Summary
SUMMARY

The knowledge of virus-mosquito interaction is important in the epidemiology of arboviral diseases. One of the important aspects is the vector competence of the mosquito to infection. Other factors such as temperature and changes in the microenvironments are likely to affect this interaction. During the present work attempts were made to study the association of environmental factors with vector competence of *Ae. aegypti* to dengue virus were made.

1. Insecticide susceptibility studies with DDT, deltamethrin, malathion and propoxur on 30 strains of *Ae. aegypti* were carried out. There were eight populations, which were resistant to DDT. The biochemical studies suggested that the mechanism for DDT resistance was due to the increase in the GST in the resistant strains.

2. Malathion resistance was detected among five field collected strains from U.P., Karnataka and Maharashtra States. The biochemical analysis showed association of malathion resistance with an increase in general esterase (EST) activity.

3. Resistance to deltamethrin was detected in the Ghorpadipteth strain. The resistance was conferred due to the mixed response of esterases and oxidases enzymes.

4. Susceptibility status of insecticide resistant strains to *Bacillus thuringiensis* (H-14) toxin was also studied. All the strains were susceptible to this toxin.

5. Replication of four dengue virus serotypes was studied in two insecticide resistant strains and laboratory strain, following ITI and oral infection method. For oral feeding of virus to mosquitoes a convenient and simple infection method using parafilm as membrane was standardised. Study showed a higher infection rate in the Balgola strain. The rate of infection was markedly lower in orally infected mosquitoes as compared to the inoculated ones.

6. Significant correlation was not seen between enzyme activity and dengue virus susceptibility in the mosquitoes. However, PAGE analysis of various isoenzymes showed marked variation at Mdh-2 isoenzyme locus in the dengue outbreak area as compared to the non-dengue area and laboratory strain.

7. Sublethal dosages of insecticides on the larvae had no effect on the dengue virus susceptibility of the emerging adults.
8. Dengue infected mosquitoes were exposed to insecticide impregnated papers. No difference in the mortality was observed as compared to uninfected individuals.

9. It was observed that strong DDT selection pressure resulted in less fecundity in the insecticide resistant strain. It also took a longer time to develop and had poor viability as compared to the susceptible strain.

10. The biological fitness value of normal and dengue infected mosquitoes showed no significant difference.

In conclusion, *Ae. aegypti* strains from different areas showed varying resistance to insecticides. The insecticide-resistant strains showed a slightly higher susceptibility to dengue viruses. No difference was seen in MDH enzyme activity of dengue infected and uninfected individuals. Some variations were seen at different isoenzyme loci in the strains from dengue outbreak area and non-dengue area. The biological fitness of DDT-resistant strain was comparatively less than the insecticide-susceptible strain.