INTRODUCTION

1.1 Mosquito

Mosquitoes are belongs to the family culicidae. These are very widespread, occurring in all parts of the world. In warm and humid tropic regions, they are active for the entire year, but in temperate regions they hibernate over winter. The mosquito life cycle is an example of complete metamorphosis.

Mosquitoes act as a vector which transmits the diseases through –viruses and parasites. Infected mosquitoes carry these organisms from person to person without exhibiting symptoms themselves. The viral diseases such as yellow fever, dengue fever and chikungunya, transmitted mostly by *Aedes aegypti*. The parasitic disease, malaria carried by mosquitoes of the genus *Anopheles*. The genus *Culex* causes filariasis and Japanese encephalitis diseases.

The vector borne diseases such as malaria, filariasis, dengue and hemorrhagic fever are still major public health problems in the Southeast Asian countries because of their tropical and subtropical climate. Poor drainage system especially during rainy seasons, fish ponds and irrigation ditches provide abundant mosquito breeding places. Malaria and other vector borne diseases contribute to the major diseases burden in India. In developing countries like India, annual mortality from malaria is about 4 to 5 million live in filariasis, endemic areas and dengue fever continues to be a threat to several million.

Moreover, vector control is an essential and effective means for controlling the transmission of these mosquito borne diseases. For its quick action, synthetic insecticides are the first line of defence but the continuous use of synthetic insecticides may led to the development of resistance and undesirable effects on non-target organisms and fostered environmental and human health concern, which initiated a search for alternative control measures. Plants are considered as a rich source of bioactive chemicals and they may be an alternative source of mosquito control agents. The botanical insecticides are generally pest specific, radially biodegradable and usually lack toxicity to higher animals.

Many studies on plant extracts against mosquito larvae have been conducted around the world. Extracts and essential oils from plants may be alternative sources of mosquito larval
control agents, as they constitute a rich source of bioactive compounds that are biodegradable into nontoxic products and potentially suitable for use in control of mosquito larvae. In fact many researchers have reported on the effectiveness of plant extracts and essential oils against mosquito larvae.

*Anopheles* mosquitoes usually lay their eggs. The eggs are not attached to each other like eggs of *Culex* they found apart from each other. *Anopheles* eggs are mostly collected near the wall of water body they float on water and stick to the wall of the water body. A female mosquito may lay eggs every third night during its life span.

Mosquito pupae, commonly called "tumblers," live in water from 1 to 4 days, depending upon species and temperature. The pupa is lighter than water and therefore floats at the surface. It takes oxygen through two breathing tubes called "trumpets." The pupa does not eat, but it is not an inactive stage. When disturbed, it dives in a jerking, tumbling motion toward protection and then floats back to the surface.

Mosquito larvae one of the four in a mosquito’s development. Adult mosquitoes lay eggs, which hatch into larvae, larvae than becomes pupae, from which the adult mosquitoes emerge. Larvae control is important because after converting in adult these fly to bite. Larvicides are chemicals or natural product that can be applied mosquito kill mosquito larvae.

### 1.2 *Moringa oelifera*

![Moringa oelifera](image)

*Fig.1. - Moringa oelifera*
*Moringa oelifera* is the most widely cultivated species of a monogeneric family -the Morangaceae, native to the Sub Himalayan tracts of India. This rapidly growing tree was utilised by the ancient Romans, Greeks, and Egyptians and it is now widely cultivated and has become neutralized in many locations in tropics. All parts of the Moringa tree are edible and have long been consumed by humans. In the west, one of the best known uses of Moringa is to flocculate contaminants and purify drinking water with its powdered seeds.

*Moringa oelifera* leaves consists chemical compounds such as phenols, flavonoids, tannin, saponin, alkaloids, glycosides, carbohydrates, steroids, amino acids, fats and reducing sugars. Epidemiologically studies have indicated that *Moringa oelifera* leaves are good source of nutrition an exhibit anti-tumour, anti-inflammatory, anti-ulcer, anti-convulsant activities.

### 1.3 Saponin

Saponin is glucosides with foaming characteristics. Saponin consist of a polycyclic aglycones attached to one or more sugar side chain.

![Chemical structure of saponin](image)

**Fig.2.- Chemical structure of saponin**

The aglycon part which is also called sapogenin is either steroid (C27) or a triterpen (C30). The foaming ability of saponin is caused by the combination of hydrophobic (fat-soluble) sapogenin and a hydrophilic (water-soluble) sugar part. Saponin has a bitter taste. Some saponins are toxic and are known as sapotoxic. Saponins possess clear insecticidal activity: they exert a strong and rapid working-action against a broad range of pest insects that is different from neurotoxicity. Saponins are known to have various biological properties. They have membrane-permeabilising, haemolytic, antioxidant, anti-inflammatory, immune
stimulant and anticarcinogenic activities. They affect feed intake, growth and reproduction in animals and they can be used as fungicides and pesticides.