Tsetse control with a "Nzi" Trap in Kenya

SUMMARY:

Tsetse flies (Glossina sp.) infest over 11 million sq km of Africa, and are vectors of Trypanosomosis (or Trypanosomiasis) in both man and domestic livestock. For example, it is estimated that tsetse occur over 7% of Zimbabwe and 60% of Tanzania and Trypanosomosis has an important negative impact on livestock production in these areas. In addition to the use of trypanocidal drugs, control, of Trypanosomosis has been tackled largely by control of the tsetse fly vector and a range of techniques are available, each with advantages and disadvantages. Methods include aerial spraying, sterile insect techniques, insecticide treated cattle, and odour bait traps and targets. Therefore, a set of simple step-by-step instructions is presented of how to assemble an Nzi trap for tsetse, adapted and tested for use in Kenya.

KEYWORDS:
Tsetse flies [1]
Insect control [2]
pest control [3]
Traps [4]

CATEGORY:
Capacity development [5]
Livestock production [6]

COUNTRIES:
Kenya

DESCRIPTION:

Background

Tsetse flies (Glossina sp.) infest over 11 million sq km of Africa, and are vectors of Trypanosomosis (or Trypanosomiasis) in both man and domestic livestock. For example, it is estimated that tsetse occur over 7% of Zimbabwe and 60% of Tanzania and Trypanosomosis has an important negative impact on livestock production in these areas. In addition to the use of trypanocidal drugs, control, of Trypanosomosis has been tackled largely by control of the tsetse fly vector and a range of techniques are available, each with advantages and disadvantages. Methods include aerial spraying, sterile insect techniques, insecticide treated cattle, and odour bait traps and targets. Furthermore, it is generally considered that deployment of traps and/or targets that destroy a proportion of the tsetse population will lead to a reduction in the incidence of trypanosomosis.

A general decline in the capacity and funding of national veterinary institutions means that communities affected by Trypanosomosis are forced to control the disease themselves. Consequently, community-based initiatives to control tsetse has become one of the major methods of controlling trypanosomosis. However, despite many attempts by various communities, the results have been generally disappointing and there are very few examples of sustained control of tsetse being achieved by a rural community without significant financial and technical support from donors and/or national governments. The causes of this failure are complex, but at least part of the problem is that rural communities, and the organisations that facilitate
community-based tsetse control, do not have adequate access to information on how to apply tsetse control technologies. In addition, the poorest rural communities need access to cheaper and practical tsetse control technologies.

**Tsetse Traps**

A range of designs for tsetse traps were developed in the 1960s and earlier but these included a number of features that made them generally difficult or impractical to use. Many, for instance, were large, cumbersome, and difficult to transport. With the development of the biconical trap by (CHALLIER and LAVEISSIÈRE 1973) a trap became available that was relatively cheap, collapsible, so that many can be carried in a vehicle, and quickly and easily assembled (see in FAO, Use of Attractive Devices for Tsetse Survey and Control [http://www.fao.org/AG/AGAInfo/programmes/en/taat/documents/manuals/vol4.html](http://www.fao.org/AG/AGAInfo/programmes/en/taat/documents/manuals/vol4.html) [7]) The biconical trap is particularly effective for species of the palpalis group of tsetse including G. palpalis and G. tachinoides, and less so for other tsetse, but widely used for sampling.

Different species of tsetse occur under and are adapted for different environmental conditions. The best design of trap depends upon the species of tsetse fly and it is important to match the trap to the species. Following the development of the biconical trap, a range of different traps have been designed. For riverine species such as Glossina palpalis or *G. fuscipes*, the best traps are the biconical or pyramidal traps. For tsetse living in savanna habitats, e.g. *G. morsitans* and *G. pallidipes*, the best traps have been shown to depend on the locality, or where they are to be used. In East Africa, the Ng or Nzi traps appear to be the best, whereas in southern Africa the Epsilon trap has produced better results. For G. brevipalpis, the H-trap is preferred whereas the Ng and Epsilon traps have been used successfully to catch G. longipennis in Kenya and Somalia. More information on can be found at [http://www.tsetse.org](http://www.tsetse.org) [8] which has a number of useful sections, including answers to the following questions relevant to tsetse and trapping tsetse:

**http://www.nri.org/tsetse/FAQ/catch.html** [9]

- What is the best trap for tsetse?
- How many tsetse can a trap catch?
- Why are most traps coloured blue and black?
- Why do tsetse follow my car?
- Do I need to use attractants with a tsetse trap?
- What are the chemical properties of the attractants?
- How safe are the attractants to use?
- What other types of fly are caught by tsetse traps?
- Where is the best site for a trap?
- Should I treat the trap with insecticide?
- What are the problems with traps?
- What is a man fly-round?
- What is an ox fly-round?
- How can I catch tsetse that follow a car?
- How do I stop ants eating the catch?
- There are lots of different types of trap cage. Which is the best design?
- What type of netting should I use
- What sort of cloth should I use to make targets and traps?
- Most traps are black and blue. Is the particular shade of blue important?

**Basic Principles of Tsetse Traps**

Tsetse have a high metabolic rate and feed exclusively on vertebrate blood. Their survival therefore depends on detecting and encountering suitable hosts on which to feed. This principle can be exploited in the design of traps and targets which mimic key features of the normal host animals, attracting tsetse in such a way that they can then be captured or killed. With traps, the captured flies can be identified and counted, useful in sampling and monitoring tsetse populations. Tsetse targets simply use insecticide-treated surfaces to kill the
tsetse by contact and are of little use in population sampling or monitoring. Both targets and traps are exposed to damage and stealing and these methods require active participation from rural communities.

As techniques for tsetse control, both traps and targets function by removing individuals from the tsetse population. Their efficiency depends on the length of time the devices remain operational, and the likelihood that an individual fly will encounter the device and be killed by it. The length of time each device remains operational depends on a number of factors including resistance to environmental damage (e.g. wind and/or damage by large animals), theft of all or part of the device, and component degradation (particularly colour fade, depletion of odour baits, and loss of insecticidal activity in the case of targets) The likelihood that an individual fly will encounter and be killed or captured by the device depends also on the number of traps or targets relative to the local abundance of tsetse, and on the particular foraging and dispersal behaviour of the target tsetse species. For more information see (KUZOE and SCHOFIELD 2004)


Insecticide-treated traps can be used to control tsetse. The insecticide treatment means that the trap will still kill tsetse even if it is badly ripped. However, if the intention is only to kill tsetse then it is probably cheaper to use a simple insecticide-treated target for control and just use the traps for survey and monitoring purposes.

The Nzi trap for Tsetse

"Nzi" is one of the Swahili words for fly. The Nzi trap was developed in Kenya for savanna species of tsetse such as Glossina pallidipes. It is also a very effective trap for stable flies (Stomoxys spp.) and horseflies (Tabanidae)

The Nzi trap is a simple, safe and economical cloth trap for the capture of biting flies (tsetse flies, horse flies, deer flies, stable flies) It was developed by Steve Mihok at ICIPE in Kenya as an environment-friendly alternative to the use of insecticides, following many years of research on appropriate and sustainable technology for African farmers. It is a passive killing device that works through the attraction of flies to large blue and black objects. Flies simply die from exposure after entering into an innovative configuration of cloth and netting.

The trap is made from simple shapes for economy, and for ease of assembly. The layout is triangular with all pieces cut to the width of the material (e.g. one metre or one yard) The trap walls are formed by a square piece of netting at the back and by two black cloth rectangles at the sides. The body is closed at the top front by a vertical blue shelf. Two blue rectangular `wings¿ extend out at an angle from the front. A trapezoidal piece of netting extends horizontally half-way into the body from the bottom of the blue shelf. The top is closed by a `cone¿, made by cutting a wedge out of a square piece of netting and sewing up the sides (a tetrahedron results: a 4-sided shape with equal triangular sides) This is illustrated in a PowerPoint presentation, "Nzi_Schematic.ppt" [93 KB] http://www.nzitrap.com/Nzi_trap/Making/Nzi_Schematic.ppt [11]. Step by step instructions on cutting the trap sections from material, and sewing these to make the finished trap are presented in a PowerPoint presentation "StepbyStep.ppt" [232 KB] available for download at http://www.nzitrap.com/Nzi_trap/Making/Sewing.htm [12].

Assembling the Nzi trap

1. **Slide show** [13]on using an Nzi trap
2. **Pieces required** [14]for a Nzi trap
3. **Pieces required** [15]for a Nzi trap (continued)
4. The **Nzi trap** [16]uses four wooden poles
5. You will need to **cut** [17]these yourself
6. **Hammer four nails** [18]into the top of the centre post
7. Having **made your four poles** [19]...
8. ...next **clear the site** [20]of vegetation
9. Hammer the **centre pole** into the ground.
10. **Fit the trap** cone over the centre pole.
11. **Stretch the rest** of the trap out...
12. ...so you can **estimate** where to put the other three poles
13. Hammer the poles into the ground.
14. **Attach the trap** to the first pole with wire.
15. Do the same with the **second corner**.
16. And with the **third**.
17. The trap cone is supported on the nails in the **centre post**.
18. Fit a **plastic bag** to the top of the cone.
19. And there you have it!!

These step-by-step instructions are also included in a PowerPoint presentation "Using the Nzi trap", available in two parts: [part 1](#) [740 KB], and [part 2](#) [863 KB].

**You manipulate and/or use pesticides? Make inquiries before!**

Pesticide can be harmful to your health, the health of your family, of the consumers and of the environment. Adopt the right gestures to use pesticides safely:

**Click on ?Reducing risks while manipulating pesticide**?

**References and further reading**


Contact details for DFID research project teams

To view table, click here [37].

Evidence of validation

To view table, click here [38]

e-Resources


Files which can be downloaded from http://www.nzitrap.com [39] include:


http://www.research4development.info/projectsAndProgrammes.asp?OutputID=64901 [40]

Information on traps for riverine species of tsetse can be found at www.cirdes.org [41] (Centre International de Recherche-Développement sur l'Elevage en zone Subhumide)

Health and safety

The researchers, their institutions or this website cannot be held responsible for any damage resulting from the use of the materials or methods described here. The application or use of treatments, processes and technologies is the sole responsibility of the user.

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Complete listing of all uploaded documentation for this technology

FURTHER READING:


SOURCE(S):

UK Department For International Development (DFID) [42]

Source URL: http://teca.fao.org/technology/tsetse-control-nzi-trap-kenya

Links: