

*Through this column we intend to record the work of innovators in our society who are making and using their own products and technology at home or in small-scale industries. Also we would include some articles and information from ethnobotanical reports. It is hoped that this would lead to further research and acknowledge innovator's innovations.*

*We invite authors/readers to contribute details of their innovations and share their knowledge for common good.*

# Development of cow dung based herbal mosquito repellent

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## Abstract

The chemical based mosquito repellents available in the market contain some harmful and poisonous chemicals which are likely to cause threat to human health. An attempt has been made to prepare a 100% herbal product, based on traditional practices and rural wisdom. It is effective and cheaper than presently chemical based mosquito repellent. Since it is totally herbal, it has no side effects on inhalation or even on digestion. This paper deals with selection and optimization of ingredients, their characteristics, medicinal properties and studies conducted about the comparison with the existing mosquito repellent. The cow dung is considered very sacred in Indian philosophy, it says that *Gomay Vaste Laxmi* i.e. Goddess of Wealth resides in cow dung. The efforts are made to study the traditional beliefs from scientific approach. The main aim of this product development is to provide employment to the rural youth and economic gains to farmers.

**Keywords:** Cow dung, Pallethrin, Neem, Tulsi.

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immemorial. Perhaps this has happened due to the destruction of the concept of dung utility as fertilizer, cheap fuel and cheap housing material and as insect repellent. A lot of research work has been done in crop fields and its effect on human health. But the harmful effects of modern insect repellents used in houses have not yet drawn the attention of many scientists.

Researchers proved that pyrethroids used in repellents lead to hyper excitation of nervous system and prolong uses result in corneal damage, liver damage and asthma. About 12% of users are seriously affected by use of repellents. The common problems are caused by inhalation of its smoke. Its inhalation toxicity is high even at low concentration of 0.0044mg/litre/day or 4.39 ppm. Highly accurate studies

## Introduction

With the onset of modern civilization, we are forgetting several useful natural resources and one of that is cattle

dung. It is amongst the third most important services rendered by animals i.e. providing dung which has been at the root of well laid out social and economic systems of civilization since time

conducted in US show that children ranging from 1-6 years in age are eating at least 0.002157mg/kg/day of palerthrin used in liquidators due to food exposure which is affecting their health whereas its limiting quantity is 0.002152mg/kg/day (Sharma, 2001).

The scientists at the Department of Pesticide Chemistry, Tamil Nadu (Ramesh & Vijayalakshmi, 2001) studied three types of following mosquito repellent: (i) two different mosquito coils containing allethrin 0.1% w/w, and transfluthrin 0.03% w/w, (ii) an aerosol sample containing a combination of two pyrethroid molecules (deltamethrin 0.02% w/w + allethrin 0.13% w/w), and (iii) two different mosquito mats containing esbiothrin 2.0% w/w and palerthrin 1.5% w/w as active ingredients. Air samples from the room were drawn at different time intervals uniformly from three different positions in the room (top, middle and bottom) and the pyrethroid contents were analyzed by them. The study revealed that at the end of 6 hours period most of the mosquito repellent coils and liquidator residue drops below 0.0001 ppm (practically negligible) that too in a closed room. The coil and liquidator used mostly for 7-8 hours a day are ineffective even after 5-6 hours and only smoke along with bad smell left inside the room and no mosquito repellent action at all.

In the present study an attempt has been made to develop, a cow dung based herbal mosquito repellent. Ever since an established fact and practice is that the natural mosquito repellent is more effective, cheap and keeps environment pleasant and health friendly.

## Materials and Methods

### Raw Material Selection

Raw material has been selected based on experience, traditional knowledge and practice by ancestors (Nadkarni, 1954; Chopra *et al*, 1956; Duke *et al*, 2002; Pulliah, 2002; Wealth India — Raw Materials). Traditionally used repelling agents have been blended with some new ingredients.

The most traditional and popular ways of repelling mosquitoes is by using neem leaves along with cow dung. It is an excellent antiviral agent when burnt. *Raal* is also used along with cow dung because of its pleasant smell that keeps environment fresh and free from bacteria. *Tulsi* is the most sacred and most generally used medicinal plant in Indian homes. It has excellent antiviral and insecticidal property.

In addition to above mentioned traditional and natural insecticides following medicinal herbs have been selected as raw material for preparing mosquito repellent coils:

#### 1. Vekhand (*Acorus calamus* Linn.)

It is commonly used as Ayurvedic medicine; it smells good and act as anti depressant. It has been used to impart tranquillizing and insect repellent property to the product.

#### 2. Ajowan [*Trachyspermum ammi* (Linn.) Sprague]

It is an aromatic herb commonly used in culinary preparation. It has been used for enhancing mosquito repellent

property and for its antiseptic and antifungal properties.

#### 3. Peppermint oil (*Mentha piperita* Linn.)

Peppermint is an aromatic and medicinal herb. It has been used because of its mild antiseptic and muscle relaxant effect. It also helps to maintain pleasant environment around.

#### 4. Lemon Grass Oil [*Cymbopogon flexuosus* (Steud.) Wats.]

Lemongrass is an aromatic and medicinal herb. It has been used because of its disinfectant property and good smell.

### Material Optimization

For preparing mosquito repellent cow dung as well as coal powder have been selected as base. Though both the bases are useful, cow dung is better because it has some additional exceptional properties. Some unpublished data says that the cow dung smoke is a potential antioxidant. A detailed study on cow dung based *dhoop* is being done at Banaras Hindu University, Varanasi in association with Govigyan Anusandhan Kendra, Nagpur.

Maida and Guggulu have been tried as binders. Maida is found to be more convenient for use and gives excellent binding to all the ingredients and holds it together strongly. Though Guggulu has exceptionally good smell and binding property, still it is not easy to be used on large scale. The suitable binder is the one which gives slow and prolong burning along with uniform binding ability.



Acorus



Guggulu



Ajowan



Cymbopogon



Figure 1 : The cow dung based mosquito repellent coil

To impart porosity to strongly bonded mixture and to ease continued burning, rice grains have been used. After doing different studies, the composition of ingredients as mentioned in Table 1 has been found to be the optimum. The following formulations have been tried along with the optimized ingredient composition given in Table 1:

1. Cow dung + maida + optimized ingredients
2. Cow dung + Guggulu + optimized ingredients
3. Coal Powder + maida + optimized ingredients
4. Coal powder + Guggulu + optimized ingredients

## Conclusion

The mosquito repellent prepared with above mentioned different formulas was given for use by inhabitants of different localities in Nagpur. A survey conducted in a group of 100 people of

different social sections and different localities in Nagpur revealed that the formulation 1 is most effective. This cow dung based product is not only mosquito repelling but also hygienic, aesthetic and medicinal. The chemical mosquito repellents contain toxic palleshtrin whose exposure to foods and water is health hazardous. The present product is a source of employment generation in rural India because organizations like Govigyan Anusandhan Kendra, Deolapar, Distt. Nagpur has taken the initiative to commercialize this product.

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Table 1 : Optimum composition of raw material

Sr. No.	Ingredients	Wt. percentage
1.	Neem	7.77%
2.	Vekhand	3.0%
3.	Tulsi	3.0%
4.	Ajowan	2.1%
5.	Raal	3.9%
6.	Rice	4.8%
7.	Saw dust	4.35%
8.	Vegetable ghee	8.0%
9.	Lemon Grass oil	8.6%
10.	Peppermint oil	7.3%
11.	Cow dung	40.4%
12.	Maida	6.35%



In this column for the benefit of our patrons we are trying to include simple tips from medical experts of various systems of medicine.

## Barley sherbet (*Jau ka sattv*) for hyperacidity

In Ayurvedic system of medicine the Barley sherbet or *Jau ka sattv* prepared from Barley (*Hordeum vulgare* Linn.) (Hindi—*Jau*) is considered to be *Madhur* (sweet), *Kashya* (astringent), *Ruksha* (dry), *Laghu* (light and easily digestible) and *Sheet* (cold). It quenches thirst, cools the body and gives instant energy, especially in the summer. It is good for hyperacidity, urinary tract infection, skin disorders and heat-induced headache. It also helps to reduce weight, if taken with honey. Barley sherbet pacifies *pitta dosha* and *kapha dosha* and aggravates *vata dosha*. Raw sugar is mixed to pacify its *vata* quality. It is very useful in *pitta*-aggravating disorders. Excessive intake can cause flatulence.

**Ingredients:** Barley seeds 100g (or as per requirement).

**Preparation:** Take a pan with a heavy base and heat it a little. Put in the barley and roast on low fire till the seeds turn brown. Make sure the seeds do not burn. Let them cool. Grind these seeds to form a fine powder. Store in an air-tight container. To drink, take three



tablespoonfuls of the powder and two tablespoonfuls of powdered raw sugar and dissolve in a glassful of chilled water. Those with aggravated *kapha dosha* can use honey instead of raw sugar.

## Herbal drink (*Tulasyadi fant*) for sinusitis and fever

Basil, *Ocimum sanctum* Linn. (Hindi — *Tulsi*) is a traditional medicine for fever and cold and its herbal drink is good for sinusitis also. According to Ayurvedic system of medicine the herbal drink prepared from *Tulsi* is *Katu* and *tikat*, dry, light, warm and pungent. It is very good for sinusitis, flu, influenza, hay fevers, bronchitis, kaphaj fever, asthma like kaphaj related disorders. This recipe pacifies *kapha*

*dosha* and *vata dosha*. It increases *pitta dosha*.

**Ingredients:** Fresh leaves of holy basil 10, black pepper balls 5 pieces, ginger 3 grams and cloves 3 pieces.

**Preparation:** Crush coarsely all the ingredients. Boil these crushed ingredients in one cup of water and boil at moderate fire for 5 minutes. Sieve this mixture and add half cup of boiled warm milk and sugar (half teaspoon). Drink warm. It is better to avoid cold exposure for 1-2 hour after drinking this tea. Relax and take bed rest.

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