

# GUIDELINES FOR EFFICACY TESTING OF HOUSEHOLD INSECTICIDE PRODUCTS

MOSQUITO COILS, VAPORIZER MATS,  
LIQUID VAPORIZERS, AMBIENT EMANATORS AND  
AEROSOLS

# **GUIDELINES FOR EFFICACY TESTING OF HOUSEHOLD INSECTICIDE PRODUCTS**

MOSQUITO COILS, VAPORIZER MATS,  
LIQUID VAPORIZERS, AMBIENT  
EMANATORS AND AEROSOLS



**World Health  
Organization**

**CONTROL OF NEGLECTED TROPICAL DISEASES  
WHO PESTICIDE EVALUATION SCHEME**

**© World Health Organization 2009**

All rights reserved.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either express or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

# CONTENTS

	Page
<b>ACKNOWLEDGEMENTS</b>	<b>III</b>
<b>1. INTRODUCTION</b>	<b>1</b>
<b>2. LABORATORY STUDIES</b>	<b>2</b>
<b>2.1 Intrinsic insecticidal activity</b>	<b>4</b>
<b>2.2 Vapour activity</b>	<b>6</b>
<b>2.3 Insecticidal activity of active ingredient(s) used as aerosols</b>	<b>6</b>
<b>2.4 Cross-resistance to other active ingredient(s)</b>	<b>8</b>
<b>2.5 Biological efficacy of formulated Products</b>	<b>9</b>
2.5.1 Mosquito coils, vaporizing mats, ambient emanators and liquid vaporizers	9
2.5.2 Aerosols	11
<b>3. FIELD TRIALS</b>	<b>12</b>
<b>3.1 Mosquito coils, vaporizing mats, ambient emanators and liquid vaporizers</b>	<b>13</b>
<b>3.2 Aerosols</b>	<b>15</b>
<b>4. REFERENCES</b>	<b>16</b>
<b>ANNEX 1. GUIDELINES FOR DEVELOPMENT OF INFORMED CONSENT FORM</b>	<b>17</b>
<b>ANNEX 2. EXAMPLE PRINTOUT OF A COMPUTERIZED PROBIT ANALYSIS</b>	<b>22</b>

<b>ANNEX 3.</b>	<b>PEET-GRADY CHAMBER SPECIFICATIONS</b>	<b>23</b>
<b>ANNEX 4.</b>	<b>WIND TUNNEL SPECIFICATIONS</b>	<b>25</b>
<b>ANNEX 5.</b>	<b>WHO TUBES AND PROCEDURES FOR TESTING THE SUSCEPTIBILITY OF ADULT MOSQUITOES TO INSECTICIDES</b>	<b>30</b>
<b>ANNEX 6.</b>	<b>MONITORING THE SUSCEPTIBILITY STATUS OF TARGET SPECIES TO INSECTICIDES</b>	<b>32</b>

## ACKNOWLEDGEMENTS

The first draft of these guidelines was prepared by a drafting committee appointed by the World Health Organization (WHO) and composed of Dr Gary Clark, Mosquito and Fly Research Unit, United States Department of Agriculture, Gainesville, FL, USA; Dr Zairi Jaal, Universiti Sains Malaysia, Penang, Malaysia; Dr Lee Han Lim, Institute for Medical Research, Kuala Lumpur, Malaysia; Dr Michael Nathan, World Health Organization (WHO), Geneva, Switzerland; and Dr Morteza Zaim, WHO Pesticide Evaluation Scheme (WHOPES), Geneva, Switzerland. None of the experts declared an interest in the subject matter of these guidelines.

The first draft of the guidelines was subsequently peer reviewed by individuals and institutions known for their expertise in the subject.

The above-mentioned drafting committee considered all comments received and prepared a second draft. This revised draft was reviewed and discussed at the WHOPES consultation held at WHO headquarters in Geneva, Switzerland on 23–27 February 2009. Industry was invited to attend the first one-and-a-half-days of the meeting for the purpose of information exchange and views, after which the second draft and comments were further reviewed by a group of WHO appointed experts, who finalized the guidelines by consensus. The WHO appointed experts were Dr Jane Bonds, Florida A&M University, Panama City, FL, USA; Dr Don Barnard, Mosquito and Fly Research Unit, United States Department of Agriculture, Gainesville, FL, USA; Dr Ulrich Bernier, Mosquito and Fly Research Unit, United States Department of Agriculture, Gainesville, FL, USA; Dr Gary Clark, Mosquito and Fly Research Unit, United States Department of Agriculture, Gainesville, FL, USA; Dr Vincent Corbel, Centre de Recherches Entomologiques de Cotonou, Benin; Dr David Dame, Gainesville, FL, USA; Dr Nigel Hill, London School of Hygiene and Tropical Medicine, London, UK; Dr Zairi Jaal, Universiti Sains Malaysia, Penang, Malaysia; Mr Christophe Lagneau, EID Méditerranée, Montpellier, France; Mr Mark Latham, Manatee County Mosquito Control, Palmetto, FL, USA; Dr Lee Han Lim, Institute for Medical Research, Kuala Lumpur, Malaysia; Professor Dr Graham Matthews, Imperial College, Ascot, UK; Dr Peter Miller, University of Technology, New

South Wales, Australia; Professor Dr A. Jennifer Mordue Luntz, University of Aberdeen, UK; Dr Michael Nathan, Farges, France; and Dr Kevin Sweeney, United States Environmental Protection Agency, Washington, DC, USA.

From the total of 15 experts who participated in this Consultation, two experts declared an interest: (i) Dr Nigel Hill: his research group at the London School of Hygiene and Tropical Medicine conducts screening of developmental public health pesticides for a large number of companies; (ii) Professor Dr A. Jennifer Mordue Luntz: she is the co-inventor of a novel, patented insect repellent owned by her employer, the University of Aberdeen, together with an external partner.

The WHO Department of Control of Neglected Tropical Diseases acknowledges all the individuals and institutions listed above for their important contributions to this work. It also expresses its sincere thanks to Dr Gary G. Clark (Research Leader, Mosquito and Fly Research Unit, United States Department of Agriculture, Center for Medical, Agricultural, and Veterinary Entomology, Gainesville, FL, USA) for his valuable support and technical advice. The financial support provided by the Bill & Melinda Gates Foundation is also gratefully acknowledged.

The Department welcomes feedback on the guidelines and suggestions for improvement from national programmes, research institutions and industry.

## 1. INTRODUCTION

The purpose of these guidelines is to provide specific and standardized procedures and criteria for efficacy testing and evaluation of specific household insecticide products intended for indoor use against mosquitoes, namely, mosquito coils, vaporizer mats, liquid vaporizers, ambient emanators and aerosols. Their aim is to harmonize the testing procedures carried out in different laboratories and institutions in order to generate comparable data for registering and labelling such products by national regulatory authorities. However, the requirements for registration of pesticides are determined by the national regulatory authorities.

These guidelines are an expanded and updated version of those recommended by the WHO Pesticide Evaluation Scheme (WHOPES) Informal Consultation on the evaluation and testing of insecticides held at the headquarters of the World Health Organization (WHO) in Geneva, Switzerland on 7–11 October 1996 (1). They were reviewed and recommended by the WHO Consultation on testing and evaluation of public health pesticides held at WHO headquarters on 23–27 February 2009.

The document provides guidance and stepwise procedures on conducting laboratory studies, field testing and evaluation of household insecticide products intended for personal protection against mosquitoes. With some modifications, the guidelines can be used to determine the efficacy and personal protection of candidate products against other flying nuisance pests.

Although the studies may provide some information on safety

**预览已结束，完整报告链接和二维码如下**

[https://www.yunbaogao.cn/report/index/report?reportId=5\\_29283](https://www.yunbaogao.cn/report/index/report?reportId=5_29283)