First report of the influence of temperature on the bionomics and population dynamics of *Aedes koreicus*, a new invasive alien species in Europe

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Additional file 2 Text S1

Temperature trends

The climate of our study area is temperate-oceanic with three main areas: subcontinental (the main valleys with more severe winters), continental (the alpine valleys) and alpine (the areas above the treeline) [1]. Clearly (see also Table S1) sites A and B, associated to Trento station, are characterized by warmer conditions.

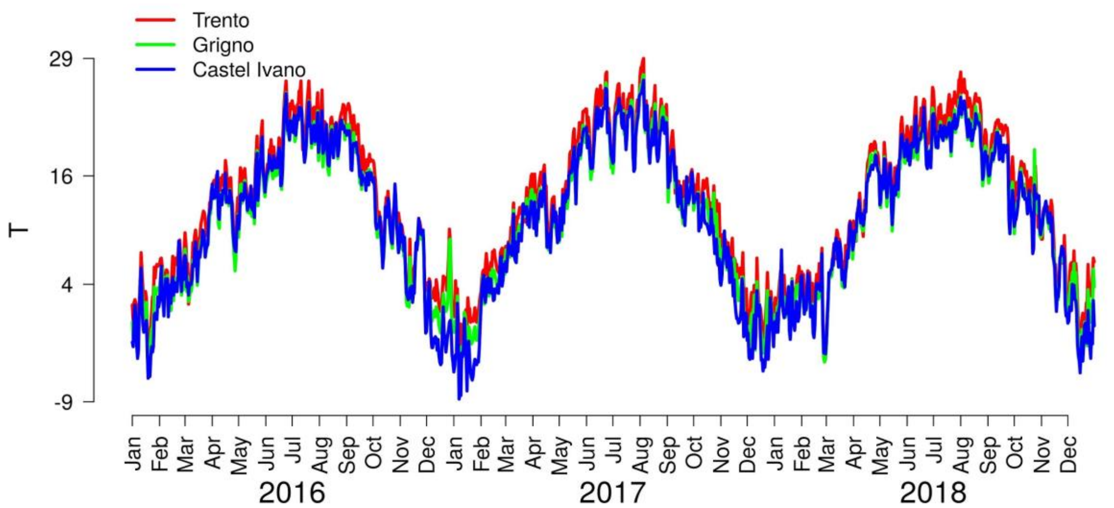

Figure S1. Average daily temperature for the three considered ground stations. Sites A and B are associated to Trento station (red line), C to Grigno station (green line) and D to Castel Ivano station (blue line).

Table S1. Study period (April-October) average temperature (°C).

Weather station	2016	2017	2018
Trento	17.9	18.4	19.1
Grigno	16.5	16.7	17.4
Castel Ivano	16.4	16.9	17.5

Ae. koreicus total captures

As shown in Figure S2, in sites C and D the number of trapped *Ae. koreicus* mosquitoes was higher with respect to the other two sites.

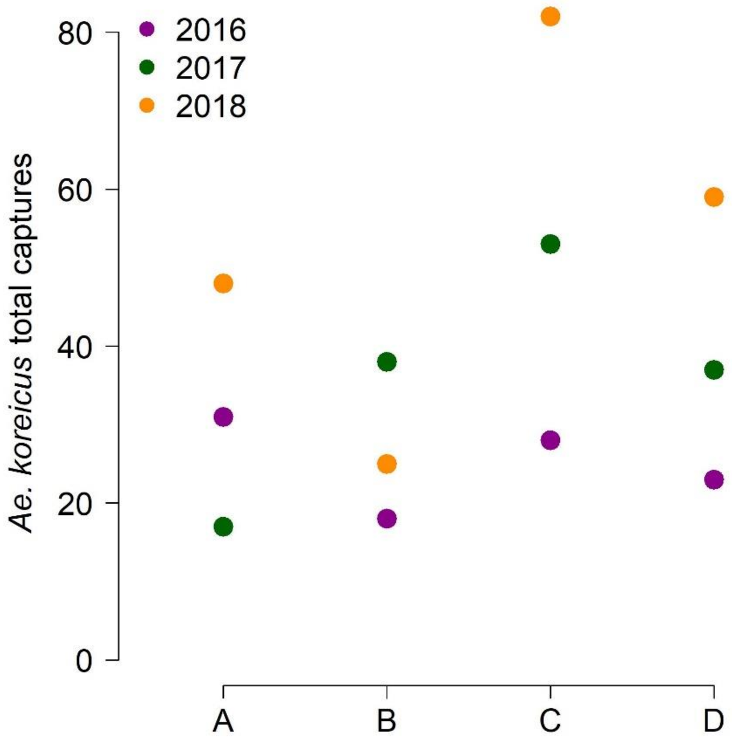

Figure S2. Number of captured *Ae. koreicus* female mosquitoes per site (A, …, D) and year.

Comparison between *Ae. koreicus* and *Ae. albopictus*

By comparing temperature-dependent developmental and survival rates computed for *Ae. koreicus* (this study) and *Ae. albopictus* [2] in Figure S3, we can note that *Ae. albopictus* is generally more adapted to higher temperatures. For instance, adult survival starts to increase exponentially only after 35°C, whereas already at 33°C we observed a sharp reduction in *Ae. koreicus* longevity.

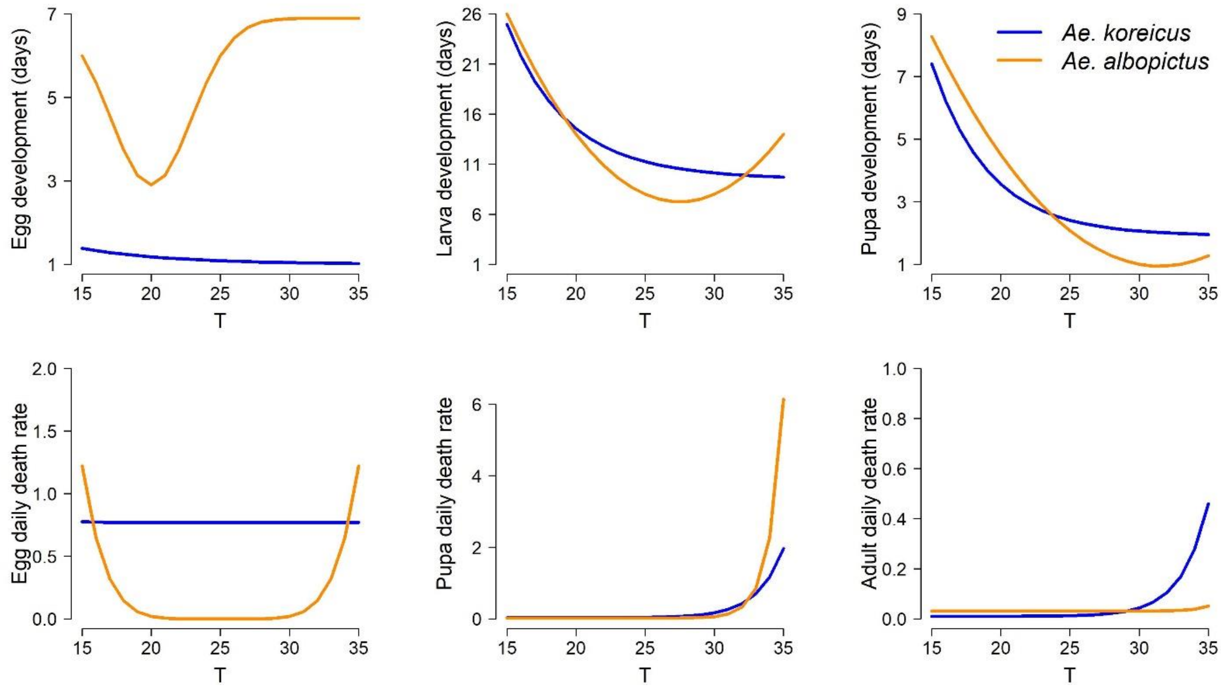

Figure S3. Comparison between *Ae. koreicus* (blue) and *Ae. albopictus* (orange) temperature-dependent developmental lengths (eggs, larvae and pupae, first row) and death rates (eggs, pupae and adults, second row).

Estimated distributions of model free parameters

Figure S4 reports the distributions of the model free parameters. Higher density dependent factors are associated with a greater number of captured mosquitoes. Figure S5 shows the relationship between the average of the estimated distribution of the density dependent factor *K(s, y)* and total number of *Ae. koreicus* collected at site *s* during year *y*. As reported in the main text, such relationship is significantly positive.

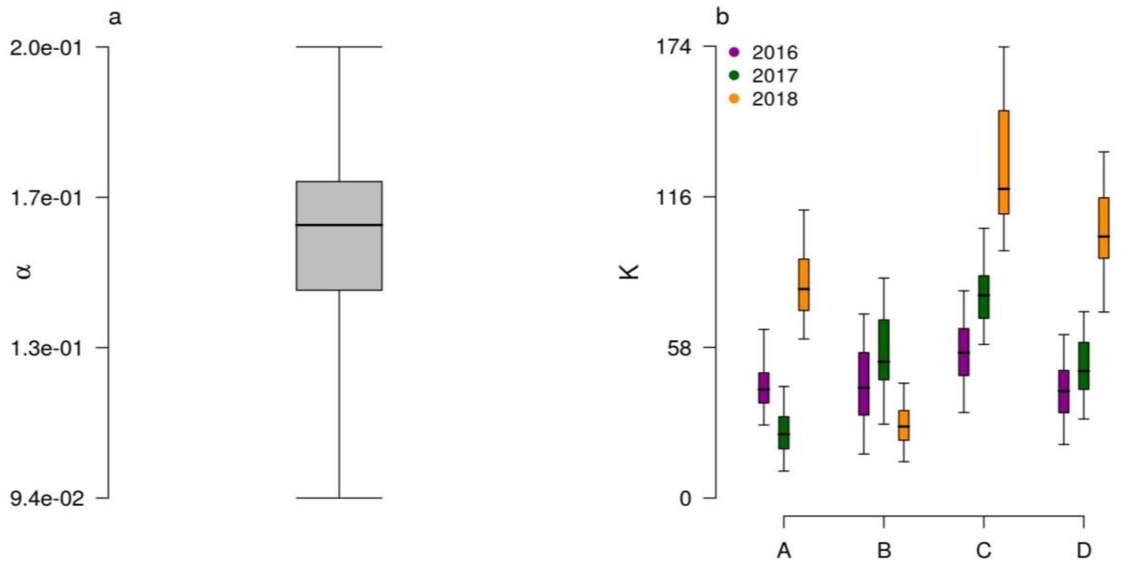

Figure S4. Boxplots (median, quartiles and 95% quantiles) of the estimated distributions of the model free parameters. a) α, the capture rate; b) *K*, the larval density dependent factor, which is year (2016, … , 2018) and site (A, … , D) dependent.

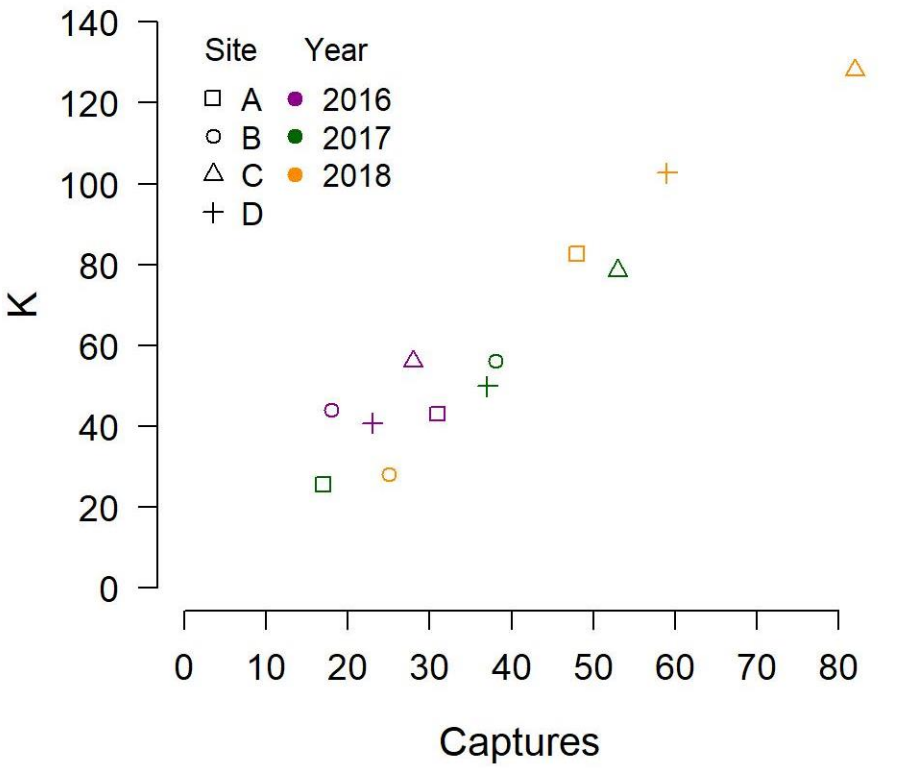

Figure S5. Relationship between the average density dependent factor *K* and the total number of trapped *Ae. koreicus* for each site (A, … , D) and year (2016, 2017, 2018) under study.

Estimated *Ae. koreicus* density

If we assume *Ae. koreicus* flight range r is 150m, similarly to what found for *Ae. albopictus* [3], then by dividing A(t), the adult mosquito abundance computed through our model, by $\pi \cdot r^2$, we can estimate the mosquito density, i.e. the number of adult females per unit of space (e.g. per hectare), which is shown in Figure S6.

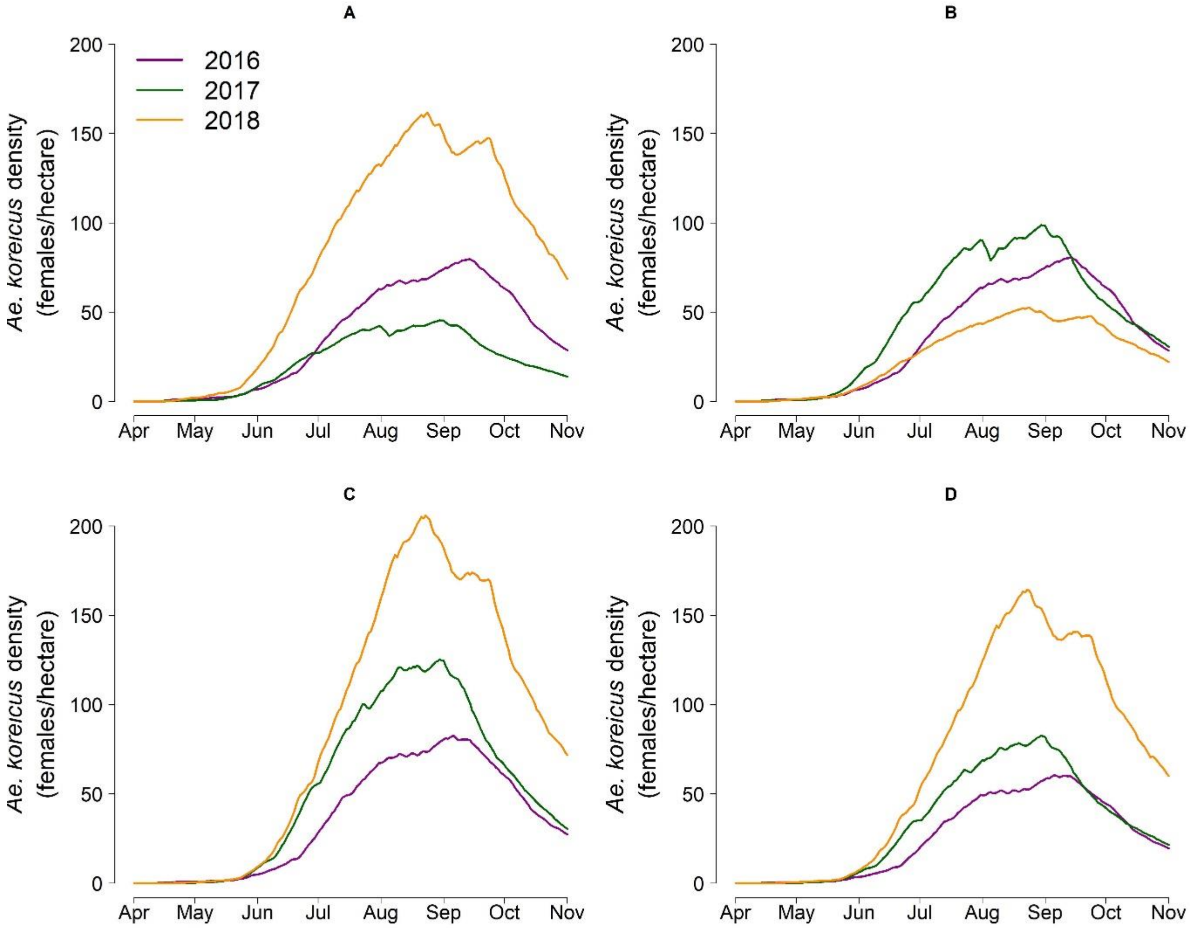

Figure S6. Estimated average number of *Ae. koreicus* adult females per hectare for each year (2016, … , 2018) and site (A, … , D) under study.

Bibliography

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