

Proceedings

Geohazards

Engineering Conferences International

Year 2006

Tsunami Relief Work - Biopesticide
Spray Operations - A Case Study

Kadarkarai Murugan

Department of Zoology, Bharathiar University, kmvbk@yahoo.com

This paper is posted at ECI Digital Archives.

<http://dc.engconfintl.org/geohazards/39>

TSUNAMI RELIEF WORK-BIOPESTICIDE SPRAY OPERATIONS - A CASE STUDY

MURUGAN K

Department of Zoology, Bharathiar University, Coimbatore - 641 046, India;PH:+91-422-2422 222; FAX:+91-422-422 387;email:mvvk@yahoo.com

Abstract

Tsunami occurred on 26th December, 2004 and in India more than 8000 people were killed due to the massive attack. The worst affected districts in Tamil Nadu were Viz., Velankanni, Nagapattinam and Cuddalore, Tamil Nadu, India. Official sources said that due to massive death of animals and human beings, the public health has been affected/ spoiled and it will cause further outbreak of infectious diseases like diarrhea, cholera and mosquito transmitting diseases. After a week there were incidents of outbreak of mosquito transmitting diseases such as malaria, and dengue. Tsunami had caused a mixing of animal debris in the breeding ground of mosquito vector and had facilitated easy development of mosquito vectors and further transmission of diseases in these affected areas such Velankanni, Nagapattinam and Cuddalore, Tamil Nadu, India. In anticipation off occurrence of the above incidence at the Tsunami affected areas of Tamil Nadu and as we had biopesticides in our hand which stimulated us to proceed to Tsunami affected areas of Tamil Nadu for the spray operations to control mosquitoes. The Team from Zoology Department had visited the most Tsunami affected areas of Velankanni and Nagapattinam of Tamil Nadu on 5.1.2005 to 9.1.2005. The team sprayed biopesticides for the control of mosquito vector of malaria, dengue fever at water stagnant areas of Cesspool ditches and streets of these villages. It is important to note that the biopesticides, which was carried by the team, was prepared by Department of Zoology, Bharathiar University, India. After 15 days there was again massive outbreak of flies, which had emerged from the bodies in the mass burial grounds as well as contaminated environment at the Tsunami affected areas. Hence, the team has also intensively sprayed at flies breeding habitats of Tsunami affected areas of Vellankanni and Nagapattinam. The team has also sprayed specific combination of biopesticides at the various rehabilitation centers and temporary shelters of Tsunami affected areas at Nagapattinam. The bio-pesticides are a right combination of herbals and have antibiotic, antiviral, antibacterial and anti-fungal properties. Spray operations had been useful to kill the microorganisms at the unused areas of the shelter. The residue of the spray operations will further be useful as disinfectant of the environment at the temporary shelters at the Tsunami affected areas in Tamil Nadu, and Pondicherry, India.

After 20 and 25 days of Tsunami incidence, there were epidemics of chicken pox and dermal diseases recorded at Nagapattinam and Cuddalore, Tamil Nadu, India. Since, we were keenly watching the post-tsunami health hazards through news papers and media; we had also visited the Tsunami affected areas of Cuddalore and Pondicherry and sprayed the biopesticides at the worst affected villages at Cuddalore and Pondicherry, India. Management plans and awareness programme should be adapted for the control and prevention of mosquito, flies and other disease causing organisms at the Tsunami affected areas by following these strategies.

i) Avoid stagnant water for the prevention of mosquito breeding need good environment (free from garbage and plant animal debris) for control of flies (ii) Public toiletry facilities to be improved. (iv) Stop usage of old cloths, from others and (v) Good drainage facilities.

Training and awareness programme to be included:

- i) To give demonstration about the life history and distribution and seasonal abundance of mosquito vectors and flies to the people of Tsunami affected villages.
- ii) To show video presentation about the pathogenic organisms of mosquito transmitted diseases such as malaria, filariasis, dengue and other disease (chicken pox, dermal and other diseases).
- iii) To teach the necessary safeguard measure against future natural disasters like Tsunami, flood, fire etc.,

The killer waves have not only washed boats, other implements and other household articles, but also had filled water in the opened materials that also had given enough moisture in about 2 to 3 km radius for the mosquito breeding. It is also of doubt that the minerals of volcano particles from deep sea might have contaminated the soil for the early proliferation of the microorganisms and mosquito breeding.

Our spray operation had good impact on the control measures as

- 1) Mosquito larval control at the breeding habitats of Tsunami affected areas was effective for the further prevention of mosquito-transmitted diseases such malaria, filarial and dengue fever.
- 2) Effective flies control was evident at the breeding habitats of Tsunami affected areas (plant and debris of animal and human beings).
- 3) Prevention and control of spread of further infectious disease causing microorganism, which cause dermal, chicken pox and diarrhea (virus, bacteria and fungi).
- 4) Suggestions to the locals for planting of medical and aromatic plants such as neem, pongamia and nochi at the Tsunami affected areas of Tamil Nadu, India and also along the entire coastal system explaining their role as physical barriers, as well as

readymade pharmaceutical uses for the emergency medical purposes. Suggestions for use of appropriate animal system (Rats, Dogs etc.,) could also be employed for the forecasting for the forecasting disaster, as they indicate through their changed behaviors.

Introduction

Tsunami occurred on 26th December 2004 and in India more than 8000 people were killed due to the massive attack. The worst affected districts in the Tamil Nadu were Viz., Vellankanni, Nagapattinam d Cuddalore, Tamil Nadu, Pondicherry, India. Official sources said that due to massive death of animals and human beings, the public health has been spoiled and it will cause further outbreak of infectious diseases like diarrhea, cholera and mosquito transmitting diseases. After a week there was a report of incidents of mosquito transmitting diseases such malaria, and dengue. Tsunami made breeding ground for mosquito vector and thereby invasion of mosquito transmitting diseases at the Tsunami affected areas such Vellankanni, Nagapattinam and Cuddalore Tamil Nadu, India

Team has also sprayed biocides with suitable herbal combinations and had sprayed on the streets and human dwelling areas at the Thevanampatinam and Thalanguada villages of Cuddalore district, Tamil Nadu, India. Due to evasion of chicken pox due to the dumping of old clothes donated by people, our operations had a timely impact on further outbreak of viral fever in populations at the villages. District Collector, Thiru. Gangan Deep Singh Bedi I.A.S., Cuddalore, Tamil Nadu, India had visited the Operational spot and appreciated the Team's work. Hence, the above said spray operation not only helped in control of mosquito larvae and there by solving vector borne diseases at helped in indirectly killing microorganisms to provide sustainable protection against infectious diseases like chicken pox and dermal diseases.

In the present study, our biopesticides application was effective against mosquito population and flies. Our biopesticides applications were a right combination of botanicals really had good impact on the other viral and bacterial diseases prevalent in the Tsunami affected areas of Tamil Nadu. For example, at Cuddalore and Nagapattinam District, Tamil Nadu, India Chicken pox have been noted during the 3rd and 4th week of January, 2005. It may be due to viral invasion at the Tsunami affected area and it might have been due to the dumping of old cloth donated by public and it has been found that the dormant viral bodies had got virulent after soaking in to the water. Hence, our herbal extracts were capable of destroying viruses and had inhibitory effect on the growth of bacteria and in total it had an ability to destroy growth of disease-causing organisms (Antimicrobial). Therefore, our biopesticides operation was really successful in spraying in the infected area (death of animals and human being).

Some of the active chemicals present in the neem and other herbals offer a non-toxic alternative to synthetic drugs and disinfectants.

People of Tsunami affected areas have already had a severe shock, had lost all the possessions in the form of materials and relations. Due to the invasion of newer disease causing organisms producing chicken pox, dermal diseases and mosquito transmitting diseases like malaria, dengue and Japanese encephalitis etc., as well as the spread of infectious diseases from the burial bodies due to the pollution that has emerged from the dense population at concentrated area, this has created, in turn will an enhancement of stress and trauma already faced by the Tsunami affected people. Hence, eradication of these kinds of situational diseases by using synthetic chemicals will pose newer intolerable problems to the Tsunami affected people.

Occurrence of dermal disease was also a major problem in the Tsunami affected areas of Tamil Nadu. Our biopesticides operation at the streets, houses and temporary shelters had definite protective effect on the people, because our herbal formulations have nutritive fatty acids and contain all these viral nutrients in significant quantities. Our herbal ingredients had already been reported to be used for treatment of many skin ailments. It is important to note that neem and turmeric have rejuvenating qualities and are absorbed quickly by the skin.

Materials and Methods

Biopesticides spray operations have been carried out at the various villages of Velankanni (Kallar, Sebastian Street and Seruthur), Nagapattinam (Akkaraipettai) and Cuddalore (Thevanampattinam and Thalanguda). Team consists of 10 members of the Zoology Department, Bharathiar University, Coimbatore 641 046, and India. Spray operation made at the various mosquito-breeding places of Tsunami affected areas in the above said areas. Selection of Tsunami affected areas was located with help of Official Co-ordinator of Tsunami Task Force, Tamil Nadu. Spray operations done in and around the houses, streets, and water stagnant areas such as cesspool, ditches, and other open house hold containers. Biopesticides spray also done at the temporary shelters of the Tsunami affected people, temples and schools etc., Biopesticides have been sprayed uniformly on the surface of the breeding habitat such as ditches, cesspool and other temporary water bodies at Tsunami affected areas of Tamil Nadu. Dipper sampling and counting of the larvae have been monitored and larval density before 24 hrs, 48 hrs and 72 hrs after the treatment was also noted. A separate sample was taken to determine the special composition of each larval habitat.

Results and Discussion

It is important to note that there was higher incidence of flies, which have emerged from the buried bodies and other dead animals at the Tsunami affected areas. After Tsunami incidence the dead bodies have been buried in a single place and it was a conducive right atmosphere for the flies complete fit to their complete their life cycle. Hence, spray operation was also done at the mass burial places of the

Tsunami affected areas for the control of flies, which cause further infectious diseases. The biopesticides have greatly affected flies larvae (maggots), which could not molt into pupa for further emergence. Since, plant derived compounds distinctly affect the developmental stages of insects, it has distinct advantages over synthetic pesticides (Murugan, 2004).

Lethal concentration were also worked out to find out the efficacy of our sprayed biopesticides against mosquito larvae populations of Tsunami affected areas and mosquito larvae collected from Coimbatore (Tables 1). The result of the lethal dose has shown interesting trend. Higher doses were needed to kill the mosquito larvae collected from the Tsunami affected areas of Tamil Nadu. The percentage difference between the lethal value were also worked out and it was interesting to note that the percentage difference of LC_{50} and LC_{90} values were higher for the mosquito population from Tsunami affected areas larval population than the mosquito population from Coimbatore, Tamil Nadu, India.

The team has also inspected and analyzed the efficacy of biopesticides at already sprayed areas of mosquito and flies infected areas after 24 hrs, 48 hrs and 72 hrs of durations (Tables 2). Really, spray operations were very successful and it has been noted that, biopesticides greatly affected the egg and larval populations of mosquito vectors and had eradicated them completely (Murugan, *et al.*, 2003).

Synthetic organic insecticides, although has higher efficacious against target species such as mosquito and flies, it can be detrimental to a variety of animal life including man. In addition to adverse environmental ill effects, they affected non-target organisms also moreover most of mosquito species have become physiologically resistant to these synthetic organic insecticides. The present biopesticides spray operation had significant impact on mosquito and flies and the oily nature of organic extracts of plants and bacterial toxins have interfered with the larval respiration as well as had induced toxicity to the gut system and brought out mortality of mosquito larvae (Kondo *et al.*, 2004).

The team has done good work for the cause of public and this operation is the need of the hour to control the infection from mosquito, flies and thereby prevent the health hazards and relieve the people from further stress and strain in the present situations. We need long-term project to control vectors and other infectious diseases like chicken pox and other dermal diseases.

Conclusion

People of Tsunami affected areas have already had a severe shock, had lost all the possessions in the form of materials and relations. Due to the invasion of newer disease causing organisms producing chicken pox, dermal diseases and mosquito transmitting diseases like malaria, dengue and Japanese encephalitis etc., as well as the spread of infectious diseases from the burial bodies due to the pollution that has emerged from the dense population at concentrated area, this has created, in turn will an

enhancement of stress and trauma already faced by the Tsunami affected people. Hence, eradication of these kinds of situational diseases by using synthetic chemicals will pose newer intolerable problems to the Tsunami affected people. This is just a small effort of ours. However, exploration of entire coastal system needs similar treatment in a big way. Authorities should concentrate on such management strategies to prevent the outbreak of epidemics and encourage researchers involved in such activities. The ad “prevention is better than cure” is very apt in this situation. The only plant-based insecticides will be effective and long lasting as compared with synthetic pesticides. Moreover, biopesticides of plant origin need to be tested to provide a cheap and environmentally safe solution to the present problems.

Table 1. Toxicity evaluation of Biopesticides on the larvae 4th instar larvae of *Culex quinquefasciatus* Liston at Tsunami affected area, Akkaraipettai, Nagapattinam District and Thevanampattinam, Cuddalore District, Tamil Nadu., India.

Concentration (ppm)	Number of Larvae	Observed Mortality in Akkaraipettai	Probit Analysis of Akkaraipettai	Observed Mortality in Thevanampattinam	Probit Analysis of Thevanampattinam
2.00	100	24e	LC ₅₀	29d	LC ₅₀
4.00	100	32d	14.57	37cd	10.80
8.00	100	49c		52c	
16.00	100	60b	LC ₉₀	67b	LC ₉₀
32.00	100	69a	49.38	75a	43.33

Within a column means followed by the same letter(s) are not significantly different at 5% level by DMRT

Table 2. Field trial of Biopesticides at Tsunami affected area, Nagapattinam, Tamil Nadu.

1. Place : Akkaraipeetai, Nagapattinam District, Tamil Nadu, India.
2. Habitat : Drainage (Tsunami contaminated water)
3. Size : 3mx 2m
4. Depth : 1cm
5. Species : *Culex quinquefasciatus*
6. Stage : Larvae
7. Calculation : $3 \times 2 = 6 \times 1 = 6$ liters.
8. Required concentration: 296.28 ppm

Sl. No.	Larval Density			
	Before treatment	After Treatment		
		24h	48h	72h
1.	20	4	-	--
2.	25	2	-	--
3.	16	5	2	--
4.	14	5	1	--
5.	22	3	1	--
6.	18	1	-	--
Total	115	20	4	-
Average	19.16	3.33	0.66	-
% Reduction		82.6%	96.5%	100%

References:

1. **Murugan K.**, Vahitha R., Baruah I. and Das S.C. (2003) *Integration of botanicals and microbial pesticides for the control of filarial vector, Culex quinquefasciatus* *Annals of Medical Entomology*. 12 (1 &2):11-23
- 2.
3. **Murugan, K. (2004)** *Chemical and botanical pesticides on their impact on the biological control agents on insects. In: Proceedings of the 3rd European Conference on pesticides and related organic micropollutants in the environment. Edited by T.A. Albanis, University of Ioannina, Greece, pp. 445-450.*
4. Shigeo Kondo, Tenji Konishi, and **Murugan, K.** (2004). *Larvicidal effects of neem (Azadirachta indica) seed Kernel extracts against Paratanytarsus grimmii (Diptera: Chironomidae) and Aedes albopictus (Diptera: Culicidae)*. *Med. Entomol. Zool.*55 (3): 247-250.