World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:18, No:06, 2024

Computational Agent-Based Approach for Addressing the Consequences of Releasing Gene Drive Mosquito to Control Malaria

Authors : Imran Hashmi, Sipkaduwa Arachchige Sashika Sureni Wickramasooriya

Abstract : Gene-drive technology has emerged as a promising tool for disease control by influencing the population dynamics of disease-carrying organisms. Various gene drive mechanisms, derived from global laboratory experiments, aim to strategically manage and prevent the spread of targeted diseases. One prominent strategy involves population replacement, wherein genetically modified mosquitoes are introduced to replace the existing local wild population. To enhance our understanding and aid in the design of effective release strategies, we employ a comprehensive mathematical model. The utilized approach employs agent-based modeling, enabling the consideration of individual mosquito attributes and flexibility in parameter manipulation. Through the integration of an agent-based model and a meta-population spatial approach, the dynamics of gene drive mosquito spreading in a released site are simulated. The model's outcomes offer valuable insights into future population dynamics, providing guidance for the development of informed release strategies. This research significantly contributes to the ongoing discourse on the responsible and effective implementation of gene drive technology for disease vector control.

Keywords : gene drive, agent-based modeling, disease-carrying organisms, malaria
Conference Title : ICCAM 2024 : International Conference on Computational and Applied Mathematics
Conference Location : New York, United States
Conference Dates : June 03-04, 2024