## Abstract

Entomopathogenic fungi such as *Beauveria bassiana* are promising biocontrol agents against the desert locust, *Schistocerca gregaria*, but their performance is strongly influenced by temperature and relative humidity (RH). In this study, native *B. bassiana* isolates recovered from soils in Isiolo and Laikipia Counties, Kenya, were molecularly identified and evaluated under factorial combinations of temperature (20, 25, 30, and 35 °C) and RH (50, 75, and 90%) to determine their effects on conidial germination, vegetative growth, sporulation, and pathogenicity against adult *S. gregaria*. Three native isolates and six conidial formulations were assessed, comprising oil-based, whey-based, and diatomaceous earth (DE)-based carriers. Temperature, RH, and their interaction significantly influenced all measured traits ($p < 0.0001$). Vegetative growth and sporulation were highest at 25–30 °C and 90% RH. Across environmental treatments, isolate 341 consistently showed the highest germination and vegetative growth, followed by isolate 334, whereas differences among isolates were less pronounced under optimal conditions (25–30 °C) than at thermal extremes (20 °C and 35 °C). Among formulations, oil-based products consistently outperformed whey-based and DE-based formulations in germination, vegetative growth, sporulation, and insect mortality ($p < 0.05$). Adult mortality at 14 days ranged from 57.8% to 100%, with the shortest median lethal time ($LT_{50}$) recorded at 30 °C and 90% RH. Overall, the findings demonstrate that the performance of native *B. bassiana* isolates and formulations is strongly modulated by temperature, RH, and carrier type under controlled conditions. These results provide a basis for selecting promising isolate–formulation combinations for further validation under field-relevant conditions.