

Is Rift Valley fever virus a threat for Germany?

Evaluation of the vector competence of German mosquitoes for Rift Valley fever virus

Challenges:

1. Covid-19 crisis and recurrent lockdown in Uganda are still interfering with transportation of the Ugandan mosquitoes to Germany.
2. Also, it has adverse effects on our work at FLI because of delayed consumables' delivery.

Innovative ways of working

To overcome this situation our team discussed and decided to use south German mosquitoes. This decision was based on the fact that Germany is at medium risk for Rift Valley fever virus (RVFV) spreading according to previously published risk assessment studies (Bortel et al., 2020).

Background:

Rift Valley fever virus is transmitted by different mosquito species. Both animals and humans can develop severe symptoms. The disease is common in African countries, but European countries are also at the risk of emergence (Ndiaye et al., 2016 and Lumley, et al., 2018).

Key Words:

RVFV MP-12, *Culex pipiens* biotype *molestus* and *Aedes albopictus*.

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Material and Methods:

A. Vector competence studies:

306 and 207 German *Culex pipiens* biotype *molestus* and *Aedes albopictus* females mosquitoes, respectively at an age of 6-8 days old were exposed for three hours to infectious blood meal containing 10^7 TCID₅₀/ml RVFV strain MP-12 mixed with heparinized bovine blood (1:2 ratio) using cotton stick method (Fig. 1). Out of them 50.65% and 27.53% fed (Table 1). Blood fed females were kept at 28°C, 12/12 photocycle and 80% humidity. 5% glucose was supplied during the incubation period (Ndiaye et al., 2016). Blood meal was titrated twice, before and after feeding and the titers ranged from 10^6 - $10^{4.86}$ TCID₅₀/ml.

B. Salivation assay and Molecular finding: Two salivation assays were done at day 14 and day 21 post infection followed by qPCR according to Bird et al. (2007) to confirm positive occurrence of RVFV in the examined samples (Table 2, Fig. 2).



Fig. 1 Blood feeding using cotton-sticks

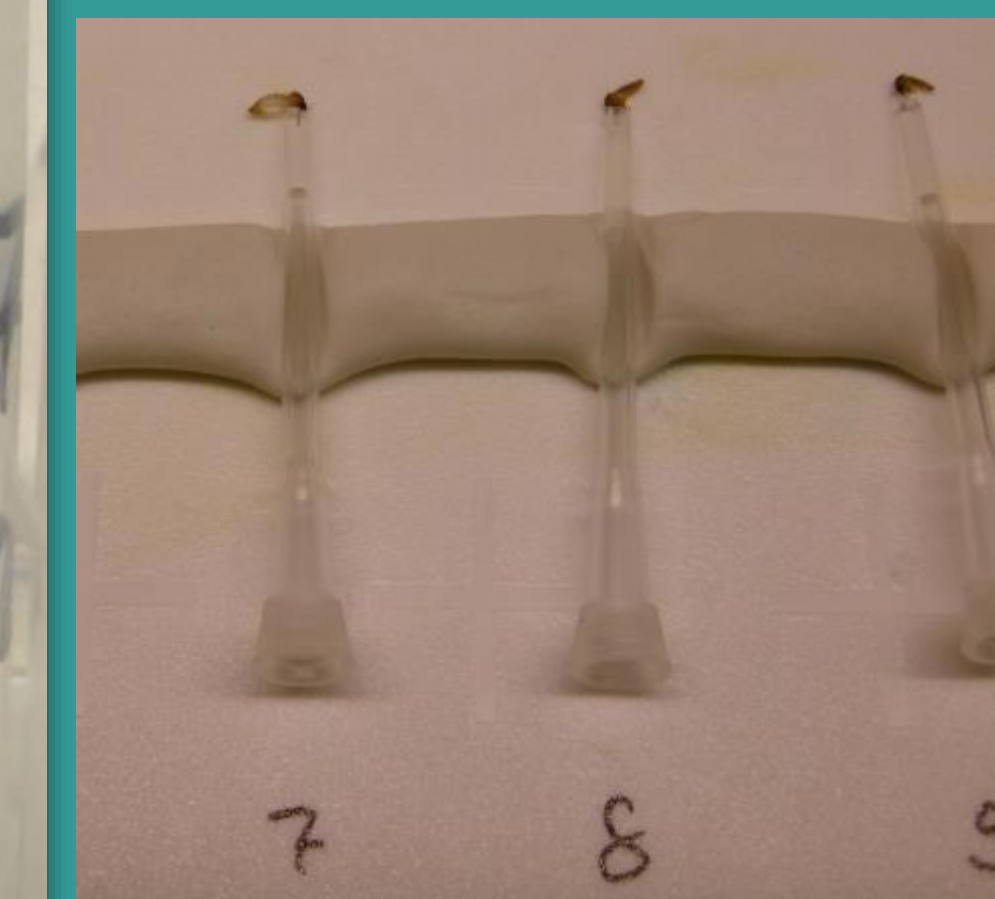


Fig. 2 Salivation Assay.

Table 1 : Feeding and survival rates

Mosquito species	Total	Blood fed	Feeding rate %	Survival number	Survival rate%
<i>Culex pipiens molestus</i>	306	155	50.65	87	56.13
<i>Aedes albopictus</i>	207	57	27.53	13	22.80

Table 2 Infection, dissemination and transmission rates

Mosquito species	Salivation day	Salivated numbers	Body Infection rate %	Legs & wings	Dissemination rate %	Saliva	Transmission rate
<i>Culex pipiens molestus</i>	14	49	13 26.53	12	24.49	8	16.33
	21	38	13 34.21	6	15.79	14	36.84
<i>Aedes albopictus</i>	14	10	2 20	1	10	2	20
	21	3	1 33.33	0	0	1	33.33

Main Finding:

- Feeding and survival rates in *Culex pipiens* biotype *molestus* are higher than in *Ae. albopictus*.
- Both have the ability to disseminate and transmit RVFV.
- German mosquitoes are competent vectors for RVFV and still able to transmit it 21 day post infection.

Future steps

1. Continue with the vector competence studies using German and African/Ugandan mosquitoes.
2. Assessment of the vector competence for RVFV in German mosquitoes in case of co-infection with some viruses circulating in Germany like West Nile virus and Usutu virus.
3. Immunohistochemical studies on the infected mosquitoes to identify the main sites for virus dissemination in case of mono and co-infections.

References:

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