Summary

Conceptualisation of plant behaviour, or plant phenotypic plasticity, has been proven to be useful both on the ecosystem scale and on the level of individuals, as it allows to predict differentiation of species across ecosystems or results of interactions among individuals. Between these extremes is a vast array of processes that drive community assembly. These processes are difficult to predict, be it at the individual level or based on whether a whole species is plastic or non-plastic. These processes are traditionally investigated at the species level. In this thesis, however, I instead show how species-specific life histories delineate plant behaviour. I hope to convince the reader that it is the plant body, or at least its species-specific properties, not merely its non-specific, theoretical degree of plasticity, that should be used to explain actual cases where plant behaviour underpins species coexistence.

As evidence for my case, I present four studies, each of them dealing with different part of the plant body that underlies different aspects of plant behaviour. In the first study, I show how species' life-history traits are coordinated with their responses to neighbour presence and resource shortage, both of these delivered in the form of changing light quantity and quality. Not only the quantity of the response, but especially its form, is deeply coordinated with life history traits of species. In the second study, I examine the amount of plasticity that plant root systems exhibit in patchy environments and link the extent of root localization plasticity exhibited with the same set of species-specific life history traits as in the first study. Previously, some of these life history traits were linked to plant plasticity in general. It has also been traditionally hypothesized that plasticity is a common property of the whole plant body, both aboveground and belowground. In the third study, I show that seedling root system development is plastic, but that the realized form of the root system is strongly affected by species-specific seed mass and the environment. Seed mass thus sets the boundaries for plasticity in architectural traits of the root system. In the last study, I show how growth forms and different environments set the optima for clonal spread of plants.

I hope that this thesis sheds new light on the interplay between plant behaviour and the plant body. Although all of the presented studies deal with multiple species, I have a feeling that I have only opened the door to research into this topic with a plethora of possibilities and undiscovered links. Even though this puts me further from the goal of linking plant behaviour and coexistence, I believe that this is the way how to shape ideas about plasticity to reflect the physical world, where real living organisms with real bodies struggle for existence.