COMPARATIVE EFFICACY OF CERTAIN PLANT EXTRACTS AGAINST MENOPON GALLINAE AND LIPEURUS CAPONIS

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Kerala has rich ethnobotanical background and herbal medicines have stood the test of time for their safety, efficacy, cultural acceptability and lesser side effects. Nevertheless, topical insecticides remain the mainstay of control of lousiness in livestock and poultry and this has led to several problems including the development of resistance, toxic manifestations in animals and birds, and concerns of residues in milk, meat as well as environment. Preliminary in vitro trials were conducted to assess the comparative efficacy of Lantana camara, Calotropis gigantea and Allium sativum against poultry lice by adopting filter paper protocol. The lice selected for the study were recovered from heavy natural infestation from backyard chicken. They were morphologically identified as Menopon gallinae and Lipeurus caponis. The trials proved the significantly high lousicidal property of ethanolic extracts of C. gigantea and A. sativum at 5% concentration in 24 hour incubation period. The lousicidal effect of L. camara as evidenced at 10% concentration after 48 hour incubation period was significantly lower than other two plant extracts with the same treatment. This seems to indicate that extracts from A. sativum bulbs and C. gigantea possess better lousicidal properties than L. camara which were directly proportionate to the concentration. The results are encouraging and provide scientific validation of the efficacy of C. gigantea and A. sativum against Menopon gallinae and Lipeurus caponis. Knowledge of plants with insecticidal properties, their toxic principles and biological activity is of utmost importance not only to replace toxic chemicals but also to unravel their effects in lesser known species.

**Keywords:** Lantana camara, Calotropis gigantea, Allium sativum, Poultry louse

**INTRODUCTION**

Kerala has ecologically optimum conditions for the propagation of ectoparasite in domestic animals. Problems of ectoparasites have been

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quite alarming leading to enormous economic losses by affecting production, causing enumerable skin diseases and transmission of infectious diseases (Panda and Mishra, 1997). Among ectoparasites, tick, mites and lice infestation produce immense productivity loss by direct biting injury and also through their disease transmission capability. Lice are permanent ectoparasites that constitute a very large group of more than three hundred species. They cause intense irritation to the skin, stimulate rubbing or licking leading to restlessness, reduced weight gain and reduced production in domestic livestock and poultry. Poultry lice were always a menace to not only intensive and backyard system of poultry rearing but also to the booming pet bird industry. The current practice of treatment and control is mainly by the use of synthetic insecticides which has far-reaching effects on toxicity as well as drug resistance. Considering the economics of ectoparasite infestation, toxicity of synthetic pesticides, emerging resistance problems and growing concern for environment, increased attention need be diverted towards designing safe eco-friendly, cheap and yet alternative methods of control (Nadkarni, 1976). Natural substances of plant origin constituted an important segment of these alternative approaches. Over 2000 plant species have been reported to possess insecticidal activity and only a fraction of them are analysed (Subramaniam and Kaushik, 2014). Ponnudurai et al. (2007) has recorded 100 per cent reduction of bird louse treated with herbal formulation containing Azadirachta indica, Cadrus deodara, Brassica compestris and Ocimum sanctum. Allium sativum (garlic), a member of family Alliaceae has been shown to possess arthropocidal properties (Stjernberg and Berglund, 2000; and Jariaj, 2001). The ectoparasiticidal effects of a number of such ethnobotanicals readily available in Kerala need scientific validation through preliminary in vitro trials followed by clinical validation. Hence a study was designed to evaluate the comparative efficacy of Lantana camara, Calotropis gigantea and Allium sativum against poultry lice collected during natural infestation.

MATERIALS AND METHODS

Cold Extraction Process

Leaves of L. camara (LC), C. gigantea (CG) and bulbs of A. sativum (ALS), were used for the study. All were shade dried and powdered in electric grinder. Ethanolic extracts were prepared from approximately 200 g of the grated material using the extraction technique described by Azhahanambe et al. (2004) with some modifications. Briefly, the gratings were macerated in rectified spirit @200 g/L, in a closed container for 24 h with intermittent vigorous mixing. The supernatant was collected in large petridishes and the alcohol was allowed to evaporate. The residues obtained after evaporation were used for in vitro assays at different concentrations. Different concentrations of the extracts viz., 5% and 10% were prepared using one per cent aqueous Tween 80 (v/v) as the solvent. The same served as control for comparison of extract activity. The activity was tested against the poultry louse.

Invitro Lousicidal Activity

The lice were collected from natural infestations in backyard chicken, identified morphologically (Soulsby, 1982) and were maintained in humidity chamber (ROTEK) at ambient conditions with temperature of 28 °C and relative humidity of 80%. Filter paper method was adopted for testing the efficacy of different extracts as described by Nalamvar et al. (2009). The extracts were poured
on to Whatman No. 1 filter paper and allowed to dry. The dried filter papers were placed on different labeled Petri dishes. Thirty lice each were selected randomly and placed in these Petri dishes, which were then maintained in a humidity chamber at a temperature of 28 °C and relative humidity of 80% and checked for number of live lice after definite time interval of 4 hours. The number of dead lice were recorded for each concentration of the extracts and compared with that of control. Three replicates were tested for each treatment. The results were statistically analysed using Chisquare test for multiple proportion.

RESULTS AND DISCUSSION

The lice were morphologically identified as *Menopon gallinae* and *Lipeurus caponis*. The lice were periodically examined for their livability under a stereozoom microscope. The number of dead louse were recorded and taken as the indicator of insecticidal property of the selected extracts. Similar results were observed for both the species. The results of filter paper method using the ethanolic extract of the plants are shown in table

All the lice were found live after 24 hour post exposure. At 24 hour exposure, CG and ALS were shown to possess statistically similar insecticidal activity at 5% concentration. At 48 hour post exposure, CG and ALS were found to exhibit the best insecticidal activity as evident from 100% lice mortality. At 10% dilution also CG and ALS exhibited significantly higher activity when compared to LC. This seems to indicate that extracts from *A. sativum* bulbs and *C. gigantea* possess better lousicidal properties than *L. camara* which were directly proportionate to the concentration. The results also concur with that of Kumar *et al.* (2011) who reported that mortality percentage of adult ticks increased as the concentration of herbal extracts increased and as the time interval progressed. Nchu *et al.* (2005), evaluating the toxic effects of extracts of *A. sativum* bulbs on adults of *Hyalomma* and *Rhipicephalus sp* of ticks concluded that ethanolic extracts caused mortality of adult ticks after 24 hours of exposure while dichloromethane extracts caused mortality in less than an hour. Nalamwar *et al.* (2009) inferred that *Acorus calamus* rhizomes contain certain constituents responsible for mortality of *Damalinia caprae*, the goat louse. Preliminary investigations on lousicidal activity of *A. sativum* extracts against *D. caprae* infestation in goats were promising (Bindu Lakshmanan *et al.*, 2013). Subramanian and Kaushik (2014) had demonstrated the insecticidal properties of *A. sativum* against flies of the genera *Musca* and *Aedes*. Birrenkott *et al.* (2000) reported that topical application of garlic reduced northern mite infestation in laying hens. Even though, Dua *et al.* (2010) had established the adulticidal activity of essential oils of *L. camara* against adult *Culex* and *Aedes* spp of mosquitoes, we found that ethanolic extracts of LC had significantly lower insecticidal property against adult lice. The results of this study also suggested the potent lousicidal efficacy of *C. gigantea* (Erukku) and *A. sativum* (garlic) against *M. gallinae* and *L. caponis* of poultry. This would improve the chances of appropriate selection of the herbal ectoparasiticidal agent, either alone or in combination since the treatment so far adopted was the application of different classes of chemical insecticides.

CONCLUSION

The results of the present study directed towards comparative evaluation of insecticidal properties of locally available ethnobotanical extracts
revealed the potent lousicidal activity of *C. gigantea* and *A. sativum* against the common species of poultry louse. It was also shown that *L. camara* is less effective when compared to the other two extracts. However, further studies are needed to identify the active components in the Erukku and garlic extract responsible for this activity. Besides, in vivo studies using suitable formulations against different types of infestations are to be considered to exploit their insecticidal properties.

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**REFERENCES**


**APPENDIX**

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