

Active circulation of Rift Valley Fever Virus in mosquitoes in Côte D'ivoire

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Abstract

Rift Valley Fever (RVF) is an emerging arboviral disease whose transmission dynamics remain poorly documented in Côte d'Ivoire. This study aimed to assess the active circulation of the RVF virus in mosquitoes across four representative geographic zones of the country: North, South, East, and Central. Entomological collections were conducted using light traps in the cities of Abidjan, Bondoukou, Bouaflé, and Korhogo. Collected mosquitoes were sorted, morphologically identified, and pooled for molecular analyses. Viral detection was performed using polymerase chain reaction (PCR) targeting a specific genomic segment of the Rift Valley Fever virus (RVFV). The results revealed the presence of the viral genome in several mosquito pools, confirming active RVFV circulation in all four study areas. RVFV was detected in *Aedes aegypti* (10.5%) and *Culex quinquefasciatus* (1.3%). Detection of the virus in these potential vectors suggests silent viral transmission among animal and human populations. These findings highlight the need to strengthen entomological and epidemiological surveillance of RVF in Côte d'Ivoire to prevent the emergence of future outbreaks.

Keywords: Rift Valley Fever, mosquitoes, Côte D'ivoire

Introduction

Rift Valley Fever (RVF) is an acute viral zoonosis endemic in several countries of sub-Saharan Africa. The causative virus is an arbovirus belonging to the genus *Phlebovirus* within the *Bunyaviridae* family (Bishop *et al.*, 1980) [1]. The disease primarily affects domestic ruminants, in which it causes mass abortions and high mortality in young animals, leading to substantial economic losses (Chevalier *et al.*, 2010) [2]. In humans, infection ranges from asymptomatic or influenza-like illness to more severe manifestations such as encephalitis, hemorrhagic syndrome, and fulminant hepatic involvement (Direche *et al.*, 2019) [3]. The combined health and economic impacts make RVF a major public and veterinary health concern.

Transmission of RVFV occurs mainly through the bite of infected mosquitoes, particularly those of the genera *Aedes* and *Culex* (Anyamba *et al.* 2010; Linthicum *et al.* 2016) [4, 5]. Mosquitoes serve not only as vectors but, in some cases, as biological reservoirs due to their capacity for transovarial transmission (Linthicum *et al.*, 1985) [6]. Several factors contribute to the onset of epidemics or epizootics: the abundance and diversity of vector species and their mammalian hosts (domestic and wild), herd immunity levels, and environmental factors such as temperature, rainfall, and vegetation etc. (Arsevska *et al.* 2016; Métras *et al.* 2020) [7, 8].

In Côte d'Ivoire (CI), data on RVFV circulation remain limited despite ecological conditions favorable to the proliferation of vector mosquitoes and the intensification of agricultural and livestock activities. Several serological studies have reported the presence of anti-RVFV antibodies

in domestic animals, suggesting silent viral circulation in certain regions of the country (Kanouté *et al.* 2017; Formenty *et al.* 1992) [9, 10]. However, very few studies have focused on the direct detection of the virus in mosquitoes, key elements in the transmission cycle. The absence of recent entomological data represents a major gap in understanding the risk of emergence or re-emergence of RVF in Côte d'Ivoire.

In this context, studying RVFV circulation in mosquito populations is essential for assessing the level of risk, guiding surveillance interventions, and anticipating potential outbreaks.

The aim of this study was to evaluate the active circulation of RVFV in mosquitoes in CI. The investigation relied on mosquito sampling using light traps, morphological identification of collected specimens, and molecular detection of the virus by PCR. The results were discussed to improve understanding of transmission dynamics and to provide essential data for strengthening entomological surveillance and RVF prevention strategies in Côte d'Ivoire.

Materials and Methods

Study Area

Côte d'Ivoire is a West African country located between latitudes 4° and 11° North and longitudes 2° and 8° West. The country exhibits great ecological, climatic, and geographical diversity, offering favorable conditions for the proliferation of a wide variety of mosquito vector species (kouassi *et al.* 2020; Adja *et al.* 2022; Adjobi *et al.* 2024) [11, 12, 13]. The country is divided into several eco-climatic zones, ranging from humid forests in the South to dry savannas in

the North, with transition zones in the Central areas and mixed environments in the East and West (Eldin, 1971) [14]. In this study, four major representative geographic zones of the country were selected: The North, South, East, and Central regions via the administrative centers of Korhogo, Abidjan, Bondoukou, and Bouaflé respectively (Figure 1). These zones were chosen because of their distinct ecological characteristics, varied human and animal dynamics, as well as their potential for viral circulation owing to the presence of potential RVF mosquito vectors. Two cattle herds per locality were selected for mosquito trapping.



Fig 1: Study Area

Mosquito Sampling and Identification

This cross-sectional study was conducted from May 2018 to May 2019 during the rainy season (RS) and dry season (DS). Adult mosquitoes were collected using light traps (Sudia et Chamberland, 1962) [15] installed from 18:00 to 06:00. The traps were placed approximately 1.5 meters above the ground within the selected cattle enclosures. Collections were carried out over four (4) consecutive days. Captured adult mosquitoes were identified under an OPTIKA stereomicroscope at 10× and 20× magnification, using the morphological identification keys of Gillies et Coetzee (1987) [16] for *Anopheles*, Huang 2004 [17] (Zootaxa 700) for *aedes*, Mattingly (1973) [18] for other *culicidae*. After identification, mosquitoes were grouped by species, sex, and site in pools of 10 individuals and stored in 1.5 ml cryovials in liquid nitrogen (−180 °C). They were then transported to the laboratory and stored at −80 °C until molecular analysis for RVFV detection.

RVF Virus Diagnosis by RT-PCR

Total RNA was extracted from adult female mosquitoes using commercial kits (QIAGEN, Valencia, CA, USA; QIAamp Viral RNA Mini Kit, 250 reactions). Mosquito pools of 10 were homogenized using disposable pestles in 1.5 ml cryovials containing 500 µl of phosphate-

buffered saline (PBS). After homogenization, the supernatant was used for total nucleic acid extraction following the manufacturer's protocol of the QIAGEN RNeasy Mini Kit. Eluted nucleic acid extracts were stored at −80 °C until specific amplification of RVFV RNA sequences.

Molecular detection of the virus was performed by one-step RT-qPCR (Applied Biosystems) using the Ambion kit reconstituted according to the manufacturer's instructions, with the following primers: Forward: TGAAAATTCCTGAGACACATGG, Reverse: ACTTCCTTGCATCATCTGATG, and probe: CAATGTAAGGGGCTGTGTGGACTTGTG, specific to the L segment of RVFV as previously used by kouassi et al. (2020) [11]. The amplification program consisted of: 50 °C for 10 minutes (reverse transcription), 95 °C for 15 minutes (denaturation), followed by 40 cycles of 95 °C for 15 seconds and 60 °C for 1 minute.

Statistical Analysis

Collected data were entered into Microsoft Excel and analyzed using R software version 4.0.2.

Mean ecological indices were calculated and compared using the G-test to assess differences between factors. For all statistical tests, the significance threshold was set at 5%. When a significant difference was detected, the Mann–Whitney test was used to identify its origin.

Results of RVFV detection in vectors were subsequently generated.

Results

Frequency of Mosquito Occurrence

This study identified seven *Culicidae* species across the four localities. During the dry season, species of the genus *Culex* were largely predominant, followed by *Anopheles gambiae*, while the remaining species were sparsely represented. *An. gambiae* showed a moderate occurrence, particularly higher in Bouaflé, whereas *An. ziemanni* was recorded only in Bouaflé. *Culex quinquefasciatus* was the most frequent species, especially in Bondoukou and Bouaflé, while *Cx. cinereus* and *Cx. nebulosus* displayed more localized distributions. *Mansonia africana* appeared at moderate levels, and *Aedes aegypti* was absent during the dry season. In the rainy season, the strong predominance of *Culex* species persisted, followed by *An. gambiae* and *Ae. aegypti*. *An. gambiae* exhibited high occurrences across all localities, particularly in Bondoukou and Korhogo, while *An. ziemanni* remained marginal. *Cx. quinquefasciatus* continued to be the dominant species, with very high occurrences in all study sites. *Cx. cinereus* and *Cx. nebulosus* was well represented in Bondoukou and Bouaflé. *Mansonia africana* appeared at low levels, while *Ae. aegypti* was common in Abidjan, Bondoukou, and Korhogo, but absent in Bouaflé.

Across both seasons, *Cx. quinquefasciatus* emerged as the most constant and widespread species, followed by *An. gambiae*. The other species showed low or localized occurrences. *Ae. aegypti* exhibited variable presence depending on the locality, being notable in Abidjan and Bondoukou but absent in Bouaflé (Table 1).

Table 1: Constancy of occurrence (C%) of *Culicidae* species recorded by study zone and overall

Constancy of occurrence (C%)						
Seasons	Species	Abidjan	Bondoukou	Bouafle	Korhogo	Total
	<i>Anopheles gambiae</i>	25%	12.5%	75%	12.5%	31.25%
	<i>Anopheles ziemanni</i>	0%	0%	12.5%	0%	3.125%
	<i>Culex cinereus</i>	0%	62.5%	37.5%	0%	25%
Dry	<i>Culex nebulosus</i>	0%	50%	0%	12.5%	15.62%
	<i>Culex quinquefasciatus</i>	0%	87.5%	100%	12.5%	50%
	<i>Mansonia africana</i>	0%	0%	37.5%	12.5%	12.5%
	<i>Aedes aegypti</i>	0%	0%	0%	0%	0%
	<i>Anopheles gambiae</i>	37.5%	75%	37.5%	62.5%	53.12%
	<i>Anopheles ziemanni</i>	0%	0%	12.5%	0%	3.13%
	<i>Culex cinereus</i>	0%	62.5%	62.5%	0%	31.25%
Rainy	<i>Culex nebulosus</i>	0%	62.5%	37.5%	12.5%	28.12%
	<i>Culex quinquefasciatus</i>	62.5%	87.5%	87.5%	87.5%	81.25%
	<i>Mansonia africana</i>	0%	0%	0%	12.5%	3.13%
	<i>Aedes aegypti</i>	87.5%	87.5%	0%	50%	56.25%
	<i>Anopheles gambiae</i>	31.25%	43.75%	56.25%	37.5%	42.19%
	<i>Anopheles Ziemanni</i>	0%	0%	12.5%	0%	3.13
	<i>Culex cinereus</i>	0%	62.5%	50%	0%	28.12%
Total	<i>Culex nebulosus</i>	0%	56.25%	18.75%	12.5%	21.86%
	<i>Culex quinquefasciatus</i>	31.25%	87.5%	93.75%	43.75%	64.06%
	<i>Mansonia africana</i>	0%	0%	18.75%	12.5%	7.81%
	<i>Aedes aegypti</i>	43.75%	43.75%	0%	25%	28.13%

Spatial Variations in Abundance

A total of 4,562 mosquitoes were collected across the four study localities. Mosquito abundance varied markedly among the sites. Bondoukou recorded the highest number of mosquitoes, accounting for more than 73% of all collected specimens, followed by Bouafle (23.61%), while Abidjan and Korhogo showed the lowest densities (<2%).

Across all localities, *Culex quinquefasciatus* was the most abundant species, representing 83.52% of all captured mosquitoes. Its predominance was particularly pronounced in Bondoukou and Bouafle, where it accounted for 85.17% and 84.77% of captures, respectively. Other *Culex* species, notably *Cx. cinereus* and

Cx. nebulosus, showed more moderate abundance and varied across localities, with higher representation in certain areas.

Anopheles gambiae showed high abundance in Korhogo, where it became the dominant species (45.33%), whereas it was much less represented in the other localities. *An. ziemanni* was observed in only one site and remained very rare (0.24%).

Aedes aegypti was also one of the most abundant species in Abidjan (40.51%), with moderate presence in Bondoukou and Korhogo but completely absent from Bouafle.

Finally, *Mansonia africana* appeared as the least abundant species across all localities (Table 2).

Table 2: Relative abundance (%) of recorded mosquito species in the four study zones in Côte d’Ivoire

Mosquito’s species	Abidjan	Bondoukou	Bouafle	Korhogo	Total number of mosquitoes collected by species
<i>An. Gambiae</i>	15(18.98%)	61(1.83%)	39(3.62%)	34(45.33%)	149(3.27%)
<i>An. Ziemanni</i>	0(0%)	0(0%)	11(1.02%)	0(0%)	11(0.24%)
<i>Cx. Cinereus</i>	0(0%)	148(4.44%)	97(9.01%)	0(0%)	245(5.37%)
<i>Cx. Nebulosus</i>	0(0%)	121(3.63%)	11(1.02%)	4(5.34%)	136(2.98%)
<i>Cx. quinquefasciatus</i>	32(40.51%)	2837(85.17%)	913(84.77%)	28(37.33)	3 810(83.52%)
<i>Ma. Africana</i>	0(0%)	0(0%)	6(0.56%)	3(4%)	9(0.2%)
<i>Ae. Aegypti</i>	32(40.51%)	164(4.93%)	0(0%)	6(8%)	202(4.42%)
Total number of mosquitoes collected by species	79(1.73%)	3331(73.02%)	1077(23.61%)	75(1.64%)	4 562(100%)

Seasonal Variation in Abundance

The data obtained show the temporal variations of the main mosquito species collected across all study zones. The dry season recorded the highest number of specimens, accounting for approximately 70% of all captured mosquitoes, a value significantly higher than that obtained during the rainy season.

Aedes aegypti was the only *Aedes* species collected in this study, representing 4.42% of the total number of recorded specimens. All individuals were captured during the rainy season.

Anopheles were mainly represented by *Anopheles gambiae* and *An. ziemanni*, accounting for 3.27% and 0.24% of captured mosquitoes, respectively. Similar to *Ae. aegypti*, *An. gambiae* were predominantly collected during the rainy

season. Their proportion in the rainy season (8.87%) was significantly higher than that recorded in the dry season (0.79%).

An. ziemanni was weakly represented (0.24%). However, unlike the previous two species, *An. ziemanni* was more frequently encountered during the dry season. Nevertheless, no significant difference was observed between the proportion obtained in the rainy season (0.07%) and that of the dry season (0.32%).

Culex species were mainly represented by *Cx. quinquefasciatus*, *Cx. cinereus*, and *Cx. nebulosus*. *Culex quinquefasciatus* was the most dominant species collected in both seasons. It accounted for 58.51% of mosquitoes captured during the rainy season and 94.6% of those collected during the dry season. Its overall proportion across

seasons (83.5%) was significantly higher than that of the other species.

Cx. cinereus was the second most abundant species after *Cx. quinquefasciatus*, representing 5.37% of all collected mosquitoes. It was more frequently encountered in the rainy season than in the dry season, indicating that its abundance varied significantly with season.

Cx. nebulosus was the least represented *Culex* species, accounting for

2.98% of all mosquitoes. It was more frequent in the rainy season (8.8%) than in the dry season (0.41%).

The genus *Mansonia* was represented by a single species, *Mansonia africana*. It was the least abundant species observed in this study, with a proportion of 0.2%, significantly lower than that of the other species. No significant difference was observed between its rainy and dry season proportions.

Table 3: Temporal abundance of recorded mosquito species

Parameter	Rainy	Dry	Ki2 (P)	Total
<i>Aedes aegypti</i>	202 (14.45%)	0 (0%)	474.95 (2.69x10 ⁻¹⁰⁵)	202 (4.43%)
<i>Anopheles gambiae</i>	124 (8.87%)	25 (0.79%)	197.79 (6.34x10 ⁻⁴⁵)	149 (3.27%)
<i>Anopheles ziemanni</i>	1 (0.07%)	10 (0.32%)	1.50 (0.22)	11 (0.24%)
<i>Culex cinereus</i>	128 (9.16%)	117 (3.7%)	55.77 (8.15x10 ⁻¹⁴)	245 (5.37%)
<i>Culex nebulosus</i>	123 (8.8%)	13 (0.41%)	232.94 (1.36x10 ⁻⁵²)	136 (2.98%)
<i>Culex quinquefasciatus</i>	818 (58.51%)	2992 (94.6%)	912.78 (1.64x10 ⁻²⁰⁰)	3810 (83.5%)
<i>Mansonia africana</i>	2 (0.14%)	7 (0.22%)	0.04 (0.85)	9 (0.2%)
Total	1398 (100%)	3164 (100%)	1087.15 (1.25x10 ⁻²³¹)	4562 (100%)

Prevalence of Rift Valley Fever Virus in *Culicidae*

Except for *Aedes*, all other mosquito species analyzed by PCR were female. Monospecific mosquito pools were formed, revealing approximately 2% of female pools positive for RVFV,

while pools of male *Aedes* were all negative. RVFV was detected in *Ae. aegypti* (10.5%) and *Cx. quinquefasciatus* (1.3%). Most of the localities surveyed (Abidjan, Bondoukou, Bouaflé, and Korhogo) harbored infected mosquitoes, except for Abidjan.

Table 4: Detection of Rift Valley Fever virus by RT-PCR in mosquitoes

	Species	Total	Genders		Number of pools	Number of positive pools (PCR)
			M	F		
Abidjan	<i>Aedes aegypti</i>	32	M	4	1	0
			F	28	3	0
	<i>Anopheles gambiae</i>	15	M	7		
Bondoukou	<i>Aedes aegypti</i>	164	M	19	2	
			F	145	15	2
	<i>Anopheles gambiae</i>	61	M	7		
Bouaflé	<i>Culex cinereus</i>	148	F	54	6	0
			M	0		
	<i>Culex nebulosus</i>	121	F	148	15	0
Korhogo	<i>Culex quinquefasciatus</i>	2837	M	0		
			F	2752	276	2
	<i>Anopheles gambiae</i>	39	M	0		
			F	39	4	0
	<i>Anopheles ziemanni</i>	11	M	0		
			F	11	2	0
<i>Culex cinereus</i>	97	M	0			
		F	97	10	0	
<i>Culex nebulosus</i>	11	M	0			
		F	11	12	0	
<i>Culex quinquefasciatus</i>	913	M	4			
		F	909	91	2	
<i>Mansonia africana</i>	6	M	0			
		F	6	1	0	
Korhogo	<i>Aedes aegypti</i>	6	M	0		
			F	6	1	0
	<i>Anopheles gambiae</i>	34	M	0		
			F	34	4	0
	<i>Culex nebulosus</i>	4	M	0		
F			4	1	0	
<i>Culex quinquefasciatus</i>	28	M	0			
		F	28	3	1	
<i>Mansonia africana</i>	3	M	0			
		F	3	1	0	

M: Male, F: Female

Discussion

This study was conducted to determine the prevalence of Rift Valley Fever (RVF) among potential mosquito vectors in cattle farms in Côte d'Ivoire. The assessment of *Culicidae* diversity provided essential data for evaluating the risk of mosquito-borne diseases, such as malaria and arboviruses (Toure *et al.*, 2018) ^[19]. Very few studies have investigated mosquito diversity and ecology across Côte d'Ivoire. In the present study, seven *Culicidae* species were recorded. Among the *Anopheles* genus, only *Anopheles gambiae* has been extensively studied in the context of malaria vector control, as malaria is endemic in Côte d'Ivoire (Sylla *et al.*, 2018) ^[20]. Our study shows that this species also plays a central role in the mosquito composition, with high occurrences across all localities, particularly in Bouaflé, classifying it as a regular species. The high constancy of *An. gambiae* aligns with previous findings (Sy *et al.*, 2016) ^[21], (Gbalegba *et al.*, 2016) ^[22] et (Githeko *et al.*, 2000) ^[23], highlighting its continuous presence in tropical regions with favorable climatic conditions and larval habitats year-round. Its persistence, regardless of seasonal variations, indicates a suitable environment for its development and confirms its central role in vector-borne disease dynamics (Bouafou, 2024) ^[24]. *Anopheles ziemanni* was observed as a rare species, reflecting its ecological specialization and restricted distribution.

The genus *Culex* was represented by *Cx. cinereus*, *Cx. nebulosus*, and *Cx. quinquefasciatus*. These mosquitoes are recognized vectors of arboviruses (Vitek *et al.* 2014; Gunay *et al.* 2015) ^[25, 26] and warrant particular attention. Notably, Quan *et al.* (2010) ^[27] identified a novel Rhabdoviridae member, the Moussa virus, isolated from *Culex decens* in Côte d'Ivoire, suggesting that this group may act as a reservoir for emerging viruses or diseases. *Culex quinquefasciatus* remains highly endemic in Côte d'Ivoire (Fofana *et al.* 2012; N'Guessan *et al.* 2001; Tia *et al.* 2023) ^[28, 29, 30]. Indeed, except in Abidjan and Korhogo areas, the various occurrence frequencies indicate this species remains consistently present throughout both seasons. It is also consistently observed in Korhogo during the rainy season and can be classified as a regular species during the rainy season in the Abidjan area. These results can be explained by the species' ability to exploit a wide variety of breeding sites, whether natural or human-made (SILUE *et al.*, 2025) ^[31]. This ecological plasticity makes it particularly well-adapted to urban and rural environments, supporting its high prevalence in all study zones. Similar findings have been reported by Lindahl (2014) ^[32], describing *Cx. quinquefasciatus* as ubiquitous in heavily anthropized areas. This adaptation explains its dominance in Bondoukou and Bouaflé.

Culex cinereus and *Cx. nebulosus* showed a more heterogeneous distribution, with higher presence in certain areas, such as Bondoukou and Bouaflé, indicating ecological preferences or environmental conditions favorable to their development. *Cx. cinereus*, alongside *Cx. quinquefasciatus*, has been reported as a potential RVFV vector (kouassi *et al.*, 2020) ^[11].

The constancy of most *Culicidae* species was higher during the rainy season compared to the dry season. This is attributable to the reduction of breeding sites during the dry season, which significantly affects mosquito populations. Similar observations have been reported by Cordellier

(1978) ^[33] in West Africa and Tabachnick et Powell, (1978) ^[34] in East Africa for *Ae. aegypti*. These authors distinguished, within the same locality, three different populations of the species *Ae. Aegypti*; (i) a wild population that develops in tree holes and rock cavities; (ii) a peri-domestic population that develops in abandoned containers around villages; and (iii) a domestic population that uses jars and pots inside homes for its pre-imaginal development. The first two populations depend on rainfall. Their densities increase during the rainy season and reach their lowest levels during the dry season (Subra et Hebrard 1977) ^[35].

The analysis of the relative abundance of mosquitoes across the four localities reveals a strong spatial heterogeneity, likely reflecting environmental, climatic, and anthropogenic differences between sites. Bondoukou appears to be the main hotspot of proliferation, concentrating more than 70% of the mosquitoes collected. This high abundance may be associated with the combined presence of favorable breeding habitats, humid areas, and human activities that promote water stagnation. In contrast, Abidjan and Korhogo show very low densities, suggesting either a lower availability of larval breeding sites or ecological conditions less suitable for the development of *Culicidae* at the time of the study.

The abundance of RVF vectors and the confirmed presence of the virus in its vectors represent critical information regarding the entomological risk of RVF emergence in Côte d'Ivoire. All geographic areas are threatened by the presence or re-emergence of RVF due to the occurrence of vectors in varying proportions depending on the zone. Indeed, the vector *Culex quinquefasciatus* was found significantly in all study areas, where it was the most abundant species. These observations are consistent with those of Baldet. (1995) ^[36] who reported that *Culex quinquefasciatus* constitutes the main culicid nuisance in African cities. Its capture in relatively high proportions across the four study sites, despite their ecological differences, highlights the strong ecological plasticity that this species has acquired over time. Originally, this culicid species developed preferentially in urban areas, particularly in temporary, grassy, and polluted breeding sites (Baldet, 1995) ^[36]. According to (AKono-Ntonga *et al.* 2020) ^[37], its increasingly noticeable presence in peri-urban and rural environments reflects a secondary adaptation. Furthermore, the number of mosquitoes captured in the Bondoukou area reached 3,331 individuals, consisting mainly of *Culex quinquefasciatus*, with a relative abundance of 85.17%. These results indicate that the Bondoukou area could be a potential hotspot for RVF resurgence, given the high abundance of vectors in this locality. Similarly, all other surveyed areas also represent potential zones of RVF resurgence. Indeed, in addition to the presence of RVF vectors in the different localities, studies conducted by several authors have demonstrated the circulation of RVF and other arboviral diseases in domestic ruminants in the South (Formenty *et al.*, 1992) ^[10], in the North (Kanouté *et al.*, 2017) ^[9] and in the Center (VALERY *et al.*, 2021) ^[38]. The vectors were highly abundant but showed low diversity in some cases, during both the rainy and dry seasons, as observed by the genus *Aedes*, for which only a single species was collected. This result may be explained by several factors, including the sampling technique. Indeed, light traps are less effective for collecting *Aedes aegypti*, as these mosquitoes are not primarily attracted to light but

rather to carbon dioxide and human body odors. Its results may be due to the known activity of this mosquito. Indeed, this mosquito is generally active during the day in East Africa (Cordellier *et al.*, 1974) [39] and India (Pandian et Dwarakanath, 1992) [40], whereas it exhibits crepuscular activity in West Africa (Cordellier *et al.*, 1974) [39]. In the present study, light traps were installed from 18:00 onward. It is therefore expected that this type of trap would be ineffective for capturing *Aedes* mosquitoes. Except for *Aedes aegypti*, which was absent during the dry season, the other species were present and more abundant in the dry season than in the rainy season. This may also be explained by the fact that mosquitoes were captured at the adult stage, and the trapping method relied on light traps placed along the fences of open-air cattle enclosures. Rain hindered the proper functioning of these traps, and the winds preceding rainfall reduced trap ventilation, thereby limiting mosquito capture. In contrast, during the dry season, artificial larval habitats such as drinking troughs, discarded water-storage containers, and similar structures remained available throughout the year because they are human-made within the cattle enclosures. This continuous availability of breeding sites favored mosquito proliferation in the cattle parks year-round. Detection of RVFV in *Aedes aegypti* and *Culex quinquefasciatus* is not new. These species are confirmed vectors of Rift Valley fever and have been repeatedly implicated in RVF epidemics (Lagare *et al.* 2024; Javelle 2025) [41, 42]. The absence of RVFV in *Anopheles gambiae*, *Anopheles ziemanni*, *Culex cinereus*, *Culex nebulosus*, and *Mansonia africana* in our study does not rule out their vector potential. Notably, *Culex cinereus* was first described as a vector of RVFV in western Côte d'Ivoire (kouassi *et al.*, 2020) [11]. Our results may be explained by the low numbers of these species collected. Similar findings were reported by Seufi et Galal (2010) [43] who detected RVFV only in the most abundant mosquito species during their study conducted in Sudan.

Conclusion

This study highlights the active circulation of Rift Valley fever virus (RVFV) in mosquitoes collected across four geographical zones of Côte d'Ivoire. The detection of RVFV in multiple species and regions suggests that the virus is silently circulating in the country, despite the absence of recently reported outbreaks. These findings represent an important warning signal for public health and veterinary authorities, as they indicate a potential risk of emergence or re-emergence of disease in both animals and humans.

Strengthening entomological surveillance, establishing early detection systems, and integrating "One Health" approaches are essential to prevent and control possible epidemic episodes. Additional studies focusing on animal reservoirs, environmental drivers, and human-vector interactions are also recommended to better understand the transmission dynamics of RVFV in Côte d'Ivoire.

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