

# LABORATORY COLONIZATION OF *Aedes albopictus* AND EFFECT ON SOME FITNESS PARAMETERS

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## INTRODUCTION

*Aedes albopictus* is the most dangerous mosquito species recently imported in Europe and rapidly spreading in the Mediterranean basin, as well as moving to Eastern Europe.

In Italy, the population density in the urban areas is still too high, despite the application of the currently available control technique, thus making large areas at risk of epidemic (Italy has recently experienced an outbreak of Chikungunya virus, supported by *Ae. albopictus*) and requiring the development of new tools.

Since some years we started to develop a S.I.T. approach to be included in the integrated *Aedes albopictus* control program. The main objective is the development of a mass rearing strategy suitable to guarantee high quality of the sterile males produced, in terms of sexual performances and fitness.

A mass rearing pilot model system has already been set up in Crevalcore. Up to now we are able to produce 100,000 male pupae per week.

Adults are kept in Plexiglas cages with a supply of 10% sucrose solution. Females are blood fed with fresh mechanically defibrinated bovine blood using a special thermostat device. Eggs are laid on filter paper and maintained up to few months in plastic boxes with a saturated solution of  $K_2SO_4$ . Larvae are fed on a diet consisting in dry cat food, yeast and dry fish food, kept in plastic trays containing de-chlorinated water and provided with aeration tubes.

## MATERIALS AND METHODS

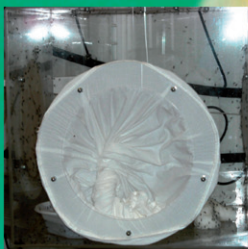
One of the main aspects to be considered in order to assess the competitiveness of the sterile males is the negative effect of colonization in artificial conditions. To evaluate the effect of mass-rearing, trials to measure the fitness of two strains, coming from the field and reared in the lab for 18 generations, and the two strains obtained crossing the two field strains were conducted.

The Rimini strain was then maintained in lab conditions for other 15 generations and, on this strain, the same fitness analysis was conducted.

The protocol used is described below:

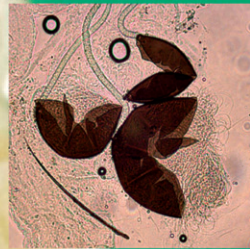
P R O T O C O L

50 males + 200 females



48 h

30 females for spermathecae control



5 days

Blood meal



5 days

Fecundity (n° eggs/female)

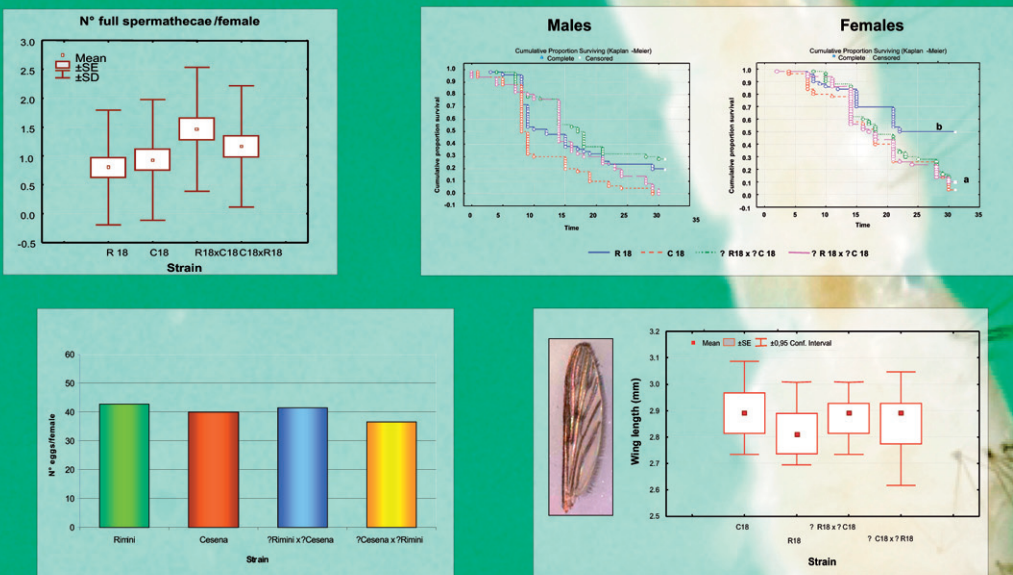


Fertility (n° hatched eggs/n° total eggs)



The adults obtained from the hatched eggs were then put in cages to check the longevity. At the same time, from a standard rearing cage, a sample of 30 males was collected for the wings measurement. Genetic diversity of the strains at F1 and during the rearing has been estimated with microsatellite markers.

## FIRST TRIAL



## FIRST TRIAL RESULTS

**Spermathecae replenishment:** no significant differences (the F1 strain obtained crossing Rimini F18 males x Cesena F18 females shows the highest percentage of 2-3 spermathecae with sperms).

**Females longevity:** The Rimini F18 females survival at 31 days resulted significantly higher than the other strains.

**Males longevity:** the Cesena F18 males survival at 31 days resulted significantly lower than the other strains.

In both Rimini and Cesena strains a progressive reduction of number of alleles and heterozygosity values has been observed (number of alleles changed from 9 to 6 and from 9 to 5 in Rimini and Cesena respectively; heterozygosity changed from 0.870 to 0.405 in Rimini and from 0.794 to 0.442 in Cesena strain). The F1 strains resulted by crossing Rimini 18 and Cesena 18 showed no significantly higher genetic diversity.

The F1 crossed strains gave good results but not so different from the parental strains. The Rimini F18 strain registered always the best performance.

## SECOND TRIAL

### SECOND TRIAL RESULTS

**Spermathecae replenishment:** significant differences.

**Females longevity:** significant differences.

**Males longevity:** significant differences.



There are significant differences between the 2 generations examined. On the F33 both males and females seem more adapted to the cage, showing a better longevity and a better capacity to mate but a reduction in the wings length and a reduction in the fecundity of the females.

The F1 crossed strains gave good results but the convenience to adopt this option remains to be determined.

