SURE Rapid Response

What guidelines are present to facilitate the evaluation of a natural material extract as a larvicide?

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This rapid response was prepared by the Uganda country node of the Regional East African Community Health (REACH) Policy Initiative.

Key messages

- The World Health Organization provides guidelines on the evaluation of mosquito larvicides. These are contained in its "Guidelines for Laboratory and Field testing of Mosquito larvicides" compiled by the Communicable Disease Control, Prevention and Eradication.
- They are a sequence of stages with three phases: Phase I-Laboratory studies, Phase II-Small Scale Field Studies and Phase III-Large Scale Field Studies
- The guidelines are available at http://whqlibdoc.who.int/hq/2005/WHO_CDS_WHOPES_GCDPP_2005.13.pdf

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SURE
Supporting the Use of Research Evidence

REACH
Regional East African Community Health Policy Initiative

EVIPNet
EVIDENCE-INFORMED POLICY NETWORK

Who requested this rapid response?

This document was prepared in response to a specific question from a policy maker in Uganda.

! This rapid response includes:

- **Key findings** from research
- **Considerations about the relevance** of this research for health system decisions in Uganda

X Not included:

- Policy or practice related recommendations
- Detailed descriptions

What is SURE Rapid Response Service?

SURE Rapid Responses address the needs of policymakers and managers for research evidence that has been appraised and contextualised in a matter of hours or days, if it is going to be of value to them. The Responses address questions about arrangements for organising, financing and governing health systems, and strategies for implementing changes.

What is SURE?

SURE – Supporting the Use of Research Evidence (SURE) for policy in African health systems - is a collaborative project that builds on and supports the Evidence-Informed Policy Network **(EVIPNet) in** Africa and the Regional East African Community Health **(REACH)** Policy Initiative (see back page). SURE is funded by the European Commission's 7th Framework Programme.
www.evipnet.org/sure

Glossary

of terms used in this report:
www.evipnet.org/sure/rr/glossary

Summary of findings

Guidelines to evaluate a natural extract product

These have been adapted from the "Guidelines for Laboratory and Field testing of Mosquito larvicides" provided by the World Health Organization Communicable Disease Control, Prevention and Eradication division's *WHO PESTICIDE EVALUATION SCHEME* in 2005 (1).

World Health Organization Document number: ***WHO/CDS/WHOPES/GCDPP/2005.13***

These provide specific and standardized procedures and guidelines for testing larvicides against mosquitoes. It aims to harmonize the testing procedures carried out in different laboratories and institutions to generate data for the registration and labeling of larvicides by national authorities. The guidelines were reviewed and recommended by the Eighth WHOPES Working Group Meeting, held at WHOHQ, Geneva, 1–3 December 2004 (2).

The document provides guidance on laboratory studies and small-scale and large-scale field trials to determine the efficacy, field application rates and operational feasibility and acceptability of a mosquito larvicide. Table 1 below summarizes the sequence and objectives of the studies and trials. The procedures provide some information on the safety and toxicity of the larvicides for non target organisms, but it is presumed that preliminary eco-toxicity and human assessments have been undertaken before any field study is carried out – detailed treatment and analysis of these extra data are beyond the scope of the document.

How this Response was prepared

After clarifying the question being asked, we searched for systematic reviews, local or national evidence from Uganda, and other relevant research. The methods used by the SURE Rapid Response Service to find, select and assess research evidence are described here:

www.evipnet.org/sure/rr/methods

Table 1: Sequence of the stages of evaluation of mosquito larvicides

Phase	Type of Study	Aim
Phase I	Laboratory studies	• Biopotency and activity • Diagnostic concentration and assessment of cross-resistance
Phase II	Small-scale field trials	• Efficacy under different ecological settings • Method and rate of application • Initial and residual activity • Effect on non-target organisms
Phase III	Large-scale field trials	• Efficacy and residual activity • Operational and community acceptance • Effect on non-target organisms

PHASE I: LABORATORY STUDIES

The objective of laboratory testing is to determine the inherent biopotency of the technical material or, in the case of formulated larvicides, their activity. It is assumed that the compound's mode of action has already been established. Information on the speed of activity is important, as this will determine the type of testing procedures to be employed. The aims of the tests at this stage are:

- to establish dose–response line(s) against susceptible vector species;
- to determine the lethal concentration (LC) of the larvicide for 50% and 90% mortality (LC50 and LC90) or for 50% and 90% inhibition of adult emergence (IE50 and IE90);
- to establish a diagnostic concentration for monitoring susceptibility to the mosquito larvicide in the field; and
- to assess cross-resistance with commonly used insecticides.

PHASE II: SMALL-SCALE FIELD TRIALS

Larvicides that show promise in laboratory studies (Phase I) may be subjected to small-scale field testing (Phase II). In Phase II, field trials of formulated products are performed on a small scale against target mosquitoes, preferably in representative natural breeding sites or, where such trials are not feasible, under simulated field conditions.

Evaluation procedures should be selected on the basis of the breeding sites and the behaviour of mosquitoes. The formulations are tested at three–five concentrations and the Phase I studies will guide the dosages chosen for use in the Phase II trials. Usually, this will be multiple concentrations of LC90 for the target species. Treatment concentrations are calculated on the basis of the amount of active ingredient per volume of water (if known or measurable) or surface area of the habitat.

The objectives of small-scale field trials are:

- to determine efficacy, including residual activity, against different mosquito vectors in different breeding sites and ecological settings;
- to determine the optimum field application dosage(s);
- to monitor abiotic parameters that may influence the efficacy of the product; and
- to record qualitative observations on the non-target biota cohabiting with mosquito larvae, especially predators.

PHASE III: LARGE-SCALE FIELD TRIALS

The efficacy of larvicides found to be suitable in small-scale field trials (Phase II) should be validated in larger scale field trials against natural vector populations in natural breeding habitats. In this phase, the larvicide is applied to the breeding sites of the target mosquito at the optimum field dosage(s) selected in the small-scale field trials using appropriate application equipment, depending on the formulation.

The objectives of the trial are:

- to confirm the efficacy of the larvicide at the selected field application dosage(s) against the target vector when applied to large-scale plots in natural breeding sites;
- to confirm residual activity and application intervals;
- to record observations on the ease of application and dispersal of the insecticide;
- to observe community acceptance;
- to record any perceived side-effects on operators; and
- to observe the effect of the treatment on non-target organisms.

What is presented here is a summary of the guidelines, the full version of which is attached in hard copy but may also be found at http://whqlibdoc.who.int/hq/2005/WHO_CDS_WHOPES_GCDPP_2005.13.pdf

References

1. World Health Organization Communicable Disease Control Prevention and Eradication. **Guidelines for Laboratory and Field testing of Mosquito Larvicides.** Geneva World Health Organization Pesticide Evaluation Scheme2005. Report No.: WHO/CDS/WHOPES/GCDPP/2005.13.

2. Report of the Eighth WHOPES Working Group Meeting. (WHO/CDS/WHOPES/2005.10). Geneva: World Health Organization2005.

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Conflicts of interest
None known.

This Rapid Response should be cited as
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