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Efficacy of Plant Extracts For management of *Cimex lectularius* (Bed Bug)

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ABSTRACT

Bed bug bites can cause itching and may also result in swelling or blister-like skin inflammations. The greatest risk posed by bed bugs is the irritation of bites or the psychological concerns resulting in lack of sleep and stress. Therefore, in the present study aqueous extracts of different plants were used for management of bed bug Cimex lectularius. Five different plants i.e. Azadiracta indica, Mangifera indica, Polyalthia longifolia, Annona squamosa, Ficus benghalensis were studied against the bed bug and observe the mortality. In present study, combination of five plants leaves extract shows 100% mortality within 19 seconds as compared to single plant leaf extract. The effect of each plant leaf extract requires maximum time for 100% mortality in seconds i.e. 180 sec., 320 sec., 150 sec., 240 sec., 140 sec. in A. indica, M. indica, P. longifolia, A. squamosa, F. bengalensis respectively.

Keywords: *Aqueous extracts, Cimex lectularius, Bed bug management*

INTRODUCTION

Bed bugs are parasitic insects of the cimicid family that feed exclusively on blood. *Cimex lectularius*, the common bed bug, it prefers to feed on human blood. Other *Cimex* species specialize in other animals, e.g., bat bugs, such as *Cimex pipistrelli* (Europe), *Cimex pilosellus*. The name "bed bug" derives from the preferred habitat of *Cimex lectularius*: warm houses and especially nearby or inside of beds and bedding or other sleep areas. Bed bugs are mainly active at night, but are not exclusively nocturnal. They usually feed on their hosts without being noticed.[1]

Infestations have occurred in homes, hotels, hostels, cruise ships, airoplanes, trains, schools, and long-term care facilities [2]. A number of adverse health effects may result from bed bug bites, including skin rashes, psychological effects, and allergic symptoms[3]. Bed bug can be infected by at least 28 human pathogens, but no study has clearly found that the insect can transmit the pathogen to a human being[4]. Additional health effects reported in medical literature have included: facilitated secondary infections from scratching bites [5].

Natural products of plant origin with insecticidal properties have been tried in the recent past for control of a variety of insect pests and vectors. Plants are considered as a rich source of bioactive chemicals and they may be an alternative source of mosquito control agents. Natural products are generally preferred because of their less harmful nature to non target organisms and due to their innate biodegradability. An attempt was made to contribute towards this need, we examined the effects of the five plant leaves aqueous extracts against adults of *Cimex lectularius.*

MATERIAL AND METHODS

Preparation of plant leaves extract:

In the present study five different plants i.e. *Azadiracta indica, Mangifera indica, Polyalthia longifolia, Annona squamosa, Ficus bengalensis* have been collected from different localities from Karad city. The leaves of all plants were brought into the laboratory and washed with distilled water and dried. After complete drying, the plant material is powdered in mortar pestle. The power of five different plants was processed for extract preparation by using soxlet apparatus. The aqueous extract prepared by using soxlet apparatus is concentrated, air dried and used for further experimental study.

Collection of bed bugs:

C. lectularius bugs were used for evaluation of anti bed bug activity. Adult blood engorged female bugs were removed & collected from the infested area and identified by the entomologist. Bed bugs were maintained in the laboratory at 25 ± 2ºC and 75 ± 5% RH in the Department of Zoology at the S. G. M. College, Karad. According to methods described by the relative humidity (RH) was attained by using in glass humidity chambers[6].

Anti bed bug activity tests:

For testing the anti bed bug activity nine different groups of test animals were prepared for experimental purpose. Each group contains five ticks. The group -1 was taken as control, while other eight groups were taken as experimental groups. The aqueous extract of each plant leaf powder (5mg/ml) was used for antiacaricidal activity. The drop wise addition of plant extracts on the experimental animal and distilled water on control animals were carried out. The time taken for 100% mortality was notified. The single plant extract as well as different combination of plants extract were tested for their antiacaricidal activity. The topical application method have been successfully used previously by other researchers in screening plants for anti bed bug properties[7].

RESULT AND DISCUSSION

The time required for 100% mortality in each group recorded in Table -1. The result indicates that, plants leaves extract combination shows high rate of mortality in minimum seconds as compared to single plant extract. The combination of all 5 different plants leaves extract shows 100% mortality occurs within 19 seconds.

Table No. 1. Effect of aqueous extract of different plants on acaricidal activity and percent mortality in time (Minute) at concentration 5mg/ml

Groups	Name of plant	Concentration 5mg/1ml	Time of 100% death (Time in Second)
I	Control	Distilled water	No mortality
II	*Azardiracta indica*	5 mg/ml	180 ± 0.044
III	*Mangifera indica*	5 mg /ml	320 ± 0.027
IV	*Polyalthia longifolia*	5 mg /ml	150 ± 0.011
V	*Annona squamosa*	5 mg /ml	240 ± 0.07
VI	*Ficus bengalensis*	5 mg /ml	140 ± 0.30
VII	*Azardiracta indica + Annona squamosa + Polythia longifolia*	5 mg /ml	39 ± 0.02
VIII	*Ficus bengalensis +Mangifera indica + Polythia longifolia*	5 mg /ml	31 ± 0.23
IX	*Azardiracta indica + Annona squamosa + Polythia longifolia + Ficus bengalensis + Mangifera indica*	5 mg/ml	19 ± 0.01

Tagates erecta has contained various chemical constituents such as thiophenes, flavonoids, carotenoids, and triterpeniods[8]. The flowers of *T. erecta* have antibacterial, antifungal, cytotoxic (against brine shrimp nauplii), and insecticidal activity. Efficacies of medicinal plant extract against blood-sucking parasites 39 (against *Tribolium castaneum* and *C. quinquefasciatus*); the potency of the chloro-form fraction was higher than that of the ethanol extract or petroleum ether fraction of the flower of *T. erecta*[9].

The methanol extracts from *Calophyllum inophyllum* and *R. Nasutus* seeds and leaves showed significant larvicidal and growth-regulatory activities even at very low concentrations on the juveniles of *C. quinquefasciatus, A. stephensi,* and *A. aegypti*[10]. *N. tabacum* extracts were tested for pesticidal activity against *Tribolium castaneum*, and shown to be very active against *Boophilus microplus* [11]. Combined effects of plant products have been exploited by many researchers[12].

Therefore In the present work combined effect of all the 5 plants shows the tremendous death (100 % mortality) of bed bugs within 19 seconds, hence these five plants maybe source of anti-bug agent.

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