

**PHEROMONE BASED SMART, ECO-FRIENDLY  
DEVICE FOR CONTROL OF THE DOG TICK,  
*RHIPICEPHALUS SANGUINEUS***

**GOWRISHANKAR, S.**

**MVM 16046 (VPA)**

*Thesis submitted in partial fulfillment of the requirements  
for the degree of*

**MASTER OF VETERINARY SCIENCE**

*in*

**VETERINARY PARASITOLOGY**

*to the*

**Tamil Nadu Veterinary and Animal Sciences University**

**Chennai- 600 051**

**DEPARTMENT OF VETERINARY PARASITOLOGY**

**MADRAS VETERINARY COLLEGE**

**CHENNAI- 600 007**

**TAMIL NADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY**

**CHENNAI- 600 051**

**2018**

**TAMIL NADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY**

**DEPARTMENT OF VETERINARY PARASITOLOGY**

**MADRAS VETERINARY COLLEGE**

**CHENNAI- 600 007**

**CERTIFICATE**

This is to certify that the thesis entitled “**“PHEROMONE BASED SMART, ECO-FRIENDLY DEVICE FOR CONTROL OF THE DOG TICK, *RHIPICEPHALUS SANGUINEUS*”** submitted in partial fulfillment of the requirements for the degree of Master of Veterinary Science in **VETERINARY PARASITOLOGY** to the Tamil Nadu Veterinary and Animal Sciences University, Chennai – 51, is a record of bonafide research work carried out by **S. GOWRISHANKAR, I.D. No. MVM 16046 (VPA)**, under my guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes.

Date :  
Place : Chennai- 600 007

**(Dr. BHASKARAN RAVI LATHA)**  
**Chairman**

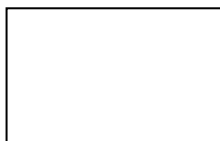
**APPROVED BY**

**Chairman: Dr. BHASKARAN RAVI LATHA**

**Members: 1. Dr. C. SREEKUMAR**

Date :  
Place : Chennai- 600 007

**2. Dr. V. LEELA**



**EXTERNAL EXAMINER**

## ABSTRACT

**Title** : **Pheromone based smart, eco-friendly device for control of the dog tick, *Rhipicephalus sanguineus***

**Name of the student** : **GOWRISHANKAR, S.**

**ID. No.** : **MVM 16046 (VPA)**

**Degree for which submitted** : **M.V.Sc (Veterinary Parasitology)**

**Chairman** : **Dr. Bhaskaran Ravi Latha**  
Professor and Head  
Department of Veterinary Parasitology  
Madras Veterinary College  
Chennai- 600 007.

**Department** : **Veterinary Parasitology**

**College** : **Madras Veterinary College,**  
Chennai- 600 007

**University** : **Tamil Nadu Veterinary and Animal Sciences University**

**Year** : **2018**

Pheromone based, smart and ecofriendly approach for the control of the dog tick *Rhipicephalus sanguineus*, using bamboo sticky tick trap was attempted. A novel drug delivery device namely vapour patch was utilized for the first time in sustained release of pheromones. Pheromones namely sex pheromone (SP), assembly pheromone (AP) and a combination of SP+AP was encapsulated in calcium alginate and chitosan microparticles, as well as impregnated in vapour patches. The microparticles were characterized and assessed by in-vitro bioassays namely Petri dish and modified 4-way olfactometer bioassay. The response of the different stages of *R. sanguineus* ticks was statistically analysed using chi-square test, binary logistic regression and Wilcoxon rank test. Sustained release studies using the same pheromone encapsulated microparticles and impregnated vapour patches was conducted after 2 months and the results were analysed.

Assembly pheromone impregnated in vapour patch and encapsulated in microparticles were very potent in attracting all stages of ticks except for both unfed and fed males. For Petri dish bioassay it was predominantly the vapour patch trials that elicited good response, followed by calcium alginate and chitosan beads. The Petri dish bioassay also revealed that AP, when impregnated in vapour patches, was most effective in attracting all the stages of tick. Maximum luring effect of unfed and fed males were elicited by SP. The sustained release study also revealed that AP was most stable and that the vapour patches were the most effective delivery device. No synergistic effect with the combination of SP+AP was noticed. Almost similar results were obtained in the olfactometer bioassay.

Field trials were conducted with bamboo sticky tick trap device. Devices baited with AP, SP+AP, SP encapsulated calcium alginate, chitosan and impregnated vapour patch along with control sticky tick trap devices were placed in kennels in Blue Cross of India, Chennai. Results revealed that AP and SP+AP impregnated vapour patches were very effective in environmental control of *R. sanguineus* ticks.

Bamboo sticky trap baited with vapour patches impregnated AP lured and killed a total number of 20,393 different stages of ticks during the trial period. Calcium alginate and chitosan beads entrapping the AP lured and killed 8,666 and 4,456 ticks respectively. All the traps were unique in that acaricides were not used to kill the lured ticks. These ecofriendly traps can be used as a part of integrated pest management for environmental control of dog ticks.

**Keywords:** *Rhipicephalus sanguineus*, sex pheromone, assembly pheromone, Petri dish bioassay, olfactometer bioassay, bamboo sticky tick trap device.