Efficacy of different ethno-veterinary products against cattle ticks in Nepal

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Abstract
Ticks cause serious economic losses in cattle and an experiment was conducted to test efficacy of different ethno-veterinary products against ticks in Lamjung, Nepal during 2017-2018. The experiment was designed in completely randomized design with seven treatments and four replications. Cattle ticks (Rhipicephalus (Boophilus) microplus) were collected, reared and produced next generation for the test. After 1 hour of treatment application, least number of ticks were found live in Cypermethrin application (2.5%) followed by Neem (10%), saltwater (25%), chinaberry and Mug-wort (27.5%). This study clearly shows that different ethno-veterinary products may be the alternative to manage the cattle ticks in the context of developing resistancy to acaricides.

Keywords: Ethno-veterinary products, cattle ticks

1. Introduction
Ticks cause serious economic losses in livestock industry (Gray, 1985, Sonenshine, 1991; Dhital, 2018) [7, 14, 24]. It has been studied that about 80% of the world cattle population is infested with ticks (Bowman et al., 1996) [4]. Ticks transmitted viral, bacterial and protozoan pathogens causing diseases like hemorrhagic fever, ehrlichiosis, anaplasmosis, theileriosis, and babesiosis in meat and dairy animals (Rajput et al., 2006) [22]. The efficacy of some acaricides against some ectoparasites became questionable (Hogette, 1999) [15]. It is reported that ticks developed resistancy to different acaricides in different parts of world (George et al., 2004; Kunz and Kemp, 1994) [10, 17]. Tick had the excellent capacity to develop resistance to the acaricides (Solomon, 1983) [23]. It is reported that ticks developed resistance to Amitraz in different parts of Kenya (Kamiti and Kamidi, 2005) [16]. Similarly, resistance is normally seen with more than one class of acaricide in Mexico (Foil et al., 2004) [9] and multiclass resistance is general in Brazil (Graf et al., 2004) [13]. Foil et al. (2004) [9] gave an average of 12 years for evolution of resistance to Amitraz. Different study report showed that ticks cause serious losses on cattle farming in Nepal (Bohara and Shrestha 2016; Dhital. 2018; Dhital et al., 2018) [2, 7, 8]. It seems necessary to evaluate the efficacy of different ethno-veterinary products against ticks.

2. Material and Methods
An experiment was conducted to test efficacy of different products against ticks in Lamjung, Nepal during 2017-2018. The experiment was designed in completely randomized designs with seven treatments and four replications namely; Neem (Azadirachta indica) leaf extracts solution, Chinaberry (Melia azedarach) leaf extract solution, Mug-wort (Artemisia vulgaris) leaf extract solution, Salt-water solution, Cypermethrin and control (no products application).

2.1 Collection of Ticks
Randomly 20 cattle ticks (Rhipicephalus (Boophilus) microplus) were collected from Bageshwori Gaushala, Bharatpur, Chitwan, Nepal in March, 2018. Ticks were collected manually using a forcep and gloves. The collected ticks were stored in a sterile container.
2.2 Rearing of ticks
Collected ticks were reared in Entomology lab at Institute of Agriculture and Animal Science, Lamjung Campus. After about 3-4 days ticks were found laid eggs and after one month eggs were hatched out into larvae. Then after fifth days of hatching, ticks were allocated for the testing the efficacy of different botanical product. Ten immature ticks were allocated in each petridis and applications of treatments were done accordingly.

2.3 Preparation of different products
Neem (Azadirachta indica) leaf extracts solution, Chinaberry (Melia azedarach) leaf extract solution, Mug-wort (Artemisia vulgaris) leaf extract solution, Salt-water solution, Cypermetrhrin. Leaves of Neem, Chinaberry, Mug-wort, Tobacco were grinded and produced its extract. Similarly, mixture of 100 gram common salt (NaCl) and 200 ml water were used for the another treatments. Tik-out (Cypermethrin 100 EC) was used as chemical pesticides against the ticks.

2.4 Statistical Analysis
All the information collected during study including qualitative information were coded and tabulated in Excel sheet. Statistical tools R 4.2.2 were used for the analysis. The recorded data were subjected to analysis of variance (ANOVA) and significant mean differences were separated by Duncan's Multiple Range Test (DMRT) at 0.05 percent level of significance (Gomez and Gomez, 1984) [12].

3. Results
As presented in Table 1 and Figure 1 highest number of dead ticks were found in Cype- rmethrin treatment followed by Neem whereas least in Chinaberry treatment after 10 min and 1 hour of treatment application. After 1 hour of treatment application, least number of ticks were found live in Cypermetrhrin application (2.5%) followed by Neem (100%), saltwater (25%), chinaberry and Mug-wort (27.5%). All ticks were found live in control treatment.

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Treatment</th>
<th>Average live ticks number after 10 min of treatment application</th>
<th>Average live ticks number after 1 hr of treatment application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Neem</td>
<td>8.25cd</td>
<td>0.75d</td>
</tr>
<tr>
<td>2</td>
<td>Chinaberry</td>
<td>9.25ab</td>
<td>3.75b</td>
</tr>
<tr>
<td>3</td>
<td>Mug-wort</td>
<td>8.75bc</td>
<td>2.75c</td>
</tr>
<tr>
<td>4</td>
<td>Tobacco</td>
<td>8.5bc</td>
<td>2.75c</td>
</tr>
<tr>
<td>5</td>
<td>Saltwater</td>
<td>8.75bc</td>
<td>2.50c</td>
</tr>
<tr>
<td>6</td>
<td>Cypermethrin</td>
<td>7.5d</td>
<td>0.50d</td>
</tr>
<tr>
<td>7</td>
<td>Control</td>
<td>10.00a</td>
<td>10.00a</td>
</tr>
<tr>
<td>Test of Sign.</td>
<td>***</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>

**Grand Mean**
- 8.71
- 3.28

**LSD**
- 0.85

**CV**
- 6.62
- 17.57

**EMS**
- 0.33
- 0.33

* Means followed by the same letter in each column are not significantly different by DMRT at < 0.05 percent level

4. Discussions
Different botanical and other products were found effective for the control of tick which is supported by different other reports. Among the tested products Neem was found most effective followed by salt water, Mug-wort (Artemisia vulgaris), tobacco (Nicotina tabaccum) and chinaberry (Mellia azadiract). It is reported by Ghosh et al. (2007) [11] Neem (Azadirachta indica) against different life stages of ticks were highly encouraging. Neem contain Azadirachtin which possesses insecticidal property (Nawrot, and Harmatha, 1994; Vietmeyer, 1992) [18, 26]. Tobacco (Nicotiana tabacum) is used in eradication of external pest of cattle infestation and mange (Davidovic et al., 2011) [6]. It is reported that tobacco leaves (Nicotiana tabacum Linn., Solanaceae) have been used as insecticide and pesticide for long time (Abdul-ghaney et al., 2011) [1]. Carlile (2006) [5] remarked that nicotine will rapidly penetrate the cuticle of the target organism, and can be used effectively as a contact insecticide. Mug-wort (Artemisia vulgaris) was using in the treatment of animals infected by blood parasites by rubbing the ground fresh leaves (Davidovic et al., 2011) [6]. Essential oils from Artemisia vulgaris work against insect (Bouzenna and Krichen, 2013; Negahban et al.,

![Fig 1: Live ticks after different times of treatment application in Lamjung, Nepal, 2017/018](image-url)


