Abstract

In our ecosystems, wild bees assume an important role as pollinators. However, considering their importance as key-stone species, most have, as yet, not been adequately researched. Many species' life histories are either insufficiently known, or not known at all.

The aim of the submitted research is to explain the life strategy of the solitary bee *Colletes daviesanus* SMITH 1846. For this purpose, aspects such as life cycle, sexual dimorphism, sex ratio, phenology, nest building, parasitism, mortality, food gathering, grooming and collecting behaviour as well as reproduction performance have been examined; the morphology of the adults is presented in a detailed atlas.

C. daviesanus can be termed a pioneer species which colonizes spatially dispersed and only temporarily available vertical nesting substrates. It succeeds in compensating the quantitative and temporal limitations of nesting sites by a high total reproduction rate. Nesting aggregations are actively formed. They may consist of thousands of females, and can, under favourable conditions, persist over many years. A large number of adaptations and specializations enables the aggregation to grow rapidly. Finally, a high total reproduction performance allows for a large number of individuals to disperse and look for new nesting sites.

As a univoltine oligolectic summer bee *C. daviesanus* is specialized on asteraceae. However, research reveals that both the phenology and the different ethological and morphological adaptations are optimized in order to exploit one particular plant species, the common tansy *Tanacetum vulgare.* All females develop a flower constancy to *T. vulgare* if available. In contrast to other bee species *C. daviesanus* is able to visit considerably more *Tanacetum* flowers per unit of time, which constitutes a decisive competitive advantage. The distances covered between the nesting site and the food source were regularly measured as up to 2000 metres, the furthest distance being 2225 metres. It is due to this wide home range that the bees are able to collect sufficient food and consequently form a huge aggregation.

As with all *Colletes* species secreta from the Dufour’s gland, brushed out with the glossa, are used for the construction of brood cells. Nests consist of up to four brood cells. Female brood cells are generally built first. Reflecting the size dimorphism of the sexes, they are bigger than the male brood cells, and are supplied with more pollen and nectar. As the number of male and female brood cells is controlled in each nest, the sex ratio (57 % males, 43 % females) is kept fairly constant over the years. It matches the theoretical pre-dictions made on the basis of parental invest-ment into the sexes. Many of the brood cells have vestibules which probably serve thermal regulation. In favourable weather conditions the building capacity of one bee is one brood cell per day, cell construction is then carried out during the night. One single female builds 18 brood cells on average, losses due to para-sitisation and mortality amount to 45 - 65 %.