In the conditions of dynamically occurring climate changes, the demand for accurate forecasting of future environmental changes is increasing. One of the methods to increase the accuracy of this kind of predictions is to use plants functional traits. These are plants traits that affect their growth, reproduction and survival. They are associated e.g. with the leaf area, wood density or seed mass of particular species. Their great advantage is that the traits are intercorrelated. For that reason, measuring the value of one trait, we are able to estimate the values of another, e.g. those more difficult to measure. Currently, some of the traits are used, for example, for objective comparisons of life strategies of different plant species or to predict changes in the species composition of plant communities.

However, the use of functional traits still has some limitations. Currently, only 17.7% of terrestrial plant species are represented in global trait databases. In addition, most of the research mainly focus on some of the most popular plant characteristics. For example, leaf traits are widely used because of their great utility in ecological research, but also the ease of obtaining data and their high availability in data repositories. Meanwhile, flower and fruit traits (reproduction traits) are often overlooked; the exception is seed mass, well-represented in trait databases. Well-established in literature conservatism of these traits, and therefore their low level of variability, could limit methodological shortcomings associated with using average trait values from publicly available databases. In this context, reproduction traits may represent the underestimated potential of functional ecology.

The purpose of the proposed research is (1) to analyse the variability of reproduction traits at the inter- and intraspecific level, and (2) to determine the potential of these traits in the development of functional ecology. To achieve the goal (1) we intend to sample flowers, fruits and leaves at the Arboretum in Kórnik. We plan to take samples from at least 150 randomly selected tree species. Measuring and analysing the traits will allow us to determine the range of variability among species originating from different regions of the Northern Hemisphere. In addition, we will be able to determine which traits are characterized by greater differences between species. To achieve the goal (2), we have planned field study, involving sampling of flowers, fruits, leaves and stems on six study plots for 30 species of woody plants. We will collect plant material from six plants of a given species from each plot. As the plots will be located in different environmental conditions and at a considerable distance from each other, we will be able to determine how the values of the studied traits differ at the intraspecific level. In addition, we will be able to compare the level of variation in the characteristics of individual plant organs and determine which traits are the least variable within a species.

The results of our research will broaden knowledge about the variability of plant reproduction traits and provide a reliable assessment of the possibilities of their use in further functional ecology studies. The results of this project will provide valuable data that will allow better recognition of the role that reproduction process plays in the life strategy of trees and shrubs species. In addition, our results will have a significant impact on the use of plant reproduction traits in basic and applied research. For example, plant reproduction traits can be used to plan strategies for managing biological invasions in forestry and nature conservation, e.g. in risk analyses of specific trees and shrubs alien species. They will also be an important supplement to the traits used so far in studies on pollinating insect clusters and the reasons for their decline, as well as in studies on seed-predating species.