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## Biological control of mosquito larvae of *Culex quinquefasciatus* Say using freshwater fish *Carassius auratus* Linn and *Poecilia reticulata* Peters

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### Research Article

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#### ABSTRACT

*Culex quinquefasciatus* is the vector of *Wuchereria bancrofti*, avian malaria, and arboviruses. The *Carassius auratus* and *Poecilia reticulata* were evaluated against the larvae of *C. quinquefasciatus* and observed remarkable larval consumption. *C. auratus* and *P. reticulata* can be used against mosquitoes for integrated vector control management programme.

Keywords: Arboviruses, Insecticides, Larvae, Predators

### INTRODUCTION

Biological control of vector mosquitoes is an important and effective means for controlling transmission of many dreadful mosquito-borne diseases such as, filariasis, malaria, JE, dengue fever, etc. *Culex quinquefasciatus* is the vector of *Wuchereria bancrofti*, avian malaria, and arboviruses. Recently researchers are focused to use biocontrol agents like fishes rather than chemical insecticides due to the adverse effects of chemical insecticides, widespread resistance in target insects, soaring price of chemical insecticides and other operational difficulties. Among the numerous predators, fish have been used since the early 1900's to control vector mosquito larvae. Use of larvivorous fishes in the mosquito control is well documented.

### MATERIALS AND METHODS

#### Feeding assay

The fishes of *Carassius auratus* and *Poecilia reticulata* ranging from  $0.470 \pm 05$  mg and  $0.475 \pm 05$  mg was used for feeding assay conducted by the method of NVBDCP <sup>[1]</sup>. After a period of seven days of acclimatization the experiment was conducted in laboratory conditions. Prestarved adult fish (n=1) was individually placed in 1 litre of dechlorinated water with fifty late third instar or early fourth instar larvae of *Culex quinquefasciatus* in a glass container. Five replicates were maintained at a time. No food was added in the jar as per WHO norms. Larval consumption rate was observed every three hours. Total larval consumption was recorded at the end of 24 hours.

### RESULT AND DISCUSSION

All five fishes of *C. auratus* consumed 43, 44, 42, 40 and 43 larvae and 7, 6, 8, 10 and 7 larvae at the end of 3<sup>rd</sup> and 6<sup>th</sup> hours individually. However, the *Poecilia reticulata* fed 3, 6, 5, 5, 3 larvae in 3<sup>rd</sup> hr; 4, 7, 8, 15, 5 larvae in 6<sup>th</sup> hr, 7, 4, 6, 5 and 8 larvae in 9<sup>th</sup> hr individually 14, 5, 8, 7 and 8 larvae in 12<sup>th</sup> hour 12, 10, 10, 5 and 6 larvae in 15<sup>th</sup> hr; 4, 10, 8, 8 and 10 larvae in 18<sup>th</sup> hr and 6, 8, 5, 5 and 10 larvae at the end 21<sup>st</sup> hr of introduction of fish (**Table 1**). *Tilapia zilli*, *Oreochromis mossambicus*,

*C. auratus*, *Aphanius dispar*, *Gambusia affinis* and *P. reticulata* showed promising results against mosquitoes by WHO [2]. The *P. reticulata* each ate an average of 41.0 *Culex* sp. larvae/day, with females fed approximately twice as many as males [3]. The mean larval consumption rate of *Aphanius dispar* against *Anopheles stephensi*  $128 \pm 0.2$  to  $204 \pm 6$ ; *Cx. quinquefasciatus*  $24 \pm 4$  to  $58 \pm 10$ ; *Aedes aegypti*  $43 \pm 5$  to  $68 \pm 2$  [4].

**Table 1.** Larval Consumption rate of *Carassius auratus* and *Poecilia reticulata* at 24 hr.

<b>Carassius auratus</b>									
Replication	Larval Consumption Rate								Total
	3 Hr	6 Hr	9 Hr	12 Hr	15 Hr	18 Hr	21 Hr	24 Hr	
1	43	7	-	-	-	-	-	-	50
2	44	6	-	-	-	-	-	-	50
3	42	8	-	-	-	-	-	-	50
4	40	10	-	-	-	-	-	-	50
5	43	7	-	-	-	-	-	-	50
Mean	42.4	7.6	-	-	-	-	-	-	-
Standard Deviation	1.51	1.51	-	-	-	-	-	-	-
<b>Poecilia reticulata</b>									
1	3	4	7	14	12	4	6	-	50
2	6	7	4	5	10	10	8	-	50
3	5	8	6	8	10	8	5	-	50
4	5	15	5	7	5	8	5	-	50
5	3	5	8	8	6	10	10	-	50
Mean	4.4	7.8	6	8.4	8.6	8	6.8	-	-
Standard Deviation	1.34	4.32	1.58	3.36	2.96	2.44	2.16	-	-

Values are mean of five replicates with SD

## CONCLUSION

The feeding behavior of *C. auratus* was faster and fed all the 50 larvae at the end of 6<sup>th</sup> hour of introduction of fish, whereas *P. reticulata* fed slowly and fed all the 50 larvae at the end of 21<sup>st</sup> of introduction of fish individually. *C. auratus* and *P. reticulata* can be used against mosquitoes for integrated vector control management programme.

## REFERENCES

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