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FORMULATION & EVALUATION OF MOSQUITOES REPLLENT CREAM

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ABSTRACT

Mosquito repellent is a product that is applied to the skin or other surfaces to deter insects (and arthropods in general) from landing or climbing on that surface. The interest in plant-based repellants has been revived seeing that the development of resistance, cross-resistance and possible toxicity hazards associated with synthetic insecticides and their rising cost. The present study aimed towards the development and evaluation of safe and efficient herbal mosquito repellent from leaf extracts of Azadirachta indica, Vitex negundo, and Ocimum gratissimum. Six different types of formulation (Type-1 to 6) were prepared using each plant extract and optimized ingredients. The mosquito repellent activity of the formulation was tested using the arm-in-cage method. One skin rubbed with a small quantity of formulation was exposed to 20 mosquitoes and the number of mosquitoes that aligned or biting the arm was recorded in each minute for five minutes. The most effective repellent activity of the Type2 formulation was 87.5% (Y-shaped Model) and 91.62% (Rectangular-shaped Model). The Typel, Type3, Type4, Types and Type6 formulation showed66.62%, 58.25%, 68.75%, 70.75% and 62.5% repellent activity in Y shaped model and 66.62%, 62.5%, 70.75%, 83.25% and 62.5% repellent activity in Rectangular shaped model respectively. During these studies, we found that Hexane extract showed higher repellent activity. No allergic reactions were observed upon the skin. So, it is a safe product. The formulation was ecological, economical and highly efficient.

KEYWORDS: Herbal medicine, Mosquito repellent, Cream, Azadirachta indica, Vitex negundo, Ocimum gratissimu etc.

INTRODUCTION

Mosquitoes are a serious threat to public healthtran smitting sever dangerous diseases for over Two million people in the tropics.[1] There has been a large increase in the insecticide resistance of This vector and has become a global problem. Insecticides residues in the environment, as a result Of chemical insecticide usage, have turned the researcher's attention towards natural products. In the past years, the plant kingdom has been of great interest as a potential source of insecticidal Products. Many species in the plant kingdom synthesize a variety of secondary metabolites Which play a vital role in defense of plants against insects/mosquitoes.

Plants may be alternative source for mosquito repellent agents since they constitute a rich source Of bioactive chemicals Plant products can be used, either as an insecticide for killing larvae or Adult mosquitoes or as repellents for protection against mosquito bites, depending on the type of Activity they possess Products of secondary plant metabolisms may be responsible for the Chemical communication between plants and insects. Control of mosquitoes is something of utmost importance in the present day with rising number Of mosquitoes borne infections Mosquitoes need to be exterminated using the right tools and With a little bit of effort. These blood thirsty beasts don't care about boundaries and they can bite you if your neighborhoods are allowing its breeding. So the mosquito control measures can be Successful only if public mosquito Program are designed. First and foremost thing is to destroy the breeding areas of these mosquitoes.

The mosquitoes are horrific they're highly aggressive, you can be bitten hundreds of times without Protection, its torture, impossible to bear.[2] Deforestation and Industrialized farming are also two of the factors causing an alarming increase in the range mosquitoes. The World Health Organization Says global warming is also expanding the range of mosquitoes that carry malaria, yellow fever, And dengue fever, putting millions more humans at risk. Malaria mosquitoes are appearing in Upland areas where they've never been seen before. A child dies of malaria every 12 seconds. Mostly in the Third World, in the history of the world, more people have died from diseases Transmitted by mosquitoes than from all the fighting in all the wars, says appropriate technology company Jade Mountain. "The world's most

dangerous animal is the mosquito," According to a BBC World Service health program: malaria now infects Approximately 110 million people annually, causing 2-3 million deaths, and with increasing drug Resistance, the problem is worsening, while attempts to control the Mosquitoes with pesticides have proved ineffective. Escaping from mosquito is nowadays a great necessitate in the world as they are posing much Irritation and even throwing many to death.

MECHANISM OF ACTION BY INSECT REPELLENTS

According to Acree et al. (1968), Aedes aegypti is attracted to lactic acid which is a component of human Sweat. Studies done by others on the behavior of Mosquitoes indicated that lactic acid was only slightly attractive alone. This therefore proves its synergistic Effect with carbon dioxide and other unidentified Components of human odour that may be essential. Compounds such as steroids, phenols, carboxylic acids, Indoles that exude from animals attracts mosquitoes Physiological sensory studies on insect gives the Impression that mosquito repellent reduce biting rate by Interfering with host-enticing signals and change a Sensual information to a repulsive one due to activation of Many sensory receptors leading to confusion of the Mosquito. The mosquito as a result is not able to detect Host attractants such as carbon dioxide, lactic acid, Ammonia and other compounds hence protecting the host.

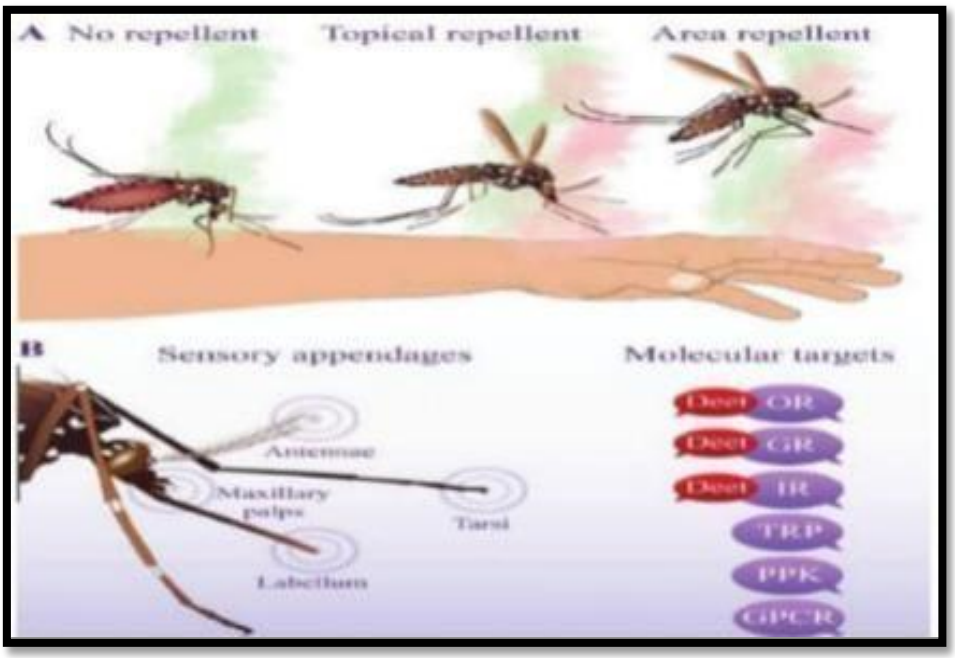

Fig. No. 1: Mechanism of Mosquitoes Repellent.

DRUG PROFILE

1. CASTOR OIL

Fig. No. 2: Castor Oil.

1. **Synonyms** : Ricinis Oil
2. **Biological source**:- Ricinus Communis
3. **Family**:-Euphorbiaceae
4. **Chemical constituents**:- 1.Ricinoleic acid -90%

2. Oleic acid. 3-6%

3. Linoleic acid 1.5-6%

4. Stearic acid 0.4 %

5. Palmitic acid 0.4

1. **Uses**:- Antimicrobial insect repellant

2. ALOE VERA

Fig No. 3: Aloe Vera.

- **Synonym**:- Musabbar, Lolesara.
- **Biological source**:- Dried leaves of aloe barbadensis Miller (Asphodelaceae)
- **Family**:- xanthorrhoeaceae
- **Chemical constitutents** :- Vitamin A, minerals, lignin, saponins
- **Uses**:-
- Strong purgative
- Prevent skin ulceration
- Irritation and malignancy

3. LEMONGRASS OIL

Fig No. 4: Lemongrass Oil.

- **Synonyms** : East Indian lemon grass oil
- **Biological source** : Cymbopogon flexuousus
- **Family** : Graminae
- **Use** : Antibacterial

4. CLOVE OIL

Fig. No. 5: CLOVE OIL.

- **Synonyms** : Caryophyllum, lavang
- **Biological source** : Eugenia Caryophyllus
- **Family** : Myrtaceae
- **Use** : Anti Microbial

5. LAVENDER OIL

Fig. No. 6: Lavender Oil.

- **Biological source** : Lavendula latifolia
- **Family** : Mint
- **Use** : Essence
- Lavender oil does double duty for insect bites. It acts as an insect repellent, and it can relieve itching after a bite occurs. Many commercial mosquito repellents contain lavender oil. Both candles and sprays can be used to repel mosquitos and other bugs.

6. MARIGOLD

Fig No. 7: Marigold.

- **Synonyms** : Genda
- **Biological source** : Calendula Officinalis
- **Family** : Daisy
- **Use** : Essence

The researchers intend to use marigold plant (Tagetes erecta) parts as suitable components of the mosquito candle, coil/ incense stick to be produced. It does not contain harmful chemical which are present in some commercial products it repels mosquitoes without destroying the environment. It contain a particular smell that many insects find up appetizing. The smell is caused by a chemical known as "a-terthienyl". Which lends a natural insecticidal property in marigold. Other toxic compounds available in all the ingredients are alkaloid, papain, terpenes and cyanogenic glycosides that are objectionable to human health.

7. ROSE OIL

Fig. No. 8: Rose Oil.

- **Synonyms** : Gulab

- **Biological source** : Rosa
- **Family** : Rosaceae
- **Use** : Flavouring Agent

8. NEEM TREE

Fig No. 9: NEEM TREE.

Dryer or semiarid regions of Asia and Africa are very suitable for the planting of Azadirachta indica from the family Maliaceae because it adapts naturally. Neem is evergreen tree whose size ranges from medium to large with dark brown to grey bark and straight trunk. It can growto a height of about 40 meters and at the same time several centimetres in width or diameter. An annual rainfall of between 500 to 1150 mm is usually required. Neem is able to accommodate drought but difficult to withstand water-logged and soils that drain poorly. It has dark green pinnate leaves that are brightly coloured with 9-15 serrated leaflets each of 7 cm long. The flowers are small, white, sweet scented and in clusters that are excellent nectar-producing grounds for bees. Trees usually blossoms between February and May in India. The fruits are green drupes which are elliptical and smooth with a seed that is covered by a pulp. Upon ripening the fruit turns golden yellow often within the months of June through to August. Studies have been made on the pesticidal properties of six species in the family Meliaceae in different parts of the world. The most promising phytochemical pesticides studies in recent studies, however, are those based on extracts of Azadirachta indica (Neem).

Indian scientists were the first to research into the benefits of neem even though in the 1920s, there was virtually little global recognition until a German entomologist found out in 1959 that neemtrees in Sudan were resistant to the attack of migratory locusts.

USES OF NEEM AND ITS LEAVES

Neem has been the most preferred tree, in different cultures it is Referred to as miracle tree in the region of Sahel because it Responds to so many needs of the people in the following ways. People take rest under the beautiful canopy of neem tree due to Its large cover. It also serves as wind- breaks to protect food Crops and buildings from winds from the desert. The flower Attracts bees that at the end produce a very delightful and Delicious honey. Neem kernels produce oil, which is used in the production of Soap and other toiletries, fuels for lighting lamps and heating Whereas the left over from the kernels after extraction of the oil Could be used as fertilizer. These were commonly known and Used by indigenes in India and the tree was planted all over Every community. Moreover, the proteinaceous residue from the Kernel was also used to feed poultry as well. This indicates that Every part of the seed and the whole plant remains useful to Humans and animals. Since ancient times in India, various parts of neem tree have Been used traditionally as medicine that heals the whole body. Also, the roots, bark, leaf and fruits of neem are considered the Major constituents in medicine, ailments such as leprosy, Intestinal infestation by worms, constipation, cough and Respiratory problems were treated with neem oil and leaf extract. It is also generally known to promote the health of people. Eczema and many other skin infections were also controlled by The oil in addition to the treatment of rheumatism, chronic sores From syphilis and ulcers.

9. TURMERIC RHIZOMES

Fig No. 10: Turmeric Rhizomes.

Botanical Name:- Curcuma longa.
Family:- Zingiberaceae
The plant grows to a height of three to five feet, and is cultivated extensively in Asia, India, China, and other countries with a tropical climate. It has oblong, pointed leaves and bears funnel- shaped yellow flowers.

The rhizome is the portion of the plant used medicinally; it is usually boiled. Cleaned, and dried, yielding a yellow powder. Dried Curcuma longa is the source of the spice turmeric, the ingredient that gives curry powder its characteristic yellow color. Turmeric is used extensively in foods for both its flavor and color. Turmeric has a long tradition of use in the Chinese and Ayurvedic systems of medicine, particularly as an anti-inflammatory agent, and for the treatment of flatulence, jaundice, menstrual difficulties, hematuria, hemorrhage. Turmeric can also be applied topically in poultices to relieve pain and inflammation. Current research has focused on turmeric's antioxidant, hepatoprotective, anti-inflammatory, anticarcinogenic, and antimicrobial properties.

MATERIALS AND METHODOLOGY

Collection: Alo-vera, rose oil, clove oil, lemongrass oil, lavender oil, Castor Oil, Marigold Extract These ingredients used in the preparation of mosquito repellant Cream collected from medicinal Garden and pharmaceutical lab.

Extraction of plant material

Castor Oil

Steps of Extraction

1) Cleaning
2) Boiling
3) Drying
4) Grinding
5) Mixing with water
6) Cooking
7) Scooping of oil
8) Drying of oil

FORMULATION OF CREAM

Table No. 1: Formulation of Cream.

Sr. No.	Ingredients name	Quantity(ml)	Use
1	Castor Oil	8 ml	Antimicrobial Repellant
2	Lavender Oil	3 ml	Insect repellant
3	Lemongrass oil	4ml	Support to Mosquito repellant
4	Clove Oil	2ml	Antimicrobial
5	Rose Oil	1 ml	Flavouring agent
6	Marigold Extracts	1 ml	Repellency
7	Neem Extracts	3 ml	Anti Bacterial
8	Aloe Vera	qs	Base, antimicrobial

Preparation of Cream

- Start by combining aloe Vera gel and castor oil in beaker
- Then keep beaker under mechanical stirred
- Start the mechanical stirrer slowly
- Then add other oils one by one
- Keep stirring up to 1 hour
- Remove and check Cream

EVALUATION OF CREAM

1) **Organoleptic Characteristics**: Organoleptic characteristics were assessed from colour and scent
2) **Homogeneity:** Homogeneity was analyzed by visual inspection for the appearance and Existence of any clog.
3) **Presence of foreign particles** : A small amount of formulation was spread on a glass slide free from grease and was Observed against the diffused light to check for the presence of foreign particles
4) **pH Evaluation** : The pH of 1% solution of cream was measured by using digital pH meter
5) **Thermal stability** : There is no change in colour and oil in different temperature

Fig No. 10: Formulation & Evaluation of Mosquitoes Repllent Cream.

MATERIAL AND METHODS FOR TESTING

Material and Equipments: Castor seeds, soap, cotton fabric, full setup of distillation apparatus, weighing balance, padding Mangle, launder-o-meter, cage, glass beaker and dryer were used.

Finish Application of the Fabric

Pretreatment

Before the fabric was treated it had been washed with 5g/l soap at 600C for30 minutes to remove the dirt on the untreated fabric with water.

Fig. No. 11: Pretreatment Formulation & Evaluation Of Mosquitoes Repllent Cream.

Mosquito Repellency Test

Cage preparation: The repellency test was done by preparing a cage and collecting 50 Mosquito. 40 cm X 40cm cage was prepared. The two opposite sides and the top cover are Prepared from transparent plastic material. And the other parts from carton. The plastic covers Are perforated for enough air circulation. The mosquitoes were collected from a place where There are available like shower rooms.

Mosquito collection: 50 mosquitoes were used for the test. The mosquitoes were collected from Toilets around dormitory. A big flask was used to collect the mosquito Testing the Treated Fabrics Before and After Washing the repellency test of the samples was done on the basis of the standard with some minor Modifications that thought important during the observations. The observations and Modifications are: While the mosquitoes are inserted in to the cage they tend to sit/rest on the Wall of the cage…not on the ground. So the testing method was modified by placing the Treated samples on the wall of the cage and the number of mosquitoes arrived on the treated Samples counted within 30 minutes.

Testing procedure: The treated samples were attached on the wall of the cage. One sample is tested at a time. Then the mosquitoes are inserted into the cage. The number of mosquitoes arrived on the Treated samples were collected and recorded for 30 min per sample. Since the mosquitoes Settle on a place where they sit first (when it is convenient for them) they may notflay to Other place. So the cage had been shacked each 3 min to disturb the mosquitoes. Now at this Time they will try to sit again and counting and recording the number of mosquitoes had been Done

Testing the treated fabrics after washing: The treated fabric was washedwith the recipe mentioned below in the launder-o-meter. After the fabric washed and dried, it was tested for mosquito repellent test to check whether The finish is durable or not. TABLE 1 WASHING RECIPE Amount of water (ml) Amount of Soap (g/l) Time (min) Type of wash 2005 30 Cold wash after washing the samples were Tested with similar procedure used for the untreated fabric.

Tensile strength test: Since the fabric strength tester was not functional the test was done on yarn form with the Following procedure. 10 warp and weft yarns each were taken out from the treated fabric. Similarly 10 warp and weft yarns each were taken out from the untreated fabric samples. All The yarns were tested for tensile strength using SHIRLEY yarn strength tester.

Shrinkage test: This taste was done by plotting 10cm X 10cm rectangle on the fabric before treatment. Then this rectangle was measured again after treatment is given. The area difference was calculated and the shrinkage was expressed in percentage. 10 untreated fabric samples were prepared with the dimension 15cm X 15cm. 10 cm X 10cm box was plotted on each sample. The Mosquito repellent finish was applied on all the samples by pad-batch-dry method. Then the Previously plotted box dimension was measured again. Finally, the shrinkage was calculated by area difference in percentage.

Fabric stiffness test

This test measures the bending stiffness of a fabric by allowing a narrow strip of the fabric to Bend to a fixed angle under its own weight. Rectangular specimens of dimension 25 mm X 200 mm were cut from sample; three specimens were cut with the length parallel to the warp and three more with length parallel to weft. The specimens were placed on the platform with one end coincident with the front upper edgeof the platform. The slide was placed on the Specimen so that the zero of the scale is in line with the notch. The slide was pushed forward at a uniform rate, carrying the specimen with it, until by looking in the mirror it is seen that the end edge of the specimen is in line with the two scribed lines at 41.5o to the horizontal. The procedure was repeated with the other side up and again at the other end of the Specimen.

RESULTS AND DISCUSSION

Table No. 2: Mosquito repellency result of different samples before washing.

Sr.No.	No.of Washes	No. of Mosquitoes
1	One time	5
2	Two time	8
3	Three time	6
4	Four time	6
5	Five time	9

Before applying Cream there are mosquito were sat on hand and afterapplying cream mosquitoes get repelled.

Fig. No. 12. Repellency Testing Cage.

CONCLUSION

Sample treated with binder and oil was effective on mosquito repellency Property. Thus, treatment should be given by Pad-Batch-Dry (PBD) method. The wash fastness was poor so it is recommended not to wash the treated fabric or retreat it after washing by Spraying. The strength of the treated fabric was better than the untreated on therefore the finish doesn't degrade the fabric. The finish results slight shrinkage on the fabric. But this is the most Noticeable effect on many other finishes and chemical treatments of cotton. The stiffness Property of the fabric was not also increased much. Finally it is concluded that the finish Applied on the fabric was effective without washing and it has no remarkable problem on the Property of the fabric rather than increasing the strength of the fabric. The future work may potentially link the gap by improving the wash fastness using some chemicals.

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