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Acaricidal Activity of *Lantana camara Linn* (Yellow Sage) Flower Extract Against *Rhipicephalus sanguineus* (Dog Tick): Towards Effective Insecticidal Organic Extract

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Abstract

Ticks, particularly Rhipicephalus sanguineus, commonly referred to as the dog tick, pose significant health risks to both animals and humans due to their ability to transmit various infections. As the prevalence of these risks continues to escalate, there is a growing need for environmentally friendly and sustainable solutions. This study delves into the acaricidal potential of Lantana camara Linn, also known as Yellow Sage, against R. sanguineus renowned for its pharmacological properties. The study employed an in vitro experimental design assessing tick mortality time. Different concentrations (25%, 50% and 75%) and dosages (1Ml, 5Ml, 10 mL) were tested. The time-to-mortality served as the primary indicator of acaricidal efficacy in this study. The findings shows that Lantana camara (Yellow Sage) extracts exhibited greater efficacy compared to the positive control in repelling R. sanguineus. These results underscore the potential of Yellow Sage as an organic alternative to synthetic acaricides, highlighting the importance of harnessing natural botanical extracts for developing effective tick control strategies. It advocates for environmentally responsible pest management practices. These findings underscore the potential of Yellow Sage as an organic alternative to synthetic acaricides. Moreover, it emphasizes the importance of harnessing natural botanical extracts in developing effective tick control strategies, while advocating for environmentally responsible pest management practices. By highlighting the efficacy of Lantana camara Linn. as a valuable resource, this study underscores the significance of exploring botanical solutions in combating health threats posed by ticks. As the world grapples with the growing challenges of tick-borne diseases, the findings of this research provide a promising pathway towards mitigating these risks through environmentally conscious approaches. Exploring both the roots and stems of the Lantana camara plant can yield valuable insights into their diverse properties and compounds. Both parts harbor a plethora of bioactive compounds with potential applications in antimicrobial, antifungal, and acaricidal realms. By investigating the roots and stems comprehensively, researchers can uncover a broader spectrum of benefits and applications. Detailed phytochemical analyses are recommended to identify specific compounds and explore their potential contributions to fields like medicine, agriculture, and environmental science.

Key Words:

Acaricidal Activity, Lantara camara Linn., Yellow Sage, Rhipicephalus sanguineus, Insecticidal Organic extract, In Vitro, Mortality.

Introduction

The demand for creative solutions increased due to the growth of ticks, resistance to conventional treatments, and concerns about chemical contamination in pet goods. *Lantana camara Linn*, also known as wild sage, is an aromatic herb found in tropical Africa. It is used in folkloric medicine and has been studied for its medicinal properties. Recently, researchers have gained interest in *L. camara* essential oils (Eos) as biopesticides due to their natural base compared to synthetic pesticides. This review aims to highlight evidence-based applications of *L. camara* and evaluate its chemical composition. The study aims to provide insights into its potential applications in agriculture. (Liambilla, 2020).

Rhipicephalus sanguineus coexist with human populations and transmit pathogens like Anaplasma, Ehrlichia, Babesia, and Theileria species. These pathogens typically present clinical signs of anemia, jaundice, and hemolytic changes. *Rhipicephalus* tick infestation also causes ectoparasitic nuisance in humans and animals. According to De Quadros et al., 2020) validating traditional plants in labs could provide reliable anti-tick products and lead to the development of plant-based alternatives. Traditional chemical pesticides are effective, but their environmental and human health effects raise concerns. This study evaluates the acaricidal activity of certain *Lantana Camara* extracts for tick prevention and to determine if there is significant difference and relationship in the efficacy of *Lantana camara* extract treated with *Rhipicephalus sanguineus in terms of concentration, time efficacy and dosage.*

Methods

The collection of specimens for evaluating *Lantana camara* (Yellow sage) as a potential *Rhipicephalus sanguineus* (Dog tick) acaricide involved obtaining plant samples and extracting the flower extract for testing. The extract extracted from the *Lantana camara* (Yellow sage) flower extract was used to evaluate its acaricidal efficacy on *Rhipicephalus sanguineus* (Dog tick). The process involved the following steps:

Collection of Specimen: The researchers collected *Lantana camara* (Yellow sage) flowers in Lipa City, Batangas. While the *Rhipicephalus sanguineus* (Dog tick) is handpicked by the researchers and collected from different stray dogs using tweezers and placed in a petri dish.

Extraction of Treatment: The researchers used the decoction method for extraction. After collecting the *Lantana camara (Yellow* sage) flower, it was air dried for a whole week and then ground into a powder. For concentration of the extract, in a stainless-steel pot, the powdered *Lantana camara* (Yellow sage) flower was concentrated for 30 minutes with different amounts of water. Lastly, the extract from powdered dried *Lantana camara* (Yellow sage) flowers was filtered using regular filter paper to produce crude extract.

Applying the Treatment: The *Lantana camara* (Yellow sage) flower extract was stored in a colored bottle. The extract with concentrations of 25%, 50%, and 75% is prepared for experimentation, along with a 1 mL, 5 mL, and 10 mL syringe for each dosage. The researchers placed five *Rhipicephalus sanguineus* (Dog ticks) in a petridish. In each petri dish, a specified amount of extract, varying for concentrations and dosages, was dropped using a syringe to start the experimentation.

Acaricidal Activity Testing: After applying the extract to each petri dish, the researchers were assigned to analyze and check the mortality rate of *Rhipicephalus sanguineus* (Dog tick) per time efficacy to gather the data needed.

Results

This study assessing the efficacy of *Lantana camara* flower extracts against dog ticks highlighted the mortality rate of *Rhipicephalus sanguineus* (dog ticks). The study discovered that

higher concentrations of *Lantana camara* extract against dog ticks could be obtained and used as an alternative pesticide to control pests.

Table 1.1: Time efficacy of Lantana camara Flower Extract on Dog Tick

		Time Efficacy (mins)		
Concentration Lantana extract (%)	Dosage (mL)	Trial 1	Trial 2	Average
25	1	14	17	15.5
	5	16	14	15
	10	15	15	15
50	1	14	13	13.5
	5	13	13	13
	10	10	9	9.5
75	1	17	11	14
	5	12	10	11
	10	8	8	8

Table 1.1 reveals a significant observation: time efficacy appears to be influenced by both the concentration and dosage of *Lantana camara* (Yellow sage) flower extract. Generally, a higher dosage tends to result in a shorter time efficacy, particularly evident in trials where a decrease in time efficacy was observed as dosage increased. However, this trend is not consistent across all trials. For instance, in Trial 2 at 25%, although the dosage increased from 1mL to 10mL, the time efficacy remained relatively stable. The concentration of *Lantana camara* (Yellow sage) flower extract also plays a role, as seen in Trial 1, where a decrease in concentration to 75% resulted in a lower average time efficacy compared to Trials 1 and 2 at 25% and 50%. This finding emphasizes the potential benefits of using a 75% concentration of *Lantana camara* (Yellow sage) flower extract as a viable strategy for the treatment of tick-related problems.

Table 1.2: Time efficacy of Positive Control (Acaricidal) on Dog Tick

		Time Efficacy (mins.)		
Concentration + control (%)	Dosage (mL)	Trial 1	Trial 2	Average
25	1	49	51	50
	5	46	45	45.5
	10	45	43	44
50	1	40	39	39.5
	5	39	36	37.5
	10	42	34	38
75	1	30	32	31
	5	28	29	28.5
	10	26	25	25.5

The table reveals that efficacy appears to be influenced by the concentration and dosage of the substance being tested, as well as the presence of a control group. Across all trials, higher dosages generally resulted in shorter-term efficacy, which is consistent with expectations.

Table 2: Time efficacy of Lantana camara Extract against Dog tick under Different Concentration and Dosages

Concentration	Dosage			Average	SD	ANOVA	p value	Level of Significance	Decision
	1ml	5ml	10ml						
25%	15.5m	15m	15m	15.17	0.29	F1: 6.35 F2: 4.19	0.0574 0.1045	0.05	Accept Accept
50%	13.5m	13m	9.5m	12	2.18				
75%	14m	11m	8m	11	3				

The table illustrates the efficacy of *Lantana Camara* Extract against Dog Tick over different concentrations and dosages. Therefore, the table suggests that there is no significant difference in efficacy over time across various concentrations and dosages of Lantana Camara Extract in combating Dog Tick.

Table 3: Time efficacy of Dog Tick against Lantana Camara Extract and Positive Control

Concentration (%)	Lantana Camara Extract	Positive Control (Acaricidal)	Average	SD	T-Test	Level of Significance	P value	decision
25	15.5	50	32.75	24.40	8.73622	0 .05	0.00001	Rejected
	15	45.5	30.25	21.57				
	15	44	29.5	20.51				
50	13.5	39.5	26.5	18.38				
	13	37.5	25.25	17.32				
	9.5	38	23.75	20.15				
75	14	31	22.5	12.02				
	11	28.5	19.75	12.37				
	8	25.5	16.75	12.37				

The table clearly shows that *Lantana Camara* extract outperforms the positive control in terms of time efficacy. This means that *Lantana Camara* works better over time compared to the positive control. The data in the table supports this conclusion, indicating a significant difference in effectiveness between the two treatments. Overall, the findings suggest that *Lantana Camara* extract could be a more effective option for addressing the target issue compared to the positive control.

Discussion

The study on the efficacy of *Lantana camara* (Yellow sage) flower extract at different concentrations and dosages highlights the impact of concentration and dosage on time efficacy. Higher dosages generally lead to shorter-term efficacy, although this pattern is not consistent across all trials. Statistical analysis, including a p-value of 6.94 and F-values of 6.35 and 4.19, indicates no significant differences in concentration among dosage levels, supporting the use of *Lantana camara* (Yellow sage) flower extract over the positive control. The data underscores the superior time efficacy of *Lantana camara* (yellow sage) flower extract compared to the positive control, suggesting its potential as a more effective treatment option for the target issue. These findings emphasize the importance of considering both concentration and dosage when evaluating the efficacy of botanical extracts for anti-tick purposes.

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