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WORKING PAPER

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# No water, no mating: Connecting dots from behaviour to pathways

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**Title:** No water, no mating: Connecting dots from behaviour to pathways

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**Abstract (150 words):** Insects hold considerable ecological and agricultural importance making it vital to understand the factors impacting their reproductive output. Environmental stressors are examples of such factors which have a substantial and significant influence on insect reproductive fitness. Insects are also ectothermic and small in size which makes them even more susceptible to environmental stresses. The present study assesses the consequence of desiccation on the mating latency and copulations duration in tropical *Drosophila melanogaster*. We tested flies for these reproductive behavioral parameters at varying body water levels and with whole metabolome analysis in order to gain a further understanding of the physiological response to desiccation. Our results showed that the duration of desiccation is positively correlated with mating latency and mating failure, while having no influence on the copulation duration. The metabolomic analysis revealed three biological pathways highly affected by desiccation: starch and sucrose metabolism, galactose metabolism, and phenylalanine, tyrosine and tryptophan biosynthesis. These results are consistent with carbohydrate metabolism providing an energy source in desiccated flies and also suggests that the phenylalanine biosynthesis pathway plays a role in the reproductive fitness of the flies. Desiccation is a common issue with smaller insects, like *Drosophila* and other tropical insects, and our findings indicate that this lack of ambient water can immediately and drastically affect the insect reproductive behaviour, which becomes more crucial because of unpredictable and dynamic weather conditions.

**Keywords:** Drought, behaviour, pathways, insects.