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Patchouli (Pogostemon Cablin Blanco) Oil-Based Products as Housefly Repellent

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Abstract: ***Vector-borne diseases rely upon most of the insects. Because of this, commercial insecticides and repellents in any form are readily available in the market. However, use of synthetic chemical may also affect the person exposed to it. Therefore, use of organic material that has an ability to repel insects specifically housefly is the most outmost concern of this study. This study aimed to determine the acceptability of Patchouli (Pogostemon cablin Blanco) Oil-based products as housefly repellent in terms of number of housefly repelled at a given time, duration of efficiency, odor, and functionality.The study employed experimental research design in developing and testing the acceptability of Patchouli (Pogostemon cablin Blanco) Oil-based Products as Housefly Repellent in terms of housefly repelled at a given reaction time and duration of efficiency. The gathered data were treated using Analysis of Variance (ANOVA). Whereas, descriptive research design was utilized to determine the acceptability of the aforementioned products in terms of odor and functionality. The data gathered were treated using Mean and Standard Deviation.The findings showed repellency to houseflies using spatial devices as source of heat and concentrated substance diffuses faster which revealed that there is no significant difference in the acceptability of the patchouli oil-based products as housefly repellent in terms of number of housefly repelled at a given reaction time, duration efficiency and odor.***

Keywords: housefly repellent, oil-based products, organic patchouli

1. Introduction

One of the annoying and persistent pests is the housefly which feeds on organic materials and carries disease-causing pathogens which causes harm to humans. These flies are hard to eradicate and would require the use ofcommercially bought chemical and hazardous products. However, there are plants with repellent property which can be used to replace the harmful products often used in homes. Essential oils of these plants act as natural housefly repellent. Patchouli has woody, earthy, smoky, musty-sweet, strong spicy smell and believed to have the property of repelling mosquitoes and useful for fungal and bacterial infection. It is through this need that the researcher decided to conduct a study on formulating repellent made from organic material and how plants with strong and distinct odor can help in repelling houseflies.

2. Statement of the Problem

The study specifically sought to answer the following questions: What are the processes involved in the preparation of Patchouli (*Pogostemon cablin Blanco)* essential oil used in reed diffuser, oil burner, mat for electric repellent and tea light candle?; What is the mean level of acceptability of Patchouli (*Pogostemon cablin Blanco)* oil-based products as housefly repellent with respect to number of housefly repelled at a given reaction time, duration of efficacy, odor, and functionality?; Is there a significant difference in the level of acceptability of the Patchouli (*Pogostemon cablin Blanco)* oil-based products as housefly repellent as to number of housefly repelled at a given reaction time, duration of efficacy, odor, and functionality?

3. Review of Related Literature

Formulations of naturally made pesticides in deterring houseflies and pests have been the trend in the market due to their ability to pose less harmful effects and serious damages both to human and animals. One of the most annoying pests is the common housefly.As cited by Lam et. al. (2009) houseflies live near humans and human waste. These flies feed on attractive solid food by regurgating saliva on it. In the study made by Loftin (2014) houseflies are the important mechanical vectors of human and poultry diseases. In the review made by Jacobs (2013), flies are strongly suspected of transmitting at least 65 human diseases and were seen on many surfaces visited by houseflies are excreted wastes.

Patchouli plant is a member of the Lamianceae family, which includes Mints, Lavenders and Oreganos. It is a natural insecticide, it keeps unwanted bugs away. Franco (2011) stated that the strong scent of the patchouli oil has been used for centuries in perfumes; more recently it has been used in incense, insect repellents and alternative medicines. Wigington (2014); Ramya (2013) stated thatpatchouli oil is very strong, and has a deep, musky scent. It can be used in sprays, lotions, and vaporizers. It will repel insects, mosquitoes, fleas, ants, lice, moths and flies.

Maia et al. (2011) mentioned that the field of plant-based repellents is moving forward as consumers demand means of protection from arthropod bites that are safe, pleasant to use and environmentally sustainable. The most important consideration is improving the longevity of those repellents that are effective but volatile such as citronella.

Several studies looked at improving formulations of plant oils to improve their longevity through development of improved formulations, repellence and spatial activity. In addition, use of oil burner that heat up essential oil so they

can evaporate and fill the room to dispense odor by means of heat was recommended by Carrion (2012).

Borel (2013) stated that undiluted essential oil may repel mosquitoes for two hours; scented candles do not offer much protection at all. Higher concentrations work best for some of these products. Bedoukian (2015) mentioned that the repellent compounds may be formulated into any suitable delivery means or system. It can be heated or unheated evaporative devices such as candles or ankle bands in absorbent materials that may be scattered on the floor.

4. Methodology

In implementing this research, the following shall be utilized:

a) Patchouli matured leaves which were air-dried and subjected to low temperature distillation.
b) Experimental method of research to show which among the different diffusersutilized can be the most effective repellent.
c) Bioassay testing of the Patchouli oil-based products was done to investigate the effects of the finished product on living organisms, the houseflies.

5. Results and Discussion

Acceptability of Patchouli Oil-Based Products as Housefly Repellent with Respect to Number of Housefly Repelled at a Given Time Reaction

Table 1: Acceptability of Patchouli Oil-Based Products as Housefly Repellent

Reaction Time (In Minute)	Oil		Reed		Oil Burner		Electric repellent		Candle	
	NHR	QD	NHR	QD	NHR	QD	NHR	QD	NHR	QD
5 Minutes	4	Evident	5	Very Evident	5	Very Evident	5	Very Evident	4	Evident
10 Minutes	4	Evident	5	Very Evident	5	Very Evident	5	Very Evident	4	Evident
15 Minutes	4	Evident	5	Very Evident	5	Very Evident	5	Very Evident	5	Very Evident
25 Minutes	4	Evident	4	Evident	5	Evident	5	Very Evident	5	Very Evident
40 Minutes	3	Moderately Evident	3	Moderately Evident	4	Evident	5	Very Evident	5	Very Evident
60 Minutes	3	Moderately Evident	3	Moderately Evident	2	Less Evident	5	Very Evident	5	Very Evident

Legend :

Scale	NHR (Number of housefly repelled)
5	17-20
4	13-16
3	9-12
2	5-8
1	0-4

Table 2: Acceptability of Patchouli Oil-Based Products as Housefly Repellent with Respect to Duration and Efficiency.

Patchouli Oil-based Products	Duration of Efficiency	Qualitative Description
Patchouli Essential Oil	4	Efficient
Reed Diffuser	4	Efficient
Oil Burner	2	Less Efficient
Electric Mat Repellent	4	Efficient
Patchouli Candle	4	Efficient

Table 3: Acceptability of Patchouli Oil-Based Products as Housefly Repellent with Respect to Odor and Functionality.

Indicative Statement	Odor			Indicative Statement	Functionality		
Patchouli Essential Oil	M	SD	Remarks	Patchouli Essential Oil	M	SD	Remarks
1. Has a strong distinctive but tolerable odor.	4.64	0.57	Strongly Agree	1. Has aesthetic value	4.77	0.38	Strongly Agree
2. Can be smelled from a distance.	4.46	0.54	Strongly Agree	2. Can be used indoor and outdoor	4.93	0.13	Strongly Agree
3. Has an aromatic odor.	4.46	0.62	Strongly Agree	3. Is safe to use	4.95	0.13	Strongly Agree
Overall Mean and SD	4.52	0.57	Strongly Agree	**Overall Mean and SD**	**4.88**	**0.21**	Strongly Agree
Overall Interpretation	**Highly Acceptable**			**Overall Interpretation**	**Highly Acceptable**		

The tables above showed results of the acceptability of the patchouli oil-based products as housefly repellent was rated by the respondents as strongly agree in repelling houseflies. Table 3 revealed that patchouli essential oil was highly acceptable in terms of odor and functionality. It is further supported by the statistical analysis in table 7.

Table 4: Acceptability of Patchouli Essential Oil Used in Electric Mat Repellent with Respect to Odor and Functionality.

Indicative Statement	Odor			Indicative Statement	Functionality		
Patchouli Mat	M	SD	Remarks	Patchouli Mat	M	SD	Remarks
1. Has a strong distinctive but tolerable odor.	4.80	0.40	Strongly Agree	1. Has aesthetic value	4.90	0.30	Strongly Agree
2. Can be smelled from a distance.	4.65	0.48	Strongly Agree	2. Can be used indoor and outdoor	4.78	0.42	Strongly Agree
3. Has an aromatic odor.	4.58	0.50	Strongly Agree	3. Is safe to use	4.18	0.39	Strongly Agree
Overall Mean and SD	**4.68**	**0.46**	**Strongly Agree**	**Overall Mean and SD**	**4.62**	**0.37**	**Strongly Agree**
Overall Interpretation	**Highly Acceptable**			**Overall Interpretation**	**Highly Acceptable**		

Table 5: Acceptability of Patchouli Essential Oil Used in Candle Repellent with Respect to Odor and Functionality.

Indicative Statement	Odor			Indicative Statement	Functionality		
Patchouli Candle	M	SD	Remarks	Patchouli Candle	M	SD	Remarks
1. Has a strong distinctive but tolerable odor.	4.73	0.45	Strongly Agree	1. Has aesthetic value	4.95	0.22	Strongly Agree
2. Can be smelled from a distance.	4.58	0.50	Strongly Agree	2. Can be used indoor and outdoor	4.88	0.32	Strongly Agree
3. Has an aromatic odor.	4.60	0.49	Strongly Agree	3. Is safe to use	4.85	0.36	Strongly Agree
Overall Mean and SD	**4.60**	**0.49**	**Strongly Agree**	**Overall Mean and SD**	**4.89**	**0.30**	Strongly Agree
Overall Interpretation	**Highly Acceptable**			**Overall Interpretation**	**Highly Acceptable**		

The tables above illustrated that patchouli essential oil used in electric mat repellent and candle were highly acceptable because the odor emitted was diffused throughout the area as it heats up the essential oils so that they evaporate and fill the room, enough for the houseflies to be repelled.

Table 6: Acceptability of Patchouli Oil-Based Products as Housefly Repellent with Respect to Odor and Functionality.

ODOR			FUNCTIONALITY		
Patchouli oil-based products	Mean	Remarks	Patchouli oil-based products	Mean	Remarks
Patchouli Essential Oil	4.52	Very Acceptable	Patchouli Essential Oil	4.88	Very Acceptable
Reed Diffuser	4.58	Very Acceptable	Reed Diffuser	4.93	Very Acceptable
Oil Burner	4.82	Very Acceptable	Oil Burner	4.93	Very Acceptable
Patchouli Mat	4.68	Very Acceptable	Patchouli Mat	4.62	Very Acceptable
Patchouli Candle	4.64	Very Acceptable	Patchouli Candle	4.89	Very Acceptable

Table 7: Significant Difference in the Level of Acceptability of Patchouli Oil-Based Products as Housefly Repellent

Indicator	F Value	P Value	Analysis
Number of Housefly Repelled	2.393	0.044	Significant
Duration	1.000	0.402	Not Significant
Odor	9.506	0.000	Significant
Functionality	34.41	0.000	Significant

As shown in table 6, there was a negligible difference in repelling houseflies. Among the products, oil burner was rated highest followed by electric mat, candle, reed diffuser and essential oil. This implies that an increase in temperature and the higher the concentration of the product causes the molecules to move and diffuse faster. Table 7 significantly revealed that, odor and functionality were far from each other which means that differences between treatments have only 4% probability from occurring by chance alone.

6. Summary, Conclusion and Recommendations

The findings of the study presented that patchouli mat repelled the most number of houseflies ranging 17-20, while the pure essential oil repelled the least ranging 9-12. Spatial repellent devices such as oil-burner, patchouli mat and candle using heat source repel housefly instantly. However, they evaporated faster. With respect to odor and functionality the patchouli oil-based products were very acceptable. Spatial devices using direct source of heat diffuse odor better. There was a significant difference in the level of acceptability of patchouli oil-based products as housefly repellent as to number of housefly repelled.

Furthermore, it can be concluded that people can usepatchouli oil-based products as housefly repellent to avoid being harmed by these annoying pests and promote a healthy environment. This proved that protecting the environment while promoting innovation takes resourcefulness, initiative coupled with advocacy for change.

In view of the findings and conclusion presented it was recommended matured patchouli leaves could be utilized in the preparation of oil-based products. In bioassaya testing of repellent, use pyrex Y tube in accordance to the guidelines for better observation of repellency of insects. Oil or water could be used for oil buirner to prolong the use of essential oil. Improvised spatial diffusers as heat source to increase the rate of diffusion of oil but using direct current to avoid electrocution or skin burns when in contact is also recommended.

References

[1] Bedoukian, R. et al. (2015). “Spatial Inhibitors, Deterrents and Repellents for Mosquitoes and Midges”. BEDOUKIAN RESEARCH, INC. United States Patent Application 20150216164.

[2] Borel, B. (2013). Does your Insect Repellent Repel Insects?. Retrieved from www.slate.com/article/health_and_science/medical_examiner/2013/05/insectrepellents_epa_approval_evaluation|(Medical examiner /

[3] Carrion, C. (2012). The Healing Intelligence of Essential Oils: The Science of Advanced Aromatherapy. Aromandina LLC. Retrieved from http://thearomablog.com/aromatheraphy-burners-vs diffusers-which-is-

[4] Loftin, Kelly M. et al. (2014). Biology and Control of Flies in Poultry Facilities Division of Agriculture Research and Extension

[5] Franco, S. (2011). The Healing Properties and Health Benefits of PatchouliEssential Oil.10 Medicinal Uses and Health Benefits of PatchouliEssential Oil. Retrieved from http://evelynparham.com/10-medicinal-uses-and-health-benifits-of-patchouli-essential-oil/

[6] Jacobs, Steve. (2013). Houseflies.Insect Advice from Extension. Retrieved from Ento.psu.edu/extension/factsheets/houseflies

[7] Lam, K., K.Thu, M. Tsang, M. Moore, G. Gries. (2009). Bacteria on houseflyeggs, *Musicadomestica,* suppress fungal growth in chicken manure through nutrient depletion of antifungal metabolites *Naturwissenschaften*, 96: 1127-1132. Accesses March 26, 2012.Retrieved fromhttp|://www.springerlink.com/content/n572h478h68h23th/fulltext.pdf

[8] Loftin, Kelly M. et al. (2014). Biology and Control of Flies in Poultry Facilities Division of Agriculture Research and Extension

[9] Maia et al., (2011). Plant-based insect repellents: A review of their efficacy development and testing. *Malaria Journal* 201110 (Suppl 1): S11 DOI|: 10.1186/1475-2875-10-S1-S11 © Maia and Moore; licensee BioMed Central Ltd. 2011 Published: 15 March 2011.Retrieved from http://malariajournal.biomedcentral.com/articles/10.1186/1475-2875-10-S1-S11

[10] Ramya, et al. (2013).“An introduction to patchouli (PogostemonacblinBenth.)-A medicinal and aromatic plant: It’s importance to mankind”. M.Tech.Department of Processing and Food Engineering, COAE&T, PAU, Ludhiana, India.

[11] Wigington, P. (2014). Patchouli. Herbal Correspondences. Retrieved from http://paganwiccan.about.com/od/bookofshadows/ig/MagicalHerbs/Patchouli.htm