

# COMMUNICABLE DISEASES

## 1.7 Mapping of mosquito breeding habitats and location of vertebrate hosts in North and Southern parts of Rajasthan state prone for emergence of JE virus using space technology (RS & GIS).

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### OBJECTIVES

1. Mapping of mosquito larval habitats, particularly *Cx. tritaeniorhynchus* and *Cx. vishnui* sub-group of mosquitoes and location of vertebrate hosts (pigs) which play major role in transmission of Japanese encephalitis virus (JE) using RS and GIS technologies.
2. To identify JE prone areas with the help of RS and GIS in conjugation with eco-entomological studies in the proposed study sites.
3. To develop early warning system of JE occurrence.

### PROGRESS

In order to collect more information on prevalence of JE vectors, cultivation of vegetation type, location of new water bodies, location of vertebrate hosts (pigs) and establishment of new roosting sites of paddy, field visits were made to five districts of Rajasthan state namely Udaipur, Dungarpur, Banswara, Sri-Ganganagar & Hanumangarh during Pre and Post monsoon period of the year 2013

#### Collection of JE vectors from different resting habitats

A total of 503 mosquito specimens belonging to 16 species were sampled from different resting habitats of mosquitoes. As many as 10 JE vectors viz., *Cx. tritaeniorhynchus*, *Cx. bitaeniorhynchus*, *Cx. fuscocephala*, *Cx. quinquefasciatus*, *Cx. pseudovishnui*, *Cx. gelidus*, *An. subpictus*, *An. barbirostris*, *An. peditaeniatus* and *Ma. uniformis* were collected during the course of study. District & village-wise distribution of mosquitoes along with JE vectors are mentioned in Table-1

**Table-1. Collection of JE vectors from different habitats in Udaipur, Dungarpur Banswara, Sri-Ganganagar & Hanumangarh district during the year 2013**

Sr. No.	Name of locality	CCBF, Sri-Ganganagar	Lalgadiya Ki Dhani, Sri-Ganganagar	Lakhuwali, Hanumangarh	Tibi, Hanumangarh	Jetana (Udaipur)	Shivpur (Banswara)	Talwara (Banswara)	Bicchiwara (Dungarpur)
Species									
1.	<i>Ae. lineatopennis</i>	-	-	-	-	+	+	+	-
2.	<i>Ae. pipersalatus</i>	+	-	-	-	-	+	-	-
3.	<i>An. annularis</i>	-	-	-	-	-	+	-	+
4.	<i>An. barbirostris*</i>	-	-	-	-	-	+	+	+
5.	<i>An. culicifascies</i>	+	-	+	-	-	+	-	+
6.	<i>An. peditaeniatus*</i>	-	-	-	-	-	+	-	-
7.	<i>An. stephensi</i>	+	-	-	-	-	-	-	-
8.	<i>An. subpictus*</i>	-	-	-	-	+	+	-	+
9.	<i>Ar. subalbatus</i>	-	-	-	-	+	+	-	+
10.	<i>Cx. bitaeniorhynchus*</i>	-	-	+	-	-	-	-	+
11.	<i>Cx. fuscocephala*</i>	-	-	-	-	-	+	-	-
12.	<i>Cx. gelidus*</i>	-	-	-	-	+	+	-	+
13.	<i>Cx. pseudovishnui*</i>	-	-	-	-	+	+	+	+
14.	<i>Cx. quinquefasciatus*</i>	+	+	+	+	-	-	-	+
15.	<i>Cx. tritaeniorhynchus*</i>	-	-	-	+	+	+	+	+
16.	<i>Man. uniformis*</i>	-	-	+	+	+	+	+	+

\*JE vectors

**Collection of mosquito larvae**

A total of 385 mosquito larvae belonging to 14 species along with 9 JE vectors namely *Cx. tritaeniorhynchus*, *Cx. bitaeniorhynchus*, *Cx. fuscocephala*, *Cx. quinquefasciatus*, *Cx. pseudovishnui*, *Cx. epidesmus*, *An. subpictus*, *An. barbirostris* and *An. peditaeniatus* were collected from different breeding habitats. Breeding habitats like Paddy fields, Perennial Pond and Marshy area produced maximum numbers of JE vectors. District & habitats-wise distribution of mosquito larvae are mentioned in Table -2

**Table 2. Collection of mosquito larvae from different breeding habitats at Udaipur, Dungarpur Banswara, Sri-Ganganagar & Hanumangarh district during the year 2013**

Sr. No	Month	May,2013	May,2013	May,2013	Sept. 2013	Sept. 2013	Sept. 2013	Sept. 2013	Sept. 2013	
	Name of locality	Sardargarh, Sri-Ganganagar	CCBF, Sri-Ganganagar	Lakhuwali, Hanumangarh	Jetana (Udaipur)	Jetana (Udaipur)	Talwara (Banswara)	Talwara (Banswara)	Bicchiwara (Dungarpur)	
	Host	Pond	pond	trenches	Well (in paddy field)	Perennial Pond	Paddy field	Pond (marshy area near pond)	Paddy field	
	Species									
1.	<i>An. annularis</i>	-	-	-	-	+	-	+	+	
2.	<i>An. barbirostris</i> *	-	-	-	-	-	-	-	+	
3.	<i>An. culicifascies</i>	-	-	-	-	-	-	+	-	
4.	<i>An. peditaeniatus</i> *	-	-	-	-	-	+	-	+	
5.	<i>An. stephensi</i>	+	+	+	-	-	+	-	-	
6.	<i>An. subpictus</i> *	+	-	-	-	+	-	-	-	
7.	<i>An. tessellates</i>	-	-	-	-	-	+	-	-	
8.	<i>An. vagus</i>	-	-	-	-	-	-	+	-	
9.	<i>Cx. bitaeniorhynchus</i> *	-	-	-	-	-	-	-	+	
10.	<i>Cx. epidesmus</i> *	-	-	-	-	-	-	-	+	
11.	<i>Cx. fuscocephala</i> *	-	-	-	-	+	-	+	-	
12.	<i>Cx. pseudovishnui</i> *	-	-	-	-	+	-	-	+	
13.	<i>Cx. quinquefasciatus</i> *	-	+	-	-	-	-	-	-	
14.	<i>Cx. tritaeniorhynchus</i> *	-	+	-	+	+	+	+	+	

\*JE vectors

**Pic.1:** Perennial mosquito breeding site at Jetana, Udaipur



**Pic.2.** Collection of mosquito larvae at Dozopal, Dungarpur



**Pic. 3.** Perennial mosquito breeding habitat at Talwara, Banswara

### **Location of vertebrate hosts (pigs & paddy birds)**

All the five districts *viz.*, Udaipur, Dungarpur, Banswara, Sri-ganganagar & Hanumangarh were searched for location of pig sties and roosting places of ardiied birds which play important role in JE epidemiology. Geo-coordinates of all the locations were recorded for the purpose of satellite mapping -Table - 3 and 4

### Recoding of Geographical coordinates of study sites

Geographical coordinates of mosquito breeding habitats, including ponds, trenches, large water bodies (water reservoir) and the area which is likely to remain under paddy cultivation during monsoon season in Udaipur, Dungarpur, Banswara, Sri-ganganagar & Hanumangarh district were recorded. In addition to this, Geographical coordinates of pig sties & roosting places of paddy birds were also recorded using Global Positioning System (GPS) for the purpose of satellite mapping.

**Table 3: Geographical coordinates of Udaipur, Dungarpur & Banswara district**

S No.	District	Name of the place	Geo-coordinates	Remarks
1.	Udaipur	Salumber	N-24.13393 E-074.04330	Paddy growing area
2.	Udaipur	Jetana	N-23.98823 E-074.08166	Perennial pond
3.	Udaipur	Jetana	N-23.99078 E-074.08372	Paddy growing area
4.	Udaipur	Pichola lake	N-24.56890 E-73.68375	Big water body
5.	Dungarpur	Bicchiwara	N-23.78669 E-73.52689	Paddy growing area
6.	Dungarpur	Gapsagar	N-23. 83924 E-073.71566	Big water body
7.	Dungarpur	Dozupal	N-23. 74391 E-073. 83298	Perennial water body
8.	Banswara	Shivpur	N-23. 55882 E-074. 36237	Cattle sheds
9.	Banswara	Talwara	N-23. 57523 E-074.31794	Marshy area

**Table 4: Geo-coordinates of Sri- Ganganagar & Haumangarh district**

S No.	District	Name of the place	Geo-coordinates	Remarks
1.	Sri-Ganganagar	Suratgarh near CCBF & Gagger river	N- 29.34103 E- 073.86801	Paddy growing area
2.	Sri-Ganganagar	Sardargarh Railway Station	N- 29. 36751 E- 073.74889	Paddy growing area
3.	Sri-Ganganagar	Jaitsar	N- 29. 34625 E- 073.66610	Paddy growing area
4.	Sri-Ganganagar	Between Sardargarh & Jaitsar	N- 29. 37165 E- 073.73450	Paddy growing area
5.	Hanumangarh	Between Suratgarh & Hanumangarh	N- 29. 45389 E- 074.02594	Paddy growing area
6.	Hanumangarh	Hanumangarh Town near temple & nursery	N- 29. 59768 E- 074. 31379	Paddy growing area
7.	Hanumangarh	Hanumangarh Town near Railway bridge & Vet. hospital	N- 29. 75867 E- 074. 33169	Pig sties
8.	Hanumangarh	Tibbi	N- 29. 55861 E- 074. 41060	Paddy growing area

9.	Hanumangarh	Lalgadiya ki Dhani	N- 29. 58971 E- 074. 33296	Paddy growing & paddy birds' roosting place
10.	Hanumangarh	Sec.11 near Central jail, Hanumangarh Railway Junction	N- 29. 60567 E- 074. 27606	Paddy birds' roosting places
11.	Hanumangarh	Lakhuwali near Pillibanga	N- 29. 46673 E- 074. 05946	Paddy growing area
12	Hanumangarh	Ward No.25, Sindhi kat, Mohalla near Pillibanga	N- 29. 60470 E- 074. 27366	Pig sties

### **Meteorological data**

Meteorological data pertaining to rainfall, numbers of rainy days, maximum/minimum temperature were also obtained in respect of Udaipur, Dungarpur, Banswara, Sri-ganganagar & Hanumangarh districts. This data will be used in analysing mosquitogenic conditions in these study sites.