

Luring and Trapping Love Bugs, *Plecia nearctica* (Diptera: Bibionidae), Using Various Food Attractants

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Edited by Thai Vu

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Abstract: It's no secret that food left outside will attract various species of nuisance insects. What becomes an even bigger problem is when there are swarms of hundreds to thousands of insects already out and about during their mating flight. This is the case in a certain nuisance species called the Love Bug, or *Plecia nearctica* (D.E. Hardy) (Diptera: Bibionidae). They are abundant some times of the year in Texas and other areas in the South. This experiment was conducted in order to see if specific food sources could be used as a valid trapping method to lure this species. Five food samples were used to test the attraction of the love bug. These samples were salt water, Coca-Cola, pineapples, apple cider vinegar, and peaches. Salt water was set as the control. The fruit samples were chosen because they reflect what may be found in nature. Coca-Cola was chosen because it is a common drink that insects may encounter in urban areas. The love bugs would be attracted to the Coca-Cola the most because it has the highest sugar content. The purpose of this study was to determine what substance best attracts these nuisance species in order to trap them and prevent them from multiplying, and therefore prevent them from surfacing in large numbers. These samples were then placed outside in containers for four days. Every 24 hours, a survey was done of the amount of love bugs present in each cup. At the end of the 4 days, the bugs were removed and counted. Results show that Coca-Cola was the most efficient substance in attracting the love bugs. It was able to attract 16 bugs out of the total of 40 captured in all of the samples. The large difference in number of insects captured between the control (salt water) and Coca-Cola is a good indicator that *P. nearctica* are more attracted to the high sugar content.

Key words: *Plecia nearctica*, trapping, fruit, attraction, Texas

The Southern region of the United States is prone to having a wide variety of nuisance insects due to the climate and precipitation patterns (Thornhill 1976). Most household pests typically cause annoyance, but in large numbers some of these insects can sometimes lead to harm. Love bugs, *Plecia nearctica*, can live from 4-9 months, larvae to adult, with females laying as much as 100-350 eggs. Males will hover above vegetation and the females will crawl on it and then fly into the swarm of males. From there the female is seized by a male midflight, or it may happen

right before she takes flight. They will begin copulation and may feed on nectar or pollen in the area while copulating. The eggs are laid around decaying material on top soil with the larvae hatching after 2-4 days and eating the decaying material. The adults drink nectar, reproduce and die in the span of 2-5 days (Buschman 1976). They emerge during the springtime when the temperature is fairly warm (Vargas, Stark and Nishida 1990). These bugs in large quantities can cause hazards such as completely blinding drivers by plastering themselves onto any passing

cars' windshield (Callahan 1973, Denmark 2010). The purpose of this study was to determine what substance best attracts these nuisance species in order to trap them and prevent them from multiplying, and therefore prevent them from surfacing in large numbers. For this study the focus is on *Plecia nearctica* (commonly known as the love bug), because of how it is attracted to different types of stimuli (Arthurs, Tofangsazi and Cherry 2013). Coca-Cola should be most effective at attracting these insects since it has the highest sugar content out of all the substances used.

Materials and Methods

Five identical insect traps were created in order to catch *Plecia nearctica*. The traps were constructed by lining the inside of cardboard boxes with duct tape (ShurTech Brands, Avon, OH) which would be what the insects would stick to. The boxes used were 12 x 14 x 4 in—just bigger than your average shoebox (Katsoyannos 1994). To prepare the containers to put the food samples into, five plastic Solo cups (Dart Container, Lake Forest, IL) were cut so that they were about one-inch-tall (this was done to make sure the insects had access to food but had to enter the

cup deeper in the box). At this point, the five food samples were added into their respective cups: Coca-Cola (The Coca-Cola Company, Atlanta, GA), peach puree (Dole Food Company, Inc., GA), pineapple puree (Dole Food Company, Inc., Costa Rica), apple cider vinegar (Bragg Live Foods, Inc. Santa Barbara, CA), and salt water (control) (Morton Salt, Chicago, IL). The fruits were pureed to a thick liquid so that the traps would be more uniform. The cut plastic cups were then placed inside their individual insect traps and the traps were taken outdoors. The boxes were all placed in the same area for uniform results, but had at least three feet of space in between each one to prevent insects from being stuck on a box nearby the one it was most attracted to. The boxes were examined every 24 hours at 5:00pm each day for four days. The insects collected were *Plecia nearctica*.

Results

There were a total of 40 love bugs trapped. The salt water trap caught three love bugs. The pineapple trap caught six. The peach trap caught five. The Coca-Cola caught 16. The apple cider vinegar caught 10 (Table 1).

Table 1. Love Bug Specimens Collected in different traps

Substance	Specimen Removed (10-IV-17)	Specimen Removed (11-IV-17)	Specimen Removed (12-IV-17)	Specimen Removed (13-IV-17) ***	Totals:
Salt Water	0	2	1	0	3
Pineapples	2	2	1	1	6
Peaches	1	1	2	1	5
Coca-Cola	4	5	4	3	16
Apple cider vinegar	2	4	2	2	10
Totals:	9	14	10	7	40

***Incomplete
24 hours

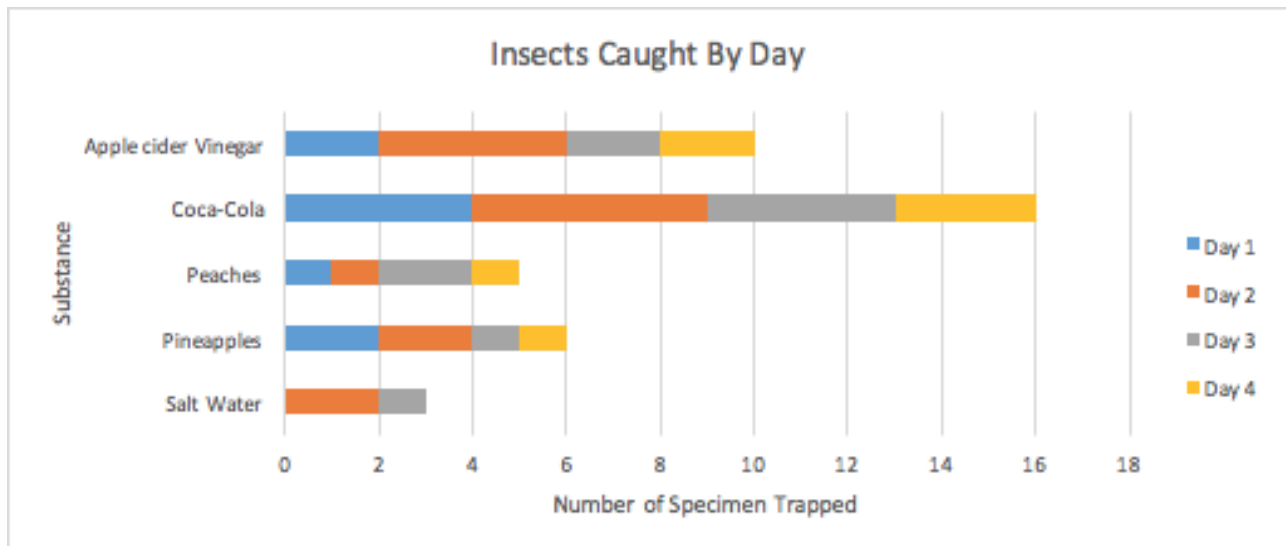


Fig. 1. Total number of Love bugs caught over a four-day period.

Discussion

The purpose of this experiment was to evaluate the best home trapping mechanism for love bugs, a common insect found during the humid months of Texas. Love bugs, or *Plecia nearctica*, are common to arid climates and is especially prominent in the spring months in Texas. Insect trapping equipment can be expensive, therefore the best way to trap using home supplies or supplies found for cheap at the store was

evaluated. The experiment took place in early April when the climate of College Station, Texas had a high humidity. This is the climate that love bugs prefer, therefore waiting until around this time was imperative to get a good sample size of insects. The traps were set up with different substances in a box that might be useful in capturing love bugs, and the results are listed in Figure 1. One thing to note in the results is that the number of insects captured was just the species, *Plecia nearctica*, as all the other specimen

were removed since they were not the specimen of interest. Through the research on love bugs feeding patterns, the hypothesis that Coca-Cola would attract the most was made. This hypothesis was upheld by the results in Table 1. In four days, the Coca-Cola was able to attract a total of 16 *Plecia nearctica*, while the second best trapping substance was apple cider vinegar with a total of 10 captured. Through research on the love bug, it was found that the best way to capture them was with something really sweet but with a slight acidity to it (Callahan, Carlysle and Denmark 1985). Pineapples have a bit of acidity, as does apple cider vinegar which might explain why these two substances attracted quite a bit of love bugs as well. Coca-Cola as the best trapping substance made the most sense as it was extremely sweet and had a kick of acidity to it. The salt water only trapped 3 insects in the four-day period, which further upholds the principle idea that a sugary-acidic substance is best for trapping. Salt water is neither sugary or acidic, therefore it did not trap the love bugs well. The reason it did trap is due to the fact that insects also need sodium. Other experimental factors might have led to this also--like touching the salt water cup after touching the pineapple cup and mixing substances. On day four, the results were skewed as it rained in College Station all day. The traps were filled with water from the rain, therefore there was less substance for the insects to be attracted to. The rain also probably kept insects from being out and about like a normal day. Both of these factors might have contributed to the significant

difference in data on the fourth day. Knowing this and knowing about the feeding patterns of the love bug, the results made sense. To further expand on this experiment, more trials could have been done to see if the results were consistent for a longer duration, or the experiment could have been set up in multiple environments. Factors like weather and environment have a strong influence on an experiment, and should be taken into consideration when considering the data. In order to further improve this experiment, one could potentially experiment with different sodas of similar sugar contents to see how much the acidity plays a factor in drawing in the love bugs. To do this, the exact same procedure would be replicated with minor alterations. Instead of different substances, different sodas with similar sugar content could be placed in the cup inside the box.

This experiment was an overall success. The best trapping mechanism was determined to be Coca-Cola and was consistent with the hypothesis of the experimenters. Through this experiment, the principle idea that using something similar to the normal feeding preferences of *Plecia nearctica* would best capture them was confirmed. All of the data is consistent with the hypothesis and the research on the feeding patterns of the love bug. Through this experiment, a simple and general trapping mechanism for love bugs was established and opened the door to future experiments.

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