Discovering the Best Fruit Fly Trap

Source: https://www.pctonline.com/article/5-tips-for-fighting-fruit-flies/

Introduction

Fruit flies on my basil plant.

- Fruit flies are a common household pest drawn to over ripe fruit and potted plants. Every time we try to keep a potted plant in our kitchen we have a fruit fly problem. This makes our house gross and it is hard to keep fresh herbs ready for making delicious dinners. If I can improve our ability to keep these nasty pests away, then we can enjoy a clean house and beautiful plants.

Fruit Fly Background Information

Close up of fruit fly eyes.

Source: https://www.science.org/content/article/proteins-sense-light-also-sense-taste-least-fruit-flies

- Fruit fly vision:
  - Fruit flies can see color because of specialized photoreceptors
  - They have a hard time seeing small details.
  - They are good at detecting motion.
- Fruit fly diet:
  - Fruit flies eat the bacteria and yeast off of over ripe fruit.
  - They like sugary and fermenting liquids like soda, beer, and wine.

Fruit Fly Trap Background Information

- Liquid traps
  - Liquid traps are commonly made using apple cider vinegar, red wine vinegar, or white vinegar because fruit flies are attracted to the smell of fermentation and sugar.
  - Vinegar is made by fermenting alcohol or acetic acid.
  - Soap is added to the vinegar and water mixture to disrupt the surface tension so that the flies fall in and can't escape.
- Sticky traps
  - Sticky traps are made by adding a lure to sticky paper that the flies are drawn to and then get stuck to and can't fly away.

Question and Hypothesis

- What is the best fruit fly trap that people can make using readily available household objects?
  - I am trying to figure out the best ingredients for homemade fruit fly traps. I want to test different types of vinegars (red wine, white wine, and apple cider vinegars) compared to sticky traps and see which one catches the most fruit flies.
  - When we had a fruit fly problem at home, we didn't have the ingredients recommended by the internet (apple cider vinegar or a sticky trap), so we wanted to see if what we had available (red wine vinegar, white wine vinegar, and rice vinegar) would work.
  - After doing initial testing, we did a more scientific controlled trial to compare our initial findings to recommendations (apple cider vinegar and sticky traps) on the internet.
- Hypothesis
  - Because vinegars have a distinct fermentation smell, I predict that the vinegar traps will attract more fruit flies than the sticky traps. Fruit flies have low resolution eyesight so I think they won't be drawn to the sticky traps.
  - I predict that apple cider vinegar will attract the most fruit flies because it smells the most like normal fruit. I think red wine vinegar will attract more flies than white wine vinegar because it is darker in color and fruit flies have good color vision.

Methods

- Field Testing:
  - In a fruit fly emergency (kitchen is full of fruit flies and people are coming over tomorrow, grab any available supplies).
  - We compared effectiveness between:

- 1 tablespoon water
- 1 tablespoon red wine vinegar
- 1 squirt of dish soap

- 1 tablespoon water
- 1 tablespoon white wine vinegar
- 1 squirt of dish soap

- 1 tablespoon water
- 1 tablespoon rice vinegar
- 1 squirt of dish soap

  - Measure and place the liquids in an open container and closed container with hole in it. Some internet articles said soap was sufficient to disrupt surface tension and trap the flies and a cover wouldn't be needed to trap the fruit flies, others recommended putting a cover with holes. We compared both.

Methods

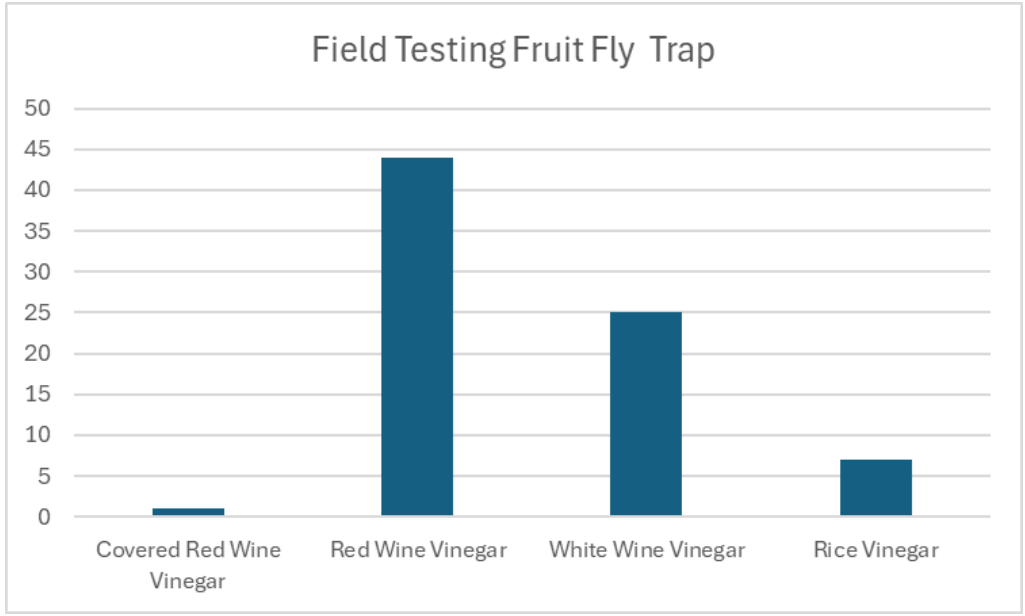
- Controlled Trial Testing:
  - After gathering data from field testing, test the ideal recommended fruit fly traps (sticky traps and apple cider vinegar) to the previous findings.
  - We compared effectiveness between:

▪ Commercially available sticky trap	▪ 1/4 cup apple cider vinegar ▪ 1 tablespoon water ▪ 1 teaspoon dish soap
▪ 1/4 cup white wine vinegar ▪ 1 tablespoon water ▪ 1 teaspoon dish soap	▪ 1/4 cup red wine vinegar ▪ 1 tablespoon water ▪ 1 teaspoon dish soap

  - Measure and place the liquids in an open container near the infested basil plant. Stick the sticky trap in the infested basil plant soil. Count the fruit flies stuck in the trap after 24 hours.

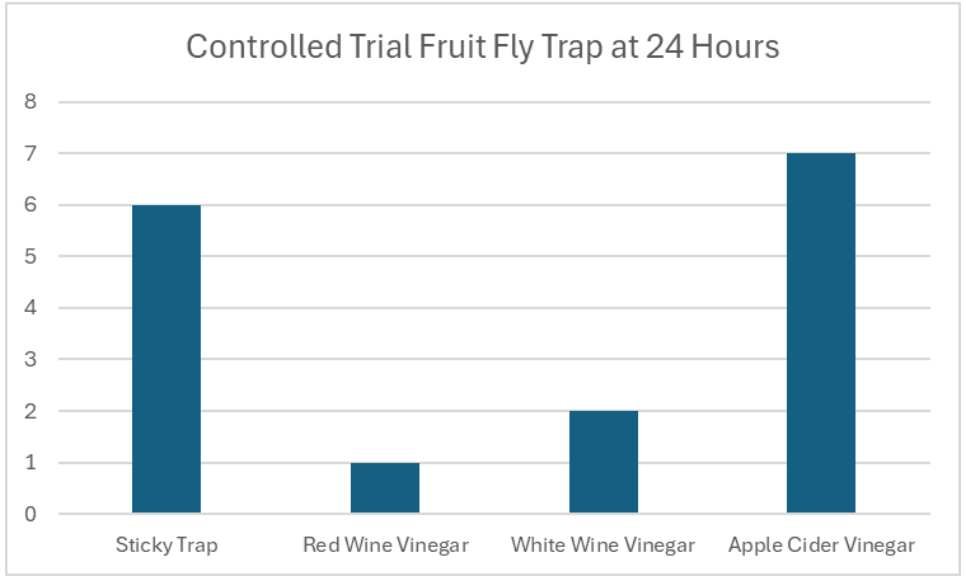
Results: Field Testing

- After 24 hours of collecting
- Covered Red Wine Vinegar: 1 Fruit Fly Caught
- Uncovered Red Wine Vinegar: 44 Fruit Flies Caught
- Uncovered White Wine Vinegar: 25 Fruit Flies Caught
- Uncovered Rice Vinegar: 7 Fruit Flies Caught
- Covered White Wine and Rice Vinegar: 0 Fruit Flies Caught
- Observation: The cover on the container inhibits catching fruit flies and is unnecessary for future testing.



Results: Controlled Trial

- After 24 hours of collecting:
  - Sticky Trap: 6 Fruit Flies Caught
  - Red Wine Vinegar: 1 Fruit Fly Caught
  - White Wine Vinegar: 2 Fruit Flies Caught
  - Apple Cider Vinegar: 7 Fruit Flies Caught



Sticky Trap

Apple Cider Vinegar

White Wine Vinegar

Red Wine Vinegar

Discussion

- When compared, the internet recommended apple cider vinegar to the red wine and white wine vinegars we had previously tested, apple cider vinegar is a better fruit fly trap than any other vinegar tested.
- The sticky trap was almost as good as the apple cider vinegar.
- When the ideal materials are not available, red wine vinegar was a good substitute and can catch a lot of flies when it doesn't have to compete with the gold standard apple cider vinegar.

Future Research

- We wanted to repeat the controlled trial a few more times to see if we would get different results, but between the two experiments, we got rid of all of our fruit flies. The experiment was a success in terms of ridding our kitchen of pesky flies, but a future scientist could improve the reliability of our findings with future research.
- We tried overwatering our basil plant, and getting a new basil plant in hopes of attracting more flies to repeat the experiment, but the new flies never came.
- In the future we might try just putting out a sticky trap or vinegar trap every time we get a new house plant to see if we can prevent fruit flies from becoming a problem in the first place.

References

- Title Slide Photo
  - https://www.pctonline.com/article/5-tips-for-fighting-fruit-flies/
- Slide 3
  - Photo:
    - https://www.science.org/content/article/proteins-sense-light-also-sense-taste-least-fruit-flies
  - Information:
    - https://zuckermaninstitute.columbia.edu/how-do-fruit-flies-see-color-columbia-study-uncovers-human-brain-circuit-work
    - https://www.terminix.com/other/flies/what-do-flies-eat/#:~:text=Do%20fruit%20flies%20eat%20fruit,where%20people%20discard%20rotten%20fruit.
- Slide 4
  - Information:
    - https://www.cottageonbunkerhill.com/how-to-get-rid-of-fruit-flies/