



FINAL YEAR RESEARCH PROJECT

**ASSESSING THE COMPARATIVE EFFICACY OF SELECTED
MEDICINAL PLANTS AGAINST TICK LARVAE IN NAMALU
SUB-COUNTY, NAKAPIRIPIT DISTRICT**

BY

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BU/UP/2021/0163

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AGAINST TICK LARVAE IN NAMALU SUB-COUNTY, NAKAPIRIPIT DISTRICT**

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**A DISSERTATION TO BE SUBMITTED TO THE DEPARTMENT OF ANIMAL
PRODUCTION AND MANAGEMENT, FACULTY OF AGRICULTURE AND ANIMAL
SCIENCE IN THE PARTIAL FULFILLMENT OF REQUIREMENTS FOR THE AWARD
OF A BACHELOR OF ANIMAL PRODUCTION AND MANAGEMENT FROM
BUSITEMA UNIVERSITY**

NOVEMBER 2024

DECLARATION

DECLARATION

I Leese Adam, declare that this information is original and has never been submitted to any higher institution of learning and has been developed for the award of degree in animal production and management of Busitema university.

SIGNATURE..... AA

DATE... 13th / 11 / 2024

APPROVAL

APPROVAL

This research project is submitted with approval by my research supervisor:

Prof. Olila Deo

Sign.....

Date

DEDICATION

I dedicate this work to my parents Mr. Benga Titus and Mrs. Nait Lucy and all my brothers and sisters for their support through my university education. My sincere thanks to my supervisor Prof. Olila Deo for his guidance towards the development of my proposal.

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ABSTRACT

Plants are a major source of medicinal agents and an increasing number of modern drugs have been isolated from plant based sources for their use in traditional medicine. About 80% of the world's inhabitants rely on traditional medicines for their primary health care. This research aimed to assess the efficacy of selected medicinal plant extracts against hard ticks. The study used a cross-sectional design and research approach involved both qualitative and quantitative approaches. It was conducted between August to September 2024 in the Namalu Sub county Nakapiripirit district. A questionnaire administered by an interviewee was used to profile medicinal plants from 25 purposely selected farmers commonly used to control ticks and experimental work involved evaluating the efficacy of extracts of Neem tree, Aloe vera, and Basil on ticks to determine mean mortality rate at different time interval.

The study results indicated that the most frequently used plant on ticks was Neem plant (64%), aloe vera plant (48%), Basil (48%), Eucalyptus (20%), garlic (12%) and lemon grass (12%), other plants not commonly used were turmeric (4%), papaya leaves (4%) and capsicum annum(4%). Also, all the three plant extracts exhibited good efficacy against the ticks as indicated by their mean \pm standard deviation. The mean and SD number of tick mortality increased with increase in time interval. It was lower at 24 hours and highest at 72hours. Neem extract exhibited the highest mean tick mortality with the lowest (6.33 \pm 1.53) for 5% at 24 hours and the highest being (23.00 \pm 2.00) for 20% at 72 hours. Basil extract had the least mean tick mortality with the lowest at (5.68 \pm 1.15) for 5% at 48hour and the highest at (18.67 \pm 1.52) for 20% at 72hours. Aloe vera extract had moderate mean tick mortality with the lowest at (3.33 \pm 1.53) for 5% for 24hours and the highest at (20.00 \pm 3.00) for 20% at 72hours.

The study recommended promotion of cultivation of these plants, in addition to its commonly cultivated purposes. Farmers and agricultural practitioners were encouraged to explore the cultivation of Neem tree, Basil and Aloe vera varieties with high phytochemical content. Furthermore, industries involved in herbal medicine, pharmaceuticals, and functional foods can explore the utilization of these plants as a valuable raw material for product development.

CHAPTER ONE: INTRODUCTION

1.0. BACKGROUND

Ticks serve as vectors for various diseases affecting both humans and animals, posing significant challenges to livestock management and public health. These parasites not only directly harm the health of livestock but also transmit diseases such as East Coast fever and tick-borne encephalitis, threatening human well-being. Moreover, ticks induce economic losses by reducing livestock productivity and necessitating costs. Different groups of chemicals have been used however there is need to explore more natural remedies to ticks. (Srivastava et al., 2008)

Traditionally, the control of ticks has heavily relied on synthetic acaricides, despite concerns over their adverse environmental effects and the development of resistance among tick populations. To address these challenges, there is a growing interest in exploring alternative and sustainable tick management strategies, with medicinal plants emerging as promising candidates due to their pesticidal properties.(Mutavi et al., 2021)

Medicinal plants, renowned for their diverse biological activities, offer potential solutions for environmentally friendly tick control. With their natural compounds exhibiting repellent and acaricidal effects, these plants represent an opportunity to develop sustainable tick management practices while minimizing environmental impact and safeguarding human and animal health.(Ghosh et al., 2011)

The lack of comprehensive knowledge on the extraction methods and bioactive compounds of medicinal plants adds to the uncertainty surrounding their utility in tick control. Understanding the optimal extraction techniques to obtain potent acaricidal compounds and assessing their safety for livestock, wildlife, and the environment are essential aspects that require further investigation.

Therefore the study aims to explore indigenous knowledge on medicinal plants used against ticks in Namalu sub county and to scientifically validate their efficacy against ticks.

1.2 Problem Statement

Despite the rich biodiversity and traditional knowledge surrounding medicinal plants in Namalu Sub County, there exists a significant gap in understanding their potential role in tick management. While local communities may have historically utilized certain plants for pest control, there is a

REFERENCES

- Eisen, L., Rose, D., Prose, R., Breuner, N. E., Dolan, M. C., Connally, N., Infectious, Z., Collins, F., States, U., Street, W., & States, U. (2018). *HHS Public Access*. 8(6), 837–849. <https://doi.org/10.1016/j.ttbdis.2017.06.010>.Bioassays
- Ghosh, S., Sharma, A. K., Kumar, S., Tiwari, S. S., Rastogi, S., Srivastava, S., Singh, M., Kumar, R., Paul, S., Ray, D. D., & Rawat, A. K. S. (2011). In vitro and in vivo efficacy of *Acorus calamus* extract against *Rhipicephalus (Boophilus) microplus*. *Parasitology Research*, 108(2), 361–370. <https://doi.org/10.1007/s00436-010-2070-0>
- Hodoșan, C., Gîrd, C. E., Ghica, M. V., Dinu-Pîrvu, C. E., Nistor, L., Bărbuică, I. S., Marin, Ștefan C., Mihalache, A., & Popa, L. (2023). Pyrethrins and Pyrethroids: A Comprehensive Review of Natural Occurring Compounds and Their Synthetic Derivatives. *Plants*, 12(23). <https://doi.org/10.3390/plants12234022>
- Kasaija, P. D., Estrada-Peña, A., Contreras, M., Kirunda, H., & de la Fuente, J. (2021). Cattle ticks and tick-borne diseases: a review of Uganda's situation. *Ticks and Tick-Borne Diseases*, 12(5). <https://doi.org/10.1016/j.ttbdis.2021.101756>
- Kemal, J., Zerihun, T., Alemu, S., Sali, K., Nasir, M., Abraha, A., & Feyera, T. (2020). In Vitro Acaricidal Activity of Selected Medicinal Plants Traditionally Used against Ticks in Eastern Ethiopia. *Journal of Parasitology Research*, 2020. <https://doi.org/10.1155/2020/7834026>
- Liu, S., Zhang, B., Lei, Q., Zhou, J., Ali, M., & Long, C. (2023). Diversity and traditional knowledge of medicinal plants used by Shui people in Southwest China. In *Journal of Ethnobiology and Ethnomedicine* (Vol. 19, Issue 1). BioMed Central. <https://doi.org/10.1186/s13002-023-00594-4>
- Luker, H. A. (2024). A critical review of current laboratory methods used to evaluate mosquito repellents. *Frontiers in Insect Science*, 4(January), 1–14. <https://doi.org/10.3389/finsc.2024.1320138>
- Mkwanazi, M. V., Ndlela, S. Z., & Chimonyo, M. (2021). Indigenous knowledge to mitigate the challenges of ticks in goats: A systematic review. *Veterinary and Animal Science*, 13(July), 100190. <https://doi.org/10.1016/j.vas.2021.100190>
- Mutavi, F., Heitkönig, I., Wieland, B., Aarts, N., & Van Paassen, A. (2021). Tick treatment practices in the field: Access to, knowledge about, and on-farm use of acaricides in Laikipia, Kenya. *Ticks and Tick-Borne Diseases*, 12(5). <https://doi.org/10.1016/j.ttbdis.2021.101757>
- Ocaido, M., Muwazi, R. T., & Opuda, J. A. (2009). Economic impact of ticks and tick-borne diseases on cattle production systems around Lake Mburo National Park in South Western Uganda. *Tropical Animal Health and Production*, 41(5), 731–739.

<https://doi.org/10.1007/s11250-008-9245-z>

Oliva Chávez, A. S., Guzman Valencia, S., Lynn, G. E., Rosario, C. A., Thomas, D. B., & Johnson, T. L. (2023). Evaluation of the in vitro acaricidal effect of five organic compounds on the cattle fever tick *Rhipicephalus (Boophilus) microplus* (Acari: Ixodidae). *Experimental and Applied Acarology*, 89(3–4), 447–460. <https://doi.org/10.1007/s10493-023-00780-9>

Paramasivam, M. (2017). Laboratory bioassay methods to assess the insecticide toxicity against insect pests-A review M Paramasivam and C Selvi. ~ 1441 ~ *Journal of Entomology and Zoology Studies*, 5(3), 1441–1445.

Shyma, K. P., Gupta, J. P., Singh, V., & Patel, K. K. (2015). In Vitro Detection of Acaricidal Resistance Status of *Rhipicephalus (Boophilus) microplus* against Commercial Preparation of Deltamethrin, Flumethrin, and Fipronil from North Gujarat, India. *Journal of Parasitology Research*, 2015, 5–7. <https://doi.org/10.1155/2015/506586>

Srivastava, R., Ghosh, S., Mandal, D. B., Azhahianambi, P., Singhal, P. S., Pandey, N. N., & Swarup, D. (2008). Efficacy of *Azadirachta indica* extracts against *Boophilus microplus*. *Parasitology Research*, 104(1), 149–153. <https://doi.org/10.1007/s00436-008-1173-3>

Adenubi, O. T., Fasina, F. O., McGaw, L. J., Eloff, J. N., & Naidoo, V. (2016). Plant extracts to control ticks of veterinary and medical importance: A review. *South African Journal of Botany*, 105, 178–193. <https://doi.org/10.1016/j.sajb.2016.03.010>

Kluster, M., & Kelantan, D. I. (2014). *View metadata, citation and similar papers at core.ac.uk. June.*

Mazhar, N., ul Hasan, M. M., Baig, S. G., Ahmed, S., Jaffery, R., & Ikram, R. (2022). Diuretic and anti-diarrheal potential of four fruit extracts of *Capsicum annum* L. *Pakistan Journal of Pharmaceutical Sciences*, 35(5), 1357–1362. <https://doi.org/10.36721/PJPS.2022.35.5.REG.1357-1362.1>

Olakunle, F. A., & Science, S. (2024). *Studies on nutritional and medicinal properties of chamomile flower , pumpkin fruit and maca root Studies on nutritional and medicinal properties of chamomile flower , pumpkin fruit and maca root. October.*

Oli, B., & Gautam, D. (2022). Medicinal value of *Azadirachta indica*: A review. *Modern Phytomorphology*, 15(March), 161–167.

Patoliya, P., Raval, K., & Upadhyaya, V. (2022). Tick infestation and its herbal treatment approach in India : A review Tick infestation and its herbal treatment approach in India : A review. *The Pharma Innovation Journal*, SP-11(4), 1323-1339 ISSN.

- Reddy, I. V. S., & Neelima, P. (2022). Neem (*Azadirachta indica*): A Review on Medicinal Kalpavriksha. *International Journal of Economic Plants*, 9(1), 059–063. <https://doi.org/10.23910/2/2021.0437d>
- Surbhi, Kumar, A., Singh, S., Kumari, P., & Rasane, P. (2023). Eucalyptus: phytochemical composition, extraction methods and food and medicinal applications. *Advances in Traditional Medicine*, 23(2), 369–380. <https://doi.org/10.1007/s13596-021-00582-7>
- Tonfack Djikeng, F., Djimbie, J. D., Achidi, A. U., Tuku, F. E., Zemoh, V.-T., Sylvia, N., Nyemb, G. M., Tiencheu, B., & Djikeng, F. T. (2022). Phenolic Content, Antioxidant Activity and Nutrient Composition of Two Formulated Medicinal Teas from Moringa, Pawpaw, Tea, Soursop and Lemon grass Leaves. *J Food Technol Food Chem*, 4(July), 101.
- Yudiyanto, Y., & Wakhidah, A. Z. (2024). *Battras : Holders of Traditional Medicinal Plant Knowledge in East Lampung* Battras : Holders of Traditional Medicinal Plants Knowledge in East Lampung , Indonesia. October. <https://doi.org/10.11594/jtls.14.03.17>