



**RWANDA
STANDARD**

**DRS
393-9**

First edition

2023-mm-dd

**Spatial application mosquito repellents—
Specification —**

Part 9: Incense sticks

Formatted: English (United States)

ICS 65.100

Reference number

RS 393-9: 2023

© RSB2023

In order to match with technological development and to keep continuous progress in industries, standards are subject to periodic review. Users shall ascertain that they are in possession of the latest edition

© RSB2023

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without prior written permission from RSB.

Requests for permission to reproduce this document should be addressed to:

Rwanda Standards Board

P.O Box 7099 Kigali-Rwanda

KK 15 Rd, 49

Tel. +250 788303492

Toll Free: 3250

E-mail: info@rsb.gov.rw

Website: www.rsb.gov.rw

ePortal: www.portal.rsb.gov.rw

Formatted: French (France)

Field Code Changed

Formatted: English (United Kingdom)

Formatted: French (France)

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Requirements	2
4.1 General requirements	2
4.2 Active ingredients	2
4.2.1 Natural repellents	2
4.2.2 Synthetic repellents	3
4.3 Specific requirements	3
4.3.1 Coating	3
4.3.2 Fragrance	3
4.3.3 Size of the sticks	3
4.3.4 Burning quality	3
4.3.5 Burning time	4
4.3.6 Repellence efficacy	4
5 Packaging	4
6 Labelling	4
7 Sampling	5
Annex A (normative) Some common essential oils in natural repellents that may be hazardous	6
Annex B (informative) Plant-based insect repellents: a review of their efficacy, development and testing	8
Annex C (informative) Active ingredients for synthetic repellents	17
Annex D (normative) Methods of test for uniformity of coating (paste) and burning quality of incense sticks mosquito repellent	18
D.1 Uniformity of coating	18
Annex E (normative) Methods for olfactory assessment of fragrance	19
E.1 General	19
E.2 Selection and training	19
E.3 Fatigue	19
E.4 Time olfactory assessment	19
E.5 Freedom from contaminating odour	19
E.6 Material	19
E.7 Procedure	20

Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettement as Rwanda Standards.

DRS393-9 was prepared by Technical Committee RSB/TC 015, *Pharmaceutical Products*.

In the preparation of this standard, reference was made to the following standard:

US 2280: Incense stick— Specification

The assistance derived from the above source is hereby acknowledged with thanks.

RS 393 consists of the following parts, under the general title: *Spatial application mosquito repellents — Specification*:

- *Part 1: Coils*
- *Part 2: Spray*
- *Part 3: Candles*
- *Part 4: Papers*
- *Part 5: Liquid vaporizers*
- *Part 6: Vaporizing Mats*
- *Part 7: Tablets*
- *Part 8: Liquid detergents*
- *Part 9: Incense sticks*

Committee membership

The following organizations were represented on the Technical Committee on *Pharmaceutical Products* (RSB/TC 015) in the preparation of this standard.

Rwanda Forensic Laboratory (RFL)

Rwanda Medical Supply (RMS) Ltd

SOPYRWA

Rwanda Food and Drugs Authority (Rwanda FDA)

PHARMALAB

MANI CORP Rwanda Ltd

Life Care Rwanda

University of Rwanda/School of Pharmacy

University of Rwanda/College of Sciences and Technology

University of Rwanda/College of Education

Rwanda Standards Board(RSB) – Secretariat

Copy for public comments

Introduction

Insecticides are used either for killing or controlling harmful insects. The insecticides which are applied for repelling insects are termed as "Repellents". Mosquito is one of the most harmful insects for mankind. To destroy them, many preparations are available on the market in various recipes like pest killer spray, soap, oil, powder, repellent etc. Out of these, mosquito repellent is the most popular as it has germicidal and disinfectant properties and is able to repel mosquitoes and is convenient to use.

The mosquito repellent is used for warding off mosquitoes which is the most harmful insect. Nowadays, mosquito repellents are used for controlling mosquito and are becoming most preferably than other mosquito destroyers gradually. With the rise in the standard of living, increasing urbanization and population, the demand of mosquito repellent mat is constantly increasing particularly in tropical places. It is a convenient method for protection against mosquito, so it has a tremendous market potential. Thus, there is a very good scope for development of such units in the country.

Spatial repellent are chemical products designed to be 'active' (requiring heat or electricity) or 'passive' (requiring no heat or electricity) and release volatile chemicals into the air within the treated space. Product examples that are currently available include mosquito coils, spray, candles, papers, liquid vaporizers, vaporizing mats, tablets, liquid detergents, among others. However, many more types of spatial repellent products are waiting to be developed.

Spatial repellents elicit 'spatial repellency' which refers to a range of insect behaviours induced by airborne chemicals that result in a reduction in human-mosquito contact. These behaviours include: movement away from a chemical stimulus, attraction-inhibition and/or, and feeding inhibition.

Among the new formulated mosquito repellent include incense sticks that was used as Incense burning like a tradition at festive occasions, weddings and religious functions. The manufacture of incense sticks involves no typical or sophisticated chemicals and the raw materials consist of powdered odoriferous or otherwise roots barks, seeds, woods, leaves, flowers, etc, and resins, essential oils and aromatic chemicals. The paste made with the raw materials and water, gum and colour whenever required is applied to bamboo sticks on which additional perfumes may be added later. The paste may also be compacted, dried and make a form of stick that could be burnt to releases fragrant smoke.

Keeping in view the significance of this product, this document covers, beside requirements on ingredients used, only physical characteristics like fragrance, visual inspection, length, size, burning time, etc, initially with a view to improve it substantially after developing performance tests in due course.

Spatial application mosquito repellents— Specification— Part 9: Incense sticks

1 Scope

This Draft Rwanda Standard prescribes the requirements, sampling and methods of test for spatial application mosquito repellents formulated and prepared as incense sticks.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

RS 91, *Labelling and marking of pharmaceutical products — Specification*

RS 394-2, *Mosquito repellents — Performance Test Guidelines — Part 2: Spatial repellents*

RS ISO 24153, *Random sampling and randomization procedures*

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1

incense stick

stick coated with incense, which burns slowly, releasing a fragrant odour.

3.2

mosquito

blood-sucking dipterous insect of the family Culicidae. *Aedes*, *Anopheles*, *Culex*, *Mansonia*, and *Stegomyia* generally containing most species involved in the transmission of protozoan and other disease-causing parasites

3.3

mosquito repellent

substance applied to skin, clothing, or other surfaces which discourages mosquito (and arthropods in general) from landing or climbing on that surface

3.4

natural repellents/biopesticides

repellents that contain natural, plant-based active ingredients

3.5

synthetic repellents

conventional repellents containing synthetic chemical active ingredients and carrier synthetic chemical compounds as approved by a competent authority

3.6

competent authority

ministry or government institution in charge of registration of pharmaceutical products

4 Requirements

4.1 General requirements

4.1.1 The product shall be in the form of stick, strong enough to stand upright and shall not bend under their own weight.

4.1.2 The product shall give out pleasant aroma continuously while burning for its full length of the coated portion, it shall burn without producing any flame except at the beginning, and shall be readily extinguishable after ignition.

4.1.3 The end of incense holders shall be beautifully crafted and capable of preventing burning on its support.

4.1.4 Upon ignition, the product shall produce smoke that is capable of repelling mosquitoes.

4.2 Active ingredients

4.2.1 Natural repellents

4.2.1.1 Active ingredients used in natural repellents shall be natural and plant based compounds such as essential oils or any other plant extract registered by the competent authority as mosquito repellents.

4.2.1.2 The manufacturer shall provide adequate data on the repellence of such ingredients.

4.2.1.3 The manufacturer shall have adequate data justifying the proportion of ingredient(s) for which claims are made, used in the product.

4.2.1.4 The essential oils used in natural repellents shall be safe for users and provide the required efficacy. The annex A gives some ingredients (essential oils) and safe concentration commonly used in natural repellents.

4.2.1.5 The concentration of plant-based active ingredient and recommended application shall be safe to the user and provide the required efficacy. The annex B provides the efficacy of some plant-based mosquito repellents.

4.2.2 Synthetic repellents

4.2.2.1 Synthetic repellents shall contain synthetic chemical compound (s) or their mixture with natural compounds, which are able to discourage mosquitoes and send them flying or crawling away.

4.2.2.2 The concentration of the active ingredients and the recommended application/use shall ensure the declared efficacy and shall be safe and proved by scientific evidence

4.2.2.3 Synthetic repellents and their active ingredients shall be approved and registered by competent authority before being released to the market. The annex C gives the list of some of active ingredients used in synthetic repellents.

4.3 Specific requirements

4.3.1 Coating

The application of the coating (paste) shall be reasonably uniform when tested in accordance with the procedure given in Annex D.

4.3.2 Fragrance

The incense sticks repellent shall give out pleasant aroma continuously while burning its full length of the coated portion when tested in accordance with the procedure given in annex E.

4.3.3 Size of the sticks

Unless specified by purchaser, the bare portion of the sticks shall not be more than 20% of the declared length.

4.3.4 Burning quality

4.3.4.1 The incense sticks repellent shall burn continuously and shall not extinguish even once before burning of the coated portion.

4.3.4.2 The smoke/fumes produced as a result of burning shall not be irritating to the nostrils/eyes.

4.3.4.3 While burning the incense sticks, no sparks shall be produced nor shall any part of the glowing tip along with the burning with unburnt coating shall fall off so as to constitute a fire hazard of any kind.

4.3.5 Burning time

The burning time of incense sticks mosquito repellent shall meet requirements as per manufacturer's declaration.

4.3.6 Repellence efficacy

When tested in accordance with RS 394-2, the vapour in the normal course of burning of the incense stick mosquito repellent shall repel 100% of the mosquitoes available in space, after a protection time indicated by the manufacturer.

5 Packaging

The incense sticks mosquito repellent shall be packaged in a way that their integrity is not compromised during storage and transportation.

6 Labelling

Each packet shall be labelled with the following information:

- a) name and address of the manufacturer;
- b) storage conditions;
- c) list of ingredients;
- d) active ingredient (s) content;
- e) repellence time;
- f) production and expiry dates;
- g) net mass in grams and/or number of sticks;
- h) burning time;
- i) batch number;
- j) age group and/or health condition for which use is prohibited
- k) direction for use and
- l) safety precaution.

7 Sampling

Random samples of the product shall be drawn for test in accordance with RS ISO 24153 from market, factory or anywhere else.

Copy for public comments

Annex A
(normative)

Some common essential oils in natural repellents that may be hazardous

Table A1 – Some common ingredients (essential oils) in natural repellents that may be hazardous

Common name	Scientific name	Safe concentration (%)	Hazard
Anise	<i>Pimpinella anisum</i>	3.6	Based on 0.11% methyl eugenol; carcinogen.
Basil	<i>Ocimum sp.</i>	0.07	Based on 6% methyl eugenol; carcinogen.
Bergamot	Citrus aurantium bergamia	0.1	Sensitising and phototoxic; skin irritant.
Cajeput	Melaleuca alternifolia	0.004	Based on 97% methyl eugenol; carcinogen.
Cedar	Chamaecyparis nootkatensis	1	Likely allergenic contaminants if nootkatone not 98% pure.
Cassia	Cinnamomum cassia	0.2 or 9	Sensitising skin irritant
Citronella	Cymbopogon nardus	2	Safety is controversial; based on 0.2% methyl eugenol or 1.3% citral; sensitising skin irritant.
Citronella (java)	Cymbopogon winterianus	2	Based on 2% methyl eugenol; carcinogen.
Citrus oils	Citrus sp.	16 – 25	Based on 0.005 % - 0.0025 % bergapten; phototoxic skin irritant
Clove	Syzygium aromaticum	0.5	Based on 92% eugenol; sensitising skin irritant.
Fever tea, lemon bush	Lippia javanica	2	Based on 5% citral in related species; sensitising skin irritant.
Geranium	Pelargonium graveolens	6	Based on 1.5% citral; sensitising skin irritant.
Ginger	Zingiber sp.	12	Based on 0.8 citral; sensitising skin irritant.
Huon oil, Macquarie pine	Langarostrobos franklini	0.004	Based on methyl eugenol; carcinogen.
Lemongrass	Cymbopogon citrates	0.1	Based on 90% citral; sensitising skin irritant.
Lime	Citrus aurantifolia	0.7	Phototoxic skin irritant.
Litsea	Litsea cubeba	0.1	Based on 78% citral; sensitising skin irritant
Marigold	Tagetes minuta	0.01	Phototoxic skin irritant
Mexican tea, American wormseed	Chenopodium ambrosioides	Prohibited	Toxic
Mint	Mentha piperata and spicata	2	Based on 0.1% trans-2-hexenal; sensitising skin irritant.
Nutmeg	Myristica fragrans	0.4	Based on 1% methyl eugenol; carcinogen.
Palmarosa	Cymbopogon martini	16	Based on 1.2% farnesol; sensitizing skin irritant.
Pennyroyal	Mentha pulegium or	Prohibited	Toxic

	Hedeoma pulegioides		
Pine	Pinus sylvestris	Prepare with antioxidants	Oxidation creates phototoxic skin irritants
Rosemary	Rosemarinus officinalis	36	Based on 0.011% methyl eugenol; carcinogen.
Rue	Ruta chalepensis	0.15	Based on presence of psoralenes; phototoxic skin irritant.
Thyme	Thymus vulgaris	2	Based on 0.1% trans-2-hexenal; sensitising skin irritant.
Violet	Viola odorata	2	Based on 0.1% trans-2-hexenal; sensitizing skin irritant.
Ylang-ylang	Canagium odoratum	2	Based on 4% farnesol; sensitizing skin irritant.

Copy for public comments

Annex B (informative)

Plant-based insect repellents: a review of their efficacy, development and testing¹

Plant-based repellents have been used for generations in traditional practice as a personal protection measure against host-seeking mosquitoes. Knowledge on traditional repellent plants obtained through ethnobotanical studies is a valuable resource for the development of new natural products. Recently, commercial repellent products containing plant-based ingredients have gained increasing popularity among consumers, as these are commonly perceived as “safe” in comparison to long-established synthetic repellents although this is sometimes a misconception. The table D1 gives an overview of repellent plant efficacy from literature review.

Table B1 – An overview of repellent plant efficacy from literature review

Plant	Location	Other names	Repellent compound (s)	Tested mode of use	Repellency % protection
MYRTACEAE					
<i>Corymbia citriodora</i>	Australia	Lemon eucalyptus	Citronellal	30% PMD applied topically	96.88% protection from mosquitoes for 4 hours
	Brazil	Lemon scented Gum	(by product of hydrodistillation) (p-methane-3,8-diol)	PMD towelette (0.57g) applied topically	90% protection from <i>An. Arabiensis</i> for 6 hours.
	Bolivia	Quwenling	Citronellol	50% PMD applied topically	100% protection from <i>An. Gambiae</i> and <i>An. Funestus</i> for 6 – 7 hours.
	China		Limonene	20% PMD (1.7 mg/cm ²) applied topically.	100% protection for 11 – 12 hours against <i>A. stephensi</i> .
	India		Geraniol	20% PMD applied topically	100% protection against <i>Ae. Aegypti</i> for 120 minutes.
	Ethiopia		Isopulegol	Thermal expulsion (leaves)	78.7% protection from <i>An. Arabiensis</i> .
	Tanzania		δ-pinene	Direct burning (leaves)	70.1% protection from <i>An.</i>

¹ Marta Ferreira Maia and Sarah J. Moore, *Plant-based insect repellents: a review of their efficacy, development and testing*. Malaria Journal, 2011.

					<i>arabiensis</i>
				Periodic thermal expulsion (leaves)	74.5% protection from <i>An. Gambiae s.s.</i>
				Periodic direct burning (leaves)	51.3% protection from <i>An. Gambiae s.s.</i>
				Thermal expulsion (leaves)	48.71% protection from <i>An. Gambiae s.l.</i>
<i>Eucalyptus spp.</i>	Guinea-Bissau Ethiopia Tanzania Portugal	Eucalyptus	1,8-cineole citronellal Z- and α - citral α - pinene	Thermal expulsion (leaves)	72.2% protection from mosquitoes for 2 hours.
<i>E. camaldulensis</i>	Ethiopia			Thermal expulsion (leaves)	71.9% protection from <i>An. Arabiensis.</i>
					72.2% protection from <i>An. Pharoensis.</i>
				Direct burning (leaves)	65.3% protection from <i>An. Arabiensis.</i>
					66.6% protection from <i>An. Pharoensis.</i>
<i>Eugenia caryophyllus</i> or <i>Syzygium aromaticum</i> or <i>Eugenia aromatic</i>	India	Clove lavang cravinho-da-india	Euginol Carvacrol Thymol Cinnamaldehyde	100% essential oil applied topically	100% protection against <i>Ae. aegypti</i> for 225 minutes
					100% protection against <i>An. Albimanus</i> for 213 minutes
				100% essential oil applied topically	100% protection against <i>Ae. aegypti</i> for 120 min.
					100% protection against <i>C. quinquefasciatus</i> for 240 min.
					100% protection against <i>An. Dirus</i> for 210 min.
VERBENACEAE					
<i>lippia spp.</i>	Kenya Tanzania Ghana Zimbabwe	Lemon bush	Myrcene Linalool α - pinene eucalyptol		
<i>L. javanica</i>			Alloparinol Camphor Limonene α - terppeneol verbenone	5 mg/cm ² plant extract applied topically	100% protection against <i>Ae. aegypti</i> for 8 hours
				Alcohol plant	76.7% protection

Formatted: French (France)

				extract applied topically	against <i>An. Arabiensis</i> for 4 hours
<i>L. uckambensis</i>		Fever tea		Potted plant	33.3% protection against <i>An. Gambiae s.s</i>
				Periodic thermal expulsion (leaves)	45.9% protection against <i>An. Gambiae s.s</i>
				Periodic direct burning (leaves)	45.9% protection against <i>An. Gambiae s.s</i>
				Potted plant	25.01% protection against <i>An. Gambiae s.s</i>
<i>L. cheraliera</i>			Eucalyptol Caryophyllene Ipsdienone p-cymene		
<i>Lantana camara</i>	Kenya Tanzania	Lantana Spanish flag West Indian Lantana Wild sage	Caryophyllene	Potted plant	32.4% protection against <i>An. Gambiae s.s</i>
				Potted plant	27.22% protection against <i>An. Gambiae s.l</i>
				Flower extract in coconut oil	94.5% protection against <i>aegypti</i> and <i>ae. albopictus</i> for one hour
				Periodic thermal axpulsion (leaves)	42.4% protection against <i>An. Gambiae s.s</i>
LAMIACEAE					
<i>ocimum</i> spp. <i>O. americanum</i>	Kenya Tanzania Zimbabwe Nigeria Ghana Cameroon Eritrea Ethiopia (...)	Tree basil Nchu avum Lime basil Kivumbasi Myeni Madongo African blue Basil Hairy basil	p-cymene estragosl linalool linoleic acid eucalyptol eugenol camphor citral thujone limonene ocimene and others	Potted plant	39.70% protection against <i>An. Gambiae s.s</i>
				Potted plant	37.91% protection against <i>An. Gambiae s.l</i>
				Fresh plants combined with <i>O. suavebrused</i> and applied topically	50% protection against <i>An. Gambiae s.l</i>
				Periodic thermal axpulsion (leaves and seeds)	43.1% protection against <i>An. Gambiae s.s</i>
				Periodic direct burning (leaves and seeds)	20.9% protection against <i>An. Gambiae s.s</i>
				100% essential oil combined with vanillin 5% applied topically	100% protection against <i>Ae. aegypti</i> for 6.5 hours

					100% protection against <i>C. quinquefasciatus</i> for 8 hours
					100% protection against <i>An. Dirus</i> for 8 hours
<i>O. suave</i>				Thermal expulsion (leaves)	73.6% protection from <i>An. Arbiensis</i>
					75.1% protection against <i>An. pharaoensis</i>
				Direct burning (leaves)	71.5% protection from <i>An. arbiensis</i>
					79.7% protection against <i>An. pharaoensis</i>
				Periodic thermal expulsion (leaves and seeds)	53.1% protection from <i>An. gambiae</i> s.s.
Periodic direct burning (leaves and seeds)	28.0% protection from <i>An. gambiae</i> s.s.				
<i>O. basilicum</i>				Thermal expulsion (leaves)	78.7% protection from <i>An. arabiensis</i>
					79.2% protection from <i>An. pharaoensis</i>
				Direct burning (leaves)	73.1% protection from <i>An. arabiensis</i>
					70.0% protection from <i>An. pharaoensis</i>
100% essential oil applied topically	100% protection for 70 minutes.				
<i>O. kilimandscharikum</i>				Thermal expulsion (leaves and seeds)	44.54% protection against <i>An. gambiae</i> s.l.
				Thermal expulsion (leaves and seeds)	37.63% protection against <i>An. funestus</i> .
				Periodic thermal expulsion (leaves and seeds)	52.0% protection against <i>An. gambiae</i> s.s.
				Periodic direct burning (leaves and seeds)	26.4% protection against <i>An. gambiae</i> s.s.

<i>O. forskolei</i>				Fresh plants hung indoors	53% protection against mosquitoes entering human dwelling
<i>Hyptis spp. Hyptis suaveolens</i>	Kenya Tanzania Ghana The Gambiae	Bushmint Wild hops Wild Spikenard Hangzimu Hortela-do-campo	Myrcene	Smouldering on charcoal	85.4% repellency against mosquitoes for 2 hours
				Fresh leaves	73.2% repellency against mosquitoes for 2 hours.
				Periodic direct burning (leaves and flowers)	20.8% repellency against <i>An. gambiae</i> s.s.
<i>Menthe spp. M. piperata</i>	Brazil Bolivia	Hortela-do-campo Peppermint		100% essential oil applied topically	100% protection against <i>Ae. aegypti</i> for 45 minutes.
<i>M. arvensis</i>		Menta Japanese mint		100% essential oil volatilized in a kerosene lamp	41% protection against indoors against <i>Mansonia spp.</i>
<i>Thymus spp. Th. vulgaris</i>	China Former Soviet Union Korea Middle-East Mediterranean	Thyme	α- terpinene carvacrol thymol p-cymene linalool geraniol	α- terpinene topically	97.3% protection against <i>Culex pipiens</i> <i>sallens</i> for 82 min.
				Carvacrol topically	94.7% protection against <i>C. pipiens</i> <i>sallens</i> for 80 min.
				Thymol topically	91.8% protection against <i>C. pipiens</i> <i>sallens</i> for 70 min
				Linalool topically	91.7% protection against <i>C. pipiens</i> <i>sallens</i> for 65 min
				p-cymene	89.0% protection against <i>C. pipiens</i> <i>sallens</i> for 45.2 min
				100% essential oil applied topically	100% protection against <i>An. Arbimanus</i> for 105 min and <i>Ae. aegypti</i> for 135 min.
				Direct burning (leaves)	85-90% protection for 60-90 min.
<i>Pogostemon spp.</i>	China	Patchouli		100% essential oil applied topically	100% protection against <i>Ae. aegypti</i> for 120 min.

<i>Pogostemon cablin</i>	India Malaysia Thailand	Oriza		100% essential oil applied topically	100% protection against <i>C. quinquefasciatus</i> for 150 min. 100% protection against <i>An. Dirus</i> for 710 min.
POACEAE					
<i>Cymbopogon</i>	China India Indonesia				
<i>C. nardus</i>	Brazil		citronellal	40% essential oil applied topically	100% protection for 7-8 hours against <i>An. Stephensi</i>
				100% essential oil applied topically	100% protection against <i>Ae. Aegypti</i> for 120 min.
					100% protection against <i>C. quinquefasciatus</i> for 100 min.
					100% protection against <i>An. dirus</i> for 70 min.
				10% essential oil applied topically	100% protection against <i>Ae. Aegypti</i> for 20 min.
<i>C. martini</i>	Tanzania Kenya	palmarosa	geraniol	100% essential oil applied topically	100% protection against <i>An. culicifacies</i> for 12 hours.
					96.3% protection against <i>C. quinquefasciatus</i> for 12 hours.
				Topically (100% essential oil)	98.8% protection against <i>C. quinquefasciatus</i> for 10 hours.
<i>C. citratus</i>	USA South Africa Bolivia	Lemongrass oil	Citral α- pinene	Topically (100% essential oil)	74% protection against <i>An. Darling</i> for 2.5 hours
					95% protection against <i>Mansonia</i> spp. for 2.5 hours
				Methanol leaf extract applied topically (2.5mg/m ²)	78.8% protection against <i>An. Arabiensis</i> for 12 hours
				100% essential oil applied topically	100% protection for 30 minutes.

<i>C. winterianus</i>				100% essential oil combined with vanillin 5% applied topically	100% protection against <i>Ae. Aegypti</i> for 6.5 hours 100% protection against <i>C. quinquefasciatus</i> for 8 hours 100% protection against <i>An. Dirus</i> for 8 hours
<i>C. excavatus</i>				Alcohol plant extract applied topically	66.7% protection against <i>An. Arabiensis</i> for 3 hours
<i>Pelargonium reniforme</i>		Rose Geranium		Alcohol plant extract applied topically	63.3% protection against <i>An. Arabiensis</i> for 3 hours
MELIACEAE					
<i>Azadirachta indica</i>	India Sri Lanka China Brazil Bolivia Pakistan Ethiopia Guinea Bissau Kenya Tanzania (...)	Neem	Azadirachtin saponins	Direct burning (leaves)	76.0% protection from mosquitoes for 2 hours
				Periodic thermal expulsion (leaves)	24.5% protection from <i>An. Gambiae s.s.</i>
				1% neem oil volatilized in a kerosene lamp	94.2% protection from <i>Anopheles</i> spp. 80% protection from <i>Culex</i> spp.
				2% neem oil applied topically	56.75% protection from mosquitoes for 4 hours
ASTERACEAE					
<i>Tagetes minuta</i>	Uganda Zimbabwe India	Khaki weed		Topically	86.4% protection against <i>An. Stephensi</i> for 6 hours
				Topically	84.2% protection against <i>C. quinquefasciatus</i> for 6 hours
				Topically	75% protection against <i>Ae. Aegypti</i> for 6 hours
				Fresh leaves (4Kg)	Reduced human landings indoors
<i>Artemisia ssp.</i>					
<i>A. vulgaris</i>	India Egypt Italy Canada USA	Mugwort wormwood St. Johns plant Old uncle	Camphor Linalool Terpenen-4-ol α - and β -thujone		

		henry Sailors Tobacco	β - pinene		
<i>A. monosperma</i>	Siberia Brazil	Felon herb Naughty man	Myrcene Limonene Cineol	5% leave extract applied topically	100% protection for 4 hours
CAESALPINIACEAE					
<i>Daniellia oliveri</i>	Guinea-Bissau The Gambiae	Churai Santao Santang Santango		Direct burning (bark)	77.9% protection against mosquitoes for 2 hours
				Direct burning (bark)	77% protection against mosquitoes
FABACEAE					
<i>Glycine max</i>	Worldwide	Soya		2% soya bean oil	100% protection against <i>Ae. Aegypti</i> for 95 minutes
RUTACEAE					
<i>Zanthoxylum limonella</i>	Thailand	makaen		100% essential oil applied topically	100% protection against <i>Ae. Aegypti</i> for 120 minutes
					100% protection against <i>C. quinquefasciatus</i> for 170 minutes
				10% essential oil combined with vanillin 5% applied topically	100% protection against <i>An. dirus</i> for 95 minutes
<i>Citrus hystrix</i>	Indonesia Malaysia Thailand Laos	Kaffir lime Limau Purut		100% essential oil combined with vanillin 5% applied topically	100% protection against <i>An. Stephensi</i> for 8 hours
					100% protection against <i>Ae. Aegypti</i> for 3 hours
					100% protection against <i>C. quinquefasciatus</i> for 1.5 hours
					100% protection against <i>An. dirus</i> for 2.5 hours
ZINGIBERACEAE					
<i>Curcuma longa</i>		Turmeric Curcuma Indian saffron		100% essential oil combined with vanillin 5% applied topically	100% protection against <i>Ae. Aegypti</i> for 4.5 hours
					100% protection against <i>C. quinquefasciatus</i>

					for 8 hours
					100% protection against <i>An. dirus</i> for 8 hours

Copy for public comments

Annex C (informative)

Active ingredients for synthetic repellents

Table C1 – List of some active ingredients for synthetic repellents

Active ingredient	Assessing risks to Health and Environment
Transfluthrin 2,3,5,6-tetrafluorobenzyl (1R,3S)- (2,2-dichlorovinyl)-2,2- dimethylcyclopropanecarboxylate	Transfluthrin, if used contrary to product instructions, may cause symptoms of poisoning including nervousness, anxiety, tremor, convulsions, skin allergies, sneezing, running nose and irritation. No specific antidotes are known, but symptomatic treatment with antihistamines may help to control any allergies.
Etoc/ prallethrin (S)-2-methyl-4-oxo-3-prop-2- ynylcyclopent-2-enyl(1R)- cis,trans-2,2-dimethyl-3-(2- methylprop-1- enyl)cyclopropanecarboxylat	Prallethrin is a synthetic pyrethroid with fast knock-down activity against household insect pests. Prallethrin is of low mammalian toxicity, with no evidence of carcinogenicity" and "is very toxic to bees and fish but of low toxicity to birds.
Metofluthrin (S1264) E-isomer (8.4%): 2,3,5,6-tetrafluoro-4 (methoxymethyl) benzyl (E)- (1R,3R)-2,2-dimethyl-3-(prop-1- enyl)cyclopropanecarboxylate Z-isomer (91.6%): 2,3,5,6-tetrafluoro- 4 (methoxymethyl) benzyl (Z)- (1R,3R)-w,w-dimethyl-3-(prop- 1enyl)cyclopropanecarboxylate	The vapors of metofluthrin are highly effective and capable of repelling up to 97% of mosquitoes in field tests. Metofluthrin is used in a variety of consumer products, called emanators, for indoor and outdoor use. These products produce a vapor that protects an individual or area. Effectiveness is reduced by air movement. Metofluthrin is neurotoxic, and is not meant to be applied directly to human skin. Although metofluthrin has insecticidal properties against other insects, it may not be an effective repellent for insects other than mosquitoes.
d-Alethrin (Pynamin Forte) (RS)-3-allyl-2-methyl-4-oxocyclopent- 2-enyl (1R)-cis, transchrysanthemate	The compounds have low toxicity for humans and birds. It is highly toxic to fish and aquatic invertebrates. At normal application rates, allethrin is slightly toxic to bees. Insects subject to exposure become paralyzed (nervous system effect) before dying. Allethrins are toxic to cats because they either do not produce, or produce less of certain isoforms of glucuronosyltransferase, which serve in hepatic detoxifying metabolism pathways.
Meperfluthrin [2,3,5,6-tetrafluoro-4- (methoxymethyl)phenyl]methyl (1R,3S)-3-(2,2-dichloroethenyl)-2,2- dimethylcyclopropane-1-carboxylate	Meperfluthrin is described as pesticide formulated for household and public hygiene situations to control mosquitoes and other insects. Example pests controlled are mosquitoes; cockroaches; bedbugs; and fleas. Mode of action is broad spectrum insecticide with contact and inhalation activity, effects insects presynaptic voltage gate sodium channels in nerve membranes rapid causing knockdown.

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Annex D
(normative)

Methods of test for uniformity of coating (paste) and burning quality of incense sticks mosquito repellent

D.1 Uniformity of coating

Take two sticks from the sample and cut each into three equal parts of the coated portion. Scrap out the paste from each portion, collect it separately and weigh. The average mass of the coating of the three portions of the same stick shall not vary by more than ± 10 percent.

Copy for public comments

Annex E (normative)

Methods for olfactory assessment of fragrance

E.1 General

The method is based on olfactory assessment of a given material by a panel of three persons.

E.2 Selection and training

Better results are obtained if individuals with a keen sense of smell are selected for making the olfactory assessment paragraph.

E.3 Fatigue

Continuous smelling causes olfactory fatigue, decreases critical odour perception. To avoid this, the number of samples assessed during a session should be limited as far as is practical. Further, during smelling the body shall be relaxed. Resting for an interval between smelling different samples is also advantageous. If the number of samples to be tested is fairly large, it is advisable to examine last those samples which are known to be fatiguing.

E.4 Time olfactory assessment

The evidence relating to the most favourable time for conducting olfactory assessment is some what conflicting. However, the morning appears to be generally favoured.

E.5 Freedom from contaminating odour

It is necessary to ensure that the hands, the nose are free from contaminating odour as these are likely to vitiate the result. It is recommended that the individual responsible for assessing odour washes his/her hands several times during smelling session.

E.6 Material

E.6.1 Stand

A cruciform patterned 3-clip stand, approximately 21 cm high, or any other suitable device to hold the incense sticks, shall be used.

E.6.2 Environment

A well-ventilated room, as free as possible from all outside disturbances. Ideally, the temperature and humidity suited are about 20°C and 80 percent RH, respectively. The colouring of the room shall be sober and the furnishings restricted. The general environment shall have a restful rather than a distracting effect.

E.7 Procedure

The three sticks from the sample and cut each into three equal parts of the coated portion. Take one part, burn and place in the stand. Keep the stand at such a distance from the nose that there is incipient yet distinct perception of odour. While smelling, concentrate wholly on the sensations received and make mental observations.

The stick shall give out pleasant aroma while burning for its full length. Test each part separately and independently to assess the aroma. The lower part of each stick shall be tested first then middle and then upper.

It is important to note that, although the room shall be well ventilated, the sticks kept under examination should not be exposed to a direct draught.

All the three persons of the panel should agree to uniformity and pleasing aroma of the incense stick sample.

Copy for public comments

Price based on **nnn** pages

©RSB2023- All rights reserved