

SCREWWORM

2. SURVEY AND INTEGRATED MANAGEMENT

An international threat to human and animal health

Survey

An important part of screwworm control is to monitor the occurrence and extent of the populations. Two important methods are to collect adults by trapping and to collect larvae from animal wounds.

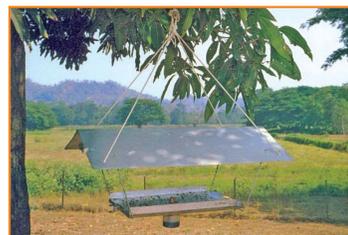


Adults

Adult screwworm flies can be detected by the use of baited traps or sentinel animals.

Adult Trapping

Trapping is used to collect adult flies. Traps are baited with a chemical lure known as swormlure and flies are collected on sticky sheets placed in the base of the trap. Other traps are under development that may not need sticky material.



Adult screwworm fly trap placed in the field.

Active Ingredients of Screwworm Lure

CHEMICAL	QUANTITY*
sec-Butyl alcohol	191 ml
iso-Butyl alcohol	194 ml
Dimethyl disulfide	193 ml
Acetic acid	192 ml
Butyric acid	63 ml
Valeric acid	64 ml
Phenol	52 ml
p-Cresol	51 ml
Benzoic acid	12 g
Indole	13 g

* Table shows quantities required to make approximately 1 litre of swormlure - 4 different mixtures may be used at times. Great care is needed when handling the lure ingredients and lure as they are hazardous chemicals.

Samples of adults and larvae collected from wounds should be preserved in 80% ethanol and sent to the nearest government veterinary laboratory for preliminary identification. Live samples must not be shipped for diagnosis. Spradbery (2002) provides identification keys to immature and adult stages of screwworm and other flies associated with wounds.

For confirmation of identification, samples can be sent to:
FAO Reference Centre for Myiasis-Causing and Disease Vector Insects and their Identification
 Department of Entomology, Natural History Museum
 Cromwell Road, London SW7 5BD, UK
 Tel: +44-(0)20-7942-5726
 Fax: +44-(0)20-7942-5229

Larvae



The collection of larvae present in animal wounds is important and special care needs to be taken to collect all stages and sizes of larvae present. Sampling kits have been developed in order that samples can be collected, killed and preserved and sent to specialists for identification.

Sentinel Animals

Sentinel animals with small wounds are used to monitor the activity of screwworm flies. Sentinel animals are 4 to 5 times more attractive to screwworm fly adults than lure-baited traps.



Sentinel cow used to monitor screwworm activity.

Identification

The identification of screwworm larvae and adults is of importance in order to establish the presence or absence of screwworms in an area. During a control programme, the identification of flies is particularly important in order to decide where greatest control efforts are required.



Sampling kit with tweezers, plastic vial containing 80% ethanol for preserving larvae, collection information sheet and sachet of insecticide powder for treating wound.



Collecting fly larvae from a wound.



Filling out collection information sheet prior to sending sample of larvae off for identification.

Integrated Management

Sustainable screwworm-free areas can be created and maintained using an area-wide integrated pest management approach (AW-IPM). This entails the selection and integration of various screwworm management tactics including quarantine, cultural control, attract and kill, insecticidal wound

treatment and releases of sterile screwworm flies. These control tactics should preferably be directed against an entire screwworm population that appears to be either genetically isolated or is geographically confined by natural barriers such as high mountains or deserts.

Prevention

is performed in areas free of screwworms but at risk, in order to prevent (re)establishment.



Signs used for public awareness as an important part of screwworm control programmes.

Quarantine measures including risk assessments need to be undertaken for areas at risk of becoming screwworm infested. Seasonal series of relevant satellite imagery, the proximity of an area to screwworm-infested areas or to livestock trade routes and records of previous screwworm infestation will contribute to risk assessments.

Fly adults can spread long distances. Records indicate that adult New World and Old World screwworm flies can travel up to 290 kilometres and 100 kilometres respectively. The potential to spread over long distances however is greatest where infested animals are moved. Thorough inspections should be performed to ensure animals are free of screwworm before and after they are transported.



Inspection of cattle for screwworm infestation prior to transport.

Additional measures such as treating animals with insecticides to kill any eggs or larvae present, will minimise the risk of spreading screwworms.

Cultural control

can involve performing animal husbandry practices which cause wounds (e.g. dehorning, branding) at times of low screwworm fly densities, in order to minimise the risk of infestation. Another technique to reduce wounds is to remove thorny trees and barbed wire from animal paddocks.



Farmer removing barbed wire from a paddock to reduce scratch injuries which can be infested by screwworm.

Suppression

is carried out where a screwworm population is established and economic losses need to be minimised.

Integrated measures for effective screwworm suppression involve regular animal screening, removal of maggots and **insecticide treatment**. Some countries have passed laws permitting, under specific circumstances, the use of long-acting insecticidal treatments (injectable or topical) that provide up to several weeks protection against screwworm adults and larvae.

Applying insecticide (e.g. coumaphos) to a wound to prevent further screwworm infestation. Prior to this larvae have been removed from the wound using forceps.



In some areas an **attract and kill** technique known as SWASS (Screwworm Adult Suppression System) can be used. SWASS pellets containing the screwworm attractant (swormlure-4) and an insecticide (e.g. dichlorvos) are used to kill flies upon contact. Although several countries decided to discontinue with SWASS because of its undesirable impact on non-target organisms, it is an effective suppression tactic for screwworm flies in dry areas; it is less effective in the humid tropics.

SWASS pellets being manufactured.



Eradication

of screwworm will be pursued when this appears feasible, economically justifiable and sustainable. Prevention measures against re-establishment would follow a successful eradication.

After a screwworm population has been suppressed by various techniques such as insecticide-based treatments, a further control method known as the **sterile insect technique (SIT)** can be used to bring about eradication. Screwworm SIT involves mass producing screwworm flies, their reproductive sterilisation with ionizing radiation and, following population suppression, the sequential release of sterile flies over the target area, usually by aircraft. Female flies mated by sterile males lay infertile eggs and no offspring is generated. The release of competitive sterile flies has to be sustained

at high enough sterile to wild male ratios to induce increasing levels of sterility in the wild population for several fly generations and drive it to extinction.

Following eradication of screwworm from an area there is a need for ongoing survey and prevention to ensure that re-infestation does not occur. Besides using SIT for creating screwworm fly free areas, mass releases of sterile screwworm flies can also be part of a barrier maintenance operation to prevent neighbouring screwworm populations from (re-)invading screwworm-free areas.



Cages of adult screwworm flies at a screwworm factory.



Loading containers of sterile adult screwworm flies prior to aerial release into an infested area.