# Weather - food web interactions steer the dynamics of an insect population

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## Abstract

Abstract Insect population dynamics are the result of an interplay between intraspecific competition, trophic interactions and external forces such as weather conditions, but studying how these processes combine to determine population change is challenging. We investigate mechanisms of population dynamics in a natural, low density insect population. Eggs and larvae of the noctuid moth, Abrostola asclepiadis, develop on its host plant during summer. The population density, and mortality, was closely monitored throughout this period during 15 years. Densities fluctuated between one and two orders of magnitude. Egg – larval developmental time varied substantially among years, with lower survival in cool summers with slower development. This was presumably due to the prolonged exposure to a large guild of polyphagous arthropod enemies. We also found a density dependent component during this period, that could be a result of intraspecific competition for food among old larvae. Dynamics during the long period from pupation in late summer through winter survival in the ground to adult emergence and oviposition the next year displayed few clear patterns and more unexplained variability, thus giving a more random appearance. The population hence shows more unexplained or unpredictable variation during the long wintering period, but seems more predictable over the summer egg-larval period. Our study illustrates how weather - via a window of exposure to enemies and in combination with density-dependent processes - can determine the course of population change through the insect life cycle.

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