

We will study an interaction between native sessile oaks, invasive red oaks and yellow-necked mice: rodents that disperse their acorns. Introduced from North America, red oak is strongly expanding in Central Europe. Acorns of both native and introduced oaks are consumed by rodents. However, rodents also disperse and bury their acorns in numerous shallow caches. Because small mammals have imperfect memory and many of them succumb to predators before they have a chance to use the cached food, some buried acorns usually avoid consumption. Such acorns are protected from consumers that do not cache seeds, and from harmful environmental factors, such as drought, frost, and UV rays. As a consequence, they have much higher chances of survival and germination than non-buried acorns. Thus, the interaction between oaks and rodents can be classified as mutualism: mutually beneficial service exchange between two organisms.

Red oaks produce acorns that theoretically should be preferred over native oak acorns for caching by rodents. They are heavier and have higher concentration of chemical compounds called “tannins”, which increase acorn resistance against soil pathogens such as fungi. Therefore, red oak acorns are superior to native sessile oaks as caching items. Consequently, introduction of red oaks might interrupt the mutualism between native oaks and small mammals that disperse their acorns.

We will examine if this phenomenon takes place in Poland. More specifically, we will test whether interactions among yellow-necked mice and the two species of oaks can be described as “apparent predation”. According to this theoretical concept, introduction of alien plant species could indirectly influence the interaction between native plants and their dispersers. Seed value is relative: in the presence of very attractive seeds, less attractive ones could be ignored. Animals might decrease caching of such seeds and increase their consumption. To fully understand how this phenomenon influences recruitment of red and sessile oak species, we will also examine how burial and transportation of seeds influence successful germination of both oak species.

Our project will be the first to address the problem of indirect effects of invasive plants on mutualism between native plants and their seed dispersers. Numerous plant species worldwide rely on rodents for dispersal of their seeds. Thus, current lack of understanding whether and how introduced species affect this interaction is a crucial gap in our knowledge. If the apparent predation operates in interaction between rodents and oaks, it would provide a prominent example of a harmful, indirect effect of invasive plant species. It would also stress the importance of third party players mediating pairwise interactions. Moreover, our experiments will provide first data quantifying the benefits (or lack of them) of seed transportation by rodents on seed germination. So far, such benefits were only assumed.