

***Restrict the growth of MOSQUITO LARVA in
refreezing fridge water using Natural Repellents with
Good Fragrance***

Science Fair Project Report

Level : *Primary Level*

Category : *Environmental Science*

Submitted by

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ARRAHMAAN
INTERNATIONAL SCHOOL

(Creating the community of Excellence)

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ABSTRACT

The present study was conducted to determine the mosquito repellent activities of refreezing fridge water. Control of mosquitoes is something of utmost importance in the present day with rising number of mosquito borne illnesses. Specialty products like mosquito repellent used to combat mosquitoes are required. This project proposal presents the design and testing of a natural and fragrant mosquito repellent.

I collected water (water that had been stagnant for so long and gets contaminated) from the fridge tray at the bottom. For my research I selected the extract of cinnamon, basil leaf, mint leaf, pepper seed, marigold flower as Natural Repellents which have good fragrance too.

I added 2.5ml of contaminated larva water in 15 test tubes and group as 3 sets. Kept some original contaminated water separately. Added 1ml of five different repellents into the first set of test tubes. Then added 2ml to the second set and 3ml of repellent to the third set tubes. For every one hour observed and recorded the movement of mosquito larva using microscope in all the samples. Through the first trial I understood that the death of mosquito larva, pupa, and adult states depends upon the concentration of the repellent.

I started the next trial with the same process by increasing the concentration of the repellent by adding 5ml, 6ml and 7ml in colloidal state and observed the death rate of larva with good fragrance and immediate killing of larva. Through my research I found that the *Basil is the best fragrant repellent but slower than pepper in killing the larva. Pepper is the best active repellent but doesn't have good fragrance as in basil. So I concluded the mixture of Pepper and basil is the best repellent for restriction of larva growth with good fragrance.*



INTRODUCTION

Mosquitoes are some of the most adaptable and successful insects on Earth and are found in some extraordinary places. Virtually any natural or man-made collection of water can support mosquito production. They've been discovered in mines nearly a mile below the surface, and on mountain peaks at 14,000 feet, and if you know where to look, there is a good possibility that there are mosquitoes breeding in your own backyard. Not every species of mosquito causes problems for people, but many have profoundly negative effects.

Mosquitoes can be distinguished easily from other flies by the fact that they have both a long, piercing proboscis and scales on the veins of their wings. Approximately 176 species of mosquitoes are found in the United States, with more than 3,000 species known throughout the world. In the United States, only a few of these species are important as carriers of disease, but many more are important nuisance species that dramatically affect peoples' quality of life.

The Mosquito Life Cycle

Stage 1: Eggs

Only female mosquitoes have the ability to lay eggs. In order to develop eggs, the female needs a blood meal. With each blood meal, the female can lay several hundred eggs. The eggs are laid in or around water and will attach to one another, forming a raft. Individual eggs will float independently. After 24 to 48 hours, the eggs will hatch and release larvae. ADAPCO carries a natural trap where the mosquito goes to lay her eggs and the eggs fall below a net and cannot successfully emerge as adult mosquitoes.

Stage 2: Larvae

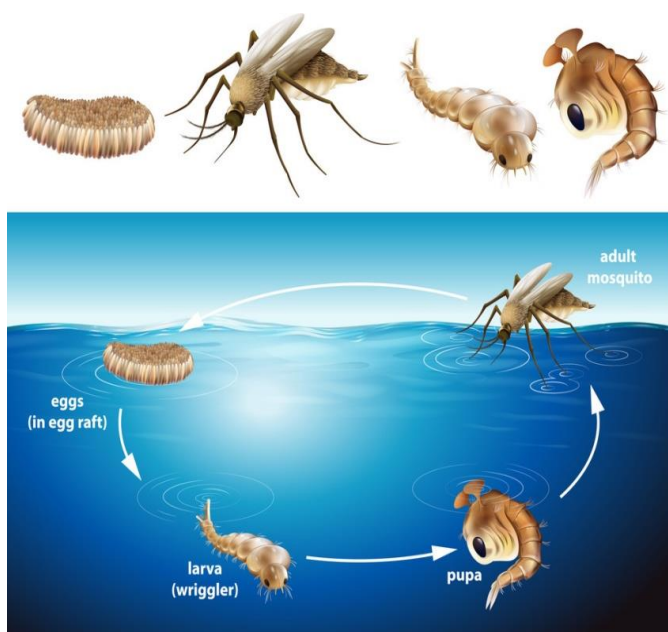
Mosquitoes spend approximately seven days to complete development of the larval stage depending on food and temperature conditions. During this time, the water can be treated with different larvicides to prevent the larvae from going into the next stage.

Stage 3: Pupae

A week to ten days after the eggs hatch, the larvae transform to pupae. At this time, they can breathe oxygen. However, they cannot feed (bite). Mosquitoes spend one to two days in the pupae stage. The water can still be treated during this stage and there are some products that provide quick mortality.

Stage 4: Adult

Once the mosquitoes have reached adulthood, they will feed on nectar; only the female mosquito will seek out a blood meal for reproduction. The adult mosquito lives for a period of six to eight weeks. A female will lay several batches of eggs during her life. Adult mosquitoes can be killed by spraying with handheld, backpack, truck mounted and even airplane sprayers. There are a variety of mosquito adulticides available containing different active ingredients. Chemicals should be rotated yearly so the mosquitoes do not build resistance to that active ingredient.



STATEMENT OF THE PROBLEM

Fridge tray is the dengue mosquito's best breeding place. To prevent dengue, the first thing to be done is to clear the accumulated water in the collection tray beneath the refrigerator. People living in apartments and residential colonies have been advised to undertake a massive cleaning drive regularly. The focus should be on water storage sumps, sunshades and terraces where unused things are dumped. This vector breeds in fresh water. People keep their houses clean but do not clear the fridge tray. It creates bad smell too. So the need is to prepare effective natural repellent with good fragrance which doesn't create any other health defects or danger to environment.

HYPOTHESIS

MINTLEAF IS THE BEST REPELLENT FOR MOSQUITO LARVA.



DESIGN OF STUDY

INDEPENDENT VARIABLE:

- Repellants- Extract from natural things (Cinnamon, basil leaf, mint leaf, pepper seed, marigold flower)

DEPENDENT VARIABLE:

- Death rate of mosquito larva

CONTROLLED VARIABLES:

- Quantity of Water
- Amount of Extract for each sample

MATERIALS:

- Test tube
- Test tube stand
- Conical flask
- Fridge water
- Dropper
- Cinnamon, basil leaf, mint leaf, pepper seed, marigold flower
- Microscope
- Glass rod

PROCEDURE:

- *Prepare the extract of cinnamon, basil leaf, mint leaf, pepper seed, marigold flower.*
- *Collect the water (water that had been stagnant for so long and gets contaminated) from the fridge tray at the bottom.*
- *Observe the water under a microscope.*
- *Add 2.5ml of contaminated water in 15 test tubes and group as 3 sets.*
- *Keep some original contaminated sample separately.*
- *Add 1ml of five different repellents into the first set of test tubes.*
- *Then add 2ml to the second set and 3ml of repellent to the third set tubes.*
- *Stir well using the glass rod.*
- *For every one hour observe and record the movement of mosquito larva using microscope in all the samples.*

COLLECTION OF DATA- PHOTOGRAPHS



Sample collection



collecting and plucking flowers



Grinding and preparing the extract





Measuring PH of extract



Larva water

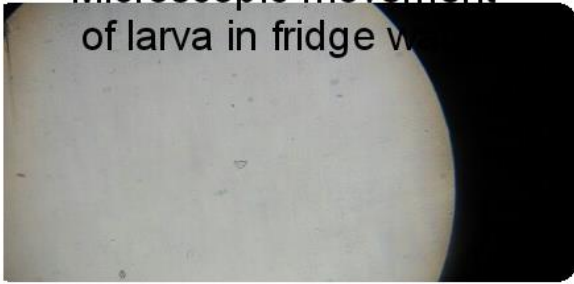


Dividing larva water into test tubes

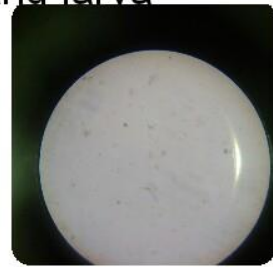
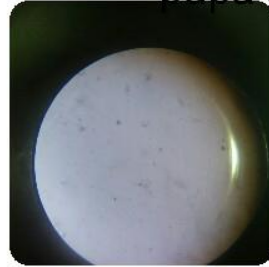
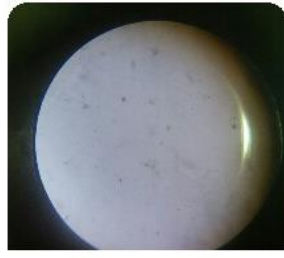


Extract of Marigold, Mint, Basil, Cinnamon, Pepper

Microscopic movement
of larva in fridge w



Microscopic view of
pupa and larva



1ml

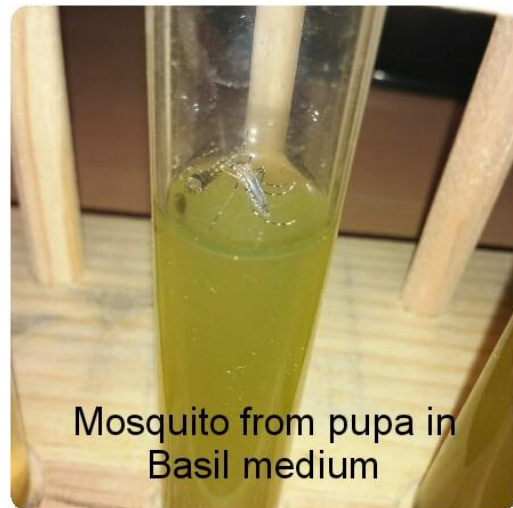


2ml

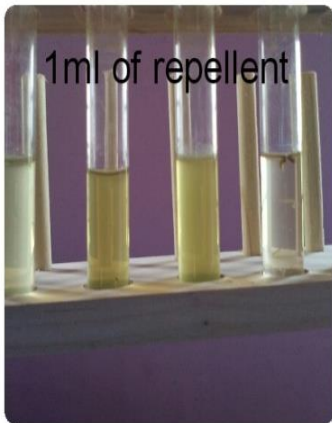


Day 2

3ml



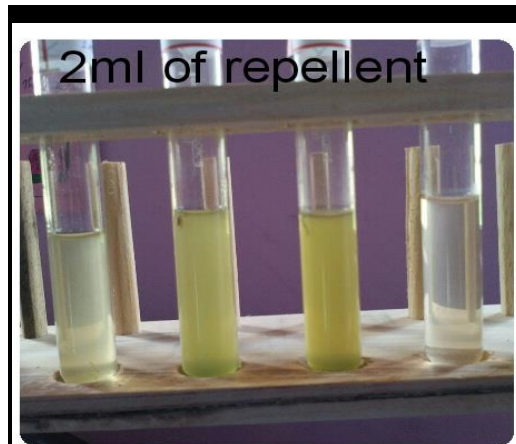
Mosquito from pupa in
Basil medium



1ml of repellent



3ml of repellent



2ml of repellent

QUALITATIVE DATA

Tabulation:

Table 1: PH LEVEL OF REPELLENTS

Distilled water PH=6.5

<i>S. No</i>	<i>Repellent</i>	<i>PH level</i>
1.	<i>Marigold</i>	4.8
2.	<i>Mint leaf</i>	6.2
3.	<i>Basil leaf</i>	6.1
4.	<i>Cinnamon</i>	2.6
5.	<i>Pepper</i>	6.2

Table 2: Observation of Larva

RP=REPELLENT, LS=LARVA WATER, C=CINNAMON, B=BASIL, ML=MINT LEAF,
PR=PEPPER, MG=MARIGOLD FLOWER

Table 2A: Death rate of larva in Sample one (Amount of repellent: 1ml)

RP	Day1			DAY 2
	After 1hr	2hr	3hr	
LS	Alive	Alive	Alive	Alive
MG+LS	Alive	Alive	Alive	Alive
ML+LS	Alive	Alive	Alive	Alive
B+LS	Alive	Alive	Alive	Dead
C+LS	Alive	Alive	Alive	Alive
PR+LS	Alive	Alive	Dead	Dead

Table 2B: Death rate of larva in Sample one (Amount of repellent: 2ml)

RP	Day1			DAY 2
	After 1hr	2hr	3hr	
LS	Alive	Alive	Alive	Alive
MG+LS	Alive	Alive	Alive	Alive
ML+LS	Alive	Alive	Alive	Dead
B+LS	Alive	Alive	Alive	Dead
C+LS	Alive	Alive	Alive	Dead
PR+LS	Alive	Alive	Dead	Dead

Table 2C: Death rate of larva in Sample one (Amount of repellent: 3ml)

RP	Day1			DAY 2
	After 1hr	2hr	3hr	
LS	Alive	Alive	Alive	Alive
MG+LS	Alive	Alive	Alive	Dead
ML+LS	Alive	Alive	Alive	Dead
B+LS	Alive	Alive	Dead	Dead
C+LS	Alive	Alive	Alive	Dead
PR+LS	Alive	Alive	Dead	Dead

TRAIL 2:

- Same process but the concentration of repellent as 5ml, 6ml,7ml and repellent is added in colloidal state.

Photo graphs:



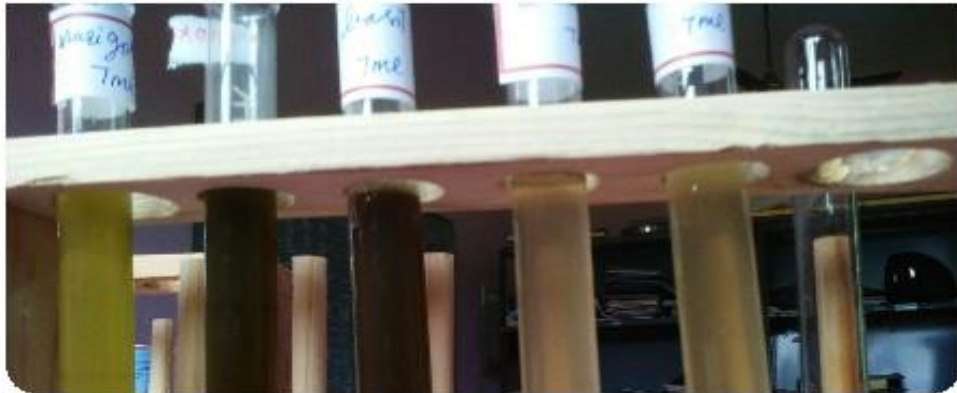


Table 3 A: Death rate of larva in Sample one (Amount of repellent: 5ml)

RP	Day1					
	After 1hr	2hr	3hr	4hr	5hr	6hr
LS	Alive	Alive	Alive	Alive	Alive	Alive
MG+LS	Dead	Dead	Dead	Dead	Dead	Dead
ML+LS	Dead	Dead	Dead	Dead	Dead	Dead
B+LS	Dead	Dead	Dead	Dead	Dead	Dead
C+LS	Dead	Dead	Dead	Dead	Dead	Dead
PR+LS	Dead	Dead	Dead	Dead	Dead	Dead

Table 3B: Death rate of larva in Sample one (Amount of repellent: 6ml)

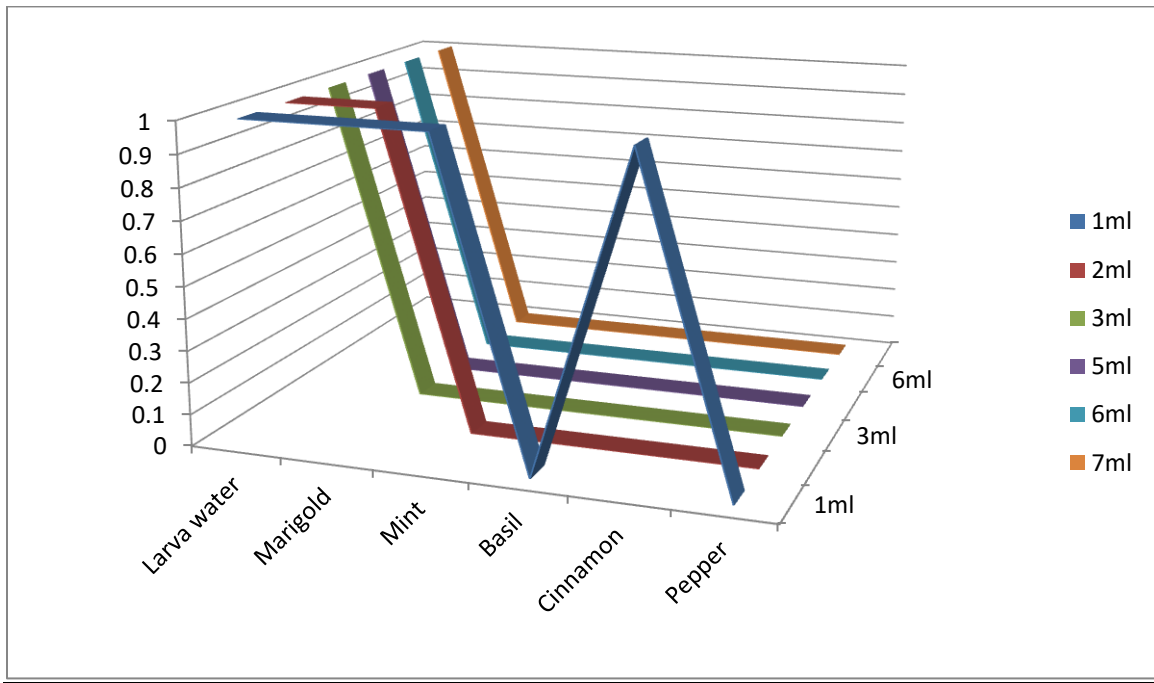
RP	Day1					
	After 1hr	2hr	3hr	4hr	5hr	6hr
LS	Alive	Alive	Alive	Alive	Alive	Alive
MG+LS	Dead	Dead	Dead	Dead	Dead	Dead
ML+LS	Dead	Dead	Dead	Dead	Dead	Dead
B+LS	Dead	Dead	Dead	Dead	Dead	Dead
C+LS	Dead	Dead	Dead	Dead	Dead	Dead
PR+LS	Dead	Dead	Dead	Dead	Dead	Dead

Table 3C: Death rate of larva in Sample one (Amount of repellent: 7ml)

RP	Day1					
	After 1hr	2hr	3hr	4hr	5hr	6hr
LS	Alive	Alive	Alive	Alive	Alive	Alive
MG+LS	Dead	Dead	Dead	Dead	Dead	Dead
ML+LS	Dead	Dead	Dead	Dead	Dead	Dead
B+LS	Dead	Dead	Dead	Dead	Dead	Dead
C+LS	Dead	Dead	Dead	Dead	Dead	Dead
PR+LS	Dead	Dead	Dead	Dead	Dead	Dead

GRAPHICAL REPRESENTATION

DEATH RATE OF LARVA IN SAMPLE ONE (1ml,2ml,3ml,5ml,6ml,7ml)



RESULTS AND DISCUSSION

RESULT for Trail 1:

AFTER ADDING REPELLENT

- After three hours in the 1ml and 2ml pepper repellent added sample, larva died.
- In 1ml of basil repellent added sample, larva died in day 2.
- In 2ml of mint leaf repellent added sample and cinnamon added sample, larva died in day 2.
- Larva died within one hour in the 3ml pepper repellent added sample.
- But after three hours in the 3ml Basil repellent added sample, larva died.
- As a whole, after one day larva died in 1ml of basil and pepper, 2ml of basil, mint leaf, cinnamon and pepper added sample, 3ml of all the repellents.

Through the first trial I understand that the death of mosquito larva, pupa, and adult states depends upon the concentration of the repellent

RESULT for Trail 2:

- In 5ml, 6ml, 7ml pepper repellent added sample within 20 minutes, larva died completely.
- Next after the pepper, in 5ml, 6ml, 7ml basil repellent added sample within 45 minutes, larva died.
- In marigold, mint and cinnamon added sample larva died after 50 minutes.
- Bad smell felt in mint, marigold, cinnamon and pepper added samples.
- But in basil added sample no such bad smell was felt.
- Basil is the best fragrant repellent but slower than pepper.
- Pepper is the best active repellent but doesn't have good fragrance as in basil.
- Comparison between basil and pepper as follows:

<i>S.NO</i>	<i>PROPERTIES</i>	<i>BASIL</i>	<i>PEPPER</i>
<i>1.</i>	<i>Colour</i>	<i>Green</i>	<i>Black</i>
<i>2.</i>	<i>Repellent mode</i>	<i>Slower than pepper</i>	<i>Fast</i>
<i>3.</i>	<i>Taste</i>	<i>Slightly acidic</i>	<i>Hottest</i>
<i>4.</i>	<i>Odour</i>	<i>Pleasant smell</i>	<i>Odourless as repellent (When added to sample)</i>

CONCLUSION

- *My hypothesis, “MINTLEAF IS THE BEST REPELLENT FOR MOSQUITO LARVA” has proven false.*
- Through this project I want to identify the best fragrant repellent by analysing the drawbacks and goodness.
- ***The mixture of Pepper and Basil in colloidal state is the best repellent for restriction of larva growth with good fragrance.***
- If we apply the natural repellent in day to day life we will get many benefits.
 - They Are Free Of Dangerous DEET.
 - They Are Friendly and Kind on Sensitive Skin.
 - They Are Good For the Human Body.
 - The Combination of Various Natural Organic Repellents Work Better.
 - Gives good fragrance.

APPLICATION

- PEPPERMINT

Minty fragrances are unpleasant to a mosquito's keen senses. The mere presence of peppermint plants can ward off these pesky flying insects to some degree. Also turn peppermint into a personal repellent by crushing the leaves and rubbing them on our skin.

- BASIL

This versatile plant isn't simply a tasty herb used for seasoning your favorite Italian fare. It can also be used as a handy natural repellent. The essential oils contained in the basil plant emit a powerful aroma that is irritating to these bothersome biters. Take full advantage of basil's repellent properties by growing it in your yard as well as creating homemade sprays from its essential oils.

- MARIGOLD

This vibrant plant is well known for its pungent aroma. Some people find the smell overwhelming and so do mosquitoes. Plant these golden flowers in various places around your yard to keep mosquitoes at bay. You can periodically cut the flowers off to add to vases around the house to prevent mosquitoes from migrating indoors. As an added benefit, the flowers of the marigold plant make a colourful addition to your garden and are edible as well.

- CINNAMON OIL

Cinnamon is more than just a great topper to applesauce or oatmeal. It can kill off mosquito eggs and can also act as a repellent against adult mosquitoes, most notably the Asian tiger mosquito.

- MINT LEAF

Mint plants are one of many aromatic herbs that have been used for centuries and have been passed down for generations. Although the plants' main uses are for culinary and medicinal purposes, the mint plants are also known to have a strong insect repelling quality.

FUTURE ENHANCEMENT

- I implement the mixture of pepper and basil in my home to kill the mosquito larva in my refrigerator tray.
- The dead larva water must contain rich nutrients. So I use this water for plant growth and observe how it acts as manure.

ACKNOWLEDGEMENT

The final outcome of this project required a lot of guidance and assistance from many people and I am extremely privileged to have got this all along the completion of my project. All that I have done is only due to such supervision and assistance and I would not forget to thank them.

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