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An overview: Identification of mosquitoes in railmangra Distict Rajsamand

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Abstract
Vector-borne diseases (VBDs) represent a significant global public health challenge, with India hosting a diverse mosquito fauna of 3,583 species. In the arid and semi-arid landscapes of Rajasthan, shifting ecological dynamics have led to an increased prevalence of diseases such as Malaria, Dengue, and Chikungunya. This study aimed to assess the abundance and seasonal distribution of *Anopheles*, *Culex*, and *Aedes* mosquitoes in Railmagra, Rajsamand district, Rajasthan, and to correlate these findings with local disease trends and environmental drivers. A field survey was conducted from July 2025 to February 2026. Data were collected through larval and adult mosquito sampling in residential areas (330 houses) and aquatic habitats (ditches) using manual aspirators, light traps, and gravid traps. Morphological identification was performed to differentiate species, and epidemiological data were synthesized from the National Vector Borne Disease Control Programme (NVBDCP). Three primary genera were identified: *Anopheles*, *Culex*, and *Aedes*. A clear ecological succession was observed: *Anopheles* reached peak density during the post-monsoon period (September–October), correlating with 30 reported cases of Malaria. Conversely, *Culex* became the dominant genus during the winter months (January–February), peaking at 150 individuals in residential areas. *Aedes* populations remained lower but persistent throughout the study, linked to 20 reported cases of Dengue. Surveillance of ditches showed that breeding site availability dropped from 20 sites in the monsoon to 5 in the winter. The study highlights a strong correlation between seasonal environmental changes and mosquito population dynamics in Railmagra. The prevalence of these vectors, even in arid conditions, underscores the urgent need for continuous surveillance and integrated vector management. Recommendations include source reduction, the use of botanical larvicides (e.g., Neem oil), and physical barriers to mitigate the transmission of Malaria and Dengue in the region.

Keywords: *Anopheles*, *aedes*, *Culex*, vector surveillance, railmagra

Introduction

The global burden of vector-borne diseases (VBDs) remains a critical challenge to public health, with over 80% of the world's population currently at risk (Franklinas *et al*., 2019) [2]. Among these, mosquito-borne illnesses represent the most significant threat, driven by rapid urbanization, climate change, and shifting ecological dynamics that alter transmission patterns (Manikandan *et al*., 2022) [4]. In India, the mosquito fauna is remarkably diverse, comprising 3,583 species across 49 genera, with 31 species recognized as primary vectors for human pathogens. Within this landscape, the subfamily Culicinae, particularly the tribe Aedini, represents a major taxonomic group of concern, exhibiting high species richness and significant vectorial capacity.

Arboviral infections such as Japanese Encephalitis (JE), Dengue, and Chikungunya pose perennial threats to the Indian subcontinent. JE remains a leading cause of viral encephalitis in Asian agricultural regions (Rahman, 2002; Verma, 2012) [8, 11] while the resurgence of Dengue (a Flavivirus) and Chikungunya (an Alphavirus) continues to strain public health infrastructure (Cecilia, 2014) [1]. According to the National Vector Borne Disease Control Programme (NVBDCP), the incidence of these diseases has reached alarming levels; for instance, historical data reflects significant morbidity and mortality, with thousands of cases reported annually across the country.

The state of Rajasthan, characterized by its unique arid and semi-arid landscapes, has increasingly become a focal point for mosquito-borne outbreaks. Despite the dry climate, Rajasthan has documented a high prevalence of *Anopheles stephensi* and *Aedes aegypti*, the primary vectors for Malaria and Dengue, respectively (Mohanty, 2018; Meena, 2020) [6, 5]. Recent surveillance underscores the region's vulnerability, as evidenced by the 2018 outbreak in Jaipur city, which marked the first recorded detection of Zika virus (ZIKV) in *Aedes aegypti* within the Indian subcontinent (Singh *et al*., 2019) [10]. Furthermore, local studies have identified a diverse mosquito population, with collections of larvae and adults revealing a dominance of *Culex*, *Anopheles*, and *Aedes* species. Aedes mosquitoes are common in Jaipur and linked to rising cases of chikungunya diseases(Prasad *et al*, 2022) [7].

In the absence of universally available vaccines and definitive therapeutic treatments for many arboviruses, vector management remains the primary defence strategy (Scolari *et al*., 2019) [9]. Recent advancements, such as the development of Attractive Toxic Sugar Baits (ATSB), offer promising avenues for regulating vector density through chemical attractants and toxicant traps (Kumar *et al*., 2021) [3]. Given that Rajasthan reported over 13,000 cases of Dengue and Malaria by mid-2019 alone, there is an urgent need to evaluate the current abundance and distribution of these vectors. This review aims to delineate the status of *Aedes aegypti* and other key species in North-West India, examining the interplay between environmental factors, hygiene levels, and the escalating transmission of Chikungunya, Dengue, and Malaria.

Indian mosquito fauna comprises 3583 species in 49 genera and 41 sub genera. The subfamily Anophelinae contains 61

species in one genus followed by culicinae with 332 species in one genus followed by culicinal with 332 species in 11 tribes and 48 genera. The tribe Aedini (subfamily culicinae) contains the highest number of species 176 species in 33 genera and two groups of incertaesedis i.e., Theindain mosquito genera have gone up from 22 to 49. A total of 31 species are currently recognized in India for transmitting various mosquito borne agents of human diseases.

Research Objectives

The primary objectives are

1. **To Assess Vector Abundance:** To determine the current status and population density of *Culex*, *Aedes* and *Anopheles* mosquito species across Rajasthan, particularly following the monsoon season in Railmagra, district Rajsamand, Rajasthan.

2. **To Analyse Disease Trends:** To review and synthesize data from the National Vector Borne Disease Control Programme (NVBDCP) to track the rising incidence of Dengue, Chikungunya, and Malaria.

3. **To Identify Transmission Drivers:** To investigate the role of hygiene levels, seasonal changes (dry vs. monsoon), and environmental factors in creating breeding grounds for vectors.

4. **To Evaluate Control Strategies:** To provide an in-depth account of the development and potential effectiveness of **ATSBs** as a novel intervention to regulate vector density in high-risk areas.

5. **To Document Emerging Pathogens:** To monitor the presence of newer threats within local mosquito populations to prevent future outbreaks.

Material and methodology

1. Site selection

The study was conducted in Railmagra, district Rajsamand, Rajasthan.

A Mosquito survey was performed in all selected study sites during the rainy and winter season. Larva collection was performed at random in site study. Adult collection of mosquito were performed in the morning on mosquitoes resting inside houses using manual aspirators. Adult mosquitoes were also collected outside using standard procedures for all night human-landing collection methods from 6 PM TO 6 AM. Field data collection for larva and adult *Culex*, *Anopheles* and *Aedes* mosquitoes were performed.

2. Description of the study sites:

The different location within the selected for mosquito sampling.

The study sites selected include

1. Over all house's of village area.
2. Over all water of ditch's present in village.

This study site comprised a area of house indoor and outdoor, water of ditch's which accommodates about 6000 people living in village area. The site is surrounded by tall trees, shrubs. The area is characterized by numerous leaking pipes, drainage channels and patched of ground poals with stagnant water. A stream water runs through the back of the houses.

3. Collection of Method

Adult mosquitoes are generally collected using traps that mimic host cues like carbon dioxide (CO_2), heat, or light.

Light and CO_2 Traps

- **CDC Miniature Light Trap:** One of the most standard tools. It uses a small light bulb and a fan to draw mosquitoes into a net. Often supplemented with "dry ice" (CO_2) to increase catch rates of blood-seeking females.
- **BG-Sentinel Trap:** Specifically designed to mimic a human host using scent lures (lactic acid) and upward-moving air currents. It is highly effective for *Aedes.*

Gravid Traps

- **Function:** These target "gravid" females (those who have already had a blood meal and are looking for a place to lay eggs).
- **Mechanism:** They use a basin of "stagnant water" (often an infusion of hay or grass) to lure mosquitoes. A fan then captures them as they fly near the water surface.

Resting Boxes and Aspirators

- **Resting Boxes:** Simple dark, humid wooden boxes placed in the shade. Mosquitoes use them as shelters during the day.
- **Aspirators:** Handheld vacuum devices (manual or battery-powered) used to suck mosquitoes directly off walls, vegetation, or from inside resting boxes.

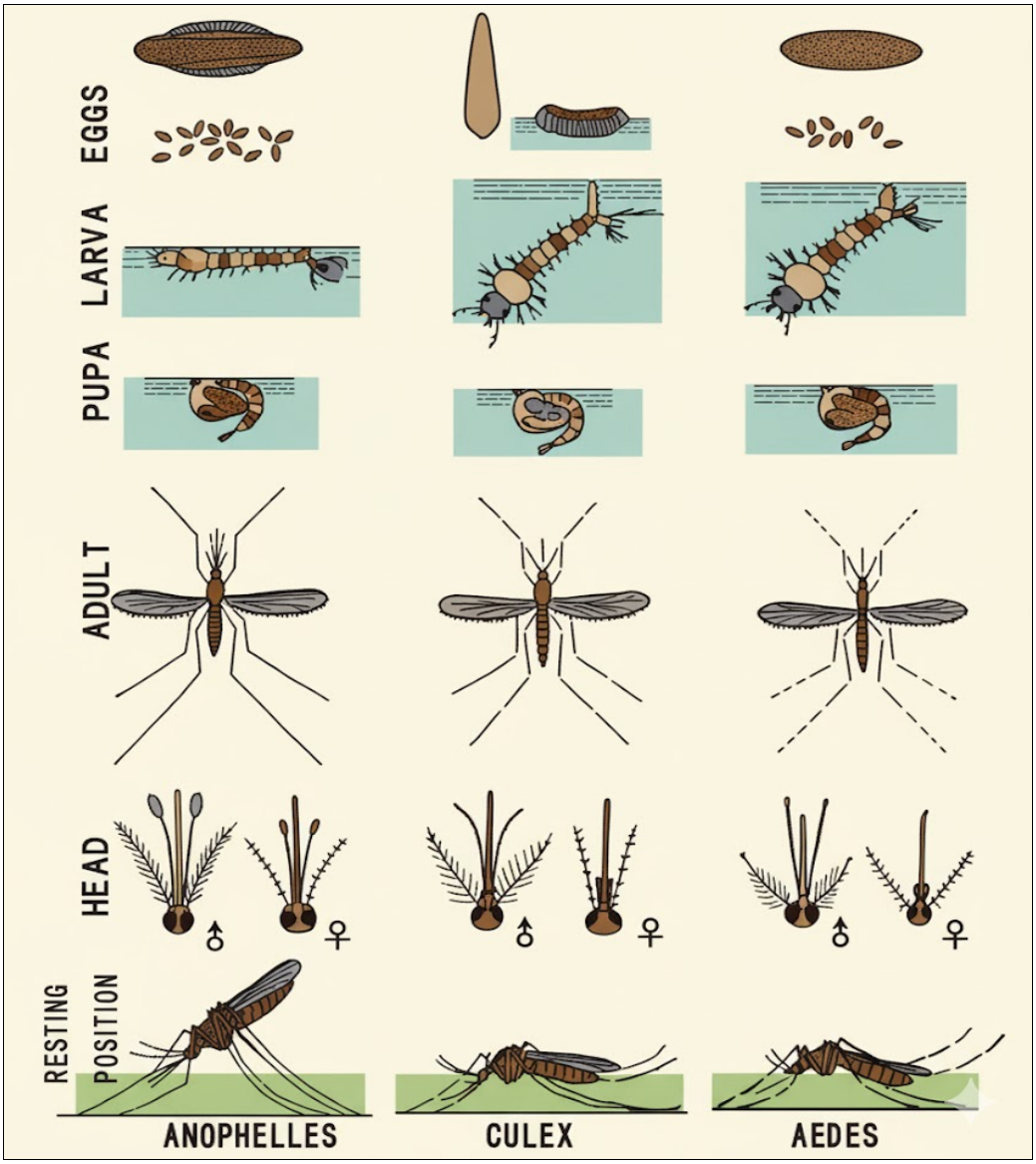
4. Identifications

The collected mosquito specimens were identified to species level. Surveys on the seasonal fluctuation of *Anapheles*, *Culex* and *Aedes* were under taken in areas of Railmagra during July 2025 to February 2026. The *Anopheles*, *Culex* and some *Aedes aegypti* specimen was present to be prevalent in all the area in Railmagra.

We are identify three species of mosquito in this area. The mosquito species are identify from some character's like mosquito mouthparts, reproduction behavior and mosquito bite etc.

Difference between *Anopheles, Aedes* and *Culex*

	Anopheles	***Aedes***	***Culex***
Body	Body divided into tree parts-head, thorax and abdomen with a pair of wings and tree pairs of legs.	Dark colored body while stripes on black colored body also known as "Tiger Mosquito" due to its appearance	Body divided into three parts-head, thorax and abdomen with a pair of wings and three pairs of legs it is also known as nuisance mosquitoes
Wings	Wings spotted	Unspotted	Unspotted
Public Health importance	A female *Anopheles* mosquito transmits malaria and filarial (not reported in India)	A female *Aedes* mosquito transmit the following diseases: ▪ Dengue ▪ Dengue hemorrhagic fever ▪ Chikungunya fever	A female *Culex* Mosquito transmits ▪ Bancroftian filariasis ▪ Japanese encephalitis ▪ West nile fever ▪ Viral arthritis
Preferred breeding place	Clean slow moving water is the preferred site to lay eggs. However can lay eggs in a wide range of water collection types, including fresh water and salt water	Artificial collection of water in desert coolers, fire buckets, flower pots, overhead tanks, discarded tins, broken bottles etc.	Dirty and polluted water collection, such as open drains, cesspools, leaking septic tanks, and dirty water puddles.



Anophleles's mouth part Aedes's mouth part Culex's mouth part

Result

A total of 3 mosquito species were reported in Railmagra, Rajsamand. Mosquito were found most abundant in this area. Total 330 houses are selected in this area. In the month of July to Aug. 120 houses were checked and the common mosquito species No. are found that is *Anopheles* = 100, *Culex*=50, and *Aedes* = 20, Month of Sep to Oct. 120 house were checked and the mosquito number are found that is *Anopheles* = 150, *Culex* = 55 and *Aedes* = 25, Month of Nov. to Dec. 120 houses were checked and the mosquito No. are found that is *Anopheles* = 50, *Culex*= 100, *Aedes*= 50 and the month of Jan to Feb 120 houses were checked and the mosquito no. are found that is *Anopheles*=40, culux-150, *Aedes*=30 from table 1.

Table 1: Three type of Mosquitoes Observation in Houses at Selected Area

Month's	No. of Houses checked	No. of *Anopheles*	No. of *Culex*	No. of *Aedes*
July-Aug	120	100	50	20
Sep.-Oct	120	150	55	25
Nov.-Dec.	120	50	100	50
Jan.-Feb.	120	40	150	30

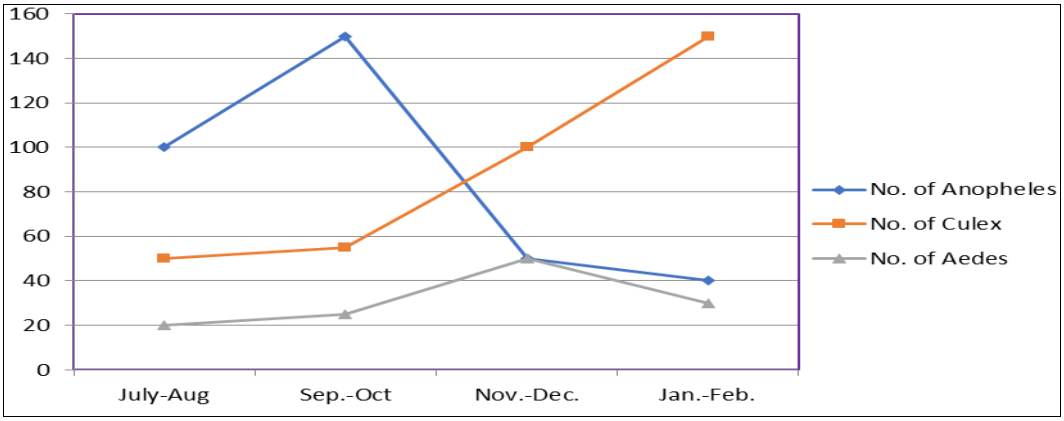
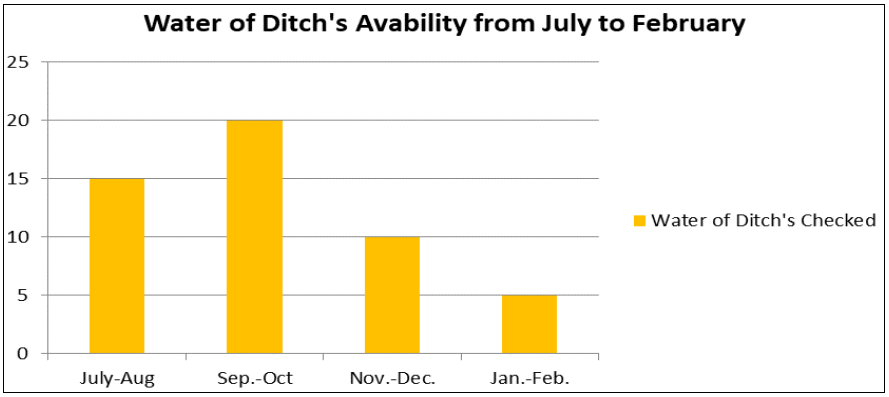


Fig.1: Showing comparative growth study of collected three type of Mosquitoes spp. in Ditch at selected area from July to February month

Table 2: Three type of Mosquitoes Observation in Ditch's at Selected Area

Month's	Water of Ditch's Checked	No. of *Anopheles*	No. of *Culex*	No. of *Aedes*
July-Aug	15	100	50	20
Sep.-Oct	20	150	55	25
Nov.-Dec.	10	50	200	50
Jan.-Feb.	5	20	50	20



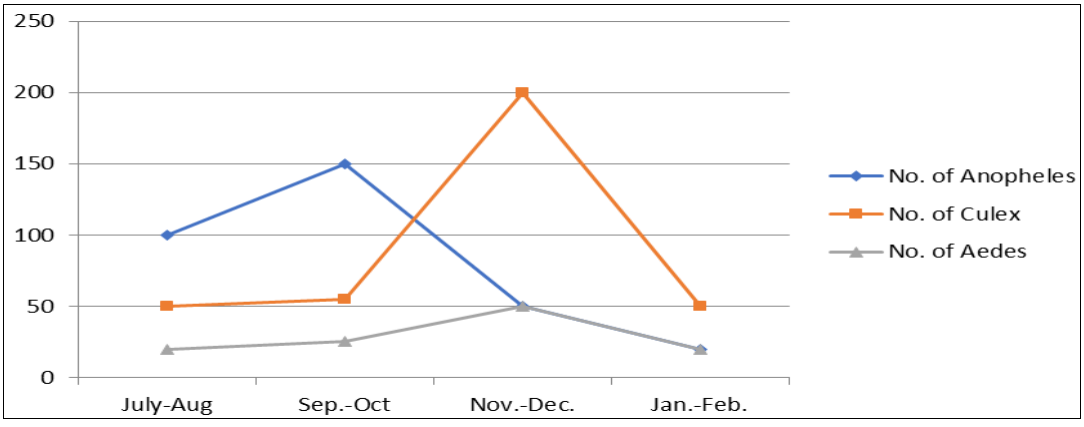


Fig.2: Showing comparative growth study of collected three type of Mosquitoes spp. in Ditch at selected area from July to February month

Table 2 described the water of Ditch's found in the area. The month of july to Aug 15 water of ditch's are found and near the ditch's presence No. of Mosquito species that is *Anopheles*=100, *Culex*=50 and *Aedes*=20, Month of Sep to Oct 20 water of ditch's are found and the no. of mosquito species that is Anopheles=150, *Culex*=55 and *Aedes*= 25, Month of Nov. to Dec. 20 water of ditch's are found and the no. of mosquito species that is Anopheles =50, *Culex*=100 and *Aedes*=50 and the month of Jan. to Feb. 5 ditch's are found and the no. of mosquito species that is Anopheles=20, *Culex*=50 and *Aedes*=20.

Diseases	No. of Patient
Malaria	30
Dengue	20
Chikungunya	0

In the village has registered 50 above cases of Mosquito borne disease. 30 cases of Malaria and 20 cases of Dengue reported in Railmagra.

1. Species Composition and Seasonal Distribution

A systematic survey conducted in Railmagra (Rajsamand) identified three primary mosquito genera: *Anopheles*, *Culex*, and *Aedes*. The distribution of these species showed distinct seasonal fluctuations based on house and ditch observations (Table 1 & 2).

- **Peak Seasons:** *Anopheles* species reached their highest density during the post-monsoon period (September–October), with 150 individuals recorded in residential areas and 150 near aquatic ditches.

- **Winter Shift:** During the winter months (January–February), a significant shift in dominance was observed. *Culex* populations peaked at 150 individuals in residential areas, outnumbering both *Anopheles* (40) and *Aedes* (30).

- **Aedes Stability:** *Aedes* populations remained relatively low but consistent, peaking at 50 individuals during the November–December period.

2. Aquatic Habitat Observation (Ditches)

Surveillance of stagnant water in ditches revealed that the availability of breeding sites varied seasonally, from a high of 20 ditches in the post-monsoon period to a low of 5 in the winter. *Anopheles* density was strongly correlated with ditch availability during the rainy season, while *Culex* showed higher resilience in these habitats during the transition to winter (Table 2).

3. Epidemiological Data

During the study period, the Railmagra region registered over 50 cases of mosquito-borne diseases. Malaria was the most prevalent (30 cases), followed by Dengue (20 cases). Notably, no cases of Chikungunya were reported during this specific observation window.

Discussion

The results indicate a clear ecological succession of mosquito species in Railmagra linked to seasonal transitions. During the rainy season (July–October), the abundance of *Anopheles* aligns with the higher incidence of Malaria reported in the village. This suggests that the monsoon-induced increase in stagnant water in ditches provides ideal breeding grounds for *Anopheles* vectors.

As the season shifts to winter (November–February), the dominance of *Culex* suggests a change in breeding preference or environmental tolerance. While *Aedes* populations were lower in total count, their presence even during dry and cold months confirms their role as a persistent public health threat. As noted by Meena (2020), Dengue remains a major risk in the dry regions of Rajasthan, and the presence of *Aedes aegypti* in Railmagra necessitates year-round vigilance.

Furthermore, the detection of these vectors in close proximity to human habitations increases the risk of arboviral transmission. Given the historical context of Zika virus in Jaipur (Singh, 2019), the presence of efficient vectors like *Aedes spp.* in Rajsamand highlights the potential for emerging viral threats. Vector control—specifically the management of *Aedes* populations—remains the most viable strategy for preventing outbreaks in this region (Scolari, 2019).

Fig.1 show that the no.of house's checked in rainy season there are the most of the *Anopheles* mosquito are present in this month as compared to the species of *Culex* and *Aedes*. *Anopheles* > *Culex* > *Aedes*. And the winter season the no. of house's checked and found there are no. of *Culex* are more than *Anopheles* and *Aedes*. *Culex* > *Anopheles* > *Aedes*. Fig. 2 show that the water of Ditch's are checked in the month of rainy season there are the most of the ditch's are present and the species of *Anopheles* mosquitos are more than present near the ditch's. And the winter season no. of ditch's are less than rainy season so the species of *Anopheles* mosquitos are less present as compare the *Culex* and *Aedes* mosquito species.

Dry and wet months the *Aedes* mosquito population is less but they are present and caused disease. The diversity in mosquito species and in the diseases they transmit intervention strategies have been implemented across this region. Mosquito are living organisms that can transmit infectious diseases between humans or from animals to human.

Control mosquitoes

- Remove standing water. If necessary empty and clean discard or tightly cover any items that hold water.
- Use screens on windows and doors; if possible use air conditioning.
- Use insect spray.

Conclusion

This study confirms the diversity and seasonal prevalence of three major mosquito species—*Culex* , *Anopheles* , and *Aedes* in house and water of ditch's of village the Railmagra, Rajsamand district, Rajasthan. The correlation between *Anopheles* abundance and the 30 reported Malaria cases emphasizes the need for targeted post-monsoon interventions.

To mitigate the risk of vector-borne diseases, a combination of environmental management and community-based larvae control is recommended. Effective home-remedy strategies to disrupt the mosquito life cycle include

- **Source Reduction:** Eliminating stagnant water in household containers and artificial ponds.
- **Botanical Larvicides:** Applying Neem oil or Garlic paste to standing water as eco-friendly alternatives to chemical treatments.

- **Physical Barriers:** Installing window screens and using insecticidal sprays to reduce human-vector contact.

Ultimately, continuous surveillance and the adoption of both traditional and modern vector control measures are essential to safeguard the public health of Railmagra.

The study provides the information on species of mosquitoes in regions of Railmagra. The study reveals the presence of 3 mosquito species from Railmagra region have dengue and Malaria vector species. The need for vector surveillance measures to stop vector borne diseases in the areas.

Some home remedies include to kill mosquito larvae in water and stop mosquito development

References

1. Cecilia D. Current status of dengue and chikungunya in India. WHO South-East Asia Journal of Public Health,2014:3(1):22–26.
2. Franklinos HVL, Jones KE, Redding DW, Abubakar I. The effect of global change on mosquito-borne disease. The Lancet Infectious Diseases,2019:19(9):e302–e312.
3. Kumar G, Ojha VP, Pasi S. Applicability of attractive toxic sugar baits as a mosquito vector control tool in the context of India: A review. Pest Management Science,2021:77(6):2626–2634.
4. Manikandan S, Mathivarnan A, Bora B, Hemalaxshmi P, Abhisubesh V, Poopathi S. A review on vector-borne disease transmission: Current strategies of mosquito vector control. Indian Journal of Entomology, 2022, 1–11.
5. Meena S. A review on the prevalence and susceptibility–resistance status of Aedes mosquitoes in Rajasthan. International Journal of Mosquito Research,2020:7(4):122–126.
6. Mohanty SS, Meena S, Kanojia PC. The mosquitoes living in desert climate are physiologically better equipped to survive in the desert environment. Iranian Journal of Arthropod-Borne Diseases, 2018, 12(3).
7. Prasad A, Kumar D, Kumar A, Jakhar DS, Kumawat KA. Three days extensive survey of malaria, dengue and chikungunya mosquitoes in the capital of Rajasthan, India. International Journal of Life Science and Pharma Research,2022:12(3):128–135.
8. Rahman M, Amin R, Sarmin S, Bokhsa S, Rahman RM, Faiz MA. Japanese encephalitis: A review article. DK Ray,2002:13:70–75.
9. Scolari F, Ciarleglio M, Bonizzoni M. Aedes spp. and their microbiota: A review. Frontiers in Microbiology,2019:10:2036.
10. Singh H, Singh PO, Akhtar N, Sharma G, Sindhania A, Gupta N, Valecha N. First report on the transmission of Zika virus by Aedes (Stegomyia) aegypti (L.) (Diptera: Culicidae) during the 2018 Zika outbreak in India. Acta Tropica,2019:199:105114.
11. Verma R. Japanese encephalitis vaccine: Need of the hour in endemic states of India. Human Vaccines and Immunotherapeutics,2012:8(4):491–493.