

## **Sterile Insect Technique for Controlling *Aedes albopictus* (Skuse); Sex Separation and Mating Competitiveness**

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Sterile Insect Technique (SIT) introduced by Edward F. Knippling in 1950s has been shown as an effective and sustainable genetic approach to control populations of selected pest insects in area wide integrated pest management programmes. Successfulness of this approach depends on the availability of an efficient sexing method and production of sterile males competitive enough to compete with wild males. In the context of developing SIT for the control of dengue vector *Aedes albopictus* (Skuse) in Sri Lanka, a method for separation of male pupae was tested and mating competitiveness of irradiated males against wild males was evaluated under laboratory conditions. Male pupae of the F42 generation of *Ae. albopictus* (Gampaha strain) were separated from female pupae using mechanical sieving method. A set of three stainless steel sieves of mesh sizes 1.4, 1.25 and 1.12mm were placed one on the other in descending order of size towards the bottom, forming a column immersed in a water jar. All pupae were poured on to the top sieve and shaken gently for seven minutes. Pupae were collected from each sieve and the male and female counts were taken after emergence of adults. Male and female pupae used for the competitiveness assessment were separated by the above sieving method. Male pupae (F42, age 28-40hours) were exposed to Gamma radiation (Gamma 220, Atomic Energy of Canada Ltd., Co60) at a dose of 50Gy by placing 300 male pupae in each plastic vial with 10ml of water. Dosimetry was performed using Frickey method. Wild fertile males and females reared from field-collected eggs from Gampaha (F1) were used to compete and cross with irradiated males respectively in different ratios. Two days after the emergence, the adult mosquitoes were caged (Bug Dorm 30X30X30cm) with ratios of irradiated males: wild males: wild virgin females 1:1:1, 3:1:1 and 5:1:1 (females, n = 100). Fertile control was set with wild males and wild virgin females 1:1. and an irradiated control was set with irradiated males with wild virgin females 1:1. Mosquitoes were allowed to mate for 3 days with access to 10% sugar solution. Then the mosquitoes were fed with cattle blood and engorged females were isolated in oviposition tubes. After 4 days, females were returned into cages and the filter papers containing eggs were allowed to dry. Eggs were hatched after one week and the hatching rates were compared.

From the pupae retained in the sieve of mesh size 1.12mm, 98.3% were males. The mean hatch rates of fertile and irradiated controls and with ratios of irradiated males: wild fertile males: wild virgin females 1:1:1, 3:1:1, 5:1:1 were 80.24%±1.63SEM, 2.42%±0.57SEM, 56.74%±5.79SEM, 37.33%±4.76SEM and 34.23%±4.73SEM respectively. Fried Competitive Index (C) of irradiated males compared to controls was 0.43. Results show sieving method can be used for separating male pupae for irradiation with 98% accuracy. Irradiated males were less than 50% competitive as wild males under laboratory conditions.

**Keywords:** Sterile Insect Technique, *Ae. Albopictus*, Sex Separation, Irradiation, Mating Competitiveness

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