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161

Risk of diffusion of Japanese encephalitis virus following its introduction in Reunion Island

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Japanese encephalitis virus (JEV) is a vector-borne zoonotic virus and leading cause of human acute encephalitis in Asia. Some vector-borne diseases have been introduced to Reunion island located in the Indian Ocean, and have posed or are posing serious public health problems such as Dengue or Chikungunya. The numerous commercial and human exchanges between Southeast Asia and Reunion raise concerns about the introduction of JEV on the island where known vectors of JEV and amplifying hosts such as pigs are present.

We used a deterministic compartmental model, developed in Cambodia (where JE is endemic) and adapted to Reunion context in order to investigate whether multi-host systems, composed of pigs, poultry, and non-competent hosts as human, dogs and cattle, would allow a local circulation of JEV (based on R_0 calculations) if introduced. Field and literature data were collected to adapt model parameters to the specific context of Reunion, including vector (estimated from mosquito trapping data) and host population sizes in areas of 1km radius (average flight distance of a *Culex* spp.) around pig farms. As the comparison between trapping data from Cambodia and La Reunion showed discordant effects of the type of trap, we studied 4 scenarios according to the trap type and to the season. For each scenario, R_0 value was used to identify the areas most at risk for JEV circulation if introduced.

The calculated R_0 s were low in all scenarios, but was > 1 in 12 areas in 2 scenarios. Regardless of the scenario, the ranks of the areas according to R_0 value did not change: ranks thus allowed identifying the most at-risk areas, one of which was located a few kilometers from the large port area of Reunion, which could be a gateway for JEV-infected vectors (Figure 1).

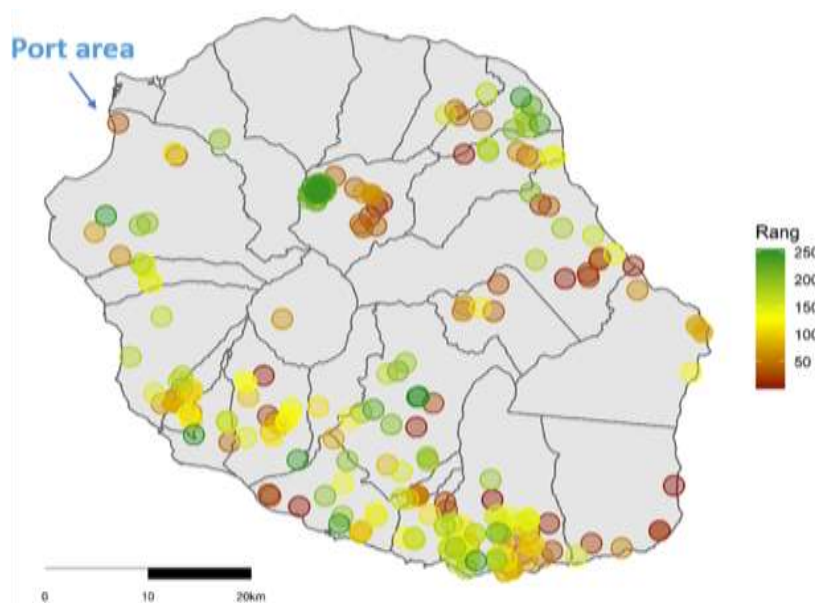


Figure 1: Ranking of multi-hosts systems (areas of 1km radius around pig farms) according to the calculated R_0 value.