

SUMMARY

Urbanisation is a phenomenon causing changes of the environment, including the disappearance of natural habitats, which further directly and indirectly affects the biology of organisms. Most of the existing literature indicates potentially harmful influence of the numerous anthropogenic factors in the urban environment on living organisms. Therefore, I hypothesised that the increasing level of urbanization negatively affects red mason bee (*Osmia bicornis*, syn. *O. rufa*). I assumed that with the increasing level of urbanisation, the manifestation of pathogens in the nest is increasing, the number of the offspring is decreasing, males are prevailing in the offspring sex ratio and the size of the adult offspring is decreasing. Furthermore, I expected that the spectrum of plants from which females form pollen loads differs among locations in the urbanisation gradient.

The research aimed to determine the influence of environments along urbanization gradient (urban, suburban and rural) on the red mason bees. A detailed literature review on the biology of *O. bicornis* was done (**manuscript 1**). The nest microbiome was identified along with the verification of the genetic material of the parasites *Nosema apis* and *N. ceranae* presence. The level of reproductive success was assessed on a basis of the population parameters (presence of healthy offspring in relation to the number of unused pollen loads, dead larvae and brood chambers with parasites) (**manuscript 2**). Analysis of the offspring sex ratio and verification of cocoon and bee size differences were conducted (**manuscript 3**). Palynological analysis of the pollen loads composition was done (**manuscript 4**). The data were analysed using various methods in R.

The presence of bee-pathogenic bacteria and fungi was not described with the MALDI-TOF MS technique in any of the urbanisation gradient localizations. Also, the presence of genetic material of neither *N. apis* nor *N. ceranae* parasites were detected in the red mason bees' offspring. The greatest manifestation of parasites occurred in suburban areas. The greatest reproductive success was achieved by urban populations of the red mason bees. Offspring females were larger and more numerous in the urban environments, than in the other locations. *Osmia bicornis*, particularly in urban areas, repeatedly collected pollen from common trees such as oaks, maples, chestnut and elm, while bees in suburban and rural areas also collected pollen from herbaceous plants and shrubs.

The results suggest that the urban environment, contrary to the hypothesis, does not have a negative impact on the biology of red mason bees. However, further research in other cities and in an extended urbanisation gradient is required.