
FRUIT PREFERENCE AMONG TERRESTRIAL MACROINVERTEBRATES ON THE CAMPUS OF JUNIATA COLLEGE

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ABSTRACT

Our experiment examined the fruit preference (apple, pear, banana or orange) of terrestrial macroinvertebrates on the Juniata College campus. We hypothesized that the banana option would be preferred, because bananas contain the highest sugar per gram of the fruit options. We tested this hypothesis by setting eight baited traps, two of each fruit option, around the campus of Juniata College in randomly selected locations. After twenty-four hours, we collected the traps and quantified the amount of macroinvertebrates. Afterwards, we ran an ANOVA single-factor test for significance. The results showed no significance among fruit preference of terrestrial macroinvertebrates on the campus of Juniata College.

Keywords: terrestrial macroinvertebrates, fruit preference, random number generator (RNG)

INTRODUCTION

Terrestrial macroinvertebrates are land-dwelling, macroscopic animals that lack a vertebral column, commonly called the backbone. The most prevalent and common terrestrial macroinvertebrate is insects, but this group also includes other arthropods, mollusks, and nematodes (USDA). Feeding habits among such a large and diverse class are quite varied. However, it is fairly well-known that fruit flies are a species that specialize in fruit (Fruit Flies & Food). Lesser known is that many different species of insects specialize in fruit, and previous studies have supported the idea that insects prefer some samples of fruit over other samples. A study published in International Journal of Tropical Insect Science provided data that supported the hypothesis that the melon fruit fly preferred *C. savitus* and *C. pepo* over the other fruit options provided (Farooq 2019). Other studies, such as the separate studies ran by Dworkin and Jones (2009) and Zhang et al. (2019), have delved into which part of the genetic code is responsible for host specialization and feeding preference. There are

comprehensive studies of fruit preference, but only on specific species. To see if there was fruit preference among terrestrial macroinvertebrates in general, we decided to test the fruit preference among terrestrial macroinvertebrates, and our sample area was the campus of Juniata College.

METHODS AND MATERIALS

On April 12th, 2022, we set out baited sticky traps contained within wire mesh (Fig. 1) at eight different locations around campus chosen via random selection. Wire mesh was employed to prevent access by vertebrate animals.

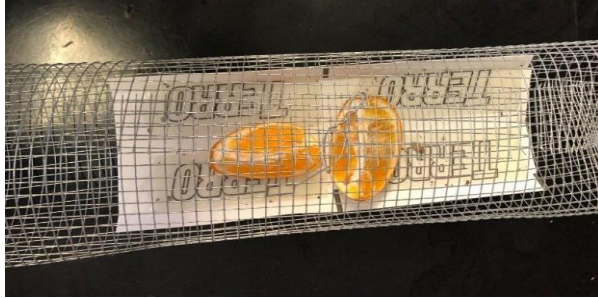


Figure 1: The traps that were used. Contained within the wire mesh is a sticky trap baited with an orange.

To ensure that our locations were random, we divided the Juniata College campus into a grid and used a random number generator (RNG) (Fig. 2). The one tile that was off of the grid was due to human error (to the left of tile six). Juniata College’s campus was located in a relatively rural area with neighboring residences and forested areas, which supported our study by creating an environment with high densities of terrestrial macroinvertebrates. Eight sticky traps were set with four different fruit types as bait, including apples, bananas, oranges, or pears.

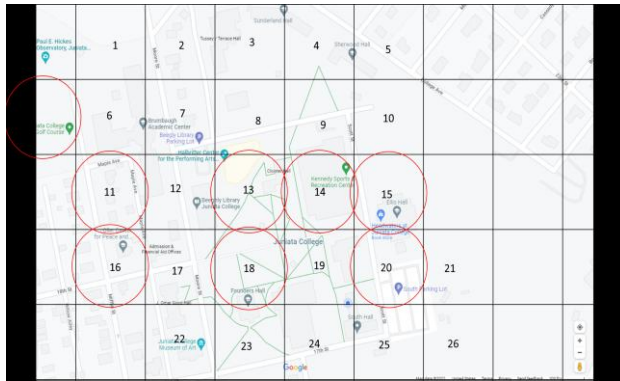


Figure 2. The campus of Juniata College and the locations selected with random number generation.

Twenty-four hours later, we collected the traps and counted the quantity of macroinvertebrates on each trap. The results were documented. The purpose of the study was to indicate which of the four types of fruit that insects and similar organisms (terrestrial macroinvertebrates) preferred (fruit preference), if there was any preference at all.

RESULTS

The data was compiled in a table (Table 1) which displays the quantity of terrestrial macroinvertebrates found at each trap, as well as the section number from the grid in Fig. 1 and the bait type.

Table 1. Quantitative data collected from the baited traps.

Section #	Bait Type	Quantity
13	Pears	24
7	Bananas	102
14	Oranges	42
1	Oranges	73
20	Bananas	8
15	Apples	10
11	Pears	31
18	Apples	12

The terrestrial macroinvertebrates showed no significant preference for any of the four types of fruit (Table 2). The single-factor ANOVA test produced a F value of 0.81665, and since $0.81665 < 1$, this supports the null hypothesis instead of the alternative hypothesis. The ANOVA also provided a P-value of 0.548131, and since $0.548131 > 0.05$, this supports the null hypothesis.

Table 2. Summary of results from a ANOVA single-factor test.

Anova: Single Factor				
SUMMARY				
Groups	Count	Sum	Average	Variance
Pear	2	55	27.5	24.5
Banana	2	110	55	4418
Orange	2	115	57.5	480.5
Apple	2	22	11	2

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	3016.5	3	1005.5	0.81665	0.548131	6.591382
Within Groups	4925	4	1231.25			
Total	7941.5	7				

These results support the null hypothesis that there is no significant preference for any of the fruit types tested (apples, pears, oranges, bananas) among terrestrial macroinvertebrates on the campus of Juniata College.

DISCUSSION

Our data analysis shows that there was no significant preference for any of the four types of fruit, which does not support our proposed hypothesis that terrestrial macroinvertebrates would prefer the banana. This means that terrestrial macroinvertebrates did not significantly prefer any one fruit option over the other fruits, which contradicts our proposed hypothesis. We theorized that terrestrial macroinvertebrates would prefer the banana option because of its higher sugar per gram compared to the other fruits. A possible explanation for this result lies in the variability among species and the number of individuals of terrestrial macroinvertebrates present throughout each baiting location. This could be a result of different biomes on an insect-level scale. This could also be, in part, due to the possibility of pesticide usage by the facilities department in close proximity to the buildings across campus. Additionally, our results could have been more reliable (i.e., less variance) and conclusive if we incorporated several more sticky traps to test additional trials with each bait type.

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