

SUSCEPTIBILITY OF LARVAE AND ADULT OF *Aedes aegypti* TO *Metarhizium anisopliae*

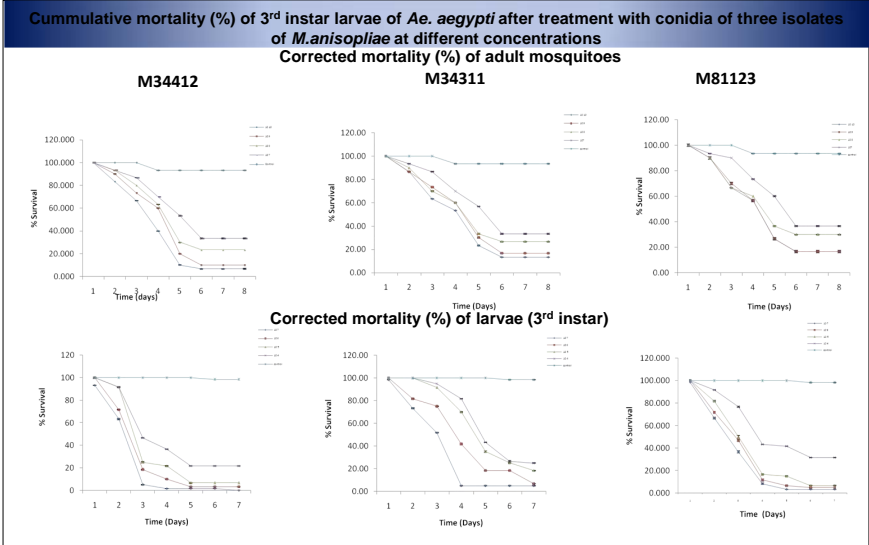
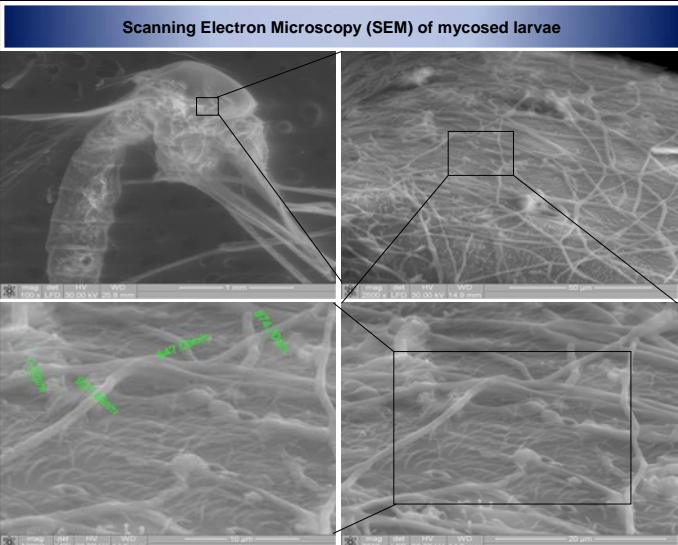
M. KAPOOR¹, P. V. PAWAR², M. JOSEPH², A. SEN² and M. V. DESHPANDE¹

(¹BIOCHEMICAL SCIENCES DIVISION AND ²LABORATORY OF ENTOMOLOGY, NATIONAL CHEMICAL LABORATORY, PUNE – 411008)



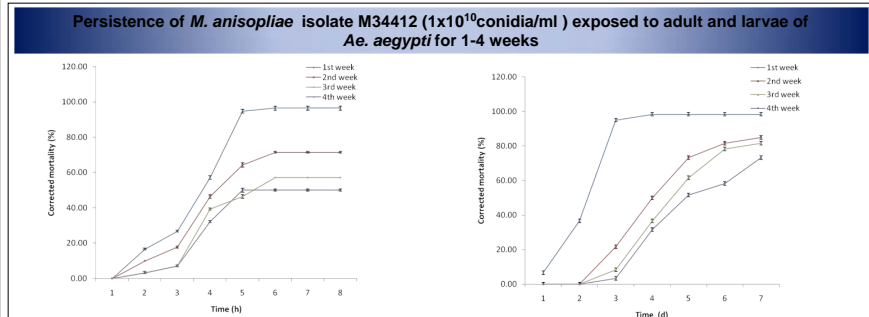
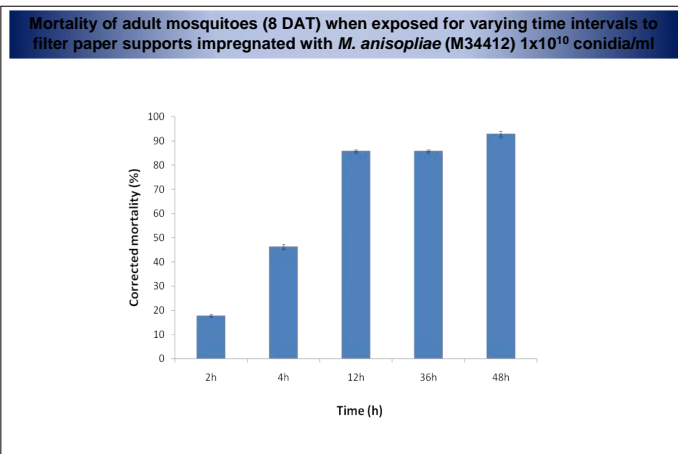
Abstract

Concerns about environmental pollution and resistance to synthetic pesticides have led to rising interest in fungi as candidates for biocontrol agents of mosquito vectors. In most studies, fungal infections have been induced by exposure of mosquitoes to various surfaces treated with conidia. Larvae and adult females of *Aedes aegypti* were exposed to fungal suspensions of three virulent isolates of *Metarhizium anisopliae*, viz., M34412, M34311 and M81123. Adult female mosquitoes were exposed to filter paper supports previously impregnated with fungal suspensions (in 0.1% Tween 80) at different concentrations (1×10^{10} , 1×10^9 , 1×10^8 and 1×10^7 conidia/ml). At higher concentration of 1×10^{10} and 1×10^9 conidia/ml, percent mortality in adults was 95% with M34412 while it was 87% and 84% with M34311 and M81123 respectively. At lower concentration, it varied from 23.3-36.6% among the three isolates over the 8 days test period at room temperature. The concentration of conidia that resulted in 50% mortality (LC_{50}) were 6.92×10^8 for isolate M34412, 5.03×10^9 for isolate M34311 and 8.22×10^9 for isolate M81123. At a concentration of 1×10^7 conidia/ml, 3rd instar larvae of *Ae. aegypti* were susceptible to the 3 isolates of *M. anisopliae* with mortality varying from 98.35% in M34412 to 96.7% in M34311 and 95% in M81123 at the end of 7 days. Value of LC_{50} varied from 5.92×10^3 for isolate M34412, 3.49×10^4 for isolate M34311 and 5.12×10^5 for isolate M81123. All strains were highly virulent with LT_{50} ranging from 3.36d to 5.76d for adults and 1.75d to 5.11d for larvae. An exposure time of 4h was sufficient to result in 50% mortality. Although a reduction in the persistence of *M. anisopliae* against *Ae. aegypti* was observed, conidia were still effective 4 weeks post application. These results show that *M. anisopliae* is a potential candidate in integrated vector management programs for control of *Ae. aegypti*.



Cummulative mortality (%) and lethal time (LT_{50}) with respective confidence intervals to kill 50% of 3rd instar larvae of *Ae. aegypti* after treatment with conidia of three different isolates of *M. anisopliae* at different concentrations

<i>M. anisopliae</i> isolate	Concentration (conidia/mL)	Per cent Mortality (means±SE)	Lethal time (days) to kill 50% of larvae (95% CI)	Adults			Larvae		
				Concentration (conidia/mL)	Per cent Mortality (means±SE)	Lethal time (days) to kill 50% of larvae (95% CI)	Concentration (conidia/mL)	Per cent Mortality (means±SE)	Lethal time (days) to kill 50% of larvae (95% CI)
M34412	10^{10}	98	3.36 (2.67-3.97)	10^7	98	1.75 (1.11-2.31)			
	10^9	96.6	3.83 (3.15-4.47)	10^6	97	2.41 (2.02-2.75)			
	10^8	76	4.52 (3.66-5.47)	10^5	93	2.86 (2.04-3.53)			
	10^7	66.6	5.40 (4.39-6.99)	10^4	78	3.54 (2.98-4.09)			
M34311	10^{10}	86.6	3.74 (2.95-4.50)	10^7	96.66	2.39 (2.01-2.73)			
	10^9	83	4.08 (3.25-4.93)	10^6	95	2.71 (2.53-3.39)			
	10^8	73	4.44 (3.50-5.57)	10^5	93.3	2.98 (2.53-3.39)			
	10^7	66	5.45 (4.43-7.08)	10^4	68.3	4.46 (3.82-5.29)			
M81123	10^{10}	83	3.98 (3.16-4.80)	10^7	95	2.66 (2.25-3.03)			
	10^9	83	4.03 (3.21-4.84)	10^6	93.3	3.57 (3.09-4.06)			
	10^8	70	4.57 (3.56-5.87)	10^5	81.67	4.75 (4.28-5.25)			
	10^7	63.3	5.76 (4.80-7.73)	10^4	75	5.11 (4.64-5.66)			



Conclusions

- *M. anisopliae* is effective against *Ae. aegypti*.
- SEM analysis of infected mosquito show that *M. anisopliae* conidia are capable of attachment by forming a germ tube, appressorium and mycelial growth on the cuticular surface, with preferred attachment sites being the head and mouth parts.
- An exposure time of 4 h results in 50% mortality.
- All the three isolates resulted in 60-90% mortality in adults of *Ae. aegypti* at a concentration of 1×10^7 to 1×10^{10} conidia/ml.
- *M. anisopliae* M34412 with a shorter kill time is more effective as compared to the other isolates.
- The larvicidal activity of all the three isolates was >95% at 1×10^7 conidia/ml concentration and LT_{50} was less than 3 d.
- The ability of conidia to infect *A. aegypti* persisted for more than 28 days.

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