Controlling Cucumber Beetles in Gardens and on Small Farms with Mass Trapping

Managing Cucumber beetles in gardens and small farms can be very difficult.

The new mass trapping system developed by Lincoln University's Integrated Pest Management (IPM) program can be used as part of a broader IPM program to manage cucumber beetles.

LINCOLN UNIVERSITY MISSOURI
COOPERATIVE EXTENSION

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Spotted cucumber beetle

Striped cucumber beetle

Striped and spotted cucumber beetles are two key insect pests of cucurbit crops (e.g., cucumbers, pumpkins, squash, watermelons, etc.). Without proper management, adult beetles can transmit bacterial wilt. Adult beetles also defoliate (remove leaves from) plants and cause surface damage to fruits. Larvae (young) of the striped beetle also feed on roots and stems. It can be hard to manage these two pests in gardens and small farms. Insecticides are an effective control option; however, they can cause harvest interruption due to preharvest intervals. In addition, some insecticides can harm beneficial and pollinator species. Also keep in mind that many types of insecticides are classified as restricted use compounds. They require private pesticide applicator training and licensing.

To address these concerns, the Lincoln University Cooperative Extension (LUCE) Integrated Pest Management (IPM) program developed a simple, mass trapping system. It has proven to be an effective IPM strategy. When used in a cucurbit field, the cucumber beetles are drawn to the traps and away from the cash crop. After entering the trap, the beetles are killed when they eat the bait laced with insecticide.

The trap has three parts. The first is a juice or milk jug. The second is a commercial, floral-based lure or attractant. The third is a commercial stun pill that kills the trapped insects. It contains the insecticide carbaryl (Sevin®), paraffin wax and powdered buffalo gourd. More details are provided in the section on trap construction.

Research conducted from 2011-2013 at Lincoln University's George Washington Carver Farm found that traps performed best when painted yellow and baited with a commercial AgBio© floral lure. In 2011, 28 baited traps were maintained for nine days. The traps killed 2,531 cucumber beetles in a watermelon crop. This combined reduction of spotted and striped cucumber beetles reduced the need for an insecticidal spray. It also allowed for the production of marketable fruit.

2015 On-Farm Study

On-farm research on mass trapping was conducted at a commercial vegetable farm in Truxton, Missouri. Over an eight-week period (May 21-July 9, 2015), 28 traps killed 3,715 cucumber beetles (striped plus spotted). In a

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zucchini plot, relatively high numbers of striped (Figure 1A, right) and spotted (Figure 1B, right) cucumber beetles were captured by yellow traps. Few adults were found on the plants. Similar results were found in the cucumber plot (Figure 2A, B, below).

Overall, beetle suppression was so effective that an average of only 0.42 insects were found per plant. This number is below what is called the economic threshold (the pest density at which insecticide applications are justified). For the entire trapping period, the 2015 data shows that for each cucumber beetle found on a plant, 26 cucumber beetles were killed by a trap.

Mass Trapping for Fall Sanitation

When the cucumber harvest ended on September 25, 2015, a mass trapping system was deployed at the Truxton site. This consisted of 15 yellow traps baited with the AgBio© floral lure and one stun pill per trap. The goal was to kill as many cucumber beetles as possible. This would reduce the overwintering population. By the time the trapping ended on December 2, 2015, the number of cucumber beetles removed was 2,043. These results are encouraging.

Figure 1: A and B

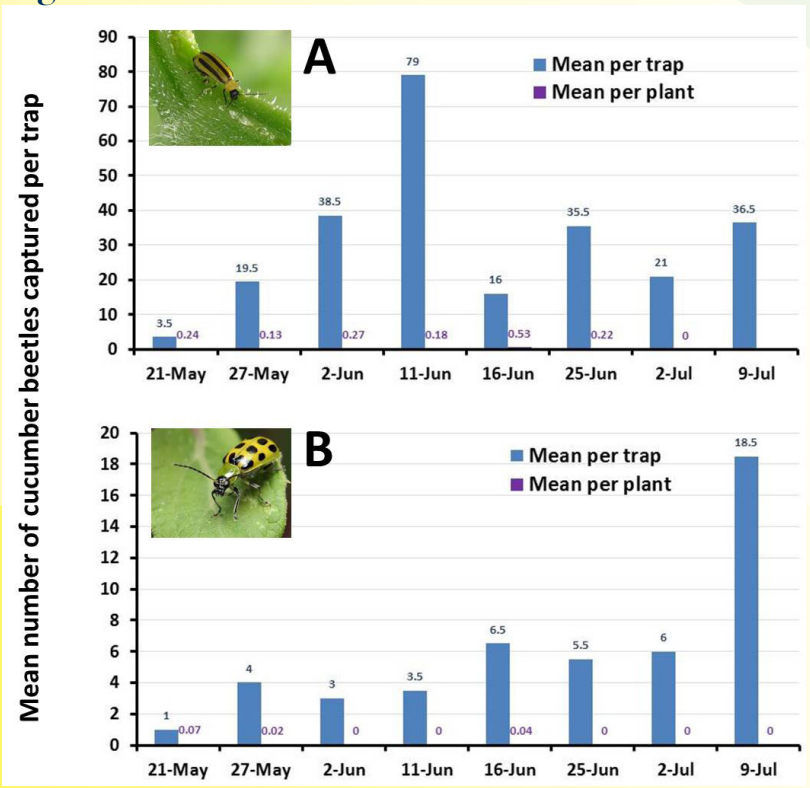


Figure 1. (above) Captures of (A) striped and (B) spotted cucumber beetles in yellow-painted traps in a zucchini plot in Truxton, Missouri (2015 data). At each trapping date, 45 plants were inspected for cucumber beetles.

Figure 2: A and B

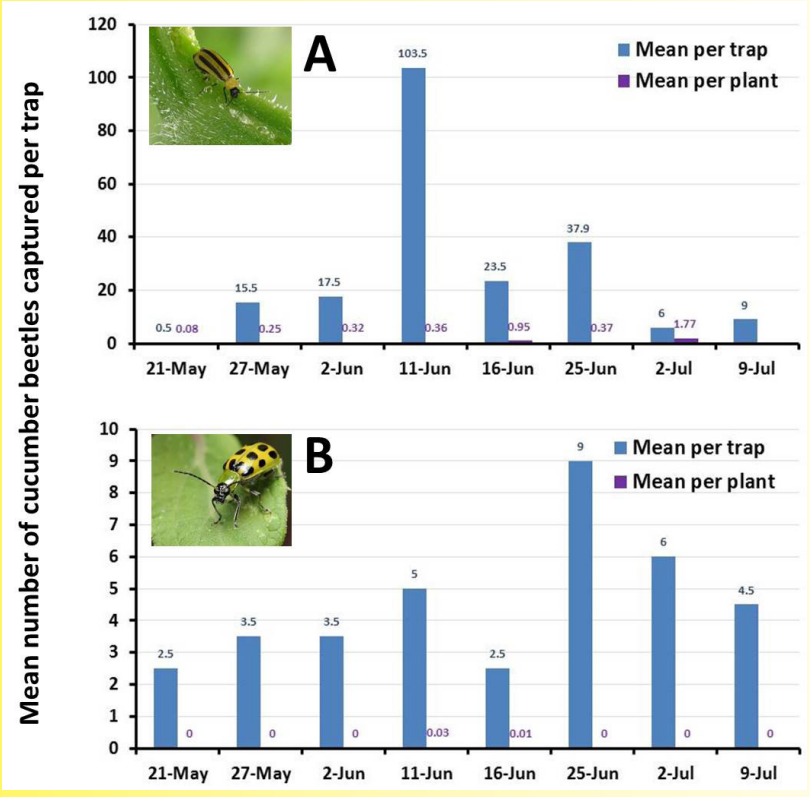


Figure 2. (right) Captures of (A) striped and (B) spotted cucumber beetles in yellow-painted traps in a cucumber plot in Truxton, Missouri (2015 data). At each trapping date, 75 plants were inspected for cucumber beetles.

2016 On-Farm Study

The floral-based AgBio© lure and the yellow color of the trap can attract honey bees. Therefore, entrances should be big enough to allow cucumber beetle access but small enough to exclude the honey bee. On April 29, 2016, 15 yellow-painted traps (Figure 3A, *right*) baited with the AgBio© lure were set up in a two-acre planting of zucchini, yellow summer squash and cucumbers in Truxton, Missouri. The goal of the replicated study was to measure the effectiveness of three slot construction methods (Figure 3B, middle). The second was a high-speed, cutoff disk mounted on a handheld rotary or oscillating tool (such as a Dremel® tool) to make a slot of uniform width or thickness limited to 1/8-inch. The third method was to cut the slot with a knife. This allows the slot to be any width, but it is difficult to maintain a consistent width. Therefore, slots are often too wide. The first method uses a handheld paper hole punch that makes a hole ¼-inch in diameter. Starting with a horizontal knife slit allows the hole puncher to be inserted. When complete, the container sides spring back to close the slit.

Overall, the 15 traps killed 3,217 striped cucumber beetles in six weeks. Table 1 (*right*) shows the average beetle counts seen on plants versus the average number found in traps. The ratio of trapped beetles to those found on plants ranged from 7:1 to 23:1. The highest ratio of beetles trapped versus observed on plants was recorded three weeks after the insecticide application, when the pesticide suppression effect should have lessened. This supports the observation that traps have the potential to keep cucumber beetles below the economic threshold for pesticide application.

Figure 3: A and B

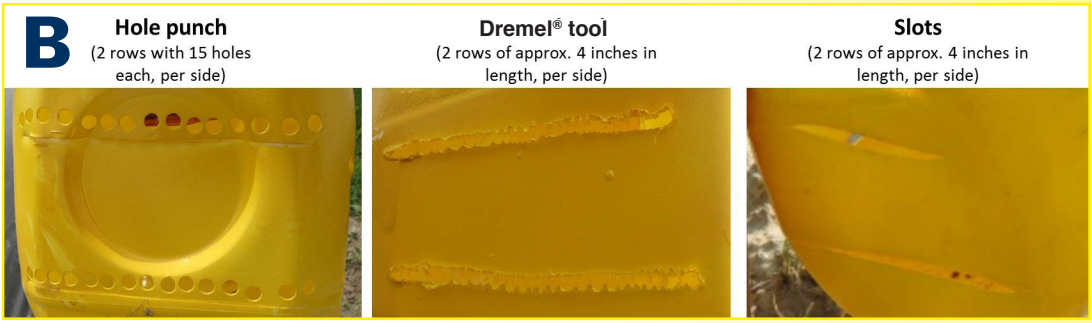


Figure 3. (A) View of the cucumber beetle mass trapping devices deployed in a summer squash plot in Truxton, Missouri, and (B) the three types of entrance holes for cucumber beetles that were evaluated. The entire surface area was similar across opening types.

Table 1: Cucumber beetle data for the 2016 mass trapping (15 traps).

DATE	Total no. striped cucumber beetles	Average no. striped beetles per trap	Average no. striped cucumber beetles per plant	Ratio*
April 29-May 12	1,632	108.8	11.9	9.1
May 13-17	579	38.6	3.7	10.4
May 18-22	141	9.4	1.3	7.2
May 23-31	501	33.4	2.9	11.5
June 1-6	176	11.7	0.5	23.4
June 7-14	188	12.5	0.75	16.7
Total captured	**3,217**			

From this study, conclusions were made about the performance of the three types of entrance holes. The 1/8-inch horizontal slot made with the Dremel® tool seemed too narrow. The freehand knife slot was too variable; however, it was effective if the width was kept at about 1/4-inch. The hole punch entrances excluded honey bees and allowed the maximum number of cucumber beetle captures. Only one honey bee (by a trap with slots made with a Dremel® tool) was captured over the six-week trapping period.

Overall, the results show that this mass trapping system is effective at suppressing cucumber beetles from cucurbit plants. Producers in two Missouri locations are now evaluating the performance of this mass trapping system.

Figure 4: A and B

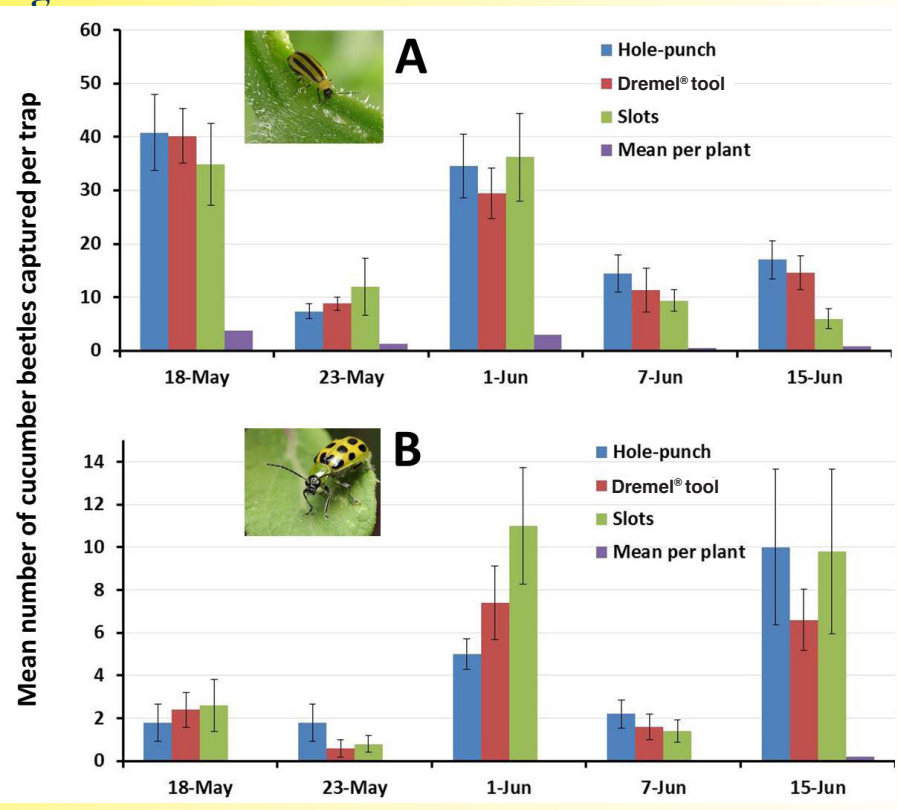


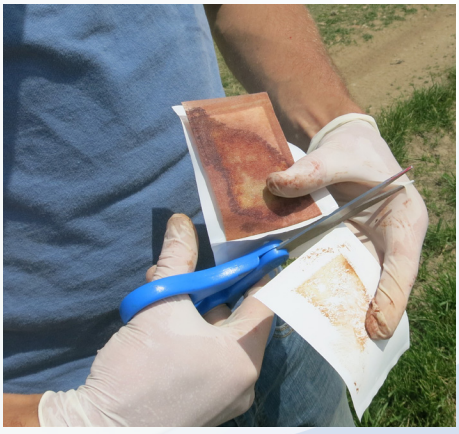
Figure 4. Captures of (A) striped and (B) spotted cucumber beetles in yellow-painted traps according to the type of entrance hole in a summer squash plot in Truxton, Missouri (April 29-June 15, 2016). At each trapping date, 45 plants were inspected for cucumber beetles.

Trap Construction Using a One-gallon Milk or Juice Container

Step 1: Trap entrances can be a series of round holes made by a paper hole punch or horizontal slots cut with a knife or Dremel®-type power tool. If using the paper hole punch, a horizontal knife cut prior to punching the holes provides access for the tool. Entrances on all sides of the container help to disperse the lure scent. Because the scent also attracts honey bees, keep the entrance small enough to exclude them and still allow access by the cucumber beetle. The diameter of the holes or slots should not be larger than ¼-inch.

Step 2: Drop the stun pill into the trap. Unfold the scent lure and attach a short piece of string or wire. Remove the two protective white flaps (*see photo, right*) to aid in scent dispersal. Insert this through the mouth of the trap. Then, catch the string under the screw-top lid so that the lure is suspended inside the trap.

Step 3: Drive a post along the edge of a vegetable row. Using additional wire, suspend the trap from the container handle so that the trap is upright, about 4-6 inches above the ground.



Step 4: Spray-paint the traps with yellow, high-gloss paint. This has proven to increase effectiveness. Once installed, traps can easily be sprayed in place.

Product Information

The commercial lure used is produced by AgBio©, Inc., 9915 Raleigh Street, Westminster, CO 80031; (303) 469-9221; agbio@agbio-inc.com.

The stun pill can be purchased from Trécé, Inc., 7569 OK-28, Adair, OK 74330; (918) 785-3061; custserv@trece.com.

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