

Evaluation of repellency against household lizards using slow sublimating ingredient infused with potent essential oils

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Abstract:

Lizards are cold blooded animals which thrive in warm climates round the world. They are also called Geckos and they belong to the family Gekkonidae. Most lizards are harmless, however, as they carry a lot of germs, any direct or indirect contact with lizards may prove to be a health risk to humans. Certain plant essential oils from plants such as lemon grass (*Cymbopogon winteriana*), *Eucalyptus globulus*, thyme (*Thymus vulgaris*), etc. are being used for their pest control properties, however, there remains a need for an effective lizard repellent product. The present study was carried out to evaluate the repellency of the test item Lizard Repellent Block against lizards (*Hemidactylus frenatus*). The test item comprised of Paradichlorobenzene, Terpeniol, Eucalyptus oil, Thymol, Clove Oil and Perfume and it was found to exhibit a high repellency. Thus, results of present study are reflecting that the test item containing Paradichlorobenzene (PDCB) infused with potent essential oils act as a potent Lizard repellent.

Key-words: Lizard, essential Oils, Paradichlorobenzene, Geckos, Air Freshener, repellent

1. Introduction:

Lizards are cold blooded animals/reptiles that thrive in warm climates around the world. Lizards are also called Geckos and they belong to the family Gekkonidae. The Gekkoidae genus *Hemidactylus* comprises at least 143 currently recognized species ^[1], of which at least 30 occur in India ^[2]. Geckos are small, gentle lizards characterised by a soft dull skin and large unblinking eye ^[3]. The common House Gecko (*Hemidactylus frenatus*) is native to southern and southeastern Asia and the IndoAustralian Archipelago, but it has been widely introduced throughout tropical and subtropical regions of the world ^[4]. The lizards are a nocturnal animal and are found in dry deciduous scrub forest; found under rock boulders, on bushes, on trees and most abundant near houses. It is seen that the lizards are highly invasive animals and have made their way into the urban households. Their preys are insects and spiders, displacing other gecko species which are less robust or behaviorally aggressive. The lizards carry a range of germs including viruses, parasites and worms and may be infested with ticks, mites and helminths. They also leave behind droppings and thus any direct or indirect contact with lizards may prove to be a risk. Thus, the common household lizards are a menace to the health of human inhabitants of the area they are in.

Generally, people use common home remedies to get rid of lizards such as the use of empty eggshells, garlic, pepper spray etc. Another approach is use of pest-control methods which will reduce the lizard food and thus keep them away and the use of sticky glue board traps, ultrasonic repellent plug-ins, etc. However, these are not found to be much effective and the presence of lizards remains a nuisance. The insecticide used to reduce pests is generally Cypermethrin which reduces the insect population and forces lizards to leave. Also, there are certain plant essential oils such as lemon grass (*Cymbopogon winteriana*), *Eucalyptus globulus*, rosemary (*Rosemarinus officinalis*), vetiver (*Vetiveria zizanioides*), clove (*Eugenia caryophyllus*) and thyme (*Thymus vulgaris*) which are being used for their pest control properties, however, there remains a need for further research to explore the lizard repellent properties of these oil. Thymol (also known as 2-isopropyl-5-methylphenol, IPMP), C₁₀H₁₄O, is a natural monoterpenoid phenol derivative of p-Cymene, isomeric with carvacrol ^[5]. Thymol is a constituent of oil of thyme, a naturally occurring mixture of compounds in the plant *Thymus vulgaris* L., or thyme. Thymol is used as an active ingredient in pesticide products registered for use as animal repellents, fungicides/fungistats, medical disinfectants, tuberculocides, and virucides ^[6]. α -Terpineol is a terpene alcohol found in natural oils such as pine oil and petitgrain (the oil from the bitter orange tree). The essential oil of clove buds (*Syzygium aromaticum*) is also considered a natural insecticide. As it is a biopesticide, Clove oil is considered a minimum-risk pesticide ^[7]. Also, Eucalyptus oil is known to possess a wide spectrum of biological activity including anti-microbial, fungicidal, insecticidal/insect repellent, herbicidal, acaricidal and nematocidal ^[8]. These plant Essential Oils show promising potential as natural insecticides/pesticides due to their act antimicrobial, insecticidal and antifeedant activities. Further, 1,4-Dichlorobenzene (1,4-DCB, p-DCB, or para-dichlorobenzene, sometimes abbreviated as PDCB or para) is an organic compound with the formula C₆H₄Cl₂. This colorless solid has a strong odor. Paradichlorobenzene is a chlorinated aromatic hydrocarbon. It is a fumigant insecticide and repellent. The properties of p-DCB having low solubility in water and its relatively high volatility: it sublimates readily near room temperature make it useful for these applications [9]. Paradichlorobenzene vapor is toxic to insects, molds, mildews, and at the same time it acts as a deodorizer ^[10].

Accordingly, a study was undertaken to evaluate the repellency of the test item 'Lizard Repellent Block' against lizards (*Hemidactylus frenatus*). The test item comprised of active ingredients including Paradichlorobenzene, Terpeniol, Eucalyptus oil, Thymol, Clove Oil and Perfume. The test item was evaluated against lizard (*Hemidactylus frenatus*) and it was found to exhibit a

high repellency. This study, therefore, highlights the potency of the test item 'Lizard Repellent Block' in working as an effective repellent to the common household lizards.

2. Materials and methods:

2.1. Test Substance Details:

2.1.1. Test substance name: Odonil "Lizard Repellent Block"

2.1.2. Appearance: Solid Block

2.1.3. Formulation Type: Solid Block

2.1.4. Active content: Paradichlorobenzene, Terpeniol, Eucalyptus oil, Thymol, Clove Oil, Perfume

2.1.5. Manufacturer: Dabur India Limited

2.1.6. Storage Conditions: Dry and Cold place

2.2. Test System:

2.2.1. Test Insect: Lizard

2.2.2. Species: *Hemidactylus frenatus*

2.2.3. Source: Field

2.2.4. Test duration: 6 hours

2.2.5. Number of Lizard: 10

2.2.6. Age: Adult

2.2.7. Observation: 6 hours after treatment

2.2.8. Replicate: 3

2.3. Method: Test Procedure

The study was undertaken as per the guidelines prescribed in Inhouse modified method of M.A.M. Nawi et al. 2020^[11].

A required number of adult lizards were collected from houses and kept in a container, which is perforated for aeration. The test unit consists of three plastic containers in the size of 38 x 24 cm which was connected by PVC pipes in the diameter of 10.16 cm represented in the Figure 1. The containers are covered with net for ventilation. The containers were labelled as A (Treatment, with test substance), B (lizards introduction container) and C (control, without any sample). Ten (10) adult lizards were introduced into the middle container – B and the container - A was taken for the treatment (with test substance) and Container - C taken as control (without any sample) and the experiment was replicated for three times.

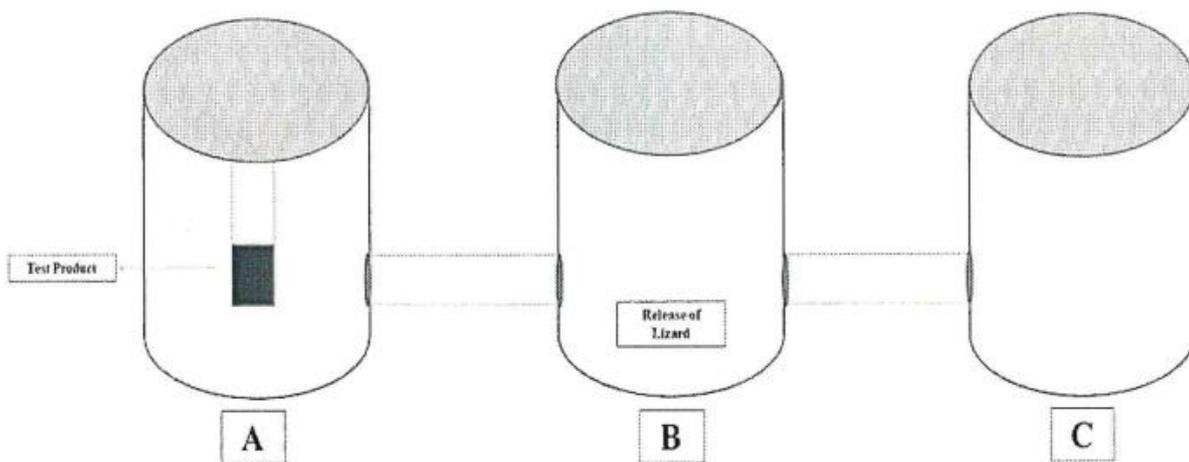


Figure 1. diagrammatic representation of the Test Unit

2.4. Observation

Repellency was observed at every 1 hour interval up to 6 hours. Repellency percentage was calculated after the completion of experiment.

2.5. Analysis

At the end of the experiment, percentage of repellency was calculated.

$$PC = [1 - NT / (NT + NC)] \times 100$$

Where,

NT: Number of lizard in the treatment

NC: Number of lizard in the control

PC: Percentage repellency (Percentage of lizard trapped in control)

3. Results

In the present study, the repellency of the test item 'Lizard Repellent Block' was evaluated against the common household Lizard (*Hemidactylus frenatus*). The Table 1 shows the results of the test replicates performed in the present study.

Table 1. Repellency of 'Lizard Repellent Block' against lizards (*Hemidactylus frenatus*)

	Replication	Repellency (hours)						Total
		1 st hour	2 nd hour	3 rd hour	4 th hour	5 th hour	6 th hour	
Control (C) (Without any sample)	R1	0	0	0	0	1	1	2
	R2	0	0	0	0	1	2	3
	R3	0	0	0	1	1	1	3
	Average	0.00	0.00	0.00	0.33	1.00	1.33	2.67
Treatment (A) (With test substance 'Lizard Repellent Block')	R1	0	0	0	0	0	1	1
	R2	0	0	0	0	0	0	0
	R3	0	0	0	0	1	0	1
	Average	0.00	0.00	0.00	0.00	0.33	0.33	0.67

The results indicate that the percentage of repellency was observed as 79.94% for the test item. This indicates that the test item 'Lizard Repellent Block' exhibited high repellency against the lizards. Thus, the results demonstrate that the test item acts as a potent repellent for lizards.

4. Discussion

Lizards are highly adaptive animals belonging to the class Reptilia and in the order Squamata. They are scaly-skinned reptiles, thick and laterally compressed body and possess legs, movable eyelids and external ear openings. Due to their smooth and shiny appearance, some lizards can appear slimy or slippery. Most lizards are harmless to humans, however, the litter is harmful to the humans. Common home remedies to get rid of lizards such as the use of empty eggshells, garlic, pepper spray etc. have not been found to be much effective and there exists a need for an efficient lizard repellent product. Plant essential oils such as Citronella, lemon grass (*Cymbopogon winteriana*), Eucalyptus globulus, rosemary (*Rosemarinus officinalis*), vetiver (*Vetiveria zizanioides*), clove (*Eugenia caryophyllus*) and thyme (*Thymus vulgaris*) are known for their pest control properties. Further, Paradichlorobenzene (PDCB) is a known fumigant insecticide and repellent. Thus, the test item comprising of actives such as Paradichlorobenzene, Terpeniol, Eucalyptus oil, Thymol, Clove Oil, Perfume was evaluated for its efficacy as lizard repellent. The results obtained of the present study indicate that the test item exhibits a percentage repellency of 79.94%. It is therefore evident from the study results that the test item 'Lizard Repellent Block' shows a high repellency against the common household lizards versus when there is no repellent used (Control).

The present study demonstrates that the test item 'Lizard Repellent Block' acts as an effective repellent against the lizards.

5. Conclusion

It is concluded from the study that the test item 'Lizard Repellent Block' manufactured by M/s. Dabur India Limited., was found to demonstrate a high repellency against the common household lizards (*Hemidactylus frenatus*). The objective of the study was to evaluate the repellency of 'Lizard Repellent Block' against lizard (*Hemidactylus frenatus*) by using the method as disclosed by Nawi et al. [11]. The results of the study revealed that the test item 'Lizard Repellent Block' showed a 79.94% repellency against lizard, thereby exhibiting a high potency as a lizard repellent.

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Conflicts of interest: The authors declare no conflict of interest.

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