UNIQUE SITUATIONS AND CHALLENGES FOR THE TEXAS BOLL WEEVIL ERADICATION PROGRAM IN THE WINTER GARDEN AREA OF TEXAS

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Abstract

For the United States and northern Mexico, our goal for boll weevil eradication is to: See no weevil! There are situations and challenges, called critical factors, unique to the Winter Garden area of Texas that, when working together make it more difficult to achieve that goal. When these factors are working in concert, there is a synergy that occurs such that the influence on boll weevil survival may be greater than the sum of the individual factors combined. The critical factors , as identified, are, 1) Climate/Weather, 2) Irrigation, 3) Volunteer cotton, 4) Late planting dates, late harvest, delayed crop destruction, 5) Topography and overwintering habitats, 6) "Texas-style" deer hunting, 7) Are weevils overwintering in large round hay bales?

Critical factor one (1) Climate/weather – the Winter Garden area has a sub-tropical climate, which means that in most years, there is **1) a lack freezing weather** of sufficient duration or temperatures low enough to cause winter mortality in boll weevils. The warmer temperatures allow **2) higher weevil survival** through the winter than occurs in colder climates because the weevils use less of their body fat reserves to sustain themselves. Concomitant with the higher weevil survival is **3) cotton plant survival through the winter**. For example, large cotton plants in the Winter Garden area were found in 2009 which apparently survived from cotton planted in 2006, the most recent time that cotton had been planted in that field. Similarly, a very large cotton plant, basically a small tree, was found in the Lower Rio Grande Valley whose growth rings revealed that it was four years old. Logically, surviving cotton plants would provide **4) a source of food for boll weevils during the winter**. In recent years, boll weevils have been caught in pheromone traps every single week of the year. This indicates that boll weevils are moving around during warm periods throughout the winter and if they are moving around they are likely to feed on cotton plants that are surviving. It naturally follows that if the plants are surviving the winter, then they would provide **5) the potential for hostable cotton/egg-laying very early in the season** – much earlier than would occur otherwise. It would be highly likely that boll weevils would find such plants and circumvent pheromone traps. It goes without saying what would happen in such a scenario.

Much of Texas has been in a serious drought for several years but the impact it has on **6) cotton seed that doesn't germinate in the fall or even in the following growing season** is critical in the Winter garden area where the influences of the previously outlined climatic effects come into play. There is a lack of winter mortality of tender seedling cotton since, during the drought, the cotton seed has not germinated in the fall. That dormant seed may germinate, becoming "non-commercial cotton," in the subsequently planted crop that will probably be irrigated in the Winter Garden. This frequently happens in fields planted to corn, grain sorghum, wheat, and vegetable crops, and cotton growing in such fields has been a common occurrence in recent years. However, in some cases, cotton seed has not germinated when the volume of water applied with sprinkle irrigation is sufficiently low. Irrigated fields of corn and grain sorghum, following cotton, have been observed that had no cotton plant at harvest but which had dense stands of hostable "non-commercial cotton" several months after a three-inch post-harvest rain. Similarly, **7) cotton plants surviving crop destruction** are more likely to survive the warmer winters than in more northerly areas of Texas. Mature "volunteer cotton" plants have been observed that appeared to be dead following a short-cycled dip in temperature to a low of 26°F. Several weeks later, these apparently dead plants were observed to be developing axillary branches.

A several-year drought period was punctuated by a rather wet growing season in the Winter Garden area in 2007. We experienced an extended rainfall period during which daily, more-or-less day-long rains occurred for longer than a three-week stretch. In addition to disrupting trap-checking schedules, these rains precluded or nullified insecticide applications - sometimes multiple applications on a field in the same day. In many cases, fields that were scheduled for spraying went weeks before an effective application could be made. Equally significant, was the one area in the Winter Garden that received eighteen inches of rain in one rainfall event which caused serious flooding. Due to standing water and saturated soils, it was a month before some traps could be checked or field margins could be treated with mist blowers.

Critical factor two (2) Irrigation – unlike many other cotton-growing areas in Texas with fewer irrigated fields, about 97% of the cotton in the Winter garden is irrigated. Soil in irrigated cotton fields is moist and cooler which allows greater survival of boll weevil larvae in the shed fruit lying on the soil surface.

Critical factor three (3) "Volunteer cotton" – due to reasons outlined above, volunteer cotton is commonplace in the Winter Garden area. Volunteer cotton is that cotton germinating from seed of the previous season's cotton in the subsequent crops such as corn, grain sorghum, wheat, vegetable crops, etc., and also in non-crop areas, particularly in those areas where modules were built the previous year. Volunteer cotton can be found throughout central and south Texas in fields, along field margins, in drainage ditches, irrigation waterways, roadsides and railroad rights-of-way, around feed-yard bunkers, etc. Large volunteer cotton plants are capable of producing hundreds of fruit per plant which are excellent sources of food and oviposition sites and thus perpetuating boll weevil populations. As an example, the results of removing and examining all of the fruit from 80 volunteer cotton plants found on one farm provided evidence that at least 561 boll weevils had been produced on those plants. Those weevils represented the potential for over 42,000 eggs in the following season.

Another element figuring prominently in the volunteer cotton issue is that of "herbicide-tolerant" transgenic cotton which is most commonly glyphosate-tolerant. When glyphosate-tolerant volunteer cotton emerges in a field planted to a subsequent crop such as corn that also is usually glyphosate-tolerant, the grower has lost his ability to control that cotton with glyphosate. Until very recently, most growers were unaware that volunteer cotton was growing in their other crops and that their glyphosate applications were not controlling the problem. In most situations involving volunteer cotton in other crops, other herbicides besides glyphosate must be used and many of those provide marginal control of cotton in a growing corn crop. As food for thought, "Could the Mid-south and Southeast have eradicated boll weevil as easily had herbicide-tolerant transgenic cotton been in widespread use 15 years ago?"

Critical factor four (4) Late planting dates, late harvest, delayed crop destruction – unlike many other areas which don't grow winter crops, the Winter Garden area has intensive winter vegetable production. Many of these crops are planted in late winter which pushes their harvest into late spring. If cotton is grown subsequent to these vegetable crops this sometimes pushes cotton-planting dates into June. A June planting date is really too late to be planting cotton and still be compatible with boll weevil eradication since the late planting results in a late harvest and delayed cotton crop destruction. In most such cases, crop destruction is delayed well past the 10 October deadline for the Winter Garden. One possible solution to this annually recurring problem would be to impose a cotton planting deadline of 140-150 days prior to the crop destruction deadline. In the Winter Garden, it takes cotton an average of 135 days from planting to 50% open bolls. This it would be reasonable to consider a planting deadline of 15 May, which would allow 148 days from planting until the crop destruction deadline, which would an additional 13 days for crop maturity.

Critical factor five (5) Topography and over-wintering habitats – the South Texas/Winter Garden is not different from any other area of the country in that all areas have overwintering habitats. However, the South Texas/Winter Garden area has hundreds, if not thousands, of square miles of rangeland/brushland, much of which is heavily overgrown with thick, almost impenetrable brush that provides potentially unlimited overwintering habitat for boll weevils.

Critical factor six (6) Texas-style deer hunting - in Texas, deer feeders are ubiquitous. "Deer corn" is the most commonly used food in deer feeders but in recent years, with the emphasis on biofuels, many deer hunters have resorted to feeding cotton seed as a less-expensive protein source. Given the almost universal presence of deer feeders in Texas, thousands of deer feeders are located in areas that are many miles out of the way and are never be seen by anyone involved in the boll weevil eradication effort. While the status for volunteer cotton growing from cotton seed used in deer feeders is unknown such use of cotton seed represents a potential source of boll weevil food and reproduction that needs clarification.

Critical factor seven (7): Overwintering in hay bales? – there is **s**trong circumstantial evidence that boll weevils are associated with large round hay bales. During the 2009 growing season, 262 boll weevils were collected in five traps placed close to and upwind of five round bale storage sites. During the Fall of 2009 numerous large hay bale (both large round bales and the larger, rectangular bales) sites popped up around the Winter Garden. If in fact boll weevils are using hay bales for overwintering, this is another critical element that jeopardizes the eradication effort,

particularly from the standpoint of movement of hay bales. It may actually become a quarantine issue from the standpoint of movement of hay bales from boll weevil-infested areas into boll weevil-free areas. In a effort to make a determination about the status of hay bales as overwintering sites for boll weevils, follow-up studies are planned for 2010. Additional hay bales sites will be added to those trapped in 2009, more traps per site will be added with one trap placed at each of the cardinal compass directions as well as the trap placed directly upwind (prevailing wind) of the hay bale site. Some of the hay bales will be caged with a boll weevil trap placed inside of each cage. Also, if one can be located, some of the decomposing hay bales will be processed through a rotary separator that was used years ago in boll weevil studies.

I have outlined several critical factors which hopefully explain some of the reasons why boll weevil eradication in the Winter Garden area of Texas has been difficult. However, failure in the case of boll weevil eradication is not acceptable and these are not excuses for failure. We, in Texas, have implemented a number of measures to rectify these situations, measures such as trapping every field that was in cotton the previous year and spraying any field (non-cotton crop) with non-commercial cotton (i.e., volunteer cotton), assessing growers for such fields if the cotton in those fields becomes hostable, as well as levying fines for this cotton if it is allowed to persist beyond crop destruction deadlines.

We believe that these and other measures will prove successful in eliminating boll weevils to the end that we will eradicate the boll weevil in Texas.