**Final Delaware Soybean Board Report – 2003**

**Title:** Survey of Corn Earworm Populations in Delaware Soybean and Sweet Corn Fields to Test the Current Levels of Susceptibility to the Pyrethroid Insecticides

**Personnel**: Joanne Whalen, Extension Specialist
Marty Spellman, Extension Associate, IPM

**Justification**:

The corn earworm, *Helicoverpa zea* (Boddie), is a major insect pest of soybeans and sweet corn grown in Delaware. Without effective control options, economic levels can cause significant yield loss. In the South, the corn earworm has developed resistance to many insecticides, including the pyrethroids, used for its control in cotton. As a result, there has been some evidence of a gradual loss of pyrethroid insecticide efficacy in areas as close as Virginia. In 2002, Virginia reported control failures of pyrethroids in soybeans for the first time when used at rates that should have killed most larvae. In addition, screening trials conducted by Ames Herbert (Extension Entomologist, VPI) are starting to demonstrate reduced levels of controls (80-85% control versus a previous level of 90-99% control). . Although we have not encountered suspect fields in Delaware, the 2002 suspect fields in VA indicate that it is time to monitor the situation more closely in our state. Since pyrethroids play a major role in sweet corn insect management, this project will be combined with a regional monitoring project funded by a special USDA grant for sweet corn. This will expand the data set available to look at shifts in corn earworm populations. Programs to monitor insecticide susceptibilities in field-collected populations of corn earworm are critical to the development management strategies to maintain cost-effective insecticides.

***Procedures:***

1. Clusters of 5 wire cone traps baited with a corn earworm pheromone lures were used to collect male moths at 6 locations( 30 traps total) throughout the state: New Castle County ( soybean area), Kent County (soybeans area), Kent County (sweet corn area), Sussex County (sweet corn area), Sussex County East (soybean area) and Sussex County West (soybean area).
2. Traps were placed in the field and lures placed in traps one to three days before moths were collected for evaluation. Monitoring was done five times throughout the season: June 9, June 23, July 28, Aug 18 and September 9 (sweet corn areas only).
3. Screening Method:

**Day 1**: Moths were collected from traps and brought back to the University of Delaware Research station in Georgetown. Moths without damaged wings and with scales over most the wing surface were maintained in ice cream containers (10 per container) overnight with a 10% sucrose solution.

**Day 2**: Live moths were transferred from ice cream containers to test vials treated with two doses of the pyrethroid, cypermethrin (5 ug and 10 ug) and one untreated vial.

**Day 3:** Moths were evaluated as alive, dead, or knocked-down (moths that are alive but unable to fly in a normal manner). Moths able to fly ≥ 3 meters were considered alive. Moths not able to fly > 3 meters were recorded as "knocked down".

***Results:*** See Tables 1-7

***Comments:*** Throughout the season, 1,770 moths were evaluated for their susceptibility to cypermethrin. Although we did find a few moths surviving at the low rate (5ug), the survivorship level was less than 2 % which is considered very low. Only one moth out of 1770 survived at the10 ug rate. The good news is that our population is still susceptible -- that is pyrethroids are still providing good control of corn earworm. Similar results were obtained in VA in 2003. We plan to conduct this survey for 2 more years to watch for any shifts in the population.

Table 1. Average Counts for All Locations

| Total # Moths Evaluated | | | Total # Moths Alive | | |
|---|---|---|---|---|---|
| 0 | 5 ug | 10ug | 0 | 5 ug | 10 ug |
| 589 | 594 | 587 | 511 | 11 | 1 |
| Season Long % Survivorship | | | 86.76 | 1.85 | 0.17 |

Table 2. Soybean Area – New Castle County ( Townsend, Middletown and Odessa)

| | Total # Moths Evaluated | | | % Survivorship | | |
|---|---|---|---|---|---|---|
| Date | 0 | 5ug | 10ug | 0 | 5ug | 10ug |
| June 11 | 0 | 0 | 0 | -- | -- | -- |
| June 25 | 2 | 1 | 1 | 100 | 0 | 0 |
| July 30 | 10 | 10 | 10 | 90 | 0 | 0 |
| Aug 20 | 7 | 8 | 8 | 71.4 | 12.5 | 0 |
| Sept 11 | -- | -- | -- | -- | -- | -- |
| Season Total | 19 | 19 | 19 | 84.2 | 5.26 | 0 |

Table 3. Soybean Area – Kent County (Marydel, Wyoming, Felton, Andrewsville)

| | Total # Moths Evaluated | | | % Survivorship | | |
|---|---|---|---|---|---|---|
| Date | 0 | 5ug | 10ug | 0 | 5ug | 10ug |
| June 11 | 0 | 0 | 0 | -- | -- | -- |
| June 25 | 2 | 1 | 1 | 50 | 0 | 0 |
| July 30 | 5 | 4 | 4 | 80 | 0 | 0 |
| Aug 20 | 1 | 1 | 1 | 100 | 0 | 0 |
| Sept 11 | --- | --- | --- | -- | -- | -- |
| Season Total | 8 | 6 | 6 | 75.00 | 0 | 0 |

Table 4. Sweet Corn Area – Kent County (Dover, Wyoming, Harrington, Milford)

| | Total # Moths Evaluated | | | % Survivorship | | |
|---|---|---|---|---|---|---|
| Date | 0 | 5ug | 10ug | 0 | 5ug | 10ug |
| June 11 | -- | -- | -- | -- | -- | -- |
| June 25 | 2 | 1 | 1 | 100 | 0 | 0 |
| July 30 | 59 | 61 | 61 | 84.75 | 3.3 | 0 |
| Aug 20 | 93 | 93 | 92 | 89.2 | 2.2 | 0 |
| Sept 11 | 20 | 20 | 20 | 90 | 0 | 0 |
| Season Total | 174 | 175 | 174 | 87.93 | 2.29 | 0 |

Table 5. Soybean Area – Sussex East ( Millsboro, Frankford, Selbyville)

| | Total # Moths Evaluated | | | % Survivorship | | |
|---|---|---|---|---|---|---|
| Date | 0 | 5ug | 10ug | 0 | 5ug | 10ug |
| June 11 | 7 | 7 | 7 | 85.7 | 0 | 0 |
| June 25 | 22 | 20 | 20 | 82 | 0 | 0 |
| July 30 | 66 | 67 | 67 | 89 | 1 | 0 |
| Aug 20 | 42 | 44 | 44 | 88.1 | 2.3 | 0 |
| Sept 11 | -- | -- | -- | -- | -- | -- |
| Season Total | 137 | 138 | 138 | 87.59 | 1.45 | 0 |

Table 6. Sweet Corn Area – Sussex County (Laurel, Bridgeville, Seaford, and Georgetown)

| | Total # Moths Evaluated | | | % Survivorship | | |
|---|---|---|---|---|---|---|
| Date | 0 | 5ug | 10ug | 0 | 5ug | 10ug |
| June 11 | 9 | 10 | 9 | 55.55 | 0 | 0 |
| June 25 | 14 | 13 | 14 | 93 | 0 | 0 |
| July 30 | 69 | 71 | 67 | 91 | 1 | 1 |
| Aug 20 | 43 | 43 | 43 | 88.4 | 4.7 | 0 |
| Sept 11 | 10 | 11 | 11 | 100 | 0 | 0 |
| Season Total | 145 | 148 | 144 | 88.97 | 2.03 | 0.69 |

Table 7. Soybean Area – Sussex West (Seaford, Laurel, Bridgeville, Greenwood)

| Date | Total # Moths Evaluated | | | % Survivorship | | |
|---|---|---|---|---|---|---|
| | 0 | 5ug | 10ug | 0 | 5ug | 10ug |
| June 11 | 8 | 9 | 9 | 50 | 0 | 0 |
| June 25 | 29 | 31 | 30 | 90 | 0 | 0 |
| July 30 | 54 | 54 | 53 | 81 | 2 | 0 |
| Aug 20 | 15 | 14 | 14 | 86.7 | 0 | 0 |
| Sept 11 | -- | -- | -- | -- | -- | -- |
| Season Total | 106 | 108 | 106 | 82.08 | 0.93 | 0 |