In recent decades, it was shown that belowground competition for some plants may take form of the tragedy of the commons (TOC). In these plants, the competing neighbours invest more in root systems than would be appropriate for optimal nutrient uptake for the group and also more than they do when grown alone. However, there is also strong evidence that other species do not follow TOC, and tailor their root system to best nutrient exploitation irrespectively of competitor presence. The root investment strategy of these plants should correspond to the ideal free distribution (IFD).

In my thesis I focus on two aspects:

- I use game theoretical models to explore, whether those strategies can coexist within species and also whether different species can coexist if they have different strategy. From this model I draw predictions, which I test by meta-analysis.
- Using *Agrostis stolonifera* as a model, I test assumptions on nutrient and neighbour perception, which underlie TOC and IFD models.

I show that according to mathematical models, those two strategies can coexist in different species in a community, but cannot coexist within a species. Within a species, the TOC strategy should always dominate, once it appears. This can be extrapolated to macroevolutionary scale – once TOC occurs in certain clade, it should not disappear. By meta-analysis of strategies across different species, I show that this really is the case, with TOC strategy clustered to Fabaceae or rosids clade.

A. stolonifera strongly decreases investment to roots in presence of competitor. This is something that does not match either TOC or IFD strategy. This species also avoids competitors' root system in space. By analysis of rhizosphere shape, I show that this behaviour is strongly governed by competitor presence, rather by nutrient availability.

It is possible to conclude, that root overproduction in intraspecific competition is likely evolutionary novelty of legumes or the rosids clade. However, due to anomalous ecology of Fabaceae, it is not clear whether this overproduction really is expression of TOC. In addition, it is clear that there are species that do follow neither TOC nor IFD. Those two findings together make the whole idea of rooting strategies dichotomisation to TOC and IFD questionable.