   
Purpose: To reseach about which area of the school has the most biodiversity and by doing this we will use the activies for the Carolina Expoloring Biodiversity Kit which are Camparing Habitat Diversity, Comparing Ant Populations in Different Habitats, and Assessing the Diversity of Speicies.  
   
Hypothesis:  
Our hypothesis is that the area which half is covering by shadow and half is under the sunlight would has the most biodiversity, and the area having more trees are staying together would have the most biodiversity. Because we think that an area has different habitat can allow more type of specie to live in there.

***Alternative Activity-1 . Habitat Islands and Diversity***

***Materials***

1.      Cardboard pieces

2.      Hand lens

3.      resalable bags

4.      toothpicks

5.      hand brooms

6.      permanent marker

7.      white paper

8.      freeze or alcohol and cotton ball

9.      calculator

10.  graph paper

11.  pencil

12.  ruler

13.  survey flags or tape

14.  Table 1.1  4 copies, 1.2 4 copies, and 1.3

***Procedure***

You can fine the procedure in “AP Environmental Science” (Carolina Exploring Biodiversity Kit) (Student Guide)  page number : S-12, S-13, and S-14.

***Activity- 2 . Comparing Ant Populations in Different Habitats***

***Materials***

1.      Corn syrup

2.      Cotton swabs

3.      Tuna in oil

4.      Plastic cups/containers

5.      Index cards (16 per groups)

6.      Hand lens

7.      Spoon or scoop

8.      Watch or clock

9.      Ruler

10.  Pencil

***Procedure***

You can fine the procedure in “AP Environmental Science” ( Carolina Exploring Biodiversity Kit) (Student Guide)  page number : S-16, and S-17.

***Activity- 3 .  Assessing the Diversity of Species***

***Materials***

1.      16 sticky traps

2.      Hole punch

3.      Permanent marker

4.      16 paper clips

5.      Graph paper

6.      Table 3.1

***Procedure***

***You can fine the procedure in “AP Environmental Science” ( Carolina Exploring Biodiversity Kit) (Student Guide)  page number : S-19.***

**Observation:**

key words definitions:

ni: number of individual morphtype

N: total number of all the morphtypes in an area

nx (a number): a name for the specie

S: number if how many specie

Shannon. : Shannon-Wiener Index of Diversity. determine the biodiversity by using number 0-7, 0 means no biodiversity, 7 means has the highest biodiversity

Richness. : Species Richness. determine the biodiversity by using number, if the number us high, th biodiversity is high.

Simpson. : Simpson's Index of Diversity. determine the biodiversity by using number 0-1, 0 means no biodiversity, 1 means has the highest biodiversity

This observation is showing the data from the three activities that we done by tables

**Table 1: different kind of morphtypes found by using funnels**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 1.1 Bunkers funnel morphotypes data collector of Area A** | | | |
| **Area description** | **Morphotypes** | **ni** | **N** |
| **Between soccer field and school building; half of the area is cover by sunlight and another isn’t; dry soil** | n1 | 8 | 24 |
| n2 | 2 |
| n3 | 3 |
| n4 | 1 |
| n5 | 1 |
| n6 | 1 |
| n7 | 1 |
| n8 | 14 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 1.2 Bunkers funnel morphotypes data collector of Area B** | | | | |
| **Area description** | **Morphotypes** | **ni** | **N** | |
| **Back playground** | n1 | 2 | 24 |  |
| n2 | 3 |  |
| n3 | 1 |  |
| n4 | 1 |  |
| n5 | 2 |  |
| n6 | 4 |  |
| n7 | 9 |  |
| n8 | 9 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 1.3 Bunkers funnel morphotypes data collector of Area C** | | | |
| **Area description** | **Morphotypes** | **ni** | **N** |
| **Near the bus parking lot, under the bush** | n1 | 1 | 5 |
| n2 | 1 |
| n3 | 1 |
| n4 | 1 |
| n5 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 1.4 Bunkers funnel morphotypes data collector of Area D** | | | |
| **Area description** | **Morphotypes** | **ni** | **N** |
| **Beside the playground** | n1 | 1 | 6 |
| n2 | 1 |
| n3 | 4 |
|  | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 1.5: Diversity Index result of Bunkers funnel morphotypes data collector** | | | |
|  | **Simpson.** | **Shannon.** | **Richness** |
| **Area A** | 0.628 | 1.44 | 8 |
| **Area B** | 0.8 | 1.75 | 8 |
| **Area C** | 0.8 | 1.61 | 5 |
| **Area D** | 0.5 | 0.87 | 3 |

**Calculation example of Simpson’s index of Diversity**

·  **Area 1:**

§         **1-[(2/24)\* (2/24)+(3/24)\* (3/24)+(1/24)\* (1/24)\*5]**

§         **=0.628**

·  **Area 2:**

§         **1-[(2/24)\*(2/24)\*3+(1/24)\*(1/24)\*2+(2/24)\*(2/24)+(4/24)\*(4/24)+(9/24)\*(9/24)]**

§         **=0.8**

·  **Area 3:**

§         **1-[(1/5)\*(1/5)\*5]**

§         **=0.8**

·  **Area 4:**

§         **1-[(1/6)\*(1/6)\*2+(4/6)\*(4/6)]**

§         =0.5

**Table 2: different kind of morphtypes found by using sugar and tuna cards**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 2.1: Ant population data collector (Sugar)** | | | | |
| **Area description** | **S** | **Morphotypes** | **ni** | **N** |
| **Between soccer field and school building; half of the area is cover by sunlight and another isn’t; dry soil** | **2** | **Black ant** | **1** | **31** |
| **Small red ant** | **30** |
| **Back playground** | **1** | **Normal ant** | **90** | **90** |
| **Near the bus parking lot, under the bush** | **1** | **Black small ant** | **4** | **4** |
| **Beside the playground** | **1** | **Normal ant** | **>40** | **>40** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 2.2: Ant population data collector (Tuna)** | | | | |
| **Area description** | **S** | **Morphotypes** | **ni** | **N** |
| **Between soccer field and school building; half of the area is cover by sunlight and another isn’t; dry soil** | **1** | **Small red ant** | **30** | **3** |
| **Back playground** | **1** | **Normal ant** | **70** | **70** |
| **Near the bus parking lot, under the bush** | **1** | **Big red ant** | **40** | **40** |
| **Beside the playground** | **1** | **Normal ant** | **>70** | **>70** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 2.3: diversity result of Ant population data collector (Sugar)** | | | |
|  | **Simpson.** | **Shannon.** | **Richness** |
| **Area A** | 0.06 | 0.14 | 2 |
| **Area B** | 0 | 0 | 1 |
| **Area C** | 0 | 0 | 1 |
| **Area D** | 0 | 0 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 2.2: diversity result of Ant population data collector (Tuna)** | | | |
|  | **Simp.** | **Shamon.** | **Richness** |
| **Area A** | 0 | 0 | 1 |
| **Area B** | 0 | 0 | 1 |
| **Area C** | 0 | 0 | 1 |
| **Area D** | 0 | 0 | 1 |

By Ben (From table 1 to 2)

**Table 3: different kind of morphtypes found by using sticky trips**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| **Very small  fruit fly** | **0** | **0** | **0** | **-** | **0** | **0** | **0** | **0** | **-** |
| **Mosquito** | **0** | **0** | **0** | **-** | **0** | **0** | **0** | **0** | **-** |
| **Flying ant** | **0** | **0** | **-** | **-** | **0** | **0** | **0** | **0** | **-** |
| **Fruit fly** | **0** | **0** | **-** | **-** | **0** | **1** | **0** | **1** | **-** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| **Very small fruit fly** | **0** | **0** | **0** | **0** | **0** | **0** | **-** | **0** | **-** |
| **Mosquito** | **0** | **0** | **0** | **0** | **0** | **0** | **-** | **0** | **-** |
| **Flying ant** | **0** | **0** | **0** | **1** | **0** | **0** | **-** | **0** | **-** |
| **Fruit fly** | **1** | **0** | **1** | **0** | **0** | **0** | **-** | **0** | **-** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** |
| **Very small     fruit fly** | **-** | **0** | **0** | **0** | **-** | **-** | **3** | **0** | **Na** |
| **Mosquito** | **-** | **0** | **0** | **0** | **-** | **-** | **0** | **0** | **Na** |
| **Flying ant** | **-** | **0** | **0** | **0** | **-** | **-** | **0** | **0** | **Na** |
| **Fruit fly** | **-** | **0** | **1** | **1** | **-** | **-** | **0** | **36** | **Na** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **28** | **29** | **30** | **31** | **32** | **33** | **34** | **35** | **36** |
| **Very small fruit fly** | **0** | **2** | **1** | **7** | **1** | **0** | **-** | **-** | **0** |
| **Mosquito** | **0** | **6** | **0** | **6** | **0** | **0** | **-** | **-** | **0** |
| **Flying ant** | **0** | **0** | **0** | **6** | **0** | **0** | **-** | **-** | **0** |
| **Fruit fly** | **0** | **6** | **0** | **0** | **0** | **0** | **-** | **-** | **0** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **37** | **38** | **39** | **40** | **41** | **42** | **43** | **44** | **45** |
| **Very small fruit fly** | **0** | **5** | **2** | **0** | **1** | **0** | **0** | **-** | **-** |
| **Mosquito** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **-** | **-** |
| **Flying ant** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **-** | **-** |
| **Fruit fly** | **0** | **0** | **0** | **0** | **8** | **0** | **0** | **-** | **-** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **46** | **47** | **48** | **49** | **50** | **51** | **52** | **53** | **54** |
| **Very small  fruit fly** | **0** | **0** | **0** | **Na** | **Na** | **Na** | **Na** | **Na** | **Na** |
| **Mosquito** | **0** | **0** | **0** | **Na** | **Na** | **Na** | **Na** | **Na** | **Na** |
| **Flying ant** | **0** | **0** | **0** | **Na** | **Na** | **Na** | **Na** | **Na** | **Na** |
| **Fruit fly** | **0** | **0** | **0** | **Na** | **Na** | **Na** | **Na** | **Na** | **Na** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **55** | **56** | **57** | **58** | **59** | **60** | **61** | **62** | **63** |
| **Very small fruit fly** | **Na** | **Na** | **Na** | **Na** | **Na** | **Na** | **-** | **-** | **0** |
| **Mosquito** | **Na** | **Na** | **Na** | **Na** | **Na** | **Na** | **-** | **-** | **0** |
| **Flying ant** | **Na** | **Na** | **Na** | **Na** | **Na** | **Na** | **-** | **-** | **1** |
| **Fruit fly** | **Na** | **Na** | **Na** | **Na** | **Na** | **Na** | **-** | **-** | **0** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **64** | **65** | **66** | **67** | **68** | **69** | **70** | **71** | **72** |
| **Very small fruit fly** | **0** | **2** | **-** | **3** | **-** | **2** | **0** | **-** | **0** |
| **Mosquito** | **0** | **0** | **-** | **0** | **-** | **0** | **0** | **-** | **0** |
| **Flying ant** | **0** | **0** | **-** | **0** | **-** | **0** | **0** | **-** | **0** |
| **Fruit fly** | **0** | **1** | **-** | **0** | **-** | **0** | **0** | **-** | **1** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **73** | **74** | **75** | **76** | **77** | **78** | **79** | **80** | **81** |
| **Very small fruit fly** | **1** | **-** | **-** | **-** | **0** | **-** | **-** | **2** | **1** |
| **Mosquito** | **0** | **-** | **-** | **-** | **0** | **-** | **-** | **0** | **0** |
| **Flying ant** | **0** | **-** | **-** | **-** | **0** | **-** | **-** | **0** | **1** |
| **Fruit fly** | **0** | **-** | **-** | **-** | **0** | **-** | **-** | **1** | **0** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **82** | **83** | **84** | **85** | **86** | **87** | **88** | **89** | **90** |
| **Very small fruit fly** | **-** | **-** | **3** | **-** | **-** | **0** | **0** | **0** | **-** |
| **Mosquito** | **-** | **-** | **1** | **-** | **-** | **0** | **0** | **0** | **-** |
| **Flying ant** | **-** | **-** | **0** | **-** | **-** | **0** | **0** | **0** | **-** |
| **Fruit fly** | **-** | **-** | **0** | **-** | **-** | **1** | **0** | **0** | **-** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Morphotype** | **91** | **92** | **93** | **94** | **95** | **96** |  |  |  |
| **Very small fruit fly** | **-** | **-** | **-** | **0** | **0** | **-** |  |  |  |
| **Mosquito** | **-** | **-** | **-** | **0** | **0** | **-** |  |  |  |
| **Flying ant** | **-** | **-** | **-** | **0** | **0** | **-** |  |  |  |
| **Fruit fly** | **-** | **-** | **-** | **0** | **0** | **-** |  |  |  |

 By Ice

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | | |  |
| **morphotypes** |  | **N for each morphotypes** | **N for total number** | |
| **Small insect** | **36** | **117** | |
| **Mosquito** | **13** |
| **Frying ant** | **8** |
| **Fruit fry** | **60** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 3.3: Diversity result of Assessing the Diversity of Species** | | | |
|  | **Simpson.** | **Shannon.** | **Richness** |
| **School area around the parking lot and area near the cannel** | 0.63 | 1.13 | 4 |

By Ben

**Conclusion:**

         Our main purpose of doing this lab is to find out which area at the school will have the most biodiversity. Our hypothesis is that the area which half is covering by shadow and half is under the sunlight would has the most biodiversity, and the area having more trees are staying together would have the most biodiversity. The reason that we think my hypothesis is true is because that the area which is covering by shadow and under the sunlight have more different kind of habitat from different organism. So, by this reason, we belief that our hypothesis is true

         To know that our hypothesis was true or not, we picked four areas with different kind of habitat, and used three different kind of experiment or activity to text the biodiversity in those four areas. Our first activity was to use berlese funnels to carry the soil from different areas, and we were trying to find out how many species were lived in those soils and how many types were there. Second activity was to put sugar and tuna on four cards, and we would put those put on the areas that we picked. And our third activity was to place sticky trips around the school areas. The control variable of our lab was the areas that we choose. And one thing that made our lab would be a little of inaccurate was the rain destroyed our sticky trip.

         The result of our experiment was that Area B, the area were mostly cover with shadow, and had trees had the most biodiversity according to the result of activity 1 but not activity 2; area A, the area which half is covering by shadow and half is under the sunlight had the most biodiversity according to the result of activity 2.  This shows our hypothesis is partially correct and partially wrong. As we looked back to our observation, table 1.2 and 1.5, we could see that Area B, which we mentioned, had the highest number of organisms and biodiversity.  But if we look at activity 2, table 2.3, it shows area A had the most biodiversity. And as we already mentioned, the rain destroyed the sticky trips, so we couldn’t say that area which the trees are very close together has the most biodiversity.

   By: Ben