

Essay on the number of replicates in each habitat vegetated and unvegetated in th...

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INSECT HABITAT

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Average and Median

What was the average number of arthropods found in the unvegetated microhabitat? 0.46

What was the average number of arthropods found in the vegetated microhabitat? 0.14

What was the median number of arthropods found in the unvegetated microhabitat? 0

What was the median number of arthropods found in the vegetated microhabitat? 0

What was the average number of beetles found in the unvegetated microhabitat? 0.39

What was the average number of beetles found in the vegetated microhabitat? 0.79

What was the median number of beetles found in the unvegetated microhabitat? 0

What was the median number of beetles found in the vegetated microhabitat? 0

What was the average number of ants found in the unvegetated microhabitat? 1.93

What was the average number of ants found in the vegetated microhabitat? 2.25

What was the median number of ants found in the unvegetated

microhabitat? ____1. 0____

What was the median number of ants found in the vegetated microhabitat?
____0____

SUM TOTALS OF INSECTS IN EACH ENVIRONMENT

The total number of specimens in the vegetated environment is 89

The total number of specimens in the unvegetated environment is 79

Total arthropods in vegetated environment is 4

Total beetles in vegetated environment is 63

Total ants in vegetated environment is 22

Total arthropods in unvegetated environment is 13

Total beetles in unvegetated environment is 11

Total ants in unvegetated environment is 54

There is also 1 unknown species in the unvegetated environment

Kruskal-Wallis test

This test is a one-way measure of variance. In order to find out if there is a significant difference between the arthropods, beetles or ants in the vegetated and unvegetated environments respectively the Kruskal-Wallis test was performed. There are only 2 microhabitats (groups) being compared against each other for each type of insect.

What was the p value for this statistical test for total arthropods? ____0. 168____

Was there a significant difference in the median number of arthropods found in vegetated versus unvegetated microhabitats? ____Yes____

What was the p value for this statistical test for total beetles? ____0. 308____

Was there a significant difference in the median number of beetles found in vegetated versus unvegetated microhabitats? _____ Yes _____

What was the p value for this statistical test for total ants? _____ 0.0099 _____

Was there a significant difference in the median number of ants found in vegetated versus unvegetated microhabitats? _____ No _____

Shannon Weiner Diversity Test

Shannon-Wiener Index denoted by $H = -\sum [(p_i) \times \ln(p_i)]$ SUM = summation p_i = proportion of total sample represented by

species i Divide no. of individuals of species i by total number of samples S = number of species, = species richness $H_{\max} =$

$\ln(S)$ Maximum diversity possible $E = \text{Evenness} = H/H_{\max}$

Shannon – Weiner diversity index for vegetated microhabitat _____ -0. 83 _____

Shannon – Weiner diversity index for unvegetated microhabitat _____ -0.87 _____

Please see excel file for calculations of the Shannon-Weiner diversity index H and Graphs.

Series 1 is Vegetated Habitat and Series 2 is Unvegetated Habitat in Rank Abundance Graph

Species diversity consists of two components: species richness and species evenness. Species richness is a simple count of species, whereas species evenness quantifies how equal the abundance of the species may be present.

This Rank Abundance graph shows that the Ant D, Blaps Kollari, Ant A and

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Ant H samples had higher Species richness because they were found in a higher proportion in the data.

This graph shows that both the vegetated and the unvegetated habitat samples had roughly equal species evenness because the species were roughly evenly divided in both habitats.

Darkling beetle (Tenebrionidae beetles) biology

Tenebrionidae beetles are one of the largest families of beetles found in nature in both temperate and tropical climates. The family name is derived from the Latin word tenebrio meaning one who loves darkness (Ref: Darkling Beetles, Family Tenebrionidae by Debbie Haddley). There are over 15, 000 species in this family but all share some common characteristics. These darkling beetles tend to be short and dark and some have bright markings (Ref: Encyclopedia Britannica).

Diet

The diet of these beetles usually includes plant material or dead and decaying vegetation or animal matter. Thus they scavenge on plant and animal material even including stored grains and flour.

Special Adaptations

In response to stressful situations these beetles emit a foul-smelling liquid to prevent predators from eating them (Ref: Darkling Beetles, Family Tenebrionidae by Debbie Haddley).

Life cycle

The Life cycle of these beetles typically includes egg, larva, pupa and adult stages. Female darkling beetles usually lay their eggs in the soil with the larva and pupa stages also occurring in the soil.

Thus it is clear that vegetation plays some role in the beetles life cycle and diet. A desert environment that lacks sufficient vegetation may make it difficult for these beetles to survive and thrive. This may explain why there are significantly more Darkling beetles in the vegetated microhabitat as compared to unvegetated microhabitat in nature.

“ Generally, ecologists find more beetles in vegetated parts of the desert compared with unvegetated microhabitats”. This does not seem to be the case with our results overall. The beetle species *Blaps kollari* appear to be evenly distributed between the 2 habitats in our data. The other 2 beetle Species *Adesmia cancellata* and *Mesostema puncticollis* appear to be slightly more prevalent in vegetated habitats compared to unvegetated habitats in the data collected. No member of either of these 2 beetle species was seen in the unvegetated habitat and this could be due to the sample size being small or it could be a real effect in larger data sets indicating that these types of beetles struggle to live in unvegetated habitats.

3 possible ecological reasons why beetles prefer to live in vegetated areas as opposed to sand areas are: 1) diet-access to food 2) life style such as laying eggs in soil and remaining life cycle in soil or dark areas and 3) protection from harsh weather and predators may be better supported in vegetated areas.

ECOLOGY EXPERIMENTAL STUDY TO TEST HYPOTHESIS

Access to food may be a factor which results in more Darkling beetles preferring to live in vegetated habitats. It could also be that since Darkling beetles love the dark they may not be able to get enough protection from harsh light unvegetated habitats such as in the desert. Most ecology experiments for hypothesis testing include the basic steps: (1) sampling methods, (2) collecting specimens, (3) gathering and organize data, (4) running statistical tests.

Sampling: A large number of beetles of 2 species of beetles could be collected from vegetated and unvegetated habitats similar to what was done in this experiment but on a much larger scale. It may also be better to focus on only 2 beetle species with contrasting environmental preferences. One species could be from the Darkling beetle type which prefers the dark and the other could be a beetle type that does not do very well in dark and cannot scavenge on dead or decaying plant matter. This other beetle species should prefer unvegetated environments such as desert sands and be able to absorb water from desert sands and identified from other ecology studies.

Data collection: Once the samples are collected from their natural habitats in sufficient numbers they should be identified and data generated. An ideal sample size would be in the range of $n = 100$ to 1000 for each of the 2 beetle species collected from various different habitats accessible.

Data Analysis and Statistical Tests: Next the data should be organized in 2 columns for each beetle species and analyzed based on their environmental preferences. A statistical test for variance called Mann-Whitney U Test should then be performed to check the variance. If the variation is significant it <https://assignbuster.com/essay-on-the-number-of-replicates-in-each-habitat-vegetated-and-unvegetated-in-the-data-is/>

could indicate that these beetle species really do prefer one type of habitat over another. There could be various biological reasons for this preference and could be further analyzed based on these differences. If there is no significant variation then it may indicate that there is no significant preference of the Darkling beetle for the vegetated environment.

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