

Effects of artificial light at night and the differences between day and night on insect abundance

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With increasing urbanisation worldwide, artificial light at night (ALAN) is also on the rise. Light fundamentally determines and influences the natural rhythm and behaviour of insects and plants. However little is known about how ALAN influences herbivory on a global scale, with subsequent indirect potential consequences on other ecological mechanisms, such as pollination. Therefore, we investigated the effects of ALAN on the abundance and species diversity of herbivores, plant-herbivore interactions as well as the herbivory intensity on wild flowers commonly found in the Swiss agricultural landscape. In order to investigate this, we conducted a field experiment, where we measured the effects of ALAN on diurnal and nocturnal herbivores on 12 different wild flowers stripes, of which six were illuminated with commercial LED street lamps. We tested whether there was a difference between dark and artificially illuminated sites in their abundance as well as in their feeding behaviour, measured by the initial damage to the plants, such as to the flower heads and to the leaves.

In a further step, we sampled insects in the three different structures, including forest edges, extensive meadows and wild flower stripes, at day and night to test whether there was an effect of the habitat on the circadian activity of herbivores. We regularly sampled insects in six fields per habitat by swipe netting the vegetation during the day and at night and subsequently sorted the insects at the orders levels to analyse how habitat influence daily and nocturnal herbivore communities.