



Drosophila suzukii,



Glossina palpalis gambiensis,



Aedes aegypti,



Anopheles arabiensis



Joint FAO/IAEA Programme
Nuclear Techniques in Food and Agriculture

Suitability of the Precision Xrad320 irradiator for sterilizing major target pests for the sterile insect technique and for phytosanitary applications

Main Results:

- Overall, less dose was needed than with gamma rays to induce >99% sterility in male pupae and adults in all insect groups.
- Pupae are more radiosensitive than adults.
- Irradiation at adult stage results in better downstream quality of sterile mosquitoes
- Chilling adults did not affect dose response significantly;
- Chilling system enables constant temperature and adult immobilization, reducing physical damage to the insects and improves overall quality
- Hypoxic environments during irradiation reduces off-target effects and results in higher quality insects (fruit flies)

Main Conclusions

- The Xrad320 is suitable for the reliable sterilization of insects.
- X-ray is usually more efficient in inducing sterility in insects than gamma rays, requiring less dose to reach the target sterility level
- The Xrad 320 is highly versatile and can accommodate specific requirements for R&D, phytosanitary applications (especially in small fruit and berries), or SIT operational programmes
- The unit offers: dose rates from <1Gy/min to around 25Gy/min by adjusting energy, current and SSD
- Sample holding containers can be provided (1L – 4.8L)
- A DUR of 1.3 can be achieved for the sample containers, due to the rotation and flipping of the sample canister during exposures
- the processing capacity is sufficient for any current mosquito or tsetse fly SIT programme, and medium scale fruitfly programmes
- The chilling system ensures a constant temperature in the sample and keeps adult insects immobile, also for longer exposure times, making the unit a viable option also for *Lepidoptera* (moths) and *Coleoptera* (beetles) which need higher doses and thus longer exposure & immobilization.



Anastrepha ludens,



Bactrocera dorsalis,



Ceratitis capitata,



Anastrepha fraterculus,