



Ahmedabad
University

WORKING PAPER

WP-SAS-21-003

No water, no eggs: insights from a warming outdoor mesocosm

Subhash Rajpurohit

Subhash.rajpurohit@ahduni.edu.in

Disclaimer: The Research Working Paper Series is managed by the Ahmedabad University Research Board (URB) to help faculty members, research staff and doctoral students to share their pre-publication versions of academic articles, book chapters, or reviews etc. Papers posted on this site are under progress, under submission, or in press and forthcoming elsewhere. The form and content of papers are the responsibility of individual authors and not that of Ahmedabad University.

Ahmedabad University, Commerce Six Roads, Navrangpura, Ahmedabad-380009, Gujarat, INDIA
Email: workingpaper@ahduni.edu.in



**Ahmedabad
University**

WORKING PAPER

Serial: WP-SAS-21-003

Title: No water, no eggs: insights from a warming outdoor mesocosm

Author/s: Rupesh Marurya, Krishna BS Swamy, Volker Loeschcke, and Subhash

Address: Ahmedabad University, Commerce College Six Roads, Navrngrpura, Ahmedabad 380009, Gujarat, India

Email: subhash.rajpurohit@ahduni.edu.in

Abstract (150 words): 1. Insects are susceptible to dehydration, and change in atmospheric humidity could affect their fitness. To understand the impacts of humidity changes on insect's reproductive fitness, we released an outcrossed *Drosophila melanogaster* population to outdoor mesocosm units (1.5 × 1.5 × 1.5m in dimension) and tracked their fecundity over 90 days under progressively developing summer season. The study was carried out in a tropical urban garden. The experimental design included tracking an outcrossed *D. melanogaster* population over 90 days in two sets of cages. One set of population was kept under outdoor conditions. The second set was maintained under laboratory conditions where only temperature was controlled. For 90 days, data on daily egg laying were collected for both indoor and outdoor cages. This design helped us to see temperature and humidity impact on reproductive output both in combination and separately. Often temperature has been found to be the key player in changes in reproductive output in a considerable number of laboratory-based studies. Our work suggested that 'temperature-humidity' interactions determine the physiological state of an organism which could untimely impact organismal fitness in a given environmental set-up. This work indicated that under natural conditions fecundity in *Drosophila* populations was significantly influenced by relative humidity and its interaction with temperature. Our results suggested that while temperature was an important parameter for fecundity, relative humidity individually and in combination with temperature also played an important role in *Drosophila* reproductive output. Thus, the combination of temperature and relative humidity was a better metric to predict the fecundity in *Drosophila* populations than considering these parameters individually under natural conditions. It clearly indicated that future warming events could drastically impact insects' reproductive output.

Keywords: Climate change, *insects*, humidity and temperature interaction, reproductive fitness, tropical summer.

