NEW AND IMPROVED BOLL WEEVIL TRAP

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Abstract

This paper is being presented on behalf of S&S Trap Company. The boll weevil trap and Grandlure pheromone are key elements in Boll Weevil Eradication Programs (BWEPs). Without these two components, boll weevil eradication probably would not be possible with today's technology. Improved traps could provide a financial savings in labor and trap replacements in the active BWEPs and those that are planned in the near future.

The time and need for a new, improved and more user friendly boll weevil trap is now!!!

Background

Historical

Over the last 30 or so years, boll weevil traps were developed, modified and evaluated by several researchers and scientists, commencing in 1969 by Cross et al., Leggett and Cross in 1971, Mitchell and Hardee in 1974, Dickerson et al. in 1981 and numerous others.

The Dickerson et al. trap has been adapted and used extensively for monitoring boll weevil movement, detecting populations and "triggering" spray applications in Integrated Pest Management (IPM) and Boll Weevil Eradication Programs (BWEPs) throughout the cotton belt and Latin America. The Southeastern Boll Weevil Eradication Foundation invested in injection molds to produce this trap for their BWEPs and until recently for other States BWEPs. Currently these traps are manufactured and offered to BWEPs by Technical Precision Plastics (TPP) of North Carolina. For purposes of this paper the existing TPP trap will be referred to as the "Standard Trap", an effective device but one that has several undesirable characteristics.

Discussion

Design Objectives

The primary objective of S&S Trap Company was to design a new boll weevil trap that would be as effective as the Standard Trap but more "user friendly" and with improved functionalities during the installation and servicing of the trap.

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The following are the design criteria that were among the 26 improvements in developing the new boll weevil trap:

General Improvements

1. Only 3 parts, the Base Cup, Cone and Capture Cylinder, all are 100% recyclable.
2. Parts being easier to assemble/ dissemble, load, cleanout, stack and tie down.

Base Cup Improvements

1. Base Cups will not stick together,
2. More flexible, less brittle,
3. Flat surface on the interior for easier bar code "reading",
4. Will not fade out during "field life" time,
5. Designed to be supported by wooden stakes, broom sticks, bamboo or fiber glass rods (see Photo 2 and 13) and
6. "Tie down" holes to help keep the Unit attached to the stake (see Photo 1 and 2).

Cone Improvements

1. Positive locking system to the Base Cup (see Photo 9),
2. Positive locking system to the Cylinder (See Photo 3),
3. One piece construction (see Photo 3) and
4. Easier to clean out.
5. Eliminated metal screen that can rust or become deformed (see Photo 11).

Capture Cylinder Improvements

1. 64% more top ventilation hole area for air movement, cooling and pheromone dispersion (see Photo5),
2. 14% more capture area in the Cylinder,
3. Positive Cylinder locking system with Cone Base,
4. One piece construction (see Photo 5) to eliminate the two piece top on the Standard Trap (see Photo 12),
5. Easy to see weevils (see Photo 7),
6. Two holder clips for pheromone dispensers (see Photos 5 and 8),
7. Two holder slots for insecticide dispensers (see Photos 5 and 8) and
8. A tamper pin indicator slot (see Photo 6).

Optional Tamper Pin will alert the trapper that someone has violated the integrity of the trap and that the data collected should be disregarded or re-evaluated (see Photos 1 and 6).

Specifications

Polypropylene Base Cup and Cone
Acrylic Cylinder and Tamper Pin

UV protection and stabilized color are added to respective parts.
Weight is approximately 100 grams.

Phase I Prototype I

In September 1999, prototype molds were constructed and the first prototype traps were produced. These traps were carried to several locations in the Mid South, Southwest and Mexico for initial evaluations. After about a week in the field, the evaluations were terminated as there were sufficient data for needed improvements and modifications.

Design modifications were made to improve the efficiency of Prototype 1 traps. These improvements were:

1. UV inhibitors incorporated in the Base Cup and Cone,
2. Greater elongation of the "twist lock" slots in the Base Cup (see Photo 2),
3. Reduction of the wooden stake nail hole (see Photo 2),
4. Improved stake holder slot (see Photo 13),
5. Elimination of extra "tie down" holes in Base Cup,
6. Adjustment of clearance between the Cone and Base Cup,
7. Reduction of mesh in Cone screen section to eliminate escapees (see Photo 3),
8. Extension of Cone apex and reduction of entry orifice into the Capture Cylinder (see Photo 3),
9. Improved and strengthened Capture Cylinder connection lugs attaching to the Cone section,
10. Elongation of slots for the "kill chip" holders (see Photo 5) and
11. Designed and molded an insert to affix inside the Cone for further evaluations.
12. Designed and molded an insert to affix inside the Cone for further evaluations.

Currently Prototype 2 of the new traps are being evaluated in two locations in the Rio Grande Valley of Texas, one location in the Upper Texas Gulf Coast and one in the Carlsbad, New Mexico area. The results from Prototype 2 should be available for distribution during January and February 2000.

Phase II Prototype

The only additional modifications identified at this time are a reduction in screen mesh size in the upper portion of the Cone (see Photo 3), a strengthening of the locking lugs on the capture Cylinder and a minor modification in the Tamper Pin. When the final mold modifications have been made and the determination of which Cone color, either opaque or green, is more effective, commercial production will commence and traps will be available for use in IPM and BWEPs.

Production capacity will be designed to produce in excess of 4.5 million traps per year.

Discussion

All of the BWEP responses on Prototype I were very positive as it related to user friendliness and functionality. The major negative response was the color fading on the Base Cups. The Prototype I traps did not have a UV protection compounds added to the resin. This short coming was remedied in prototype II resins.

"Hobo" temperature sensors were used in the Capture Cylinder and Cone section of the new trap and the Standard Trap to monitor internal temperatures and verify the temperature range in each section of the traps; they were about the same.

Time and motion studies on the new trap will be conducted to determine the labor savings in the installation, monitoring and servicing of the traps in the field. Early estimates range from 20% to 30% savings in labor and several trappers rated the S&S Trap at least 33% greater than the Standard Trap for user friendliness.

References

Ridgway, R.L., Lloyd, E.P. and Cross, W.H. 1983 Cotton Insect Management With Special Reference to the Boll Weevil, 185-186. United States Department of Agriculture. Agriculture Research Service. Agriculture Handbook 589.

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Oklahoma FWEP - Jerry Coakley, Bill Massey and Staff
Tennessee BWEP - Ron Seward and Staff, Texas BWEP - Osama El-Lissy and Staff,
SEBWEF – Gerald McKibben
USDA-ARS - Dick Hardee and Dan Wolfenbarger (Retired)

The Enemy

Photo 1. Assembled Trap

Photo .2 Base Cup

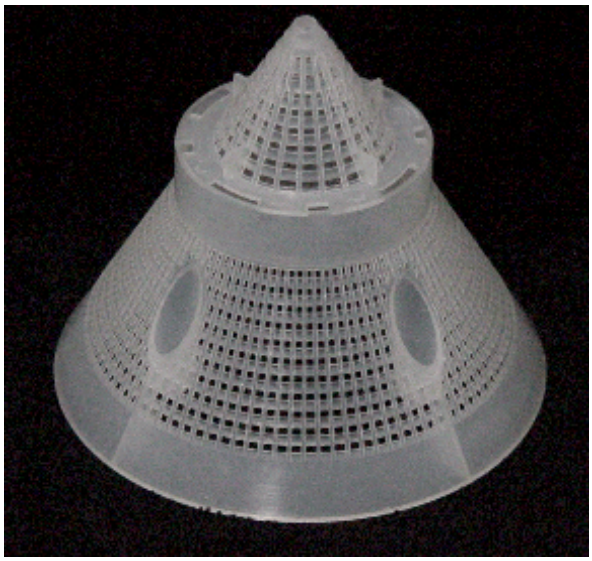

Photo 3. Opaque Cone

Photo 4. Green Cone

Photo 5. Capture Cylinder

Photo 6. Tamper Pin

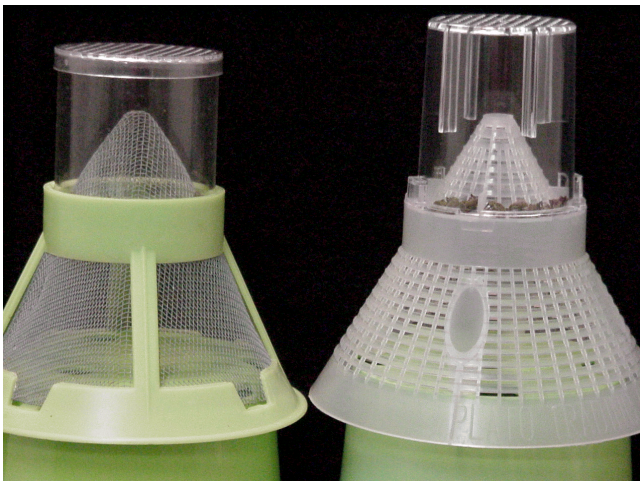

Photo 7. Easy to see, both traps have 10 boll weevils

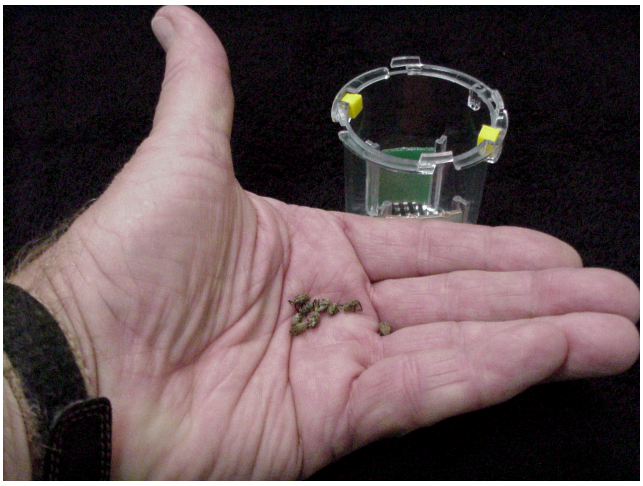

Photo 8. Easy to clean out without handling pheromone or insecticide kill chips

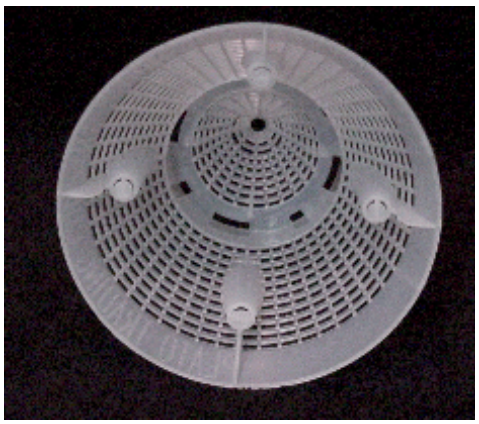

Photo 9. Cone has 4 locking lugs and will function properly with only two lugs in place

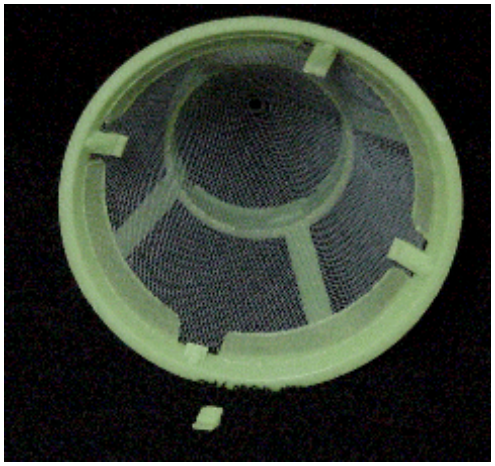

Photo 10. Standard Trap Cone with one locking "foot" broken. This trap will not function properly

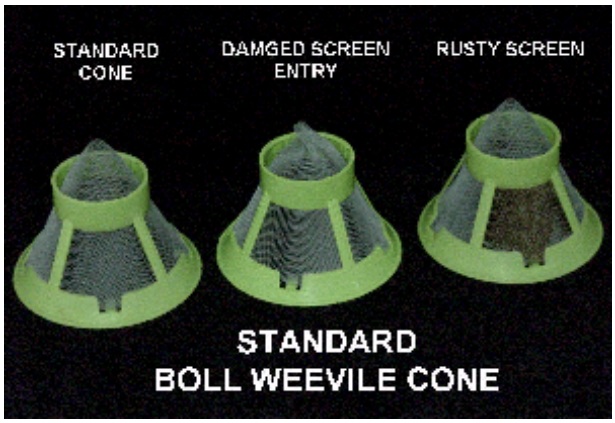

Photo 11

Photo 12. Standard Trap with the top missing. This is a common occurrence

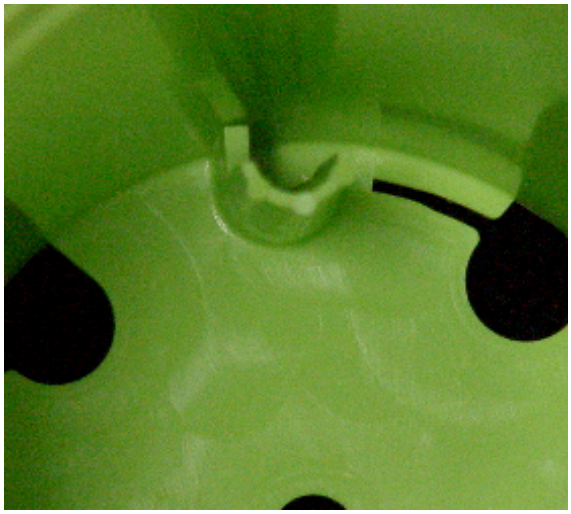

Photo 13. Improved stake holder