Title : Dynamic changes in plant species competition: effects of nitrogen and pathogens on multispecies competition networks

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Abstract : Plant competition is key to understanding processes such as population dynamics, maintenance of species diversity, or the assembly, stability and functioning of ecosystems. However, it has been challenging to study competitive interactions between multiple species in highly diverse systems. To go beyond the pairwise approach, network theory has developed a series of tools and metrics that characterise the structure of interactions among species. However, very few studies have explored how such networks vary with changes in resources and enemies, or how networks differ between species with different growth strategies (e.g., slow *versus* fast-growing species). We conducted a manipulative experiment with 18 perennial plants, which varied strongly in growth strategy, planting the species into neighbourhoods with different densities of each competitor and we followed their performance across two seasons. We did this within the context of the PaNDiv Experiment, near Bern in Switzerland, in which species richness, plant functional composition, nitrogen supply and foliar pathogen presence were manipulated. Our results show that nitrogen and fungicide (and to some extent seasonality) re-arrange the structure of plant interaction networks and decouple network metrics. Both the mean and the variance of the community specific leaf area (SLA), which is strongly linked to the growth strategies, impacted the structure of plant interactions. Competition networks can represent the overall structure of species interactions and can shed light on the mechanisms determining effects of global change on biodiversity.