

The Best Scent Attractant for *Drosophila melanogaster*

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Introduction:

Invading fruit flies are a big threat to today's produce growers and are pests to fruit-lovers (ucdavis.edu). "The key to stopping and controlling fly populations is early detection (alameda.ca)", and the most effective and least harmful way of getting rid of fruit flies is to lure then trap them in either commercial or home-made traps (bhg.com). Many field experiments have tested baits and traps for fruit flies, with surprising findings. For example, pineapple juice and brown sugar was found to attract papaya fruit flies (Casana-Giner, 2005). With this in mind, further studies can be conducted using other combinations of fruits as attractants for fruit flies. This research will help determine what types of fruit small fruit flies, *Drosophila melanogaster*, are attracted to the most.

Question: Will the fruits tested have differing levels of attractiveness to fruit flies?

Hypothesis: The fruits tested will attract different numbers of fruit flies.

Procedures

Materials:

- Cutting board
- Knife
- Aluminum foil
- Masking tape
- Three bait systems (see directions below)
- Refrigerator
- Freezer
- Funnel
- Approximately 300 *Drosophila melanogaster* (these can be obtained by ordering cultures online or by simply placing fruit outside and collecting the small flies off it hours later).



An example of *Drosophila melanogaster*

Methods

Bait System

Materials:

- 12 water bottles
- Plastic tubing
- Power drill and bits
- Ruler with centimeters

Methods:

Obtain 12 spring water bottles. Remove all labels and pour out the water. With a power drill put one hole in nine bottles and three holes in three bottles. Holes are 2.5 cm down the side of bottle and are 1 cm in diameter. Holes are made with consecutive use of 13/64, 7/16, and 1/2 drill bits. Then, the bottoms of all bottles are cut off 6 cm from the bottom of the bottle. Nine pipes that are 1 cm in diameter and 13 cm in length are cut to length. Pipes are washed with hot soapy water and allow them to dry. The pipes will connect three bottles with one hole to one bottle with three holes.



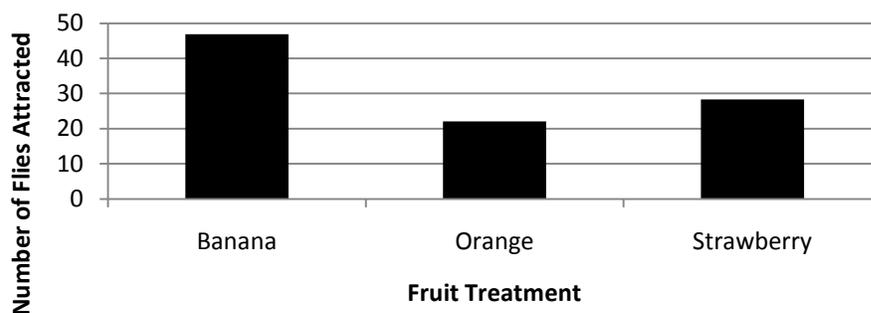
An example of a bait system

Experiment

Set up the bait systems in one room. Cut the fruit into about the same-sized chunks and place them into the bottoms of the bait system water bottles. Each bait system should contain one of each fruit and an empty water bottle for control. Reconnect the bottoms to the bait system and tape to prevent any accidental spilling. Wrap all bottles in the bait system with aluminum foil; secure the foil with masking tape. Open top on all bottles to circulate air. Refrigerate approximately one hundred *Drosophila* fruit flies for 3 minutes. After five minutes, funnel the temporarily slowed flies to the center bottle and close all tops. Observe fly behavior and allow the flies to wander for a period of 1-2 hours. Record all behavior. When the period is done, disconnect pipes from the center bottle. Tape up all holes and place the disassembled bait system in a freezer. Once all flies are dead, take the system out of the freezer. Record the number of flies in each bottle. Complete this experiment at least three times. The results of all trials can be averaged for easy depiction with a graph.

Data:

Number of Flies Attracted to Fruit



Conclusion:

Very few flies are found within the control bottle. The greatest fly attractant tested is banana, because it attracts an average of forty-seven flies. Strawberry is the next greatest attractant with twenty-nine flies attracted. Orange is the least attractive of the three fruits, attracting only twenty-one flies. Some of the variation in this project could be due to several factors. The size of the fruit probably influences how attractive it is to the fruit flies. Flies might also be confused when traveling within the bait system, causing them to not select a fruit.

Future Research:

This research could be continued in many different ways. Different types of fruit can be used in the future as well as different stages of ripeness of those fruits. As mentioned in the introduction, combinations of ingredients may also be attractive to fruit flies. So, combinations of fruit with other fruits or sugar could also be explored. The differences between male and female fly preferences could also be researched to see if there is a gender difference in fruit preference. Finally, these baits could be tested outside to see if flies outside prefer the same fruit as the flies that are tested indoors.

References:

Casana-Giner, Victor, et al. "Attractiveness of 79 Compounds and Mixtures to Wild *Ceratitis capitata* (Diptera: Tephritidae) in Field Trials." *Journal of Economic Entomology* 94 (2001): 898-904. Feb. 2005 <<http://www.entsoc.org>>.

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