Roy Choudhury, Gupta, Nandy, Abraham, ARora

Indian Institute of Science Education and Research

Mohali

JANUARY-APRIL, 2013

Ecology Laboratory

REPORT

Contents

[Pollinator Behaviour Analysis 2](#_Toc354601886)

[Aim: 2](#_Toc354601887)

[Motivation 2](#_Toc354601888)

[Experimental Techniques 2](#_Toc354601889)

[Paramecium Population Dynamics 5](#_Toc354601890)

[Energy allocation in plants 7](#_Toc354601891)

[Winogradsky Column 9](#_Toc354601892)

[Aim: 9](#_Toc354601893)

[Observations: 9](#_Toc354601894)

[CONTROL 9](#_Toc354601895)

[NaOH 11](#_Toc354601896)

[EGG YOLK 12](#_Toc354601897)

[UREA 14](#_Toc354601898)

# Pollinator Behaviour Analysis

Aim:  
To study the co-relation between the flower colour and bee flower selection.   
Does the flower colour affect the behaviour of bees?

## Motivation

In plants, we observe either self-fertilisation/pollination or cross fertilisation. Insects play an important role in the pollination process for certain plants.

Behaviour of Pollinators in general depends on, visual cues and olfactory cues. The plants ‘allegedly’ use colour and fragrance to attract pollinators and ‘reward’ them in return for pollination, with nectar and pollen (these are eaten to gain lipids).

## Experimental Techniques

The following are the techniques can be employed:

1. Focal Animal Sampling :

In this method all occurrences of the specified action of one individual are recorded for a predetermined interval of time.

1. Activity Scans:

An individual’s activities are recorded at regular intervals, for example, every 30 seconds.

It provides the percent of time spent in a particular activity. Instantaneous scan sampling is best done with a sample interval as small as possible and an easily identifiable behaviour.

In this experiment we used the method of focal animal sampling.

OBSERVATIONS:

|  |  |  |
| --- | --- | --- |
| **Colour of flower** | **Average of DURATION2 (seconds)** | **Count of FLOWER** |
| Dark Purple | 29.0 | 3 |
| Faded Blue | 11.5 | 2 |
| Faded Purple | 9.0 | 2 |
| Light Pink | 9.3 | 4 |
| Light Violet | 6.5 | 2 |
| Pink | 24.7 | 6 |
| Violet | 28.0 | 1 |
| White | 13.3 | 3 |
| WhitePurple | 9.8 | 5 |
| **Grand Total** | **15.82142857** | **28** |

|  |
| --- |
| The flower colours are observed to be light : |
| Faded Blue |
| Faded Purple |
| Light Pink |
| Light Violet |
| Pink |
| Violet |
| White |
| White Purple |

The flower colours observed to be dark :

Dark purple

Pink

Violet

# Statistical Analysis

Null hypothesis :

Average duration of time spent on the dark flowers = 27.2 s

Standard deviation = 2.3 s

Average duration of time spent on the light flowers = 9.9 s

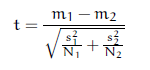
Standard deviation = 2.3 s

Too see if the difference in the average duration is statistically significant,

We perform a two tailed t test.

Since the sample size is extremely small we use student’s T distribution which depends on only the the degrees of freedom of the system being analysed. If we can relate our means and variances with this distribution, it becomes simply a matter of looking up values to find the probability of their occurrence, assuming the Null hypothesis to be true. We now define a less than 5% probability of occurrence to mean that the means are too different to belong to the aforesaid population, and thus the null hypothesis must be rejected.

We’ve found experimentally, m1, m2, s1, s2, n1 and n2, which are means, variances and degrees of freedom respectively.

We find the t value using the following equation:

df = 8 + 3 -2

= 11

α=0.05

Our value for two sample unequal variance (heteroscedastic) (tcalculated) = 0.000171

Table value for two sample unequal variance (heteroscedastic) (ttable)= 0.96

If tcalculated > ttable, then the Null hypothesis is rejected. Else, the null hypothesis can not be rejected.

So in our case the null hypothesis cannot be rejected.

# Paramecium Population Dynamics

Aim:

1. To identify the protist species and estimate protist population size through sampling.
2. To study population growth in the lab species of Paramecium*.*

Materials and methods:

For preparation of cultures:

The standard protocol as provided was followed.

Procedure:

For data collection:

We setup two cultures of volume 50 mL each.

The flasks were named as ‘A’ and ‘B’.

For 10 days, we determined the density of 100 uL of each of the cultures.

We initially took 5 drops of 20uL, but as the density began to rise on the by the 3rd day, we reduced the drop size to 10uL.

OBSERVATIONS:

The data and the plots are produced below:

Result:

Discussion:

# Energy allocation in plants

Aim:

To study the allocation of resources to somatic growth and reproduction in plants.

Materials required:

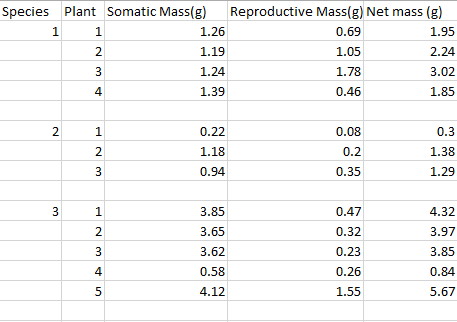
Plant specimens, aluminium foil.

Apparatus required:

Weighing balance, Hot air oven.

Method:

1. We collected at least three plant specimens of 3 species of plant.
2. The reproductive parts of the plant like the fruits, flowers were carefully separated from the somatic part (remaining) excluding the roots.
3. The two parts were packaged separately in aluminium foil and labelled properly.
4. These were dried in the hot air oven for 2 days.
5. The two parts were weighed for their dry weight.

DATA:

ANALYSIS:

Hypothesis:

# Winogradsky Column

# Aim:

To observe changes in terms of stratification.

# Observations:

# CONTROL

3rd March 2013

CONTROLL

Zero Level

No growth, appears greenish, Nothing ele present.

First Level

Very little silica present

Second Level

Silica crystals, some plant moss like structures.

8/03/2013

Control(10X magnification)

1) Bottom layer- Silica as dark colored big pieces, light colored stationary structures can also be seen.

2)Bubble like tiny organisms can e seen moving very fast underneath the food materials, thread like structures of light green color can also be seen. The thread like structures looks like plant roots.

3)Bubble like organism which are a lot smaller than the parameciums can be seen.

4)Moreover, an organism with a tail, which looks more like a wine glass shaped one. This wine glass shaped organism looks transparent, but it can also change its shape.. becomes circular, wine glass shaped and so on..

5)It tends to move along a straight line. We did not see any organism to organism interaction amongst these..

Middle layer- Silica, bubble like organisms, drop shaped transparent organisms moving very fast (but only one) can also be seen.

Top Layer- Some structures that appear like plant root, silica could be seen.

17th March 2013

CONTROL

Nothing

18/03/2013

b) Control –(Magnification 10X)

Zero level

Silica, much extremely small bubble like structures.

First Level

Same as the zero level.

Second level

Silica and a large number of ciliates and round organisms.

Third level

Same as the second level.

25/03/2013

CONTROL

Top Layer- Nothing

Bottom layer- Nothing

Middle layer- Nothing

8th April 2013

Control

empty except silica

# NaOH

3rd March 2013

NaOH

Zero Level

No mud, silica. No organisms present

First Level

No mud, silica. No organisms present.

Second level

Contains silica

8/03/2013- Winogradsky column observations

a) NaOH ( 10X magnifications)

Top Layer- A lot of sand particles

Middle layer- smaller parameciums and baby parameciums also

Bottom layer- Smaller than the lab parameciums.

17th March 2013

NaOH

Zero Level

Same organisms as the second level.

First Level

Nothing

Second Level

Only one type of organism. It is very small under 4X, has an oval shape and travels at a moderate speed, with respect to paramecium.

Third Level

Same organisms as in second level. Nothing Else.

18/03/2013

c) NaOH- (Magnification 10X)

Zero Level

Silica and extremely tiny round organisms.

First Level

Slightly big black round organisms, silica and extremely tiny round organisms.

Second Level

Silica and many huge ciliates

Third Level

Extremely fast moving ciliates, very tiny round organisms and a lot of silica.

25/03/2013

NaOH(10X Magnification)

Top layer- Small sized parameciums, small transparent organisms that seems to have contaminated the cultures.

Middle layer- Nothing

Bottom Layer- small parameciums.

8th April 2013

Naoh –

middle- 10x small paramecium ,rest silica

# EGG YOLK

3rd March 2013

EGG YOLK

Zero Level

Silica crystals, some plant moss like structures, very tiny black dot like organisms.

First Level

Contains silica crystals

Second Level

Lots of mud and silica crystals.

8/03/2013- Winogradsky column observations

EGG YOLK( 10X Magnification)

Top Layer-

1)Lots of silica, oval organisms which are transparent and they move in circles are seen. Their motion is like, moves in circles and then stays, and so on..

2) Other smaller bubble like fast moving organisms can also be seen.

Middle Layer-

Silica plus same as the top layer.

Bottom Layer-

1) Silica, same as top layer, plant like or some stuff that looks like moss.

2)We say plants because of the thread like appearance when compared with silica crystals.

18/03/2013

a) Egg Yolk- (Magnification 10X)

Zero Level

Some silica, transparent membranous structures, tiny bubble like structures floating about.

First Level

A lot of silica, some ciliated transparent structures with dog tail kind of motion.

Second Level

Contains silica, very fine hair like structures, some ciliated transparent organisms

Third Level

Same as the second level observation.

25/03/2013

EGG YOLK

Nothing

8th April 2013

Egg Yolk –

top –

10x small transparent spherical organisms,rest silica

# UREA

8/03/2013

b) Urea ( 4X magnification)

Bottom layer- A lot of sand particles. No moving things

Middle layer- thread like structures, lots of sand

Top layer- Sand particles, No moving organisms

18/03/2013 – Winogradsky Column Observations

Urea-(Magnification 10X)

Zero Level

Silica and fine transparent hair like structures

First level

Silica, fine transparent hair like structures, small tiny transparent bubble like structures

Second Level

Same as the first level

Third level

Only Silica and nothing else

25/03/2013

UREA

Nothing

3rd March 2013

UREA

Zero level

No mud, silica. No organisms present.

First level

No mud, silica. No organisms present.

Second level

Contains silica .

8th April 2013

Urea –

empty except silica

17th March 2013

UREA

Nothing