Recent achievements in the application of SIT methods for the suppression of *Aedes albopictus*

Bellini Romeo[1], Balestrino Fabrizio[2], Puggioli Arianna[1], Carrieri Marco[1]

[1]Centro Agricoltura Ambiente "G. Nicoli", Via Argini Nord 3351, 40014 Crevalcore, Italy **(rbellini@caa.it)**

[2]Insect Pest Control Laboratory, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, FAO/IAEA Agriculture and Biotechnology Laboratories, A-2444 Seibersdorf, Austria

PILOT MASS REARING UNIT

A pilot mass rearing unit with a production capacity of 100,000 *Aedes albopictus* sterile males per week was established with the following basic parameters:

- Females are blood feed with a thermostatic device
- Eggs are collected on filter paper and counted digitally
- Larval density is 2.0 larvae/ml
- Larval diet is equal to 0.5 mg/larva/d, consisting of 50% tuna meal, 36% bovine liver powder, 14% brewer yeast and 0.2 g of Vitamin Mix per 100 ml
- Sexing exploit the sex dimorphism of pupae with a male pupae productivity in the range 22-28% (calculated on the total number of reared males), with a residual presence of females in the range 0.3-1.0%
- Sterilization is performed on aged male pupae in the water by applying a radiation dose of 35 Gy which produce sub-sterile males with 1-2% residual fertility

Figure 1: Larval rearing trays

STERILE MALES MATING COMPETITIVENESS

Trials conducted in semi-field large enclosures showed as the best performing radio-sterilized males are obtained when pupae are exposed to 30 Gy showing a very high Capacity to Induce Sterility index (0.96±0.62)

CIS Index = F/S*[(PT - PC) / PC]

where:

- F the number of fertile males
- S the number of sterile males
- PT is the percent egg hatching in the control enclosure
- PC is the percent of egg hatching in competitiveness enclosures

Figure 2: Large enclosures for competitiveness studies

FIELD TRIALS

Pilot field trials showed that sterile males released at the dose of 900-1,500 males/ha/week may induce a significant sterility level in the local population.

When the sterility in wild collected eggs achieved values in the range of 70-80% a similar reduction was found also in the number of egg density in the ovitraps.

But the decline registered in the fertility of the local population was not enough to bring the population density to collapse.

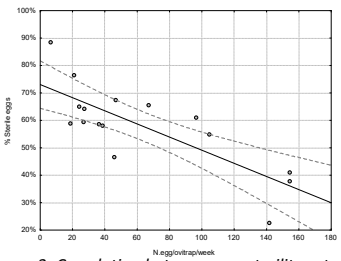

Figure 3: Correlation between egg sterility rate and number of eggs in the ovitraps

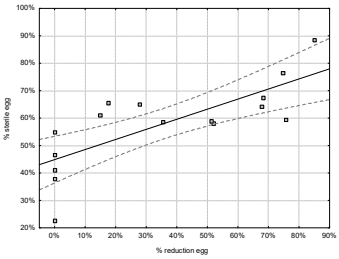

Fig. 4: Correlation between egg sterility rate and egg density decrease in SIT areas compared with the control areas

QUALITY CONTROL

Standardized procedures are under development to evaluate sterile male performances.

One of the most direct and reliable indicator is the flight capacity which can be measured by simple flight tube device.

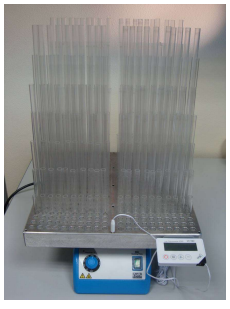

Figure 5: Flight tube device

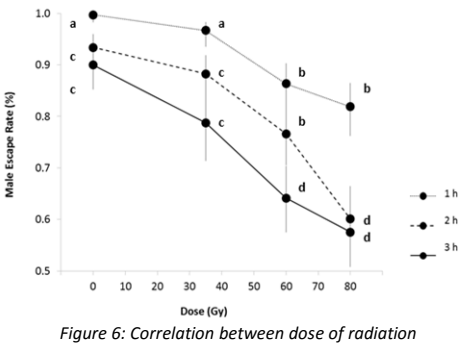

Figure 6: Correlation between dose of radiation and male escaping rate