

There are two phenomena in Europe and around the world: a shortage of pollen, which determines the hunger of pollinators, and a decline in pollen diversity. As a result of human activities, mainly due to heavy urbanization, habitat destruction and fragmentation, the use of pesticides and the cultivation of monocultures, the number of pollinators has decreased dramatically. These factors also affect the honey bee (*Apis mellifera*). So far, no substitute has been developed that could completely replace bee pollen. Nectar is a source of carbohydrates, and pollen is rich in proteins, carbohydrates, fats and other biological compounds that are essential for the proper functioning and balance of the body. An appropriate diet rich in a number of compounds with appropriate, balanced proportions affects the proper functioning of the digestive tract through active absorption of food particles, intestinal peristalsis, protection against the development and / or inhibition of the development of pathogenic microorganisms. The result is an adequate life expectancy of the bee and the ability to perform all necessary activities for the bee colony. A healthy bee is one whose immune system is efficient and reacts quickly to unfavorable / harmful particles and pathogens. The first line of defense of bees, right after anatomical and physiological barriers, are biochemical immune barriers, which consist of an antioxidant and proteolytic systems, and biochemical markers. The proteolytic system consists of enzymes called proteases and their inhibitors. Proteases "cut" the pathogen's proteins and prevent it from multiplying. Protease inhibitors inactivate enzymes (specific proteases) of the pathogen and help maintain homeostasis in the bee's body. The reactive oxygen species and pathogen residues formed in these processes are neutralized by antioxidants. Biochemical markers support the functioning of these two systems and are also indicators of bee health. Their low activity is closely correlated with a decrease in bee immunity. We assumed that bees consuming one type of food (monodiet) had reduced activities of these biochemical immune barriers. In order to function efficiently and at a high level, these barriers must be supplied with energy in the form of ATP. The substrates for the synthesis of ATP are glucose, glycogen and triglycerides. Therefore, in this project, we also decided to check whether and to what extent monodiet has an influence on the concentrations of these compounds.

The aim of our project is to determine the influence of monodiet as a natural stress factor on the activity of the proteolytic and antioxidant system, as well as biochemical markers and the concentration of compounds responsible for energy reserves in the hemolymph of workers along with their aging processes. The monodiet will be considered in the context of the following pollen: rape, phacelia, buckwheat and goldenrod.

The results of this study will enrich our understanding of how monodiet affects the action of key compounds involved in the body's immune / response. Determining whether and how a single pollen affects the bee's response is part of the latest research in the field of nutriphysiology, ecology of pollen plants and shaping the landscape through specific plantings. Determining the impact of individual mono-diets on the immune processes of bees will be one of the first steps in developing a balanced diet for these insects. The end result of the research, in addition to scientific publications, will be the selection of pollen with the most beneficial effect on the functioning of the organism of bees. In addition, this information will enrich the current knowledge about what plants are worth sowing in flower meadows. In the long term, the results can be used to stimulate the development of colony strength [before wintering and early spring (when there are no flowering plants and therefore pollen)], as well as in times of increased risk of pathogen-induced disease to improve lost nutrients in their body; as well as in migratory apiaries and in laboratory experiments with the use of bees.