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RESEARCH ARTICLE

LARVICIDAL EFFICACY OF ECO-FRIENDLY BIO-PESTICIDES *Azt* AND *Btk* AGAINST THE CHICKUNGUNYA MOSQUITO *AEDES AEGYPTI* (LINN. 1762)

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Aedes aegypti=Chickungunya Mosquito**;** Azt= Azadirachtin from Azadirachta indica**;** Btk= Bacillus thuringiensis var.kurstaki;larvicidal; IMM= Integrated Mosquito Management

ABSTRACT

The use of synthetic pesticides was careless and indiscriminate, and led to number of well-known problems (US National Academy of Sciences, 1992 Bulletin). Eventually we need a movement towards a more environment-oriented, sustainable, health protecting, low toxic pesticides in an attempt to preserve and protect the environment and human health. It should be to the extent that it is a pro-poor alternative and economically vibrant rural pest control materials under IMM (NICD 1997). As a logical conclusion, this led to the test of *Azt* and *Btk*. Their notable successes as a feeding deterrent to a number of pests, especially mosquito population throughout the world, expectations developed on the use of these bio-pesticides (Schmutterer 1992 and Bhattacharia 1998). The *Azt* and *Btk* are readily available, highly economical, dependable bio-insecticides with least poison effect. Since the control of the vector *Aedes aegypti* is an essential for the "National Economy", present study on the control of *Aedes aegypti* first instar larvae which are distributed in the breeding season, was designed to provide data using *Azt* and *Btk* at the laboratory. By the analysis of such data (Tables, plates and graphs) it has been inferred that **"**all 3%, 6% and 10% concentrations of Azadirachtin from *Azadirachta indica* and *Bacillus thuringiensis* var. *kurstaki* control the first instar larvae of *Aedes aegypti*. The least concentration of these is absolutely enough to control the Chickungunya Mosquito".

INTRODUCTION

Mosquitoes can be an annoying, serious problem in mans domain. They interfere with work and spoil hours of leisure time. Their attacks decrease milk production in cattles; some are capable of transmitting disease such as Malaria, Yellow fever,Dengue,FilariasisandEncephalitis(www.mada.state.md.us/mosquito/ mosquito/htm). The *Aedes aegypti* mosquito is the primary carrier for viruses that cause "Dengue Fever" and "Yellow Fever". *Aedes aegypti* is an early morning or late afternoon feeder, but will also bite at night under artificial illumination. *Aedes aegypti* breed in artificial containers and eggs can resist desiccation for up to one year. The eggs will hatch when flooded by deoxygenated water. (NICD, 1997). The use of synthetic pesticides in the control of mosquitoes during the last half-century has often been careless and indiscriminate, and led to number of well-known problems. As a logical consequence of the undesirable side effects of these products, there is a growing awareness in industrialized and also in developing countries, of the toxicological and environmental problems involved in the use of synthetic pesticides. (Bulletin, 1992). Warthen (1979) has listed 85 species of insect pests affecting a wide range of crops on which neem products (Azadirachtin) act as feeding inhibitors and insect growth regulators. (Larew, 1988; Zehnder and Warthen, 1988). Singh in his review lists 110 insect species, which neem products can effectively combat (Schmutterer, H. and Singh, R.P., 1995). *Bacillus sp.* is naturally occurring bacteria that are effective against a range of insect pests. Although highly toxic to insects, *Bacillus sp.* is considered generally safe to humans and pets (Baker J. R, and Powell M.A, 1998). *A. aegypti* is one of the most important vectors found around Erode and Kavindapadi. It has caused enough damages for human life and economics recently. Thus control of *A. aegypti* with Azadirachtin and *Bacillus sp* is selected for detailed study for it is important to identify the best control program to execute in the present day crisis.

Review of Literature

Aedes mosquitoes occur around the world & are over 950 species. *Aedes aegypti* is easily recognized by the contrasting black and white rings on its legs and the lyre-shaped pattern of silver markings on the upper surface of the thorax. *Aedes aegypti* mainly breeds in the domestic environment like water storage tanks and jars, and roof gutters, leaf axils, bamboo stumps and temporary containers. All these habitats typically contain relatively clean water. They are fertilized at the moment of oviposition and deposited singly on the container wall just above the water level. The larvae are entirely aquatic. Hatching to pupation could be 7-14 days or even less depending on conditions. Pupae may swim on disturbances but do not feed. They have short trumpets and single hair at the tip of each swimming paddle. They rest not only in the wet area but also in dry sides of all containers. (NICD 1997). The viruses that are transmitted by mosquitoes and other arthropods are called arboviruses. The present day crisis is the transmission of Dengue haemorrhagic fever and Chickungunya. Dengue haemorrhagic fever is a severe illness that occurs in Southeast Asia and has appeared relatively recently in the America and the South Pacific, mainly affecting children. Infection starts with high fever, vomiting, headache, and

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difficulty in breathing and pain in the abdomen. Signs of internal bleeding are common often leading to permanent disability. (NICD). Chickungunya is a wildly pronounced disease of the current times. A chill of fear and alarm passes through one by the very mention of the disease. The disease is playing havoc on the public health causing unutterable suffering in the form of high fever and acute joint pain though it is not considered fatal. (Priya Devi R., 2006). Vector control measures, when practicable, are carried out in addition to drug treatment. Because of the pollution of breeding sites, not all larvicides are effective and relatively high dosages are needed (WHO, 1997). The comparative study by histogram on the experiments of control of *Aedes aegypti* first instar larvae by 3%, 6% and 10% *Btk* concentrations indicates a total death of larval stage. (Manimekalai T, Ramakrishnan N, 2005). All these considerations and the distribution of larvae in aquatic area. The present study of evaluating the IMM programme with multidimensional approach and specifically on the use of biodegradable and eco-friendly bio-pesticide Neem oil (*Azt*) and bio-control organism *Bacillus thuringiensis* (*Btk*) in controlling the first instar larvae of *Aedes aegypti*.

MATERIALS AND METHODS

The mosquitoes were collected in and around Erode and Bhavani using mosquito collection Jar. *Aedes aegypti*: species were identified based on the similarities of morphological structure through thorax & legs and introduced into the cage; using plastic containers with proper feeding, all the stages were reared step by step. The spray of Azt and Btk in a random way specifically in the selected containers A,B,C and E,F,G was done along with the control containers with twelve first instar larvae of *Aedes aegypti*. Three repetitions were carried out. Overnight observations were made for each experiment and the average of the results was tabulated.

RESULTS AND DISCUSSION

Chickungunya is considered to be a rare form of viral fever caused by an Alpha virus. The disease is transmitted to the humans through *Aedes aegypti*. (Priya Devi, R., 2006). The present crisis due to the disease warrants special non-toxic eco-friendly methods to eradicate the vector. The preliminary survey favoured with a data on a wide range of control of *Aedes aegypti* engineered with Azadirachtin, the Neem oil and *Bacillus thuringiensis* But the field experiments are wanting. The spray of *Azt* and *Btk* in the present study gave clear results of the death of all the first instar larvae of *Aedes aegypti* overnight while those without spray as a control showed live first instar larvae metamorphosing to second instar larvae *Aedes aegypti.* (Table1).

The body changes of the dead ones showed shrinkage, dehydration or contraction of different parts expressing tetranotriterpenoid effect of the Azt and the endotoxin activity of Btk. They have been accounted by many authors on many vectors. Such a similarity in the experimental results of *Aedes aegypti* at Erode at the field level is enlightens the susceptible stage of the vector that may be controlled.

Table 1 Efficacy of Azt and Btk on the pupae of Aedes aegypti**.**

S.No	Experiment on I instar larvae of *Aedes aegypti*	Dead
1	3% Azt concentration spray	12
2	6% Azt concentration spray	12
3	10% Azt concentration spray	12
4	Control	0
5	3% Btk concentration spray	12
6	6% Btk concentration spray	12
7	10% Btk concentration spray	12

CONCLUSION

By the analysis of such data (Table) it has been inferred that "all 3%, 6% and 10% concentrations of Neem oil and *Bacillus thuringiensis var. kurstaki* control the first instar larvae of *Aedes aegypti*" and it is effective, far cheaper and fully eco-friendly.

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