Effect of the environment on life-history traits in Drosophila suzukii

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Abstract

The life-history traits of organisms can be driven by the environment. Specifically, the nutritional composition of resources can influence life-history traits in insects. In Drosophila, the ratio of protein to carbohydrate (the P:C ratio) strongly influences life history traits. However, natural resources used by Drosophila species vary in many other factors. We compare how well P:C ratios of fruit resources predict life history traits in D. suzukii, relative to other measures of fruit composition and fruit identity, which integrates all aspects of the resource. We evaluate how 12 different fruit purees influenced life-history traits in D. suzukii. Fecundity (eggs laid in 24 hours) on each fruit medium was measured in a choice and a no-choice environment. We also evaluated development time, the rate of survival from egg to adult, and the total number of adults as an estimate of total fitness. We then test whether fruit identity, composition or P:C ratio best predict D. suzukii life history. Fruit influenced

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the entire life cycle, including oviposition and larval performance as well as the number of adults produced in the next generation. Variation in these traits is best explained by fruit identity, then composition, and lastly by the P:C ratio. These results highlight the importance of considering a resource as a whole. Considering only the ratio of protein to carbohydrates is not sufficient for understanding variation in key life-history traits.