

Mortality caused by aqueous extract of the leaves of *Datura stramineus* to goat biting louse, *Bovicola caprae* (Phthiraptera)

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Abstract: Extensive and indiscriminate use of organic lousicides is leading to environmental hazards i.e. persistence of residues, development of resistance and targeting of non-target beneficial organism. Hence, phytotherapy is emerging as effective tool for louse control, due to ecofriendly and biodegradable nature of plant extracts. In the present study the mortality and repellency caused by five concentration of aqueous extract of the leaves of commonly available *Datura stramineus* were tested against goat biting louse, *Bovicola caprae*. Fifteen percent concentration of extract prepared from leaves of aforesaid plant imparted 77% mortality and 66% repellency to goat biting louse.

Keywords: Biting louse, *Bovicola caprae*, *Datura stramineus*, Goat louse, Phthiraptera

INTRODUCTION

Effective lice control is no longer a matter of replicate application of synthetic pesticides as it harms the non-target beneficial organisms, contaminates food and feed, apart from its economic implications. Extensive and indiscriminate use of organic pesticides generally creates environmental hazards. Pesticidal formulations based on chemicals from plants have attained particular attention because of specificity to insect pests, their biodegradable nature and potential for commercial application as natural toxicant, repellent or behaviour modifiers. The herbal formulations launched by different pharmaceutical companies (Pestoban-D, Nimbitor, AV/EPP/14 and Ectozee) have been tested against ectoparasites of poultry, dogs, buffaloes and cattle (Das *et al.*, 1993; Maske and Bhilegaonkar, 1995, 96; Bhilegaonkar and Maske, 1997; Maske *et al.*, 2000)

The lousicidal properties of few plant extracts have been tested against poultry lice (Kumar *et al* 2002a, b, 2003; Khan *et al.*, 2008, Brigid *et al.*, 2015, Al-musawi, 2017). Workers likes Abdel- Ghaffar *et al.* (2012), Campli *et al.* (2012) and Yones *et al.* (2016) have tested the lousicidal properties of certain plant extracts against human head lice. The lousicidal efficacy of camphor oil has been tested against a pigeon louse (Khater *et al.*, 2013). Effect of garlic (*Allium setivum*) on the goat lice *Bovicola caprae* has been studied by Lakshmanan *et al.* (2013). Kosale *et al.* (2009) has also tested the lousicidal activity of certain plants. The present report supplements information on the efficacy of aqueous extract prepared from the leaves of *Datura*

stramineus, against goat biting louse, *Bovicola caprae*.

MATERIALS AND METHODS

For the present study healthier lice (*Bovicola caprae*) were collected from lousy goats, with the help of wetted camel hairbrush. The leaves of the common plant *Datura stramineus* were collected from neighboring localities. For the preparation of extract, the leaves of plants were dried in shade, at room temperature. The dried materials were cut into small pieces and then grounded (with the help of electric/ iron grinder) into fine powder. The powder was soaked in water in weight to volume ratio ranging from 1:3 to 1:5 and kept for 72 hrs., at room temperature. The extract was filtered through Whatman's filter paper no. 1 (3 times). The water was removed from the extracts by evaporation with the help of rotovap. The residue of the aqueous extract of leaves so prepared was stored in the freezer, till testing. *In-vitro* filter paper bioassay (mortality and repellency) of the lousicidal activity of extract (untreated filter paper as control) was conducted on the lines adopted by Kumar *et al.* (2002a) and Khan *et al.* (2008). One way Anova test was applied to determine the significance of differences in the mortality rates and exposure time.

RESULTS AND DISCUSSION

The percentage mortality caused by different concentrations of the extract of *Datura* leaves to goat biting louse, *Bovicola caprae* after 6 hrs., 12 hrs., 24 hrs. and 48 hrs. intervals has been shown in Fig. 1. Five percent concentration of *Datura* leaves caused 35.2 % mortality

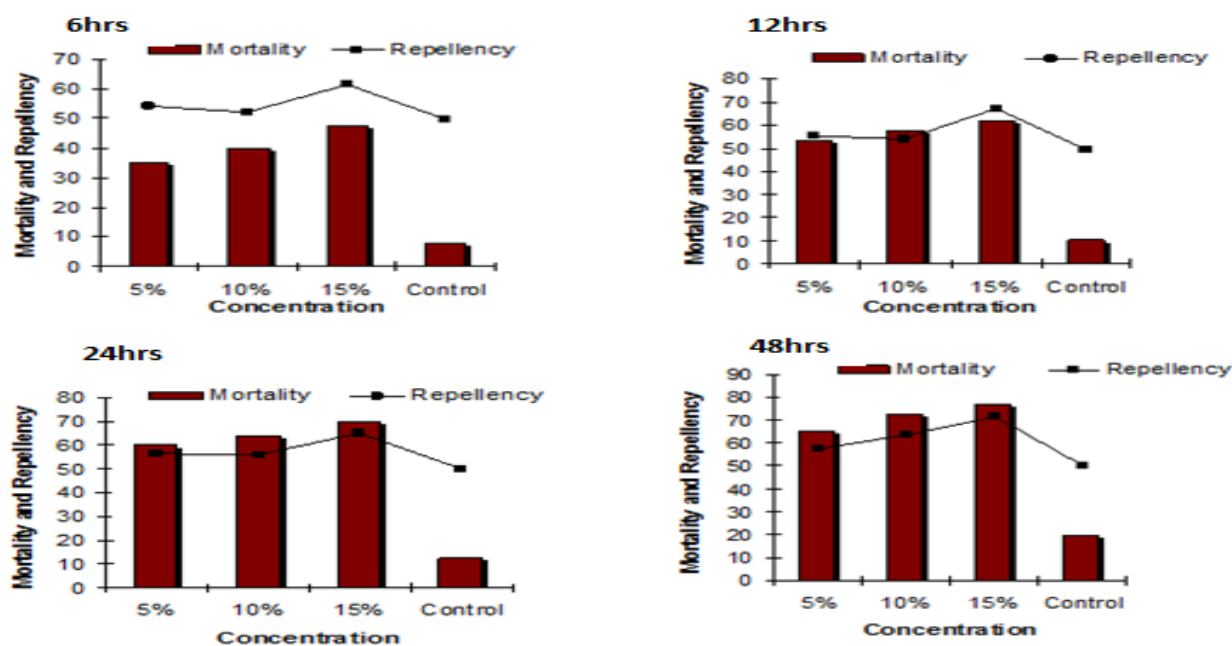


Fig. 1. Showing percent mortality (%) and repellency (%) of goat biting louse, *Bovicola caprae* against three concentration of *Datura* leaves (*Datura stramonium*) extract, with respect to exposure time.

ty in 6 hrs., 53.1 % in 12 hrs., 60.2 % in 24 hrs. and 65.4% in 48 hrs. Likewise, 10 % concentration of extract caused 40.2 % mortality after 6 hrs., 57.3 % after 12 hrs., 63.8% after 24 hrs. and 72.6 % after 48 hrs. Lastly, the percent mortality caused by 15 % concentration at 6 hrs., 12 hrs., 24 hrs. and 48 hrs. remained 47.6 %, 62.3 %, 70.1 % and 76.78 %, respectively. The corresponding values of percentage mortality in control group were 7.67 %, 10.33 %, 12.29 % and 19.33 %. The differences in the mortality rates imparted by the extracts were significant (at 0.001 level) with respect to concentration but not the exposure time (one way Anova). Percentage repellency caused by 5%, 10% and 15% concentrations of *Datura* extract at 6, 12, 24, and 48 hrs. are shown in Fig. 1. Mean value of repellency caused by 5.0% preparation remained 55.7%. Likewise, the average values of percentage repellency shown by 10 and 15% preparation of *Datura* leaves extract remained 56.4% and 66.3%, respectively. Few workers have tried to test the lousicidal potential of formulations launched by selected pharmaceutical companies. viz. Nimbitor (Maske *et al.*, 2000), Pestoban-D (Das *et al.*, 1993), Ectozee (Maske and Bhilegaonkar, 1995; 96) and AV/EPP/14 (Bhilegaonkar and Maske, 1997). Lousicidal properties of *Citrus vulgaris*, *Azadirachta indica*, *Adhatoda vossica*, *Argemone maxicana* and *Cassio fistula* have been tested against tropical hen louse, *Lipeurus lawrensis tropicalis* (Kumar *et al.*, 2002a). The aqueous extract prepared from the leaves of *Azadirachta indica* imparted maximum mortality (80%) and repellency (73%) to a *L. lawrensis tropicalis*. Furthermore, lousicidal potentials of leaf and seed extract of *Zanthoxylum alatum* have

also been tested (Kumar *et al.*, 2002b, 03). An isolated fraction of the acetone extract of *Z. alatum* imparted 80% mortality and 96% repellency to *L. lawrensis tropicalis* (Kumar *et al.*, 2002b). Likewise, the acetone extract prepared from seed extract of same plant caused 100% mortality to aforesaid louse in 12 hours (at 1:1 concentration). The crude *Mentha piperita* oil diluted with methanol also caused 100% mortality to a *L. lawrensis tropicalis* in 48 hours (Khan *et al.*, 2008). Khater *et al.* (2013) found that 1% camphor oil and d phenothrin killed the tested pigeon lice, *Columbicola columbae* within one hour. Likewise, Almusawi (2017) noted the potent anti-lice property of *Ziziphus mauritiana* alkaloids and *Eucalyptus camaldulensis* against poultry lice *Menacanthus stramineus* and recorded its LC 50 values as 3.687 and 1.045, respectively. Leaves of *Datura* appear to contain an ingredient having lousicidal property as its extract imparted 77% mortality and 66% repellency to goat biting louse (at 15% concentration, in 48 hrs.). Plants extract imparting more than 75% mortality to pest attract the attention of workers for further screening (separation of fractions present in its extract by TLC, testing of its active ingredient for lousicidal potential, followed by molecular characterization)

Conclusion

Plants contain a wide range of bioactive compounds having potent pesticidal properties. They are easily extractable, ecofriendly, biodegradable and do not harm non target organism. The aqueous extract prepared from leaves of a commonly available plant *Datura stramonium* imparted 77% mortality to goat biting

louse, *Bovicola caprae* (at 15% concentration in 48 hrs.). Further separation of its active ingredients, its testing and characterization may help in developing a lousicide.

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