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Integrated Mosquito Management by Simple Eco-Friendly Technology

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ABSTRACT

Mosquito is one of the threatened insect pests. It acts as a vector of various diseases like malaria, dengue, filaria, chikungunya, etc. It breeds well in water with organic matter. Thus, a study was made to enquire the actual safe breeding place of this insect. It is proved that most of the mosquitoes (54%) breed well in septic tank water of sanitary latrine. Adult enters the septic tank through outlet pipe and completed the life cycle safely and emerged out either through water outlet or gas pipe. In this paper, a simple technological alteration was devised with normal sanitary latrine i.e. outlet pipe of the septic tank was made U-shaped instead of straight, so that U-shaped tube always holds some running water to prevent the entry of adult gravid female mosquito. The top of the gas pipe is also netted properly with rust proof net. About (17%) mosquitoes breed in the stagnant water of discarded earthen vessels and coconut shell. In this project paper discarded coconut shell and earthen vessels were reused to produce saplings instead of plastic bags in agricultural nursery and others. Mixture of Pudina (*Mentha spicata*) and neem (*Azadirachta indica*) herbal eco-friendly mosquito repellent sticks, spray and pudina oil were also effectively used to combat adult mosquito and its larvae. Thus, an integrated mosquito population management was attempted in a local area of Berhampore town (24.09° N, 88.26° E) also to reduce the use of plastic bags to produce sapling in nursery and others.

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Introduction

From the early civilization mosquito is one of the well-known insect pest and vector of diseases like malaria, filaria, dengue etc. With the implementation of cleaner environment, there is brilliant alteration of breeding places of mosquitoes. The aim of study is to reduce mosquito population by controlling its breeding by using low cost or no cost mosquito control device by herbal agents, thus maintenance of ecological balance. Also to stop the use of conventional harmful chemicals in the market to control mosquito, to develop employment opportunities of people by rural and urban centric cottage industry.

Figure 1

A simple U-shaped outlet pipe that always holds some running water and a net at the top of the gas pipe (Figure 1) will certainly reduce mosquito population and thus it will help to manage mosquito borne diseases.

Materials and Methods

A survey was conducted to assess the population of mosquito larvae and pupae from different sources such as septic tanks, stagnant drain water, open cistern, discarded coconut shell etc. Equal amount of water sample was collected during month of June to September from different breeding places of mosquitoes randomly. Number of larvae and pupae irrespective of species were counted individually using filtration device.

A survey was also conducted across 100 households within the Berhampore Municipality, randomly selected from different areas, to assess whether the residents were aware of the health risks posed by septic tanks as potential breeding grounds for mosquitoes, as well as their knowledge of the preventive measures such as use of U- shaped outlet pipe instead of a T-shaped outlet pipe, use of net on outlet pipes of septic tanks as well as on the top of gas pipe required to protect themselves from these hazards.

Collection of Materials: Pudina leaf, neem leaf (Figure 2), bamboo stick, charcoal dust, gum etc.

Making incense stick (Figure 3) – Pulp of pudina and neem leaves was made and mixed with charcoal dust, wooden dust and gum. The mixture was adhered to stick and dried in the sun.

Mosquito control spray (Figure 4) – Leaf extract of pudina and neem (50 ml) was mixed with water or ethanol (20 ml) to spray inside or outside the room.

Making body oil – Pudina and neem leaves kept in coconut oil for a few days and used as body oil to repel mosquitoes [1].

Figure 2

Figure 3

Figure 4

Experiment 1

Equal numbers of mosquito larvae were taken into jar labelled as A and B. 80% water and 20% herbal spray was kept in jar A whereas 100% pond water was kept in B jar.

Result

After 6 hrs larvae in both the jars were alive but larvae of jar A were not so much active compared to larvae of jar B. After 15 to 18 hrs the larvae of jar A were completely dead but larvae of jar B were alive (Figure 5).

Figure 5

Experiment 2

100 houses were selected at random. Of these, 50 houses were further randomly chosen and fitted with an innovative U-shaped outlet pipe (Figure 6) with their septic tanks, while the remaining 50 houses had pre-installed T-shaped outlet pipes.

Figure 6

All outlet pipes, both U-shaped and T-shaped, were securely covered with bandage cloth to trap adult mosquitoes. To ensure the integrity of the experimental data, the gas outlet pipes of all septic tanks were also covered with the same material, as they could otherwise serve as potential entry or exit points for adult mosquitoes.

Result of Exp-2

A huge number of mosquitos were trapped inside the bandaged mouth of the T-shaped outlet pipe. No mosquitoes were found inside the bandaged mouth of the U-shaped pipe.

Result of Survey

About 54% mosquito larvae and pupae were counted from septic tank water, 20% from open stagnant drain water, 9% from open cistern and 17% from other sources. (Figure 7)

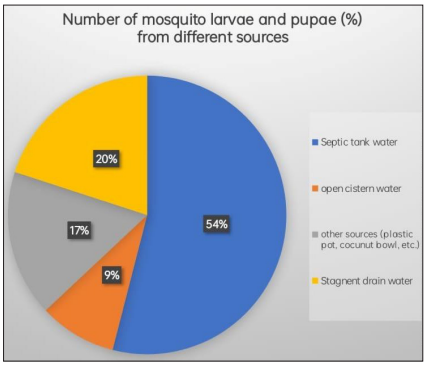

Figure 7

Only 4% of people were aware of the knowledge about the septic tank water as a breeding place of mosquito and the preventive measures taken by the owner of the house regarding septic tank was zero percent.

Innovation Potential

Pudina (Mentha spicata) and neem (Azadirachta indica) herbal extract safe, harmless, eco-friendly and fit for healthy lifestyle, incense sticks, spray, body oil etc. all are potent innovation and best effective against mosquito.

With the progress of rural and urban development, mosquito brilliantly select septic tank as its ideal breeding place.

Scientific use of a U-shaped outlet pipe and a net at the top of gas pipe, no doubt another innovation to minimize mosquito population. It is a novel idea because adult gravid mosquitoes cannot enter the septic tank to breed.

Impact

1. Products are cost effective (Figure 8), easily available, affordable to public, safe for children and adults.
2. Outlet U-shaped tube and a piece of net at the top of gas pipe can reduce the mosquito population.

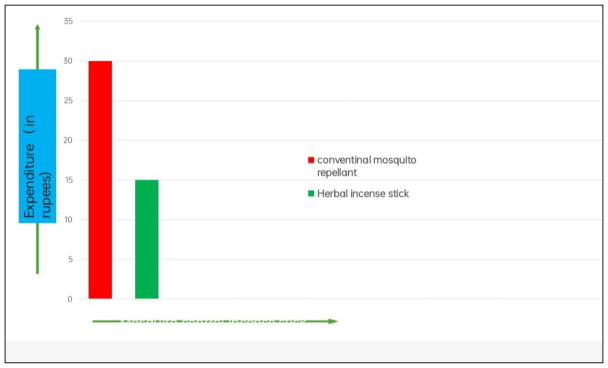

Figure 8

Discussion

Scientific use of a U-shaped outlet pipe of septic tank or sanitary latrine and a net at the top of gas pipe, an innovative to minimize mosquito population. It is a novel idea. Every owner of the house can easily fit an outlet U-shaped pipe and a net at the top of the gas pipe at a minimum cost and effort. Maintenance cost is also minimum or nil. A major problem can be solved investing minimum price and effort [2].

Pudina (Mentha spicata) and neem (Azadirachta indica) herbal extract safe, harmless, ecofriendly and fit for healthy lifestyle, incense sticks, spray, body oil etc. all are my own innovation and potent and best effective against mosquito as pudina contain pulegone, carvone and menthol which are poisonous to mosquitoes. GABAA (Gamma amino butyric acid-A) receptors were stimulated by pulegone. GABAA is actually a neuro inhibitor which restricts the nervous stimulus in the mosquitoes and thus they become inactive. Neem leaves contain nimbin and nimbidin which inactivates mosquito & its larvae. The herbal extract acted as a larvicide actively as the larvae died in A jar when treated. Most people (71%) wanted to use herbal, economical, harmless pudina and neem spray, oil and incense sticks. It is a good sign for ecological harmony as well as pollution free ecosystem [3,4].

Discarded coconut shell (Figure 10) and earthen vessels were reused for sapling preparation (Figure 9) instead of plastic bags in agricultural nursery and others.

Figure 9

Figure 10

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