

Larvicidal Activity of Roasted Coconut Shell's Extracts against Different Species of Mosquitoes Found in and around Mumbai

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Abstract:

Comparative study of the various fractions of oil in organic solvents obtained by roasting dried coconut shells for larvicidal activity against the 3rd and 4th instars' larvae of Culex pipen fatigan, Aedes aegypti, Anopheles stephensi to combat various diseases. The extracts of roasted coconut shell were prepared by heating the pieces of coconut shell in device developed⁴ and were tested for larvicidal activity. The petroleum ether extract proved maximum larvicidal activity with minimum concentration followed by crude oily extract and chloroform. In conclusion the petroleum ether extract can be developed as eco friendly larvicides.

Key words: Cocos nucifera, Culex pipen fatigan, Aedes aegypti, Anopheles stephensi, Petroleum ether, Chloroform, Methanol.

Introduction:

The Cocos nucifera is one of the plant abundantly available in the coastal region whose each and every part is being used by mankind, hence the plant is known as 'Kalpa vriksha' in India, which means 'the tree which provides all the necessities of life' (1, 2, 3). It is used for its several beneficial products such as fiber, timber, functional food, oil and charcoal. It is also used to treat abscesses, asthma, bronchitis, burns, cold, constipation, cough, dysentery, earache, fever, flue and diarrhea. The juice of coconut is also used to strengthen the heart and restore energy to the ill (4, 5). Various studies suggest that the dry coconut shells are

source of certain organic materials such as polyphenols and organic acid which has great potential and may be good source for future antibiotic (6, 7). Coconut shell is a waste from agricultural sector and is available in large quantities in tropical region of India. The total production of coconut oil of India is over a quarter of world's total production which will grow further with the global demand. Coconut shell is waste material of coconut oil industry; hotel industry and house hold waste. Hence the purpose of the study is to emphasize and create awareness of the great potential of the plant and its application as alternative source of biological agent in herbal pesticides to kill mosquito larvae.

Material and Methods:

Cocos nucifera mesocarp was taken, sun dried, broken into pieces. 250g of the pieces were weighed and bioactive crude oil was extracted by heating the pieces in earthen pot. The dark viscous oil is subjected to solvent extraction with increasing polarity such as Petroleum ether, Chloroform and Methanol using separating funnel.

Solvent extraction: 5ml of oil was taken in a separating funnel and 20ml petroleum ether was added. It was vigorously shaken for 10-15mins and petroleum ether mixture in a petri plate and left for the solvent to evaporate. This process is carried till the petroleum ether is colourless mixture. The residue is subjected to chloroform and methanol.

Bioassay: Bioassay was conducted in 500ml glass beakers containing 250 ml of dechlorinated water for each species separately. The test solution with

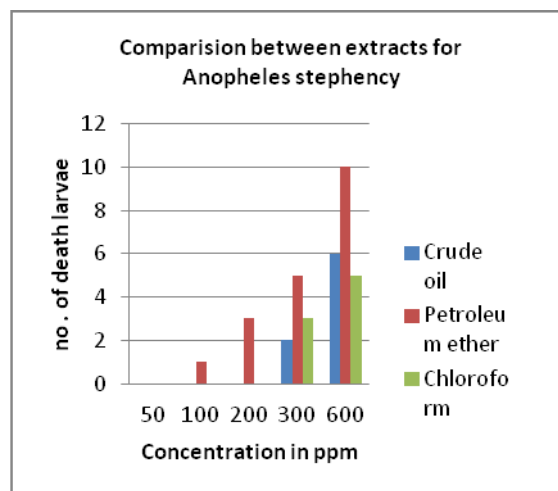
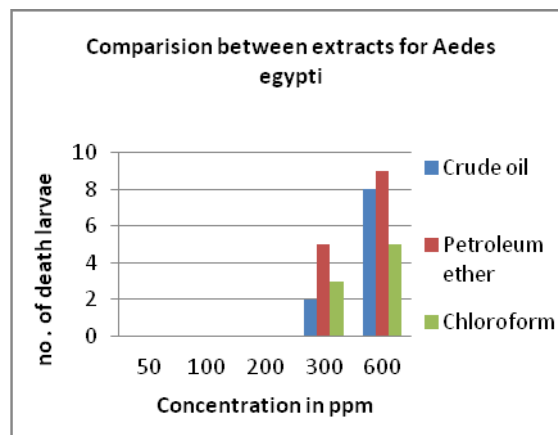
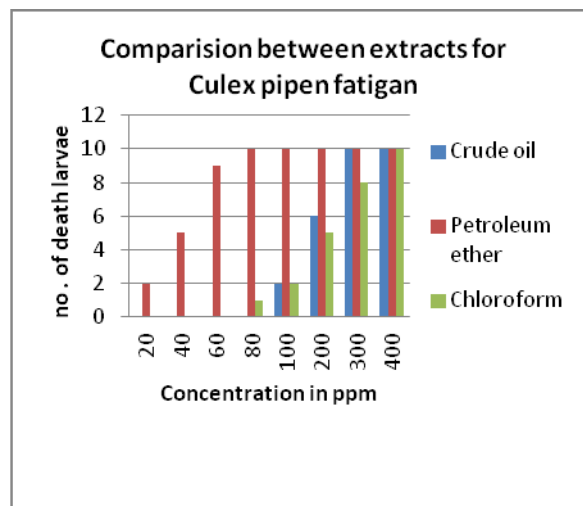
four replicates was prepared according to the guidelines of WHO (2005)⁽⁸⁾. A batch of 3rd and early 4th instar larvae(10 in no.) of *Culex pipen fatigan*, *Aedes aegypti* and *Anopheles stephensi* were collected from the field and introduced in each test solution and in an appropriate control solution. The results were observed at 24hour.

Results discussion:

Among all three extract (Crude oil, Petroleum ether and Chloroform) Petroleum ether extract has shown maximum larvicidal activity form all the species tested followed by crude oil extract and chloroform extract. Also it was observed that larval development period extended. Larvae of treated group took 3-4 days to develop from third instar to fourth instar where as it took 2-3 days in the control group. This phenomenon of prolongation of larval development period suggests that the extract interfered in the development of mosquito larvae and further led to the death of larvae. Several researches have been done on other medicinal plants which showed that the plant extract increases the developmental stage of mosquitoes leading to prolongation of larval and pupal development stage of mosquitoes leading to prolongation of larval and pupal development period^(9, 10,11).

Table 1: Lethal concentration of organic solvent extracts of roasted coconut shell against third and fourth instar larvae of *Culex pipen fatigan* mosquitos

Species	Extract	LC ₅₀ (ppm)
<i>Culex pipen fatigan</i>	Crude oil	149.35
	Petroleum ether	31.85
	Chloroform	176.30
<i>Ades</i>	Crude oil	565.56
	Petroleum ether	295.54
	Chloroform	295.07
<i>Anopheles</i>	Crude oil	725.37
	Petroleum ether	298.54
	Chloroform	746.00



Conclusion: Present investigations suggest that the Petroleum ether extract possess effective larvicidal properties against *Culex pipen fatigan*, *Aedes aegypti* and *Anopheles stephensi* can be a better replaceable option to chemical substituent which can be used as herbal insecticide for treating the mosquito larvae.

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