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Swarming patterns of light trapped individuals of caddisfly species (Trichoptera) in Central Europe

Research Article

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Abstract: This study is on the light trapping of caddisfly species (Insecta: Trichoptera) related to the proportion of males and females and the moon phases. The data collected includes 24 species in 9 light-trap stations, for 49 swarming events between the years 1980 and 2000. We found the massive emergence of adults happens fractionally in swarming intervals. This is connected with the phenology and life cycle of each species. The percentage of males and females of the same species during different swarming events cannot be considered equal. The proportion of males and females are different in the swarming of different species. We found that the number of male and female individuals is substantially synchronized with each other within the swarming, but it can be different in the case of each species. The duration of the swarming, even in the same species, are not always uniform. The effect of the Moon cannot be clearly identified in any species, even if data from several swarmings are available. The swarming peaks appear near different Moon quarters.

Keywords: *Sex ratio • Light-trap • Moon Quarters*

1. Introduction

The caddisflies (Trichoptera) are one of the most important groups of aquatic insects, which include 13,574 species [1]. Their seasonal activity is therefore essential to understanding the ecological impacts [2].

The caddisflies imagos generally are active at night and they are attracted to artificial light. Therefore according to prior investigations [2-8], light trapping is one of the most suitable methods of identifying their swarming patterns and abundance. This includes the beginning and end of swarming, and the length and peaks of activities. This research is important for the characterization of caddisflies species and their function in nature conservation research.

Thousands of adults were collected in the study [9,10]. This trapping method has been extensively used by trichopterologists from temperate areas [9,11-16] through Mediterranean aquatic habitats [17,18] to subtropical/tropical regions [10,19,20].

By 'swarming' we mean the length of the flight-period of the imagos. The caught caddisflies are short-lived, thus observed flight by light-trap can be considered as a time series of the different emerging and dying specimens. Accordingly, the swarming reflects the hatching of imagos from the pupae, with some probably negligible delay [21].

The daily distribution of flight activity is an important aspect in the study of potential moonlight effects on caddisflies, because the nightly duration of the moon staying above the horizon is changing during the moon phases [21,22].

The caddisflies may have very different types of daily activity patterns. Many trichopteran species fly exclusively in daylight [23,24]. Most of the caddisflies are active during evening or night, but some species have a daily bimodal activity pattern [25]. Other studies reported that the swarming of caddisfly adults starts mainly after dusk and peaks before midnight at early or late evening, but the flying of many species continues until dawn [26].

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