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Herbal Mosquito Repellent Cake

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ABSTRACT

Citronella grass has been serving from years as a mosquito repellent in the field of modern medicine.Commercially available mosquito repellents are chemical based and harmful to human body. An attempt has been made to prepare a 100% herbal product based on Citronella leaf residue, which is left out and of no use after steam distillation. It is cheap, effective and environment friendly. It is a first and preliminary work based on formulating and evaluating herbal mosquito repellent cakes using natural binders such as neem powder, potato starch, corn starch, coconut shell powder, wood powder and cow dung. The efficacy of prepared citronella leaf cakes is evaluated on different parameters such as flammability, burning time and mosquito repellency test. This research article primarily focuses on the efficacy of the Neem powder cake when saturated with 10% Citronella oil.

Keywords: Flammability, Mosquito repellent residual percentage,Citronella leaf cakes,Natural binders.

INTRODUCTION

Controlling mosquitoes is one of most extreme significance in the present day situation with rising number of mosquito borne infections. A disturbing expansion in the reach of mosquitoes is primarily because of deforestation, industrialized cultivating and stale water. Thus special items like mosquito anti-agents for combating Mosquitoes are required. The items utilized for Mosquito control have changing levels of effectiveness. Carbon dioxide present in sweat in warm-blooded creatures goes about as an alluring substance for mosquitoes. The view of the smell is through Chemoreceptor present in the radio wires of mosquitoes. Insect anti-agents work by veiling human aroma. Mosquito anti-agents dependent on synthetics has a surprising security profile, however they are toxic against the skin and sensory system like rashes, swelling, eye disturbance, and more awful issues, though expanding in children, anaphylactic shock, and low pulse [10, 11].Hence, normal mosquito anti-agents are preferred over substance mosquito anti-agents.

The entirety of the mosquitoes loops enlisted and sold contain solely engineered parathyroid, for instance, d-alethic, d-transallethrinandtransfluthrin as dynamic ingredients. These curls give a serious level of decrease in numbers of host-chasing mosquitoes [16,5].However, many individuals actually detest smell of the mosquito loops containing manufactured parathyroid when they are scorched; and these individuals additionally feel that the coils might be unsafe for their wellbeing. Endeavors have been made to discover new dynamic ingredients, especially those got from normal plants to replace the manufactured parathyroid [4].

The nine potential plants in particular Greater galangale*(Alpiniagalange*), Finger root *(Boesenbergiapandurata)*,Turmeric *(Curcuma longa)*, Cardamom *(Elettariacardamomum)*, Neem *(Azadirachtaindica)*,Siamese *(Cassia siamea)*, Citronella grass *(Cymbopogonnardus)*, Eucalyptus *(Eucalyptus citriodora)* and Siam weed *(Eupatorium odoratum*) that communicated serious level of repellency against mosquitoes are suggested as new dynamic fixings for inclusion in mosquito loop definitions. The capability of unstable oils separated from turmeric, citronella grass and bushy basil as topical repellents against both day-and night-gnawing mosquitoes has been shown [13].

On account of Citronella species, for instance, the components present in the oil are answerable for the desirable anti-agents attributes of the plant against mosquitoes [2]. The anti-agents effectiveness of 38 essential oils against mosquito chomps was looked at, including the species *Aides Aegyptus* and discovered Citronella oil as the most viable and gave 2 hours of repellency [14,15]. The synthetic synthesis of citronella oil was studied and it was tracked down that the rough fundamental oil consists of dynamic fixings that particularly suppressed the development of a few types of Aspergillums, Penicilliumand Europium [6]. The most dynamic mixtures among the 16 volatiles inspected in Citronella oil, comprising of6 significant constituents of the fundamental oil and 10 other related monoterpenes, were citronellal and linalool. The greater part of the fundamental oil-based anti-agents tend to give short-enduring insurance for under two hours. Citronella oil has shown great adequacy against44 mosquitoes in fixations going from 0.05 %to 15 % (w/v) alone or

in mix with other natural or bug repellent items [1].The normal for the oil is because of the presence of four principle segments, citronellal eugenol, geraniol and limonene [8, 11]. A curl item planning using sawdust, rice husk and corncob based fillers along with herbal oils and home grown powders showing towards the improvisation ofmosquito anti-agents by supplementing it with normal fillers and folios have been devised[10]. The current investigation was done to evaluate repellency of mosquito cakes got from plants. An attempt has been made to foster a Citronella based herbal mosquito repellent cake which is more effective, cheap and keeps climate lovely and health friendly utilizing various folios, for example, sawdust, coconut shell powder, neem powder and so on

MATERIALS AND METHODS

Collection of Citronella leaf after distillation

Citronella *(Cymbopogonwinterianus)* leaf remains were gathered from Pharmaceutical Medicinal Plant garden, Udaipur, Rajasthan India after steam refining from steam refining plant. Heaps of leaves were cut into little pieces with the assistance of clean sharp scissors.

Preparation of Citronella leaf cakes

Cut leaf pieces were grounded into glue utilizing electrical processor by adding refined water. 50-100g of Citronella leaf glue was taken and was plated appropriately. Wet loads of cakes were taken. For the assurance of dry weight cakes were permitted to dry in sun for 24 hrs and dry weight was taken.

Formulation of cakes using different natural binders

The distinctive normal covers (500g each) was purchased from nearby sellers. Diverse normal folios utilized were wood powder, potato starch, corn starch, coconut shell powder, neem powder and cow excrement. A similar strategy was followed for various mixes utilizing diverse normal folios for the arrangement of cakes.

Supplementation of Citronella leaf glue with binder and impregnation with oil

Each cake was ready as 20% (w/w) folio (i.e. wood powder, coconut shell powder, Neem powder, cow waste, corn starch, potato starch) in each cake definition, though the citronella leaf glue (80%) in all cake plans was same. Thus, a sum of six cake definitions involving various covers with Citronella leaf as dynamic fixings were ready for testing. Citronella leaf cakes with no supplementation were utilized as reference cake. Wet weight and dry load of each cake were noted following 24 hours of drying. At the same time, various centralizations of citronella oil, for example, 5%, 10%, 15% utilizing methanol asa transporter liquor was equitably splashed on various mixes of cakes. Ten cakes *(recreates)* were ready from every blend.

EVALUATION OF MOSQUITO REPELLENT MOVEMENT

For exploring mosquito repellent action the pre-arranged cakes were checked for its combustibility, consuming effectiveness regarding consuming time andeventually its successful anti-agents movement. Combustibility trials of these cakes were directed to check its predictable instability. Further the time taken to consume the cake, smoke delivered and its causal result, for example, irritation,coughing, tears were noticed and recorded. Debris created by cakes were gauged and recorded. The cakes were singed in chosen mosquito inclined regions in the evening and night time frame like brambles, shrubs,laboratory corners, division premises and cafeteria.

RESULTS AND DISCUSSION

In the current examination we expected to plan a characteristic, home grown mosquito repellent dependent on citronella leaves which are a characteristic wellspring of fundamental oils. Among the plant families with promising fundamental oils utilized as mosquito anti-agents, Cymbopogonspp., Ocimum spp. and Eucalyptus spp. are the most refered to [12]. Singular mixtures present in these combinations with high anti-agents action incorporate α-pinene, limonene, citronellol, citronellal, camphor and thymol. All things considered, engineered synthetic substances are even more every now and again utilized as anti-agents than fundamental oils, these normal items can possibly give productive, and more secure anti-agents for people and the climate.

Collection of plant material

In drug therapeutic plant garden,udaipur,steam refining plant is worked for extraction of citronella oil from Cymbopogonwinterianus *(JavaCitronella)*. After steam refining the left out leaves were gathered for this examination and it was chosen as the base for mosquito repellent citronella leaf cakes.Approximately, three kg of Citronella leaf remains were gathered from steam refining plant and were finely grounded.

Preparation of Citronella leaf cakes in blend with regular folios

For the arrangement of mosquito repellent curls, various fillers can be utilized, in any case, in this examination regular folios were used [10, 4]. Cow manure based plan alongside improved fixings like Neem, Tulsi, rice; sawdust and so forth has additionally been reported[4]. Citronella leaf cakes were ready by plating 60g of leaf glue in a sterile petri dish. Wet load of cakes and dry loads (after 24 hours).A critical measure of water misfortune is recorded for example 53.57g in all blends. These regular fasteners are effectively accessible and can be bought. It gives amazing restricting to every one of the fixings and holds it firmly together. Reasonable fastener is the one which gives slow and delayed consuming alongside uniform restricting capacity. Neem powder cake and wood powder cake demonstrated effective possibility for mosquito repellent movement dependent on Citronella leaves when included 20% fixation. Cow compost based cake created more smoke and in this manner isa potential cell reinforcement which is as per the outcome [4].

Table 1:Average Wet and Dry Weights ofCitronella Leaf Cakes

S.No.	Name Of The Sample	Average Wet Weight (G)	Average Dry Weight (G)	Amount Loss(G)
1	Citronella Leaf Paste	54	7	47
2	25% Wood Powder+ Leaf Paste	65.4	12.30	53.1
3	25% Neem Powder+ Leaf Paste	74	16.10	57.9
4	25% Potato Starch+ Leaf Paste	70.33	18.10	52.33
5	25% Corn Starch+ Leaf Paste	71.30	22.10	49.2
6	25% Cow Dung+ Leaf Paste	76.63	14	62.63
7	25% Coconut Shell Powder+ Leaf Paste	63	10	53

Table 2:Parameters to Check Flammability Of Citronella Leaf Cakes

S.No.	Name Of The Sample	Dry Weight (G)	Ash Weight (G)	Time Taken To Burn (Min.)	Residual (%)	Irritation	Remarks
1	Citronella Leaf	7.33	3.20	10	43.50	Less Irritation	Fully Burnt
2	Citronella + 20% Wood Powder	13	2	20	21.30	Less Irritation	Fully Burnt
3	Citronella + 20% Coconut Shell Powder	9.10	2.2	8	25.30	Less Irritation	Fully Burnt
4	Citronella + 20% Neem Powder	20.10	5.30	20	24	Less Irritation	Fully Burnt
5	Citronella + 20% Cow Dung	13.50	5.25	18	37	Less Irritation	Fully Burnt
6	Citronella + 20% Corn Starch	20.17	9.80	25	45.50	Less Irritation	Not Burnt Completely
7	Citronella + Potato Starch	21.50	10.30	37	48.20	Less Irritation	Not Burnt Completely

ASSESSMENT OF CITRONELLA LEAF CAKES

The adequacy of arranged citronella leaf cakes were assessed on three distinct boundaries like combustibility, consuming time andmosquito repellency test.

a) Flammability test and burning time

To notice the combustibility of the cakes, the cakeswereburnt utilizing candles .The amount of ash,irritation delivered by various mix of cakes and the time taken for total consumption were recorded. Amount of ash generated from every mixture and their consuming time were recorded. Residual percentage was determined using ash weight nd dry weight.Residual percentage is determined by:

Residual percentage (%) = Ash weight/Dry weight x 100

For a decent and reliably consuming mosquito repellent cake, it is fundamental that the cake ought to be scorched totally, creating low smoke, least irritation and less residual rate. A high residual percentage rate proposes fragmented consuming of cakes and thus two blends gave most noteworthy lingering rate for example cornflour and potato starch (45.50% and 48.20 % respectively). The results suggested that the preparation with high concentraion of starch took more time for ignition. (25 minutes – corn flour and 37 minutes potatostarch) and along these lines expanded their leftover rate. On the other hand, wood powder, coconut shellpowder and neem powder mixes took more time to ignite therfore giving less residual percentage. Subsequently, it tends to be recommended that the neem powder and wood powder blends were useful for making mosquito repellent cakes as the ignition time, irritation and residual percentage were very less as compared with the different mixes. Hence, the results suggest that the coconut shell powder is not a suitable option as it gives lesser residual percentage. Henceforth, the wood and neem powder showed best flamabilty and burning time test results. Although, wood powder doesn't have any restorative property yet is widely accessible and neem powder cake is the most ideal alternative, being therapeutically dynamic and its simple

accessibility.

b) Mosquito repellency test

Mosquito repellency test was finished by essentially choosing the mosquito abundant regions like brambles, bushes, tea stalls, drainage corners and cafeteria in the evening and night time. After acquiring public permissions to ignite the formulation cakes, their comments were noted down and checked if the mosquitoes are available or getting away after burning the cakes. Additionally, the mosquito repellency was checked by blending citronella oil with methanol in various concentrations like 5%, 10%, 15%.

Mosquito repellant efficacy of two naturaaly occurring and medicinal compounds citronella and citronellal against the mosquito *Culexpipienspallens*was investigated by Kim et.al (2005) both in vitro as well as in field. The in vitro test was carried by using human bait method in which hand groups were impregnated with 30% and 15% citronella extract and 30% citronellal extract and with groups impregnated 30% citronella in field. The result was determined by tallying the numbers of mosquitoes bite per unit time, percentage repellencies were determined and affirmed by t-test analysis. From the above results obtained, different concentrations of Citronella oil (5%, 10% and15%) were blended in with methanol. A neem powder mosquito cake with additional 10% Citronella oil was observed to be the best option for repellency.

Effect of Citronella grass in diminishing human mosquitocontact when utilized in mosquito coils has been observed [12]. Thestudies revealed that mosquito coilswith leaves of citronella grass showed most elevated viability against the mosquito while that containing rhizomes of turmeric was least successful. The studies were carried out on 12 species of Mosquitoes belonging to five genera *(Aedes,Anopheles, Armigeres, Culex and Mansonia),* yet Cx.vishnui, Culexgelidus and Cx. quinquefasciatus were most dominating species. The adequacy of both the mix was additionally expanded by adding 10% citronella oil. Neem powder with citronella leaf as a base is the most ideal choice as it has antibacterial and other therapeutic properties. Rather citronella leaf cakes can likewise be utilized as a mosquito repellent. Accordingly, a decent attempt was made in planning citronella leaf based natural mosquito repellent cake involving Neem powder impregnated with 10% citronella oil.

CONCLUSION

At present, the utilization of chemical compounds to control mosquito and arthropods raises a few concerns identified with climate and human wellbeing. An option is to utilize natural items that have great adequacy and are harmless to the ecosystem. Essential oils from plants extracts have been widely tested for their mosquito repellant activity. The primary focus of the study was to utilize the repellant properties of the oil of the plant Citronella*(Cymbopogonwinterianus)* and its leaves. Citronella leaf stays as cakes is the initial and preliminary report. Furthermore, the utilization of other ingredients likeblenders expands the repellant properties of some fundamental oils. Based on outcome so obtained it tends to be reasoned that the citronella leafcakes with neem powder as a binder and impregnated with 10% citronella oil shows less residual percentage, less burning time and irritation, can repulse mosquitoes viably. This report is the summarization of the fundamental work done utilizing Citronella leaf cakes with herbal binders like neem as herbal mosquito repellant.

REFERENCES

1. Fradin MS (1998). Mosquitoes and Mosquito Repellents: aclinician's guide. Ann Int Med. 128: 931-940.
2. Katz TM, Miller JH, Herbert AA (2008). Insect repellents:Historical perspectives and new Developments. J Am AcadDermatol. 58 (5):865-871.
3. Kim JK, Chang SK, Jong KL et al. (2005). Evaluation of repellency effect of two natural aroma mosquito repellent compounds, citronella and citronellal. Entomol Res. 35(2):117-120
4. Mandavgane SA, Pattalwar VV, Kalambe AR (2005).Development of cow dung based herbal mosquito repellent.Natural product radiance. 4 (4): 270-273.
5. Mulla MS, Thavara U, Tawatsin A et al. (2001) Mosquito burden and impact on the poor: measures and costs for personal protection in some communities in Thailand. J AmMosq Control Assoc. 17: 153-159.
6. Nakahara K, Alzoreky NS, Yoshihashi T et al. (2003). Chemical composition and antifungal activity of essential oil from Cymbopogonnardus (citronella grass). JARQ. 37 (4): 249-252.
7. Nerio LS, Olivero-Verbel J, Stashenko E (2010). Repellent activity of essential oils: A review. Bio resource Technol. 101:372-378.
8. Olivo CJ, Carvalho NM, de, Silva, JHS et al. (2008) Óleo de citronella no controle do carrapato de bovinos. RevistaCiência Rural. 38 (2): 406-410.
9. Patel EK, Gupta A, Oswal RJ (2012). A review on: mosquito repellent methods. IJPCBS. 2(3): 310-317.
10. Phal D, Patil S, Naik R et al. (2012). Concentration of d-transallethrin in air after complete smoldering of mosquito repellent coil manufactured using different fillers, Inter J BiolPharm Allied Sci. 1(9): 1312-1321.
11. Shasany AK, Lal RK, Darokar MP et al. (2000). Phenotypic and RAPD diversity among CymbopogonwinterianusJowittaccessions in relation to CymbopogonnardusRendle. Genet Resour Crop Evol. 47: 553–559.
12. Tawatsin A, Thavara U, Chompoosri J (2002). Field evaluation of mosquito coils derived from plants against night-biting mosquitoes in Thailand. Proc Inter Conf on Biopesticides. 3:243-253.
13. Tawatsin A, Wratten SD, Scott RR et al. (2001). Repellency of volatile oils from plants against three mosquito vectors. J Vector Ecol. 26: 76-82
14. Trongtokit Y, Rongsriyan Y, Komalamisra N et al. (1995).Comparative repellency of 38 essential oils against mosquito bites, Phytother Res. 19(4): 303-309

15. Wong KKY, Signal FA, Campion SH et al. (2005).Citronella asan insect repellent in food packaging. J Agri Food chem.53(11): 4633-4636
16. Yap HH, Lee CY, Chong NL et al. (1996). Performance of mosquito coils containing transfluthrin against Culexquinquefasciatus an urban squatter environment. TropBiomed. 13: 101-103