Climate and *Aedes* Infestation: Evaluating Statistical Models for Ovitrap Positivity and Egg Density

CLEIDE CARNEIRO DE ALMEIDA[1], CAMILLA SANTOS FERREIRA DE LIMA[1], SINVALDO ALVES PEREIRA[2], ROSANA BRETAS VIANA[2], KEICY SANDY SILVESTRE DE SOUZA[2], ALEX SANDRO PEREIRA CORREIA[3], ROSANA PEREIRA[3], ERICK GONÇALVES SILVA[3], SAMUEL ANUNCIAÇÃO DE CARVALHO[3], ARISTEU VIEIRA DA SILVA[1]

[1]GRUPO DE PESQUISA EM ZOONOSES E SAÚDE PÚBLICA, UNIVERSIDADE ESTADUAL DE FEIRA DE SANTANA (UEFS), BAHIA, BRAZIL, [2]SECRETARIA MUNICIPAL DE SAÚDE DE BURITIZEIRO, MINAS GERAIS, BRAZIL, [3]JA TECNOLOGIA, INOVAÇÃO E INFORMAÇÃO, BAHIA, BRAZIL

Entomological surveillance using ovitraps is essential for controlling arboviruses. This study evaluated the influence of climatic variables on Aedes spp. oviposition in Buritizeiro (MG) using PneuTrap3D® traps. From April to December 2024, 65 to 75 traps were placed in households and regularly inspected for Aedes eggs and larvae. After one to two weeks, the traps were collected, and eggs were counted under a stereomicroscope (20x). The Ovitrap Positivity Index (IPO = positive ovitraps/total ovitraps) and Egg Density Index (IDO = counted eggs/positive ovitraps) were calculated. Climatic data (temperature, humidity, and rainfall) were obtained from INMET. Generalized Linear Models (GLM) with Gamma and Quasi-Poisson distributions, Generalized Additive Models (GAM) for nonlinear patterns, and Random Forest models were applied to assess variable importance. All data analysis and statistical modeling were performed using R software (version 4.4.1). The mean IPO and IDO were 32.87±13.16 and 38.59±14.74. GLM models for IDO did not identify significant climatic predictors. For IPO, the Quasi-Poisson model provided the best fit, indicating that rainfall had a negative effect, close to statistical significance (P Value = 0.0547), suggesting that rainy periods reduce ovitrap positivity. The reduced model with only rainfall lost significance, suggesting that other variables contributed to IPO variation. GAM did not detect significant nonlinear relationships, and Random Forest confirmed the low influence of climatic factors on IPO and IDO. These findings suggest that rainfall may affect IPO but does not explain IDO variation. Additional factors, such as land use and local environmental characteristics, may be key determinants in Aedes spp. infestation.

Supported by Universidade Estadual de Feira de Santana, JA Tecnologia, Inovação e Informação

Key-words: Entomological surveillance, Ovitrap Positivity Index, Climatic variables.