UGC Minor Research Project Report

"Studies on Bio-Efficacy of a few Entomogenous Fungi from Goa against *Anopheles stephensi*, *Culex quinquefasciatus* and *Aedes aegypti*"

(2004-2006)

Submitted To

University Grants Commission Western Regional Office-Pune

Submitted By

Dr. S.H. Bhosale
Co-Investigator

Mrs. Deeparani Prabhu
Principal Investigator
UGC-MRP F. No.47-76/2003 (WRO)

Ponda Education Society's College of Arts and Science

Farmagudi, Ponda-Goa.

(affiliated to Goa University)

SUMMARY:

Anopheles stephensi (Liston) is an important vector of urban malaria in the Indian Subcontinent and Middle East. As a vector *Culex quinquefasciatus* (Say) mosquito transmits the nematode worms causing filaria. In India filariasis is caused by *Wuchereria bancrofti* and *Brugia malayi.* The most common form of filariasis in India is Bancroftian filariasis and it is prevalent in Goa too. The vector of Dengue Haemorrhagic Fever (DHF) *Aedes (Stegomyia) aegypti* (Linnaeus) is also found in Goa. Studies on insecticide susceptibility status of *Anopheles stephensi, Culex quinquefasciatus* & *Aedes aegypti* in Panaji, Goa has revealed that the adult and larval stages of all three vectors are resistant to DDT and in varying degree to Dieldrin.

A number of biological agents of mosquitoes such as fishes, bugs, mesocyclops, bacteria and fungi are known and attempts were made to use such organisms against mosquito developmental stages (Kumar A. 1996.). Around 700 species of entomopathogenic fungi known from 85 genera have been recorded.

OBJECTIVES:

1. Sourcing and isolation of entomogenous fungi from different localities in Goa.
2. Identification and study of microscopic characters of the entomogenous fungal isolates.
3. Preliminary bioassay of a few fungal isolates against laboratory reared mosquito larvae of the three vector species *Anopheles stephensi, Culex quinquefasciatus* & *Aedes aegypti*.
4. Identifying two promising mosquito pathogenic fungi showing larvicidal activity.

MATERIALS AND METHOD:

1. To meet the objectives insect **s**amples were collected from 8 different locations in Goa. Insect cadavers, live and dead mosquito larvae from breeding sites and dead adult mosquitoes were collected from 6 different locations in Goa viz., Panaji, Ribandar, Curchorem, Old Goa, Bicholim & Ponda. From the remaining 2 locations i.e. rice fields at Banastarim and backwaters at Carambolim, fungi were sourced using mosquito larval baits in simulation float chamber.

2. The fungi were then isolated in the lab brought to pure culture and maintained in the lab on media. Their colony characters and microscopic characters were studied. They were then identified up to Generic level using these characters.

3. The test isolates were cultured in petriplates on 1.7% Corn meal agar or Potato dextrose agar for 14 days. The spores were harvested and conidial suspensions of 10^5 -10^6 spores /ml concentration were used for Bioassays.

4. The bio-efficacy of each test fungal isolate was assessed against *Cx. quinquefasciatus* 3rd instar larvae using a WHO (1996) recommended standard method. Test isolates affecting more than 50% mortality were considered as potential biocontrol agents of mosquitoes and referred to as promising isolates. The promising isolates were also tested against *Anopheles stephensi* and *Aedes aegypti* III instar larvae in a similar manner.

RESULTS:

From a moderate collection of samples from 8 different localities of Goa, eight isolates of fungi were recovered in pure culture . All the fungal isolates were sporulating and were Hyphomycetes/anamorphic fungi. They were assigned to 3 genera of fungi. Using standard taxonomic keys and monographs the identification of all the fungi isolated was confirmed upto the generic level.

Two isolates viz., *Penicillium* sp. 2 D2 and Fusarium sp. 1 D1 were effective in killing 100 % 3rd instar *Cx. quinquefasciatus* larvae at a dose range of 10^5-10^6 conidia/ml. All the other isolates yielded less than 50% mortality at the same dose.

Both the promising isolates were tested against *Anopheles stephensi* and *Aedes aegypti*. Penicillium sp. 2 D2 caused 100 % mortality in *Anopheles stephensi* and 70% in *Aedes aegypti*. Fusarium sp. 1 D1 caused a mortality of 85% in *Anopheles stephensi* and 65% in *Aedes aegypti*.

In both the cases the effective spore dose was n x 10^5conidia/ml for *Cx. quinquefasciatus* &

Anopheles stephensi. While a much higher dose was required to kill the *Aedes aegypti* larvae.

Further Scope: Identification of the fungal isolates can be further carried till species level.

Main bioassays can be carried out further after mass culturing the promising isolate.

CONCLUSION:

All the four objectives set at the start of the project were fulfilled. This Minor Research Project work has yielded isolates of indigenous entomogenous fungi and has analysed their pathogenicity against the 3rd instar larvae of the filarial vector *Culex quinquefasciatus*. The 2 promising isolates were then assayed against *Anopheles stephensi* and *Aedes aegypti* 3rd instar larvae to study their larvicidal activity. The positive results say that further studies to see their effect on other instars and adult mosquitoes can be carried out. Efforts to develop these mosquitopathogenic entomogenous fungi into a biolarvicide may be carried out in the near future.

REFERENCES:

Kumar, A. (1996). Mosquito control. In “Elementary Malariology”. Goa Board of Secondary and Higher Secondary Education. Goa, India. Samrat Printers .

WHO. 1996. Report of the WHO Informal consultation on the evaluation and testing of Insecticides, CTD/WHOPES/IC/. 96.1. pp: 68-69.

****