Dispersal, i.e. movement of an individual from its place of birth to a site of reproduction or its movement between successive sites of reproduction, ensures gene flow and therefore is a fundamental biological process that has consequences for population dynamics, population genetics and species distributions. Understanding the mechanisms of dispersal is especially crucial for predicting species range shifts and spread of potentially invasive organisms, particularly due to the rapid anthropogenic changes we are currently experiencing. Particularly, there remains a need to better understand the role of natural selection in shaping dispersal.

Obligate plant parasite *Aceria tosichella* (wheat curl mite: WCM), is among the most important pests of wheat, mostly due to its ability to transmit cereal viruses. The successful spread of WCM to cereal-producing regions worldwide has challenged researchers and cereal growers for more than seven decades. It is known that WCM is passively dispersed with wind, however efforts to understand the mechanisms of its dispersal and drivers of its long-established and recent invasions have not yet been undertaken. Some theoretical models predicted the evolutionary relationship between dispersal strategies and host specificity in WCM. However, no empirical tests of these hypotheses have been attempted. Additionally, these presumptions have overlooked that WCM is in fact a complex of genetically distinct lineages, possibly cryptic species, with divergent invasive potential.

The aim of the project is to use the most invasive WCM genetic line (MT-1) and experimentally test whether there is an evolutionary interplay between dispersal and specialization. The question whether WCM high dispersal ability influences local adaptation to different hosts and thus the likelihood of host shift and range expansion will be answered.

Research will include field and experimental work. During the field study, samples of plants infested with WCM will be collected from the agricultural landscape. Subsequently, specimens genetically identified as MT-1 will be used for experiments. In the first step of experimental work WCM MT-1 will be subjected to **experimental evolution**. For this purpose mites will be reared for many generation on single or on randomly rotated several hosts. As an effect, two genetically distinct lines will be obtained: specialists (S) and generalists (G). In the she second step, selected S and G lines will be subjected to **artificial selection** in wind tunnels towards (+) and against (-) dispersal. Next, the dispersal efficiency and colonization success of all selected lines (S+, S-, G+, and G-) will be compared by measuring their population growth rates in different conditions.

The results of the project provide the basic and crucial knowledge on WCM dispersal, which will contribute to the development of ecological and evolutionary research as well as of applied research focused on management strategies of WCM in agricultural landscape.