:
In the southeastern eradication programs, a barrier or buffer zone surrounded the eradication area. This barrier zone usually was comprised of a non-cotton zone, or an intensely treated insecticide area, that was needed to maintain low boll weevil populations. Boll weevil populations were

monitored by using pheromone traps to detect boll weevil adult movement.

No such buffer zone existed in the LRGV program. The close proximity of Mexico to the south and C. drummundii areas to the north eliminated any semblance of a buffer zone. In fact, commercial cotton growing areas are located within 40 miles of each other, from Brownsville to the Tampico, Mexico area. How is it that an eradication effort by TBWEP in the LRGV was initiated without a buffer zone in place?

Underestimating The Long Range Movement Of The Boll Weevil:

Over the years there have been many observations that clearly show that the boll weevil is capable of moving more than 50 miles in a single growing season.

Guerra et al. (1988), Jones et al. (1989) and Lukefahr et al. (1994) have documented movement of the boll weevil for distances much greater than 50 miles. There have been well-authenticated instances, but unpublished, when boll weevil movement has easily moved more than 50 miles to infest cotton. The most dramatic has been an area in northern Tamaulipas, Mexico, where boll weevils have moved from Ocampo, Tamps., to Jaumave, Tamps. Not only is the distance greater than 50 miles, but Jaumave is located in a valley surrounded by a 5,000-foot mountain range. A small experimental cotton planting in 1976 (10 meters square) became infested before the cotton plants in the experimental plot had begun to flower.

Another instance occurred in a non-cotton growing area (north of Cd. Victoria) at Guemez. For three consecutive years an experimental cotton planting became infested with boll weevils even though this planting was located more than 50 miles from the nearest cotton field.

Another well-documented instance occurred in an area near San Fernando, Tamps. This irrigated area is located approximately 100 miles south of Brownsville, Texas. The area had not grown cotton for over five years. Because of its isolation, the U.S.D.A. conducted a large sterile-male Heliothis virescens (F.) experiment in the area . Although there had been no cotton grown for over five years, the experimental cotton planting became infested by the boll weevil by mid-season.

Kerr County, Texas is located in the hill country north of San Antonio, Texas. In the mid 1960's the county agent at Kerrville had some potted cotton plants on the roof of the court house. These plants became infested with boll weevils, and were more than 60 miles from any cultivated cotton.

In yet another instance, a small cotton planting located at Lobo Flats, in Jeff Davis County, Texas, was monitored by J. Harris, a U.S.D.A. employee, in the 1960's. This area is located in a dry and arid zone located more than 100 miles from any cultivated cotton; but became infested with boll weevils before the end of the growing season.

This long range movement of the boll weevil must be considered if any realistic eradication program is to be effective. Obviously this was not done by the TBWEP and the flawed program in the LRGV of Texas in 1995 would never have been successful in eradicating the boll weevil.

A Realistic Containment Program:

As discussed above it is totally unrealistic at the present time to consider eradicating the boll weevil from the LRGV of Texas. Given the unique constraints mentioned, eradication is simply not a realistically obtainable goal. However, it is possible to have a containment zone that would significantly reduce the boll weevil economic injury levels during the growing season. This is a realistically obtainable goal and could be achieved following the program outlined below.

Complete Stalk Destruction Program:

One of the most effective measures that would result in low and manageable boll weevil populations would be a phyto-sanitary program whereby all cotton stalks would be completely destroyed by the August 31 deadline. This would give a six-month host-free period and would have a devastating impact on boll weevil populations. Obtaining this host-free period is paramount and must have the utmost priority.

However, some major changes would be necessary before such a program could be implemented. Grower attitudes of the importance of the host-free period must change. After more than 25 years, it is obvious that the Texas Department of Agriculture is unable and (or) unwilling to manage such a program. Therefore, the enforcement should be changed by legislation so another enforcement mechanism can accomplish this goal. The effectiveness and need for the Cotton Administrative Committee must come into question.

To achieve the host-free period objective, it would be necessary in many years to apply chemicals by air that will terminate growth and fruiting of the cotton plants. The volunteer seedling cotton would be eliminated so that it would never be a factor in supporting boll weevil populations. Such a program would be the most cost effective and the most environmentally sound boll weevil control strategy.

Fall Diapause Sprays:

As has long been recognized, a fall diapause spray program is the least environmentally disruptive chemical control measure that is available for boll weevil suppression. We believe that all cotton should receive these sprays until destroyed. In the LRGV, a good portion of the acreage is destroyed before the August 31 deadline. These growers should receive an incentive bonus for early stalk

destruction, as these fields will not require the fall diapause sprays.

Pre-emptive Sprays In The Spring:
Weevils that have survived the non-growing season are low in number and in a weakened physiological state. Therefore, they are susceptible to low dosages of insecticide, and can be greatly reduced before fruiting forms are large enough to support larval development. Therefore, at the pin head square stage, the first pre-emptive spray would be applied and the second spray applied at the one-third (pencil eraser) square size. Since sprays that control aphid, thrip, and plant bugs are routinely applied at this time, the cost of boll weevil control is minimal. However, it is important to time these sprays with the development of the cotton plant. If applied later than ⅓ grown square, boll weevils can escape control and the beneficial insects do not have time to recover, increasing the possibility of secondary pest outbreaks.

None of these sprays would be applied after May 1 in the LRGV regardless of cotton growth stage. Only areas with a history of boll weevil populations would be sprayed with the pre-emptive sprays. These sprays would be applied under the direction of the individual cotton producer, using band application by ground where timing and field conditions permit. This would result in reducing pesticide in the environment and cost by as much as ⅔. The choice of pesticide would be left to the producer.

If these measures are carried out on a timely basis there would be no need to employ pheromone traps to monitor boll weevil adult populations. Pheromone traps would not be used and this would be a huge cost savings.

The LRGV will continue to be influenced by long range weevil migrants, but a well-executed containment will minimize their importance in a cotton production program for the LRGV of Texas. This boll weevil containment strategy is a realistically obtainable goal which would serve well the LRGV cotton producers in addition to the producers across the cotton belt.

Implementation Of The Containment Program:
The boll weevil continues to be a major production constraint in the LRGV, so some type of containment program is necessary. The question is: what organization exists that is capable of administering the program? The grower funded Producer Association of the LRGV lacks the producer confidence to implement and manage such a program.

As mentioned above, the Technical Advisory Committee of the TBWEP includes five Ph.D. entomologist/ biologists, four of whom have been involved with Texas A&M University IPM Cotton Programs in Texas and the fifth is a USDA-ARS scientist with a longtime involvement in Biological Control Programs. This group did not display the needed leadership when approving the spring start up of the Eradication Program or in approving the rate reduction of malathion from 16 ounces to 12 ounces in mid-season. This committee disregarded the published reports that the boll weevils in the LRGV are three to seven times harder to control than in the Southeastern U.S. Cotton Belt and Central Texas.

Therefore, a new organization, with scientifically sound concepts, must be formed to implement the containment program. This group would have to have regulatory authority and be able to administer the necessary measures to insure a successful program. This organization must be controlled locally by individuals that have the confidence of our cotton industry.

Summary

It is totally unrealistic to consider eradicating the boll weevil from the LRGV. However, it is possible to have a containment zone that would significantly reduce boll weevil economic injury levels during the growing season. This would also reduce boll weevil migrants from the LRGV. This is a realistically obtainable goal and could be achieved by following a strategy of complete stalk destruction, fall diapause sprays, and selective pre-emptive sprays in the spring. This strategy would be compatible with the established IPM practices for the LRGV. The implementation and proper management of this containment zone strategy would serve well the LRGV cotton producers in addition to those across the cotton belt.

Disclaimer

The readers should be fully aware that the contents of this paper are the findings and opinions of the authors and not necessarily those of Rio Farms, Inc.

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