Assessing the Efficacy of Low-Cost Mosquito Traps: A Citizen Science Approach to Vector Surveillance in South Australia.

Shashikala Wijesooriya, Prof.Craig Williams, Dr.Meruyert Cooper, AsPr. Craig Styan, Dr. Cameron Webb*

UniSA-STEM, University of South Australia, Mawson Lakes, Adelaide, SA 5095, Australia

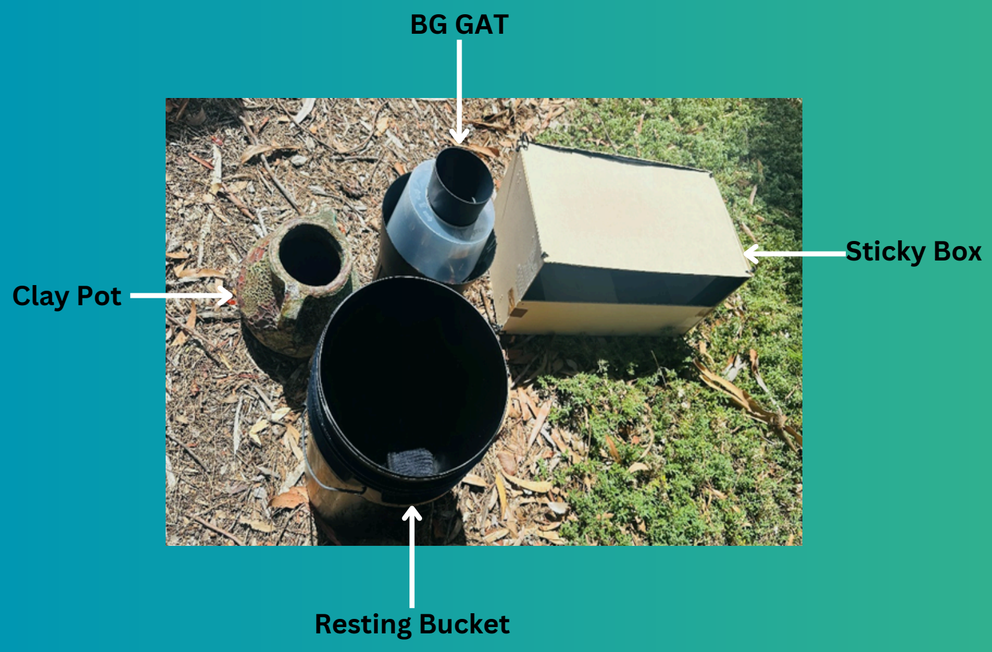
*The University of Sydney Institute for Infectious Diseases and Charles Perkins Centre Citizen Science Node, University of Sydney, NSW 2006, Australia

Introduction

Mosquitoes are the deadliest animals and disease vectors globally, responsible for transmitting a wide range of pathogens, including those causing malaria, dengue, Zika, and Japanese encephalitis. These diseases collectively result in hundreds of thousands of deaths annually, with a disproportionate burden in tropical and subtropical regions. This citizen science study assessed the effectiveness of four mosquito traps Clay Pot, Sticky Box, Resting Bucket, and BG GAT across various locations in Adelaide to monitor mosquito distribution, species composition, and abundance. Results highlight species-specific trap efficacy and location-based species richness, supporting low-cost, community-engaged surveillance as a scalable strategy for enhancing vector-borne disease monitoring and control.

Methodology

1. Traps were deployed for four weeks across four locations in Adelaide (Pooraka, Globe Derby Park, St. Kilda, and Parkside) using a Latin square design to control for positional variation.
2. Each trap was inspected weekly to record mosquito capture rates.
3. Mosquitoes were identified using a taxonomic key, and specimens were manually counted to evaluate species diversity and abundance across locations.
4. Data were analyzed to compare trap efficiency, species-specific responses, and environmental suitability.

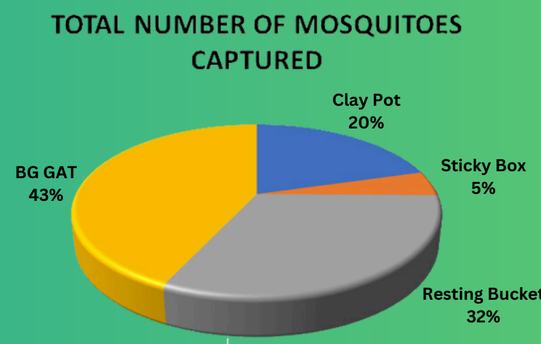


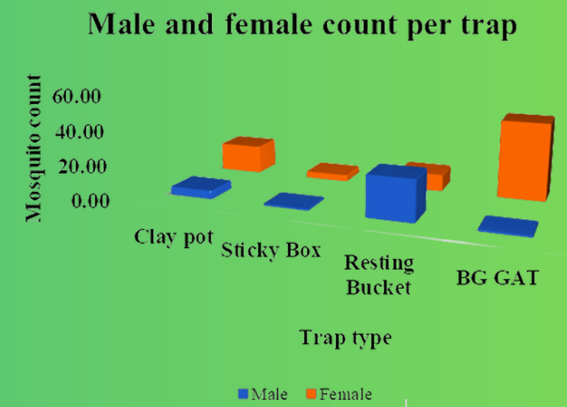
Aedes notoscriptus

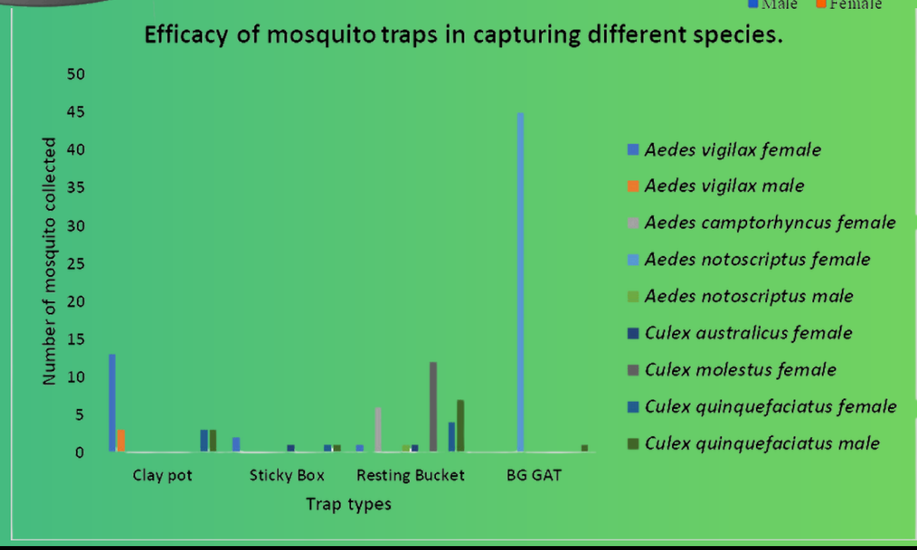
Culex quinquefaciatus

Culex molestus

Results/Findings







Discussion and Conclusion

The BG GAT trap emerged as the most effective, capturing 46 specimens, predominantly *Aedes notoscriptus* females (45), indicating species-specific efficacy. The Resting Bucket trap recorded a higher species diversity, with 34 mosquitoes, including significant numbers of *Culex molestus* (12 females) and *Culex quinquefasciatus* (4 females, 7 males). The Clay Pot trap captured 22 mosquitoes, primarily *Aedes vigilax* (13 females, 3 males).

Species diversity also varied across the four locations. Pooraka, a suburban area, and Globe Derby Park, a salt marsh area, demonstrated the highest species richness. A species-specific response was observed at the urban Parkside location, where the BG GAT selectively attracted *Aedes notoscriptus* females. The Resting Bucket exhibited versatility, capturing both male and female mosquitoes across multiple species, suggesting its utility for general mosquito surveillance.

The BG GAT trap demonstrated high species-specific efficacy, particularly for capturing *Aedes notoscriptus* in urban settings, making it valuable for targeted vector surveillance. The Resting Bucket trap displayed broader species diversity, capturing significant numbers of both Culex and Aedes species, indicating its suitability for general surveillance.

Site-specific variations in species richness, especially in suburban and salt marsh areas, emphasize the importance of tailored trap deployment for comprehensive mosquito profiling. These results highlight the potential of low-cost, community-integrated mosquito monitoring systems to inform real-time vector control strategies, bolstering public health efforts against mosquito-borne diseases.