IGamma- ray irradiation as a method for sterilization of males of *Aedes albopictus (skuse)* for its control through Sterile Insect Technique (SIT)

J.Harishchandra[1], W.Abeyewickreme[2], M.D. Hapugoda[1], R.G. Premaratne[1], J.R.L.Gilles[3]

Sterile Insect Technique (SIT) can be integrated with other conventional control methods to suppress population of *Aedes albopictus,* a vector of dengue in Sri Lanka. A study was conducted to determine the effective dose of gamma radiation for producing sterile males of *Ae. albopictus* mosquitoes.

A batch of male pupae (n=32) aged 24-48 hours in F1 was irradiated using Gamma 220, (Co_{60}) irradiator with 25, 30, 40, 50, 60 and 70Gy in duplicates. Adult emergence rate and male longevity were recorded. Virgin females from the same cohort (F1) were introduced into each cage for mating and fed blood starting 5 days after emergence. Then, females were isolated in individual tubes and hatching rate of individual egg batches was calculated after two weeks of egg maturation in hatching solution. Spermacheca of female mosquitoes were dissected and insemination rates were calculated after egg laying.

Male mosquito pupae in F1 showed low mortality (0-3.12%) immediately after exposing to radiation (0-48 hours). After 14 days of the irradiation, survival rate of male mosquitoes in F1 were 82.7%, 79.7%, 56.3%, 73.4%, 76.6%, 76.1% and 56.3% when irradiated at 0Gy, 25Gy, 30Gy, 40Gy, 50Gy, 60Gy and 70Gy respectively. No significant difference was observed among survival of males in different doses except in 30 Gy and 70 Gy (Kaplan-Meier survival analysis, Log Rank test). Low survival rate at 30 Gy could be due to mosquito handling errors and need to be retested. Based on the hatching rate of the F2 progeny, males (F1) showed 89%, 93%, 97%, 99%, 99% and 100% sterility when irradiated at 25Gy, 30Gy, 40Gy, 50Gy, 60Gy and 70Gy respectively. Insemination rate of the irradiated males among different doses and controls were above 90% in F1 based on spermatheca dissection of blood-fed females (F1).

50 Gy is recommended as the most suitable radiation dose to produce 99% sterility in *Ae. albopictus* males which has 76% survival after 14 days of irradiation. This dose can be used to produce sterile males of *Ae. albopictus* for a SIT programme.

Key words: Dengue, Aedes albopictus, Gamma rays, Irradiation, Sterile Insect Technique

[1] Anti Malaria Campaign Headquarters, Public Health Complex, Narahenpita, Colombo 05
jeevanieharishchandra@yahoo.com, risintha@yahoo.com

[2] Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya, Ragama, Sri Lanka
wabeyewickreme@yahoo.com. , menakaha@yahoo.com

[3]Insect Pest Control Laboratory, FAO/IAEA Agriculture and Biotechnology laboratories, 2444, Seibersdorf, Austria, J.Gilles@iaea.org