

# Review on Mosquito Control: Surveys, Analysis and Investigations

Sunil J. Kulkarni

Datta Meghe College of Engineering, Airoli, Navi Mumbai, Maharashtra, India

## ABSTRACT

Mosquito borne illnesses and diseases are increasing due to lack of cleanliness in public places and decreasing immunity. Places such as tree holes that periodically hold water, tide water pools in salt marshes, sewage effluent ponds, irrigated pastures, rain water ponds provide favorable conditions for mosquito growth. The problem of mosquitoes becomes severe due to the diseases such as malaria, which can be fatal. There is need to develop public mosquito programs. Chemical, physical, mechanical and biological methods for mosquito repelling are reported in literature. Various plant essential oils are used for mosquito repelling from ancient ages. Studies and research on mosquito repellent is generally aimed at cost reduction and increasing effectivity. Current review summarizes research and studies on mosquito repellents.

**Key words:** Repellent plants, biodegradability, essential oil, breeding, extracted oil.

## INTRODUCTION

Places such as tree holes that periodically hold water, tide water pools in salt marshes, sewage effluent ponds, irrigated pastures, rain water ponds provide favorable conditions for mosquito growth. The problem of mosquitoes becomes severe due to the disease such as malaria, which can be fatal. There is need to develop public mosquito programs. Chemical, physical, mechanical and biological methods for mosquito repelling are reported in literature. Various plant essential oils are used for mosquito repelling from ancient ages. Most of synthetic formulations are carcinogenic and non eco-friendly. Use of herbal products is fast growing due to advantages such as environmental friendliness and high effectiveness. Many researches indicated that the natural plant extracted essential oil and other products exhibit better properties than synthetic ones. Studies and research on mosquito repellent is generally aimed at cost

reduction and increasing effectivity. Current review summarizes research and studies on mosquito repellents.

## RESEARCH AND STUDIES ON MOSQUITO CONTROL

Pattanayak and Dhal surveyed the mosquito repellent plants.<sup>[1]</sup> In their work, they studied the plants located in different tribal area in Odisha. In their paper, they also discussed various chemical, physical, mechanical and biological methods for mosquito repelling. Their studies indicated that the waste distillate remaining after hydro-distillation of the essential oil was far better than others. They listed 29 different plants with insect-repellent property used by the various tribes of odisha. They observed that tribals mainly used the dried stem and leaf of the plant, seed oil. According to authors, plant derived repellent had the advantages such as nontoxicity and biodegradability. They concluded that many

lives can be saved by development of low cost herbal mosquito repellents. Diuk-wasser et.al. presented logistic regression models for five mosquito species implicated as the most likely vectors. [2] They carried out studies based on West Nile virus (WNV). They found that the sensitivity of models ranged from 75% to 87.5%. Lawal et.al. formulated mosquito repellent from essential oil of plants. [3] According to them most of synthetic formulations are carcinogenic and non eco-friendly. They used hydrodistillation method for essential oil. They prepared graded concentrations of essential oil with polyethylene glycol, ethanol and water complex. They found that 8% and 10% formulations gave best results with 68-95% repellency activities for 2 hours.

Khan tried dragonfly nymph for mosquito control. [4] Their investigation established dragonfly nymph as strong bio-control agent mosquito larvae. They found that Dragonflies nymph eat at least about 50 mosquito larvae per hour. Forattin et.al. carried out studies on mosquitoes and anthropic environment. [5] They established relation between a rice irrigation system and mosquito breeding. They found that several species were comfortable with the anthropic environment. According to Shooshtari et.al., one of the efficient ways to control contagious diseases distribution is mosquitoes control and personal protection. [6] They reiterated that herbal repellents are safe and biodegradable alternatives to synthetic chemicals. Their study indicated that essential oils had better repellent efficacy rather than herbal extracts. In their studies Mavundza et.al. documented plants traditionally used to repel mosquitoes. [7] In their investigation, they identified plant species and their parts being used. According to their survey, 13 plant species in the area were used for mosquitoes. Bradford et.al. carried out investigated mosquito biology, behavior, and potential for west Nile virus transmission with respect to effect of weather. [8] They studied maintenance and transmission cycle of West

Nile virus (WNV). Rani et.al. investigated Citronella leaf based herbal mosquito repellents. [9] They used Citronella leaf remains. They made an attempt to produce herbal mosquito repellent using natural binders such as neem powder, potato starch, corn starch, coconut shell powder, wood powder and cow dung. They found that neem powder repellent had maximum repellency activity with 10% Citronella oil. Ganle investigated the reasons for increased policy attention and resource mobilization to malaria control. [10] They carried out focus group discussions (FGDs), unstructured or in-depth interviews, and direct field observations. Mondol et.al. carried out investigation on the control of mosquito larvae using cigarette butts(CB). [11] They prepared CB extract in laboratory and characterized it by FTIR, UV-Vis, pH and conductance. In their study of mosquito larvicidal activity they found that percent mortality increased with increasing the dose and time of exposure of larvae.

Sesanti et.al. used the mixture of papaya leaf extract and seeds effectively to kill mosquito larvae *Anopheles* sp. [12] Schultz et.al. carried out an investigation on *Nepeta cataria* and the Osage orange (*Maclura pomifera*) fruit for their activity against mosquitoes and cockroaches. [13] They found that catnip essential oil and elemol were effective mosquito repellents for treated surfaces. Resh et.al. tried to identify the research journals where mosquito research is published. [14] For this purpose they analyzed research on Agricola database. They found that 2.5% of total serials produced 50% citations. Shankar et.al. carried out investigation on repellent Activity of local plants. [15] They carried out primary screening of five plants. They observed that three plants, *Azadirachta indica*, *Murraya koenigii* and *Citrus medica* provided six hours protection from mosquitos. Yimer and Sahu carried out investigations on extracted oil for *Artemisia Annu*. [16] They used extracted oil with eucalyptus oil, neem oil and rose oil. They

found that the mixture of *Artemisia Annua* with eucalyptus yielded best results.

## CONCLUSION

Investigations and surveys by various researchers indicate that one of the efficient ways to control contagious diseases distribution is mosquitoes control and personal protection. Most of synthetic formulations are carcinogenic and non eco-friendly. Use of herbal products is fast growing due to advantages such as environmental friendliness and high effectiveness. Many researches indicated that the natural plant extracted essential oil and other products exhibit better properties than synthetic ones. Plant derived repellent have the advantages such as nontoxicity and biodegradability. The surveys carried out by various researchers indicate that many lives can be saved by development of low cost herbal mosquito repellents.

## REFERENCES

1. B. Pattanayak and N.K.Dhal, "Plants Having Mosquito Repellent Activity: An Ethnobotanical Survey", *International Journal of Research and Development in Pharmacy and Life Sciences*, August - September, 2015, 4(5), 1760-1765.
2. Maria A. Diuk-Wasser, Heidi E. Brown, Theodore G. Andreadis, And Durland Fish, "Modeling the Spatial Distribution of Mosquito Vectors for West Nile Virus in Connecticut, USA", *Vector-Borne And Zoonotic Diseases*, 2006, 6(3), 283-295.
3. H. O. Lawal, G.O. Adewuyi, A. B. Fawehinmi, A.O. Adeogun, S. O. Etatuvi, "Bioassay of Herbal Mosquito Repellent Formulated from the Essential Oil of Plants", *Journal of Natural Products*, 2012, 5, 109-115.
4. Mohsin Khan, "Control Of Mosquito Population By Dragonfly Nymph", *Research Directions*, Sept 2014, 2(3), 1-7.
5. Oswaldo Paulo Forattini, Ina Kakitani, Eduardo Massad, Daniel Marucci, "Studies on mosquitoes (Diptera: Culicidae) and anthropic environment.2 -Immature stages research at a rice irrigation system location in South-Eastern Brazil", *Rev.Saude Publica*, 1993, 27(4), 227-236.
6. Mohammad Barat Shooshtari, Hamed Haddad Kashani, Siamak Heidari and Ruhollah Ghalandari, "Comparative mosquito repellent efficacy of alcoholic extracts and essential oils of different plants against *Anopheles Stephensi*", *African Journal of Pharmacy and Pharmacology*, 2013, 7(6), 310-314.
7. E.J. Mavundza, R. Maharaja, J.F. Finnie, G. Kabera, J. Van Staden, "An ethnobotanical survey of mosquito repellent plants in uMkhanyakude district, KwaZulu-Natal province, South Africa", *Journal of Ethnopharmacology*, 2011,137, 1516– 1520.
8. Carrie Marie Bradford, "Effects Of Weather On Mosquito Biology, Behavior, And Potential For West Nile Virus Transmission On The Southern High Plains Of Texas", A Dissertation In Environmental Toxicology Submitted to the Graduate Faculty of Texas Tech University in Partial Fulfillment of the Requirements for the Degree of Doctor Of Philosophy Approved Steven Presley, Chairperson of the Committee, Todd Anderson, Stephen Cox ,Nancy McIntyre, Richard Nisbett Accepted John Borrelli Dean of the Graduate School, August, 2005,1-197.
9. Nandini Rani, Aakanksha Wany, Ambarish Saran Vidyarthi and Dev Mani Pandey, "Study of Citronella leaf based herbal mosquito repellents using natural binders", *Current Research in Microbiology and Biotechnology*, 2013, 1(3), 98-103.
10. John Kuumuori Ganle, "Today, we have development but mosquitoes are everywhere: Development, Environmental Change and Malaria in a Rural District of Ghana, Human Welfare, Spring 2012, 1(1), 70-81.
11. Naba Kumar Mondal, Amita Hajra, Deep Chakraborty, Shreya Medda, Uttiya Dey, Jayanta Kumar Datta, "Cigarette Butt Waste and Its Effective Utilization towards Larvicidal Activity of Mosquito", *International Journal of Scientific Research in Environmental Sciences*, 2015, 3(1), 0009-0015.

12. Henny Sesanti, Arsunan, A.A and Hasanuddin Ishak, "Potential Test of Papaya Leaf and Seed Extract(Carica Papaya) as Larvicides against Anopheles Mosquito Larvae Mortality Sp. in Jayapura, Papua Indonesia", International Journal of Scientific and Research Publications, June 2014, 4(6), 1-8.
13. Gretchen Schultz, Chris Peterson, and Joel Coalts, "Natural Insect Repellents: Activity against Mosquitoes and Cockroaches", American Chemical Society, 2006, 1, 168-174.
14. Vincent H. Resh, Norma G. Kobzina,, Ferenc De Szalay E.T.Tdoa Rold P. Batzer, "Where Is Mosquito Research Published, March 1991, 7(1), 123-125.
15. B. Sai Shankar ,T. Saravanan, M. Ragavi, G. Kaviya, Ankita Anushree, Arul Samraj, Samuel Tennyson, "Screening of Local Plants for Their Repellent Activity against Mosquitoes (Diptera: Culicidae)", Journal of Mosquito Research, 2013, 3(14), 97-104
16. Seid Yimer and Omprakash Sahu, "Anti-mosquito repellent from Artemisia Annu, International Journal of Medical and Clinical Sciences, May, 2014, 1(1), 001-008.

How to cite this article: Kulkarni SJ. Review on mosquito control: surveys, analysis and investigations. International Journal of Research and Review. 2017; 4(2):10-13.

