

1.3. Monitoring of JE virus abundance using Remote Sense & Geographical Information System

R. Rajendran, K. Ayanar, B.K.Tyagi, P.C. Kanojia, S. Sabesan*, P. Vanamail*, K.H.K. Raju* & P.K. Das***

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Duration : One year

Funding Agency : Intramural, collaborative study

*VCRC, Pondicherry; **NIV, Pune

Objectives

- To correlate JE mosquito vector(s) abundance with different stages of wet cultivation and other environmental variables
- To link remote sensing (RS) imageries corresponding to ground characteristics pertaining to JE vector breeding.

To monitor the JE virus abundance through environmental determinants using Remote Sense (RS) & Geographical Information System (GIS), a preliminary entomological survey were carried out from July 2005 to March 2006 in 3 different agronomic practices of rice cultivation. A total of six villages from three PHCs, viz., Pennadam (double crop area), Sirumangalam (single crop area) and Nallur (rainfed area) of Cuddalore district were chosen for the study. The mosquitoes were collected during dusk hours and identified in the laboratory. The preliminary analysis on vector abundance in different agronomic practices are given in Table 3.

Double crop area

Culex tritaeniorhynchus was the dominant species (49.67%) followed by *Cx. gelidus* (41.97%), *Cx. fuscocephala* (7.54%), *Cx. vishnui* (6.22%) and other culicines (10.32%).

Single crop area

Culex tritaeniorhynchus was the dominant species (85.1%) followed by *Cx. gelidus* (2.7%), *Cx. vishnui* (2.4%), *Cx. fuscocephala* (2.1%), and other (2.7%).

Table 3. PMH density of mosquitoes collected in dusk hours in GIS study villages in Cuddalore district

Species	Double crop area		Single crop area		Rainfed area	
	Ave.PMH	%	Ave.PMH	%	Ave.PMH	%
<i>Cx. tritaeniorhynchus</i>	185.22	49.67	304.0	85.1	111.1	57.1
<i>Cx. vishnui</i>	6.22	1.67	8.6	2.4	26.8	13.8
<i>Cx. pseudovishnui</i>	0.00	0.00	0.0	0.0	0.0	0.0
<i>Cx. bitaeniorhynchus</i>	0.01	0.00	0.1	0.0	0.0	0.0
<i>Cx. infula</i>	0.17	0.04	0.9	0.3	0.1	0.0
<i>Cx. gelidus</i>	156.50	41.97	9.5	2.7	5.5	2.8
<i>Cx. fuscocephala</i>	7.54	2.02	7.6	2.1	7.1	3.7
Other culicines	10.32	2.77	9.6	2.7	4.7	2.4
Subtotal	365.99	98.14	340.3	95.3	155.3	79.9
<i>An. subpictus</i>	4.51	1.21	5.9	1.6	16.1	8.3
<i>A. pedtaenivatus</i>	1.17	0.31	6.5	1.8	7.4	3.8
Other anophelines	1.25	0.34	4.4	1.2	15.7	8.1
Subtotal	6.93	1.86	16.8	4.7	39.2	20.1
Grand Total	372.92	100.00	357.1	100.0	194.5	100.0

Rain fed crop area

Culex tritaeniorhynchus was the dominant species (57.1%) followed by *Cx. vishnui* (13.8%), *Cx. fuscocephala* (3.7%), *Cx. gelidus* (2.8%), and others.

Among the JE vectors, *Cx. vishnui* subgroup mosquitoes contributed 87.5% in single crop area, 70.9% in rain fed area and it was only 51.4% in double crop area. The secondary vector *Cx. gelidus* contributed 42% from double crop area which was significantly higher than the other two areas. In all three crop areas no *Cx. pseudovishnui* mosquito specimens could be collected.

The details of agronomic practices in these areas including meteorological data have been collected. Preliminary data on vector abundance indicate that they are influenced by the different agro-climatological factors. This study will be continued during next year.

1.4. JE surveillance network, Tamil Nadu

S.C.Tewari, N.Arunachalam, P. Philip Samuel, R. Paramasivan, V.Thenmozhi & B.K.Tyagi

Starting Date : 1996

Duration : On going service activity

Funding Agency : Intramural

In continuation of JE virus surveillance net-work programme in collaboration with Tamil Nadu Govt. JE virus antigen was detected in desiccated mosquitoes by ELISA. A total of 923 pools of mosquitoes comprising of *Cx. vishnui* sub group received from the different Zonal entomological teams were screened, of which 22 pools were found positive. These positive pools were from the collection of Cuddalore [10], Trichy [7] and Thanjavur [5], during the month May '05 (1), July (1), August (3), September (2), October (4), November (7), January '06 (1), February (2) and March (1) [Table 4], indicating JEV activities during pre and post transmission seasons. The results were informed regularly to the concerned authorities for initiating vector control measures. This study is being continued..

Table 4. Zone wise (Tamil Nadu state) detection of JEV antigen by ELISA in dessicated vectors (2005-2006)

Sl.No.	Zone / Month. Year	Number of pools positive / Number of pools screened (No. of specimens)												Total
		Apr.05	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.06	Feb.	Mar.	
1	Cuddalore	0/35	0/29	0/14	1/19	1/8	2/27	1/30	3/24	0/45	1/32	1/42	0/39	10/344
		1669	1415	680	739	276	1024	1356	1011	2035	1219	1860	1925	15209
2	Thanjavur	0/15	1/8	0/8	0/7	2/15	0/5	1/18	1/12	0/32	0/29	0/26	0/6	5/181
		670	392	382	345	688	175	846	504	1361	1390	1145	300	8198
3	Tiruchirapalli	0/12	0/2	0/8	0/2	0/16	2/47	3/33	0/84	0/30	1/25	1/10	7/269	
		550	96	380	55	0/0	593	2289	1522	3939	1303	1138	433	12298
4	Tirunelveli	0/2	0/1	0/5	0/0	0/0	0/1	0/5	0/14	0/7	0/8	0/43		
		95	0/0	33	249	0/0	0/0	30	210	669	310	356	0/0	1952
5	Virudhunagar	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/4	0/6	0/10	
		0/0	0/0	0/0	0/0	0/0	0/4	0/1	0/6	0/4	190	300	490	
6	Dindigul	0/0	0/0	0/0	0/0	0/0	0/4	0/1	0/6	0/4	0/15			
		0/0	0/0	0/0	0/0	0/0	125	0/0	20	346	0/0	148	0/0	639
7	Vellore	0/0	0/0	0/0	0/0	0/0	0/0	0/3	0/8	0/25	0/25	0/61		
		0/64	1/39	0/31	1/33	3/23	2/52	4/96	7/78	0/181	1/106	2/134	1/86	22/923
Grand Total		2984	1903	1475	1388	964	1917	4521	3367	8350	4571	5953	4058	41451

1.5. Susceptibility of *Culex tritaeniorhynchus* against JE virus in Cuddalore district, Tamil Nadu

P. Philip Samuel, N. Arunachalam, R. Rajendran, K. Ayanar, Victor Jerald Leo & B.K. Tyagi

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Duration : 3 years

Funding Agency : Dept. of Science & Technology, Govt. of India

In order to determine the JE virus activity in this area, mosquitoes were collected during dusk hours in the selected villages situated in the Cuddalore district. Orally infected mosquitoes with JE virus were screened by ELISA, to find out the vector infection. The vector infection is one of the important factors, which is responsible for the occurrence of JE in an area. JE case incidence shows a strong seasonality, most cases being recorded during the months of October and November. Virus infection in vector mosquitoes also shows a seasonal pattern. Therefore it is considered worth to examine whether seasonality of virus infection in mosquitoes is influenced by temporal changes in the susceptibility of vectors to virus in an endemic area.

Study area for this project was selected based on the case incidence of Japanese encephalitis reported from these areas. Mosquitoes of *Cx. tritaeniorhynchus* species were collected during dusk hours in the selected villages of Nallur Block – (S.S.Puram & Kodikkalam), Mangalore Block – (Avinangudi & Pothiramangalam), Vridhchalam Block (Alichikudi & Sathukudal) and Kammapuram Block (Ko.Adhanur & V.Kumaramangalam) situated in the Cuddalore district. Thus the coverage of the study area was extended to get more samples (Table 5).

Table 5. Study Area

No.	Name of the Block	Villages
1	Nallur	S.S. Puram, Kodikkalam
2	Mangalore	Avaninangudi, Pothiramangalam
3	Vridhachalam	Alichikudi, Sathukudal
4	Kammapuram	Ko. Adhanur, V. Kumaramangalam

Susceptibility studies carried out using *Cx. tritaeniorhynchus* mosquitoes showed a higher JE virus infection rates during hot & wet season Aug - Sept (75%) and subsequently very low during the following seasons viz. cool & dry season Jan-Mar (4.8%). The infection rates were 10.3 and 10.5 during cool & wet season (Oct - Dec) and hot & dry (April - June) months. It is to be noted that a high infection rate during hot & wet season Aug - Sept *ie.*, 75% is due to less number of samples screened and hence this data is not considered for analysis. The infection rates for the remaining seasons

appears to be more or less the same in two seasons ie. cool & wet season (Oct - Dec) and hot & dry (April - June) and it was found to be low during the cool & dry season. This year these studies were extended to 8 more villages to cover 3 more blocks (Table 6) and the results showed 21%, 5.5%, 12.25 % , 8%, 11.38% and 14.25% from the cool & wet season (Oct - Dec) to cool and dry season (Jan - Mar) months respectively. Susceptibility of *Cx. tritaeniorhynchus* to JE virus from different geographical locations varied. In addition to this differences in the virus susceptibility was observed between field collected and laboratory reared populations Significant differences was also observed in the susceptibility of *Cx. tritaeniorhynchus* to JE virus existed with in and between years. This observation clearly reveals that the infection rates are not uniform in different seasons, ie. mainly between endemic (cool & wet season - Oct. to Dec.) and non-endemic (cool and dry season - Jan. to Mar.) seasons these temporal changes that could perhaps reflect the differences in the vectorial capacity of mosquitoes. This work will be continued to observe for consistency in infection rates in different season from these localities. Study is being continued.

Table 6. Seasonal variations in the susceptibility of *Culex tritaeniorhynchus* from Cuddalore district of JE virus

S.No	Area	Infection rate (%)					
		Cool-wet (Oct-Dec 04)	Cool-dry (Jan-Mar 05)	Hot-dry (Apr-Jun 05)	Hot-wet (Jul-Sep 05)	Cool-Wet (Oct-Dec 05)	Cool-dry (Jan-Mar 06)
1	S.S.Puram	4.00	8.40	23.40	6.00	24.00	19.00
2	Kodikkalam	4.00	13.00	2.77	15.00	18.00	8.00
3	Avinangudi	13.00	0.00	0.00	4.00	1.00	10.00
4	Pothiramangalam	17.00	0.00	3.63	8.00	7.00	14.00
5	Alichikudi	22.00	0.00	5.00	4.00	4.00	14.00
6	Sathukudal	48.00	0.00	4.00	3.00	13.00	22.00
7	Ko.Adhanur	35.00	26.10	18.95	13.00	17.00	16.00
8	Kumaramangalam	25.00	8.10	29.00	7.50	7.00	11.00
	Mean %	21.00	5.50	12.25	8.00	11.38	14.25
	Laboratory reared	41.00	1.10	0.00	4.00	31.00	5.00