

## Studies On Diversity And Seasonal Distribution Of Tick Species Infesting Cows In Degloor Region, Maharashtra, India

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### **Abstract:**

Ticks pose a major constraint to cow's health and productivity, primarily through blood feeding, irritation, and their ability to transmit a variety of disease-causing pathogens. The present study was designed to document the species composition and relative abundance of tick fauna infesting cows in this region. A longitudinal field investigation was carried out from Dec. 2023 to Nov. 2024, during which 1,097 representative tick specimens were collected from tick-infested cows among a sample of 400 cows. Three tick species were identified, with their relative abundance as follows: *Rhipicephalus microplus* (63.26%), *Hyalomma anatolicum anatolicum* (34.28%), and *Rhipicephalus sanguineus* (2.46%). Among the collected specimens, *Rhipicephalus microplus* was identified as the predominant species in the study area. The study revealed pronounced seasonal variation in tick abundance, with overall infestations peaking during the Monsoon Season, followed by post-monsoon, summer, and winter. These results demonstrate the first comprehensive baseline record of tick diversity on cows in Degloor Taluka and contribute to understanding tick ecology for developing region-specific control strategies.

**Keywords:** Ectoparasites, Cow, Ticks, Seasonal distribution, Degloor Taluka, Maharashtra

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### **1. INTRODUCTION**

In India, livestock production constitutes a cornerstone of the agricultural sector, contributing significantly to the country's economic growth while serving as a crucial source of food and nutritional security for its population (Navyasree et al., 2025). Livestock production is confronted with numerous challenges that hinder its productivity and long-term sustainability. A primary constraint is the high prevalence of infectious diseases and parasitic infestations. Among the various challenges, losses produced by ticks are of particular concern (Babu N et al., 2025). In a livestock-dependent country such as India, the substantial economic losses resulting from decreased milk production due to tick infestations represent a serious threat to farmers' livelihoods and the overall agricultural economy (Ghosh et al., 2006). Globally, ticks are recognized as the second most important vectors of human infectious diseases, following mosquitoes (Boulanger et al., 2019). Tick-borne diseases often develop rapidly, leading to severe clinical symptoms and, in many cases, fatal outcomes, posing substantial challenges to cattle husbandry (Ghosh et al., 2006). Ticks inflict both direct and indirect losses on livestock. Direct effects include irritation, blood depletion, damage to skin and the introduction of toxic substances, while indirect effects arise from morbidity or mortality associated with tick-borne or tick-related diseases (Zhou et al., 2009). Consequently, tick infestations lead to considerable economic losses. In India, dairy products serve as a primary source of protein for the majority of the population, and cows play a crucial role in the national economy by providing milk, meat, hides and bio-fuel.

In India, the financial losses due to tick infestations and TTBDs are estimated at approximately \$498 million annually (Minjauw & McLeod, 2003). Although it is impossible to precisely estimate the financial losses, these diseases have a significant impact on farm profitability and cow productivity. Ticks serve as vectors for numerous pathogens, encompassing viruses such as Kyasanur Forest Disease (KFD), in addition to protozoan and bacterial agents including Theileria, Babesia, and Anaplasma (Ghosh & Nagar, 2014). Infestation by ectoparasites such as ticks can compromise cows' health, causing alterations in blood parameters, deficiencies in trace elements and minerals, and disruptions in key biochemical indicators. Ticks and the diseases they transmit are among the most significant challenges affecting livestock health, leading to substantial economic losses. Effective management of these ectoparasites requires not only an understanding of the overall prevalence of infestation but also detailed knowledge of the species involved. Identification at the species level is critical, as it facilitates accurate diagnosis of TTBD diseases and allows for the implementation of targeted, species-specific control strategies. Furthermore, assessing the relative abundance of different tick species provides essential information for prioritizing control measures. Knowledge of which species are most prevalent enables the design of focused interventions that are both efficient and cost-effective. Although several studies have investigated the diversity of tick fauna in various

regions of Maharashtra, recent data on tick infestations on cows in Degloor Taluka remain scarce. Addressing this gap is crucial for improving cows' health and guiding the development of effective, species-specific control programs in the area. Therefore, the objectives of this study are

1. To identify the tick species infesting cows in Degloor.
2. To assess the seasonal distribution and relative abundance of the identified tick species to facilitate species-specific control strategies.

## 2.0 MATERIALS AND METHODS

### 2.1 Study area

This study was conducted in Degloor Taluka, located in the semi-arid southern part of Nanded District, Maharashtra. The region has a tropical climate influenced by the southwest monsoon and comprises Degloor city and villages grouped into five Zilla Parishad circles, all of which were included to represent the entire taluka.

### 2.2 Study Population and Sample Size

A total of 400 cows were randomly selected from multiple villages distributed across Degloor Taluka. The animals comprised both local and exotic breeds and represented a range of age groups, providing a representative of the region's cow's population.

### 2.3 Study design

The present study was designed as a longitudinal investigation to assess the diversity and seasonal abundance of ticks on cows across Degloor Taluka. The same cohort of animals was repeatedly observed across four distinct seasons to evaluate tick infestations, allowing for a comprehensive assessment of seasonal distribution. The study was carried out from December 2023 to November 2024, covering one complete annual cycle. Field surveys were carried out fortnightly between 8:00 a.m. and 11:00 a.m., during which each animal was carefully examined for the presence of ticks. Data were systematically recorded during each observation to assess the abundance and seasonal distribution of ticks.

### 2.4 Collection and identification of ticks

Tick samples were collected seasonally during winter, summer, monsoon, and post-monsoon from infested cows across five study circles. Ticks were manually removed using forceps or fingers from various body regions and preserved in 70% ethanol at room temperature. Host data including breed and collection date were recorded. Morphological identification was performed on petri plates under a stereo microscope using the keys of (Estrada-Peña Agustín et al., 2004; Walker A.R. et al., 2003, Lakhwinder Singh et al., 2022).

## 3.0 RESULTS AND DISCUSSION:

### Field Sampling and collection of ticks

Field surveys were conducted across various cow sheds in Degloor Taluka to collect ticks from the study population. During the study, a representative sample of 1,097 ticks was collected from a total of 10,936 ticks observed on the examined cows. Collected ticks were preserved in 70% ethanol, and labelling of the vials was performed after collection for proper identification.

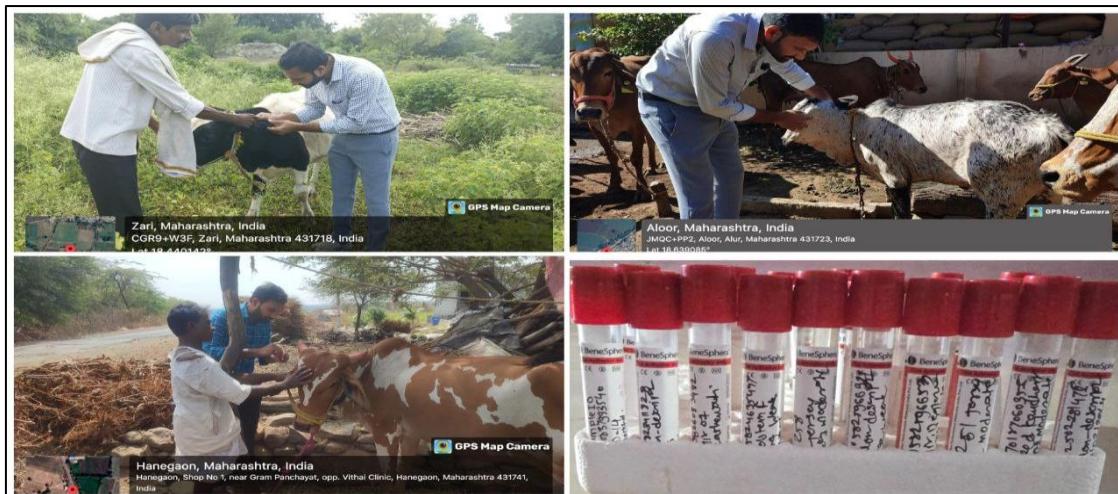


Figure 1 photographs of the sampling process and ticks' collection from the study area.

Representative photographs of the sampling process are presented in Figure 1, illustrating the field conditions and the examination of cows during the study.

#### Identification of Tick Species Infesting Cows in Degloor

The morphological identification of each collected tick specimen was confirmed through stereomicroscopic examination. The specimens were identified to the species level, revealing three distinct species belonging to two genera: *Rhipicephalus microplus*, *Hyalomma anatomicum anatomicum*, and *Rhipicephalus sanguineus*. Representative photographs of these specimens, showing their dorsal and ventral aspects, are presented in Figure 2. (Panels A-D).

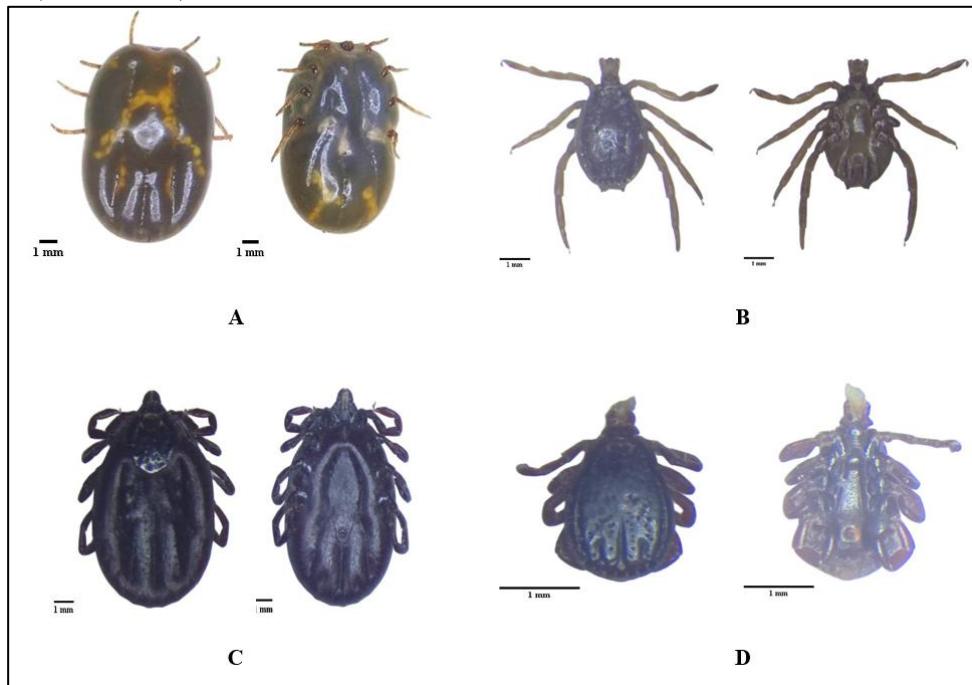


Figure 2. Identified tick species collected from cows: Dorsal and ventral views of (A) Female *Rhipicephalus microplus* (B) Male *Hyalomma a. anatomicum* (C) Female *Rhipicephalus sanguineus* (D) Male *Rhipicephalus sanguineus*

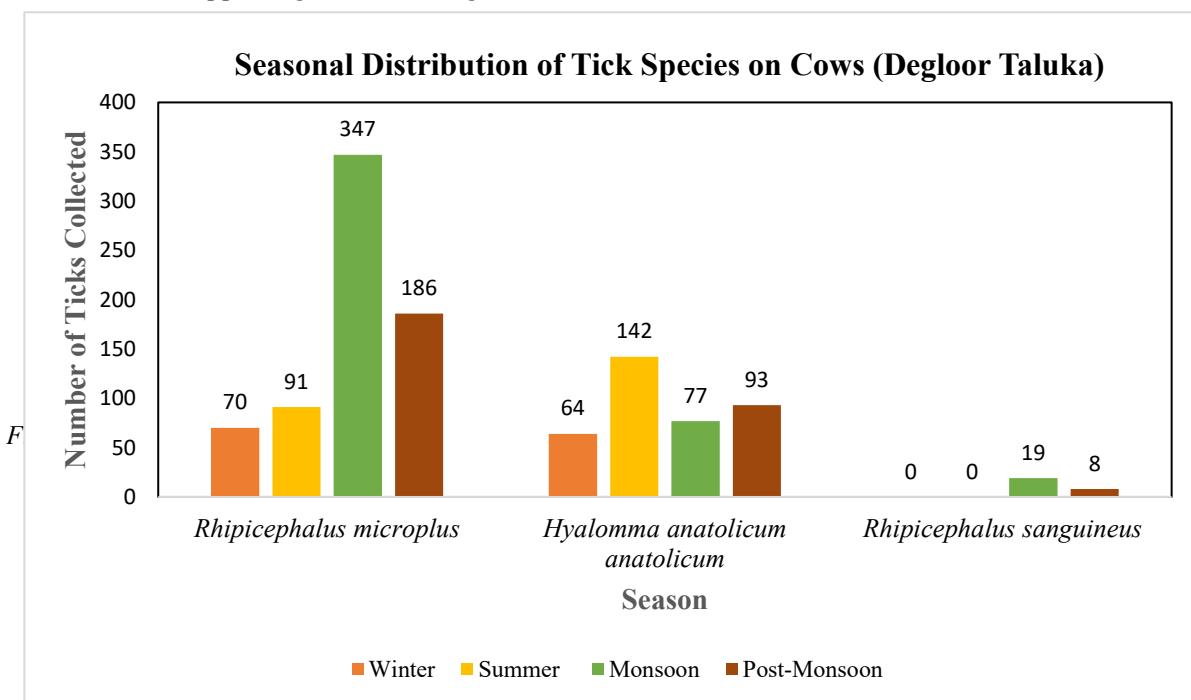
#### Abundance of Tick Species

During the present study, a total of 1,097 adult ixodid ticks were collected from various body regions of infested cows in the study area. Morphological examination revealed two genera and three species of ixodid ticks identified, namely *Rhipicephalus microplus*, *Rhipicephalus sanguineus*, and *Hyalomma anatomicum anatomicum*. Among these, *R. microplus* was the most abundant, accounting for 63.26%. *Hyalomma a. anatomicum* comprised 34.28% and *R. sanguineus* was the least prevalent, representing only 2.46% of the ticks. The observed predominance of *R. microplus* corresponds with previous studies conducted across various parts of India, which have similarly reported this as the most prevalent tick infesting cows under tropical and subtropical conditions (Balasubramanian et al., 2019; Ghosh et al., 2019; Kumar et al., 2023; Singh et al., 2021, Ravikant et al., 2022). The occurrence of *R. sanguineus* on non-canine hosts is uncommon and usually linked to close contact with heavily infested dogs or contaminated surroundings. In this study, the detection of *R. sanguineus* species on cows likely reflects cross-infestation arising from close contact between livestock and domestic dogs within shared environments (Dantas-Torres, 2010).

#### Seasonal Distribution of Tick Species

Seasonal distribution of tick species on cows in Degloor Taluka showed marked variation across the four seasons (Figure 3). The overall number of ticks collected was highest during the monsoon season (443 ticks; 40.38%), followed by post-monsoon (287; 26.16%), summer (233; 21.24%), and winter (134; 12.22%). *R. microplus* was most abundant during the monsoon season (347616; 56.33%). Conversely, *H a. anatomicum* showed peak activity during summer (142376; 37.77%), indicating its tolerance to comparatively dry environmental conditions.

The seasonal pattern observed in the present study, where *Hyalomma a. anatolicum* exhibited its highest abundance during the summer months, closely mirrors trends documented from several regions of India. Research conducted in coastal Odisha and Punjab demonstrates that this species attains peak activity in May and June, with summer contributing the largest share of overall prevalence (Dehuri et al., 2024; Haque et al., 2011). The present finding of high activity during the summer and post-monsoon seasons supports this ecological adaptability, suggesting that *H. a. anatolicum* populations in Degloor may have undergone local adjustments to withstand the semi-arid and post-monsoon climatic conditions characteristic of the region. *R. sanguineus* was rare, appearing primarily in monsoon (1927; 70.37%) and post-monsoon (827; 29.63%) periods. These findings indicate that the abundance of tick species on cows is strongly influenced by seasonal conditions, with the monsoon season supporting the overall highest infestations.



#### 4.0 CONCLUSION:

This study presents the first detailed analysis of tick abundance and seasonal distribution on cows in Degloor Taluka, Maharashtra. Three ixodid species namely *Rhipicephalus microplus*, *Rhipicephalus sanguineus* and *Hyalomma a. anatolicum* were identified, with *R. microplus* being the dominant species, reflecting its strong adaptation to tropical conditions. Analysis of seasonal patterns indicated peak tick infestations during the monsoon season, with decreasing abundance observed in the post-monsoon, summer, and winter periods. Therefore, the study highlights the need for seasonally focused management strategies to reduce tick infestations and related health impacts in cows.

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