

Supplementary Information

ESTIMATING SPATIO-TEMPORAL DYNAMICS OF AEDES ALBOPICTUS DISPERSAL TO GUIDE CONTROL INTERVENTIONS IN CASE OF EXOTIC ARBOVIRUSES IN TEMPERATE REGIONS

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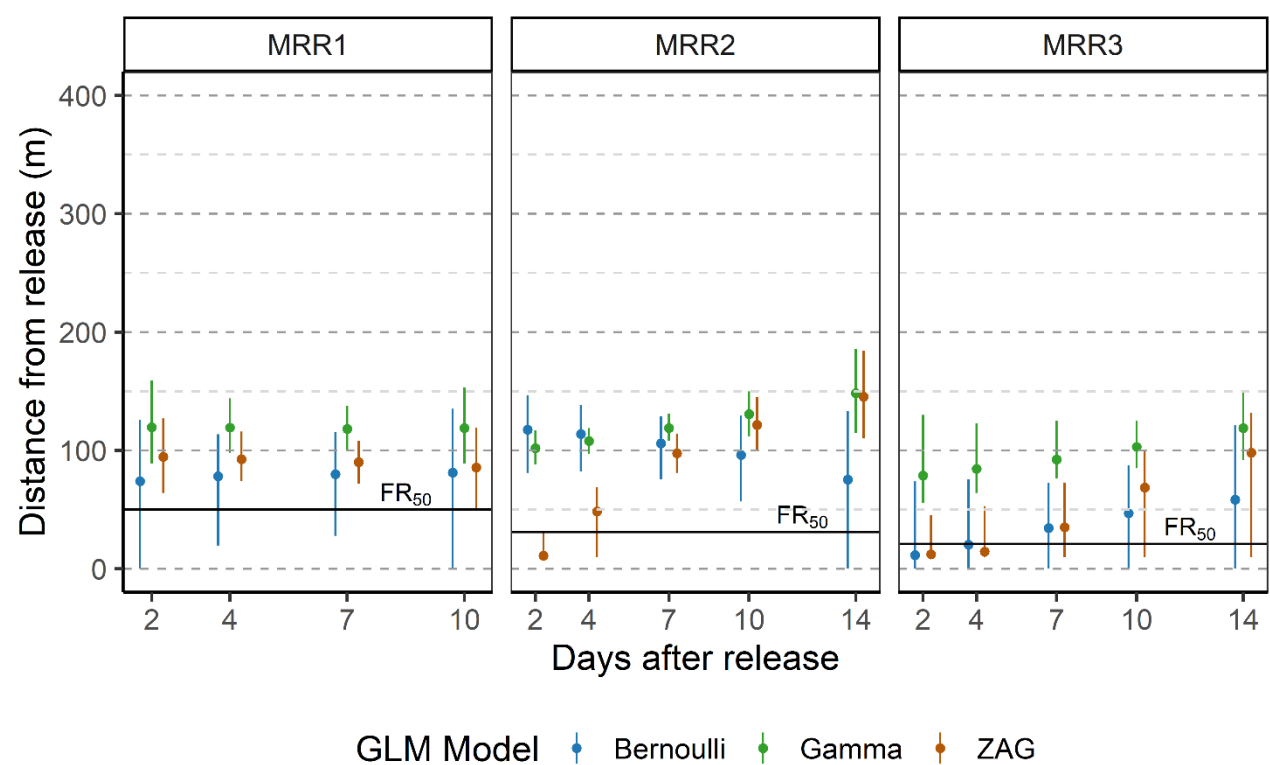
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Model results for 50% percentile

The 50% percentile values reached about 100 m after 2, 7 and 10 days since release in MRR1, MRR2 and MRR3, respectively (Figure S1). On average, the 50% percentile of the distance up to which mosquitoes are expected to travel was stable in MRR1, but was predicted to increase with time in MRR2 (from <50 m at day-2 to ~150 m at day-14) and in MRR3 (from <50 m at day-2 to ~100 m at day-14) by the ZAG model, which account for mosquito captured in the release site. The Gamma model instead, highlights that the distance travelled by mosquito leaving the release point is quite high (about 100 m) very early after the release (Supplementary Fig. S1). Result of the Bernoulli GLM model allows to estimate the distance up to which 50% of marked mosquito are expected to be detected. This estimate ranged on average between 0 and 150 m in the three experiments and was affected by the lower number of recaptured mosquito resulting in wide confidence intervals (Supplementary Fig. S1).

Supplementary Figures



Supplementary Figure S1 - Distance up to which 50% of mosquitoes are expected to travel estimated by three models (Bernoulli GLM, Gamma GLM, Zero Altered Gamma model). On the x-axis the days after release, on the y-axis the distance from the release site. Dots represent the mean distance value; vertical lines represent the 95% confidence intervals obtained by non-parametric bootstrap. The horizontal solid black lines represent the flight ranges of 50% marked *Aedes albopictus* (FR₅₀, calculated according to Lillie et al.²³, White & Morris³⁰, and Morris et al.³¹). Each panel identifies a mark-release-recapture experiment (MRR1, MRR2 and MRR3).

Supplementary Tables

Parameters	Estimate	SE	Z value	Pr(> z)
MRR1 (intercept)	-2.34	0.10	22.46	<0.0001
MRR2	0.43	0.12	3.34	0.0009
MRR3	-1.15	0.20	-5.76	<0.0001

Supplementary Table S1 - Binomial GLM estimating the different among the recapture rates after 11 days from release in the three mark-release-recapture experiments (MRR1, MRR2 and MRR3).

Experiment	metres	Days after release [†]							
		2	3	4	5	6	7-11	12-16	1-16
MRR1*	0-50	-	6	3	5	2	7	-	23
	50-100	1	9	8	12	8	10	-	48
	100-150	0	4	2	3	0	4	-	13
	150-200	0	0	1	0	1	0	-	2
	200-250	0	0	2	0	1	0	-	3
	250-300	0	1	0	0	0	2	-	3
	300-350	0	0	0	0	1	1	-	2
	350-400	0	0	1	0	0	1	-	2
	400-450	0	0	1	2	0	0	-	3
	450-500	0	0	2	0	0	0	-	2
	0-500	1	20	20	22	13	25	-	101
MRR2*	0-50	-	28	34	13	5	1	1	82
	50-100	3	7	25	12	7	7	1	62
	100-150	2	1	13	10	5	9	4	44
	150-200	0	1	2	3	0	1	0	7
	200-250	0	1	1	2	0	2	1	7
	250-300	0	1	2	3	0	1	0	7
	300-350	0	0	0	0	0	2	0	2
	350-400	0	0	1	0	0	0	0	1
	400-450	0	0	0	1	0	0	1	2
	450-500	0	0	0	0	0	0	0	0
	0-500	5	39	78	44	17	23	8	214
MRR3*	0-50	-	0	1	8	6	4	0	19
	50-100	0	0	2	2	8	2	1	15
	100-150	0	0	0	0	1	0	2	3
	150-200	0	0	0	0	0	1	2	3
	200-250	0	0	0	0	0	0	0	0
	250-300	0	0	0	0	0	0	0	0
	300-350	0	0	0	0	0	0	0	0
	350-400	0	0	0	0	1	0	0	1
	400-450	0	0	0	0	0	0	0	0
	450-500	0	0	0	0	0	0	0	0
	0-500	0	0	3	10	16	7	5	41

Supplementary Table S2 – Marked *Aedes albopictus* females recaptured during each mark-release-recapture experiment (MRR1, MRR2 and MRR3) in the concentric annuli of 50 up to maximum of 500 m radius around the release site. * - Number of marked *Aedes albopictus* females released: 1,149 (MRR1); 1,600 (MRR2) and 1,210 (MRR3). † - Since between mosquitoes release and STs activation there is an interval of 12h, days indicated have to be reduced by 12 h (e.g. mosquitoes collected on day-2 were actually collected 36h after release instead of 48).

Weather data			Days after release																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	tot
MRR1	T (°C)	mean	22	24	25	25	26	26	24	24	25	25	24	-	-	-	-	-	25
		min	17	16	18	20	22	20	19	19	19	20	20	-	-	-	-	-	19
		Max	29	31	31	30	31	32	32	31	32	31	29	-	-	-	-	-	31
	RH (%)	min	44	33	44	37	35	36	39	49	36	50	49	-	-	-	-	-	41
		Max	100	100	91	91	85	90	97	99	100	95	100	-	-	-	-	-	95
	Rainfall (mm)	tot	0	0	0	0	0	0	9	0	0	4	4	-	-	-	-	-	2
MRR2	T (°C)	mean	24	25	27	27	25	22	21	22	24	25	26	21	19	20	21	21	23
		min	18	18	22	22	21	16	15	13	17	21	20	16	14	14	15	17	17
		Max	30	30	32	35	31	27	30	32	30	31	33	25	25	26	26	26	29
	RH (%)	min	35	47	47	35	51	32	26	31	47	41	31	37	25	28	27	30	36
		Max	85	93	100	100	97	87	90	100	100	96	89	79	72	77	71	67	88
	Rainfall (mm)	tot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MRR3	T (°C)	mean	18	20	21	21	21	21	21	21	20	21	20	20	19	19	20	20	20
		min	17	17	16	16	16	18	15	14	16	15	16	15	14	12	14	16	15
		Max	19	26	27	28	28	26	27	28	29	27	25	26	27	27	26	26	26
	RH (%)	min	94	57	49	48	46	49	33	34	29	43	41	39	38	47	51	50	47
		Max	100	100	100	100	100	100	96	100	100	100	88	92	98	100	100	100	98
	Rainfall (mm)	tot	169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11

Supplementary Table S3 – Weather data concerning the three mark-release-recapture experiments (MRR1, MRR2 and MRR3), downloaded from the ARPAV agrometeorological station of Legnaro (45°20'51N, 11°57'08E), located about 10 km northwest from the centre of the study area.