Developing a business model for Women self-Help Groups: Investigation on using Alpine leaves for Organic Insect Repellents- Socio-Economic Capacity building for Rural Women

Dr.R.M.S.Parvathi,* Professor, Department of CSE,

Ms.S.Arjuman Banu**AP-Selection Grade, Department of Chemistry ,

Sri Ramakrishna Institute of Technology, Coimbatore, Tamilnadu, India
rmsparvathi@gmail.com , Corresponding Author*

Keywords

Mosquito repellent, Alpine plants, medicinal properties, Socio- Economic capacity building.

Corresponding Author*

Dr.R.M.S.Parvathi,* Professor,
Department of CSE,
Sri Ramakrishna Institute of Technology, Coimbatore, Tamilnadu, India
E mail - rmsparvathi@gmail.com

ABSTRACT

Creepy crawlies play a few advantageous parts in the biological system and for people and other creatures. They are amazingly imperative to pollinating our nourishment crops, as well as a assortment of other plants. Nearly three-quarters (75%) of all nourishment crops are pollinated by creepy crawlies and other creatures. In any case a minority of creepy crawlies are considered as bugs since they are hurtful to people or other creatures. Creepy crawlies like mosquitoes and flies are carrier of numerous infection causing intestinal sickness, dengue, typhoid, chikungunya etc. Various shapes of repellents are accessible in the market which are utilized to keep away the creepy crawlies which are chemical based. Most mosquito repellents, accessible in the showcase are stacked with harmful chemicals, uses N,N-Diethyl-3-methylbenzamide (DEET), which is so harmful that indeed the Natural Security Organization says one ought to wash it off your skin when you return inside, maintain a strategic distance from breathing it in and not splash it specifically on your confront. This project work inquire about the advancement and assessment of mosquito repellent sticks with the assistance of different home grown items mainly from alpine plants including eucalyptus oil, coconut oil, lavender oil, lemongrass and cinnamon oil, peppermint and citronella, neem oil and starch powder, wood powder, charcoal powder making them ozone-friendly, monetary compelling, non-harmful. Thus crucial think about on normally occuring plants basically elevated plants and trees for their restorative properties and utilization as mosquito repellent, have been made. An endeavor has been made towards the Socio- Financial capacity building for the rural women of Pachapalayam village, where the college is situated.

Keywords

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INTRODUCTION

Products that repel mosquitoes make it inappropriate for mosquitoes. People are looking for mosquito repellent items made from herbal plants that are low toxicity and safe. Numerous plants are found in that line which uses essential oils, which have been shown to be an effective insect repellents. According to recent research, exposure to insect repellents and other pesticides is linked to an increased chance of developing malignancies, usually of the breast, brain, lymphatic system, soft tissues, stomach, and prostate. Exposure to insect repellents in youngsters is also associated with weakened immune systems and an increased risk of developing several types of cancer.

While long-term exposure has been connected to both cancer and endocrine system disturbance, intermediate exposure has been associated to neurotoxicity, or harm to the nervous system. This indicates that since studies are connecting repellents to growth and development problems as well as birth defects, pregnant women and children should restrict or prevent their exposure to them. Some insects are dangerous because they can bite, sting, or even carry illness. Wasps and bees have the ability to sting, and for allergic people, this sting can be fatal. Insects that feed on people and other animals, such as bed bugs, mosquitoes, horseflies, yellow flies, fleas, tsetse flies, lice, and others, can leave behind irksome and uncomfortable bites. These insects can occasionally introduce lethal pathogens into our bloodstream while feeding on us, which can result in severe sickness or even death. Additionally, insects can spread some of the deadliest diseases. Malaria, which is spread by mosquitoes, kills an estimated 3 million people year and infects 200 million or more people annually. Other diseases conveyed by insects include dengue fever (distributed by mosquitoes), sleeping sickness (spread by tsetse flies), black plague (spread by fleas), typhus (spread by lice), and West Nile Virus (spread by mosquitoes). The vulnerability of humans to diseases spread by insects is not unique. The majority of vertebrates, including domestic and livestock animals, are in danger.

This project proposal embarks on an investigation to experimentally verify age old practices adopted in Indian villages which used bio products for repelling insects, one such practice is the burning of neem leaves to keep mosquitoes away. Even if there are some organic repellents on the market, the majority of these claims have not been supported by research.

LITERATURE REVIEW

National Status Review:

- Narahashi et al, (1992) describes that the main site of action of the pyrethroids is the sodium channel, which is kept open for long periods of time, causing prolonged sodium current to flow, leading to hyper-excitation of the nervous system.
- Singh and Agarwal (1988) have found that himachalene from cedarwood oil possess very good insecticidal activity against housefly.
- V.P. Sharma (current scince, 2001) describes, "repellents such as vaporizers, diethyl toluimide, and herbs are widely used in the country to combat mosquito nuisance and malaria.

International Status Review:

- Chen et al (1992) exposed male ICR mice to mosquito coil smoke with d-allethrin reported histopathological lesions, including the loss of cilia and an increase in vascularity of the alveolar wall .
- Garey et al (1998) reported that D-transallethrin, through hormonal pathway, may contribute to reproductive dysfunction, development impairment and cancer.
- Oil of Lemon Eucalyptus (OLE) (p-menthane 3,8-diol [PMD]) is a plant-based repellent. In studies evaluating malaria, OLE provides 6 hours' worth of protection against mosquito bites, but should NOT be used in children less than 3 years of age. Brands include Repel, Cutter and Murphy's Naturals. OLE is registered with the EPA, and is available as a spray. It can cause eye irritation and should not be consumed orally. OLE is often marketed as a "natural" insect repellent, but may still cause skin irritation or toxicity if

swallowed. It is not an "essential oil".BioUD is a synthetic pesticide, assigned a low toxicity rating. It is derived from wild tomato plants. In studies, when BioUD was compared to DEET 7% to 30%, against the mosquitoes *Aedes aegypti* (L.) and *Aedes albopictus Skuse*, overall, BioUD was found to be an effective repellent for mosquitoes (up to 6 hours) and ticks (up to 2.5 hours).**Catnip oil** is an extract of Oil Nepeta cataria which is a member of the mint family of plants (*Labiatae*). Catnip is a herb that grows year-round and grows wild in most parts of the United States. Researchers have reported that catnip oil is about 10 times more effective than DEET. The EPA concludes that no risks to human health are expected due to low toxicity and current use as a food ingredient by the general public without any reported adverse effects on human health. However, it can lead to eye irritation.

- The Odomos plant, also known as Citronella, is a medicinal geranium with mosquito-repellent properties. It is a popular insecticide with a leafy-rose aroma and is used to inhibit mosquito presence.

OBJECTIVES

- Fundamental study on alpine plants and trees for the year properties and usage as mosquito repellent
- Experimental analysis on preparing the organic insect repellent using alpine leaves
- construction of a nursery in SRIT campus to cultivate alpine trees and plants for verifying sustainability of the alpine ecosystem
- Development of a business model to produce and market the organic insect repellent
- Train and up skill Pachapalayam village women through women self-help groups to establish startup for manufacturing d organic repellent.

METHODOLOGY

This project will involve the following methods:

- Preliminary studies on Alpine plants and trees to identify insect repellent properties
- Procurement and setup of a nursery to cultivate alpine plants and trees
- Experimental analysis to identify the composition of the proposed organic repellent
- Training of women self-help groups for developing the business model.

Insects such as cockroaches, spiders, and mosquitoes infiltrate human homes, workplaces, and other places. Because they transmit bacteria and viruses that cause a variety of illnesses and problems when they sting on polluted food or water, some insects are dangerous to people and pets. There are many chemical-based repellents on the market, but they are also dangerous for people and animals, especially small children.

Current research trends in the cosmetic and personal care industry have focused on finding organic ways to replace chemical components in all personal care products and cleaning solutions. Herbal and organic products are available as substitutes for chemicals in cosmetics and personal care products. The current research trends in the cosmetic and personal care industry have focused on finding organic solutions to replace chemical components in all personal care products and cleaning solutions. In this study, an effort will be made to find organic solutions for insect repellents using alpine plants and trees, which are known to have properties that keep insects away, especially mosquitoes. Herbal and organic products are also available as alternatives to chemicals in cosmetics and personal care products.

OUTDOOR PLANTS THAT KEEP THE MOSQUITOES AWAY IN SUMMER

- No. 1: Citronella Grass. Citronella is a common ingredient in insect-repelling sprays and candles.
- No. 2: Lavender.
- No. 3: Marigolds.
- No. 4: Basil.
- No. 5: Rosemary.
- No. 6: Lemon Balm.

- No. 7: Catnip.

Alpine plants like Rosemary, sage mint, catmint, basil, marigold, bee balm lavender, Lemongrass, Germania, lanchana fennel, eucalyptus will be considered in the experimental investigations.

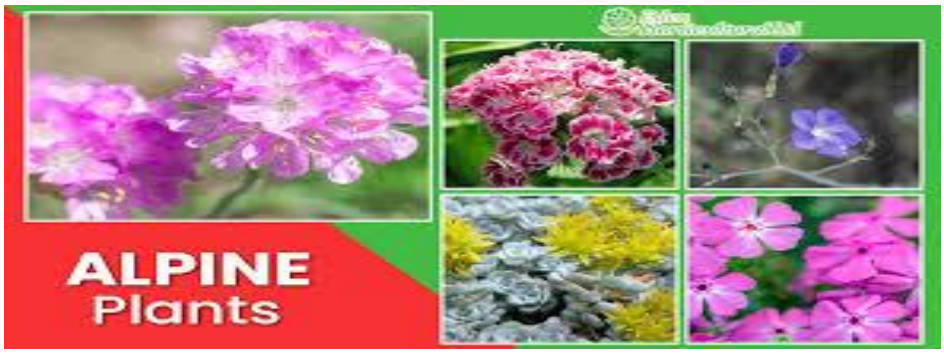

Fig 1: Alpine Plants

It is also plan to develop a business model to empower local women from Pachapalayam village to start a startup for manufacturing and marketing the developed product this venture will be covered under the institutions social responsibility grant to sustain the alpine ecosystem and to promote women empowerment to women self-help groups in the neighboring community.

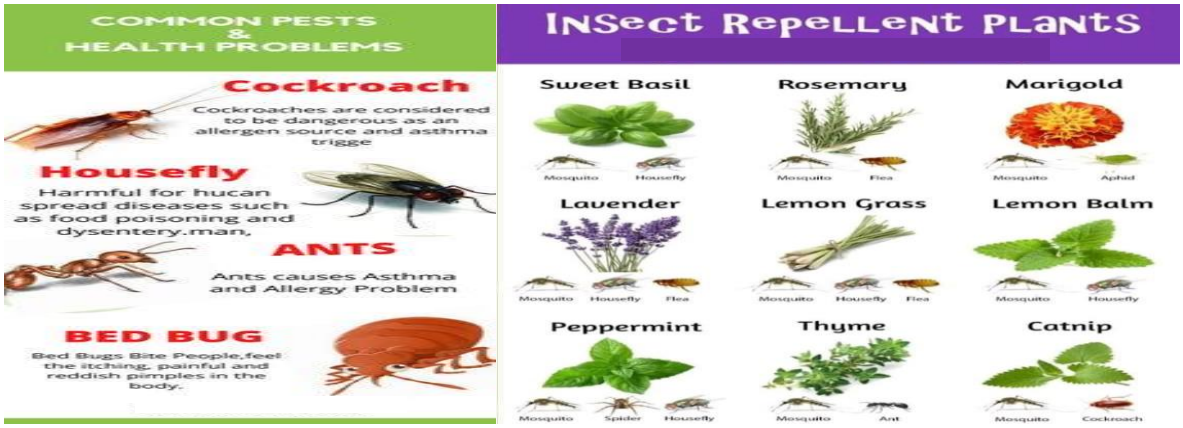

Fig 2: Insect Repellent Plants

The experimental studies will take into account alpine flora such as garlic, lanchana fennel, rosemary, sage mint, catmint, basil, marigold, bee balm lavender, lemongrass, Germania, and eucalyptus.

DEVELOPING BUSINESS MODEL

In order to maintain the Alpine ecosystem and support women's empowerment among women self-help groups in the surrounding community, a business model will also be developed to enable local women from Pachapalayam village to launch a startup for producing and marketing the created product. This project will be funded by the institution's social responsibility grant.

Burning organic materials like bamboo and wood, followed by oxygen and steam treatment, produces the charcoal powder. The leftover material from woodworking processes including cutting, grinding, and milling is used to make wood powder. It is made up of tiny wood fragments. The combustion process was improved by the wood powder and charcoal.

The following materials were used:

Charcoal and wood powder

The charcoal powder is obtained from burning organic material such as wood, and bamboo and then treated with oxygen and steam. Wood powder is obtained from the unwanted material of woodworking operations such as chopping, grinding, and milling. It is composed of small chippings of wood. The charcoal and wood powder enhanced the combustion process.

Starch powder

The commercial starch powder obtained from crushing of starch present in food material and then mixing the pulp with water. After that, the paste is washed or removed impurities and then dried. The starch powder was used due to its binding properties.

Eucalyptus oil

Eucalyptus oil is obtained from the fresh leaves and top branches of the eucalyptus plant. 20% eucalyptus oil provided more than 94% protection against mosquitoes for 4 hours.

Coconut oil

Coconut oil is obtained from the coconut tree (*Cocus nucifera*) and used as unsaturated fatty acids and emulsifier.

Lemongrass oil

Lemongrass oil is obtained from the C*ymbopogon citratus*. The essential oil used as an aroma therapy.

Cinnamon oil

Cinnamon aldehyde exhibits the strongest mosquito-repellent activity.

Neem oil

Neem oil is obtained from the seed oil *Azadirachta indica* due to the presence of α-terpinyl acetate, eucalyptol and δ-cadinene and α-cadinene

PROJECT DELIVERABLES

Following a thorough experimental study and testing to ensure that it is safe for use by people of all ages, the organic insect repellent will be created. Since alpine leaves and plants will be grown at home, pesticides will not be used on the plants.

The planned research is projected to produce the following results and deliverables:

- An organic insect repellent made from Alpine plants and trees;
- Local communities are empowered under the ISR (Institute Social Responsibility) system;
- Establish an Alpine environment on the SRIT campus.

Fig.3: Mosquito Repellent Sticks

DEMOGRAPHY OF PACHAPALAYAM VILLAGE

- Tamil Nadu » Coimbatore » Coimbatore North » Pachapalayam

Pachapalayam

Block / Taluka → Coimbatore North
District → Coimbatore
State → Tamil Nadu

About Pachapalayam

According to Census 2011 information the location code or village code of Pachapalayam village is 644426. Pachapalayam village is located in Coimbatore North taluka of Coimbatore district in Tamil Nadu, India. It is situated 25km away from sub-district headquarter Coimbatore North (tehsildar office) and 25km away from district headquarter Coimbatore. As per 2009 stats, Pachapalayam village is also a gram panchayat.

The total geographical area of village is 731.97 hectares. Pachapalayam has a total population of 2,359 peoples, out of which male population is 1,191 while female population is 1,168. Literacy rate of pachapalayam village is 64.26% out of which 72.80% males and 55.57% females are literate. There are about 683 houses in pachapalayam village. Pincode of pachapalayam village locality is 641107.

Population of Pachapalayam

Particulars	Total	Male	Female
Total Population	2,359	1,191	1168
Literate Population	1,516	867	349
Illiterate Population	843	324	519

Village Name : Perur, Pachapalayam (பேரூர்)
City Name : Coimbatore
District : Coimbatore
State : Tamil Nadu
Language : Tamil And English
Current Time 11:25 AM
Date: Monday , Oct 15,2024 (IST)
Time zone: IST (UTC+5:30)
Elevation / Altitude: 431 meters. Above Seal level
Telephone Code / Std Code: 0422

Ward : Ward
Assembly constituency : Kinathukadavu assembly constituency
Assembly MLA : shanmugam, A.
Lok Sabha constituency : Pollachi parliamentary constituency
Parliament MP : SHANMUGA SUNDARAM. K
Pin Code : 641010
Post Office Name : Perur (Coimbatore)

CONCLUSION & FUTURE WORK

Nineteen different plant species were identified, with Alpine plants being used to make mosquito repellent sticks and cones. The most popular plant species utilized as mosquito repellant in the villages utilized along with commonly occurring essential oils were Maghizham tree or Mimusops kummel, and wild/Natal/Cape laburnum or Calpurnia aurea.

The nearby village of Pachapalayam to enable them to continue producing mosquito repellent sticks using locally accessible alpine plants, women received practical instruction in the creation of mosquito repellent sticks and cones. The rural women of Pachapalayam village, where the Sri Ramakrishna Institute of Technology is located may benefit from this. Rural women's socio economic standing can rise as a result.

The local Pachapalayam village Women were given hands on training in the preparation of Mosquito repellent sticks and cones, so that they could proceed with the manufacturing of mosquito repellent sticks with the use of locally available Alpine plants. This could improve the livelihood of the rural women of the Pachapalayam village, where the Sri Ramakrishna Institute of Technology is located. This could improve the socio economic status of the rural women.

THE EFFECTIVENESS OF THESE REPELLENTS IN THE FUTURE

Future research should examine these favored Alpine plants' ability to repel the main malaria vector in both lab and field settings. Additionally, it will be established which bioactive chemicals are responsible for the repellant property.

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REFERENCES

1. Billings, W.D. (1974). "Adaptations and Origins of Alpine Plants". Arctic and Alpine Research. **6** (2): 129–142. doi:10.2307/1550081. JSTOR 1550081.
2. Billings, W.D.; Mooney, H.A. (1968). "The Ecology of Arctic and Alpine Plants". Biological Reviews. **43** (4): 481–529. doi:10.1111/j.1469-185x.1968.tb00968.x. ISSN 1464-7931. S2CID 85714370.
3. Bliss, L.C. (1962). "Adaptations of arctic and alpine plants to environmental conditions". Arctic. **15** (2): 117–144. doi:10.14430/arctic3564. JSTOR 40506981.
4. Bliss, L.C. (1971). "Arctic and Alpine Plant life Cycles". Annual Review of Ecology and Systematics. **2**: 405–438. doi:10.1146/annurev.es.02.110171.002201.

5. Hacker, Jürgen; Neuner, Gilbert (2008). "Ice Propagation in Dehardened Alpine Plant Species Studied by Infrared Differential Thermal Analysis (IDTA)". Arctic, Antarctic, and Alpine Research. **40** (4): 660–670. doi:10.1657/1523-0430(07-077)[HACKER]2.0.CO;2. S2CID 85721404.
6. Kala, Chandra Prakash (2000). "Status and conservation of rare and endangered medicinal plants in the Indian trans-Himalaya". Biological Conservation. **93** (3): 371–379. Bibcode:2000BCons..93..371K. doi:10.1016/S0006-3207(99)00128-7.
7. Kala, Chandra Prakash (2005). "Health traditions of Buddhist community and role of amchis in trans-Himalayan region of India". Current Science. **89** (8): 1331–1338.
8. Körner, Christian (2003). Alpine Plant Life: Functional Plant Ecology of High Mountain Ecosystems. Berlin: Springer. ISBN 978-3-540-00347-2.
9. Smith, Alan; Young, Truman P. (1987). "Tropical Alpine Plant Ecology". Annual Review of Ecology and Systematics. **18**: 137–158. doi:10.1146/annurev.ecolsys.18.1.137.
10. Smith Olsen, Carsten; Overgaard Larsen, Helle (2003). "Alpine medicinal plant trade and Himalayan mountain livelihood strategies". The Geographical Journal. **169** (3): 243–254. Bibcode:2003GeogJ.169..243S. doi:10.1111/1475-4959.00088.
11. Stegner, M; Lackner, B; Schäfernolte, T; Buchner, O; et al. (2020-09-24). "Winter Nights during Summer Time: Stress Physiological Response to Ice and the Facilitation of Freezing Cytorrhysis by Elastic Cell Wall Components in the Leaves of a Nival Species". Int J Mol Sci. **21** (19):
12. Steinger, Thomas; Körner, Christian; Schmid, Bernhard (1996). "Long-term persistence in a changing climate: DNA analysis suggests very old ages of clones of alpine Carex curvula". Oecologia. **105** (1): 94–99.
13. Tsukaya, H.; Tsuge, T. (2001). "Morphological Adaptation of Inflorescences in Plants that Develop at Low Temperatures in Early Spring: The Convergent Evolution of "Downy Plants"". Plant Biology. **3** (5): 536–543. Bibcode:2001PlBio...3..536T. doi:10.1055/s-2001-17727. S2CID 260251147.
14. Zhang, Qi-Peng; Wang, Jian; Wang, Qian (2021-03-01). "Effects of abiotic factors on plant diversity and species distribution of alpine meadow plants". Ecological Informatics. **61**:.101210 Bibcode:2021EcInf..6101210Z. doi:10.1016/j.ecoinf.2021.101210. ISSN 1574-9541.