Biodiversity and the Functioning of Ecosystems

iDiv Annual
Conference 2019
Abstract book

Topic session 5
Friday, 30 August
9.00—10.45
Conference room 1AB

iDiv
German Centre for Integrative
Biodiversity Research (iDiv)
Halle-Jena-Leipzig

Alexandra Weigelt, *Session keynote*

Mechanisms driving BEF relationships in plant roots

Thomas Hornick, *Standard talk*

Linking ecosystem functioning with high-throughput pollen diversity and pollen trait monitoring

Kathryn Barry, *Standard talk*

SimNet – A collaborative network of modelers to better understand how community assembly influences ecosystem functioning

Fons van der Plas, *Standard talk*

Predicting multiple ecosystem functions from plant traits: holy grail or mission impossible?

Georg Albert, *Standard talk*

Joined effects of niche and trophic complexity on ecosystem functioning

Ana Carolina Antunes, *Speed talk*

Future vertebrate food webs and ecosystem services under a climate and land-use change scenario.

María Felipe-Lucia, *Speed talk*

Land-use intensification alters the structure of biodiversity-functioning-services networks

Rémy Beugnon, *Speed talk*

Effects of tree functional dissimilarity on soil community composition and functions

Gemma Rutten, *Speed talk*

Mycobiome assembly along tree richness gradients across various systems

Karl Andraczek, *Poster*

Will “Insect Armageddon” affect litter decomposability in grasslands?

Linnea Catherine Smith, *Poster*

Patterns and drivers of soil respiration across European land-use types

Susanne Marr, *Poster*

Secondary Metabolite Profiles are Ídentifying Grassland Plant Species Across Seasonal and Community Dynamics

Xuanlong Ma, *Poster*

Integrating new optical and radar satellites for remote sensing of plant functional diversity

Lena Kretz, *Poster*

From the leaf scale to the floodplain: Effects of herbaceous vegetation structure on sediment retention

Constantinos Xenophontos, *Poster*

Phylogenetic and functional dissimilarity have contrasting effects on the ecological functioning of synthetic bacterial communities

Maria D. Perles-Garcia, *Poster*

Spatio-temporal dynamics of individual-tree crown plasticity as affected by local neighbourhood interaction in BEF-China

Felix Gottschall, *Poster*

Tree species identity determines wood decomposition via microclimatic effects

Josephine Ulrich, *Poster*

Invertebrate decline affects plant species abundance and phenology

Agnieszka Sendek, *Poster*

Drought modulates interactions between arbuscular mycorrhizal fungal diversity and barley genotype diversity

Carla Klusmann, *Poster*

Does plant diversity ameliorate abiotic stress from soil compaction?

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Session keynote

Weigelt, Alexandra

Leipzig University

Mechanisms driving BEF relationships in plant roots

In grassland ecosystems roots make up as much as 70% of plant biomass. Plant roots determine, to a large extent, the outcome of competitive interactions with neighbors, and they play a pivotal role for ecosystem services such as nutrient retention and carbon sequestration. And yet, in contrast to aboveground biomass, we still know very little about their dynamics, behavior and functional traits, particularly in the light of biodiversity-ecosystem functioning relationships. Spatial resource partitioning across resource gradients is one of the main hypothesized mechanisms for BEF relationships. However, spatial resource partitioning does not predict enhanced ecosystem functioning belowground in more diverse grasslands. While there is some evidence for spatial light partitioning aboveground, roots rather aggregate than segregate in more diverse mixtures compared to monocultures. Especially belowground, biotic interactions might be driving BEF relationships mediated via differences in morphological and chemical root traits or via changes in root growth over time. Ultimately, these differences may drive soil carbon stocks via increased root exudates and reduced root decomposition in more diverse grasslands.

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Weigelt, Alexandra

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Standard talk

Hornick, Thomas

Helmholtz-Centre for Environmental Research - UFZ

Martin-Luther-University Halle-Wittenberg

Linking ecosystem functioning with high-throughput pollen diversity and pollen trait monitoring

Pollen diversity contributes to multiple vital ecosystem services including pollination, crop production and food security, and air-quality and health. A major challenge in quantifying pollen diversity is that current quantification methods are time consuming and limit the potential for monitoring at the taxonomic, temporal and spatial scales required. The project PolDiv (Automated high throughput pollen diversity monitoring of air quality and pollination as ecosystem services), aims to determine pollen diversity and pollen traits by using a combination of imaging flow cytometry and deep learning, allowing for high-throughput sample processing. Training and testing of deep learning is performed with reference pollen of various plant species as well as pollen-trap material capturing the natural biodiversity of aerobiological samples. Our results will contribute towards understanding how pollen diversity relates to allergy symptoms and human health, plant-pollinator networks, as well as socio-economic aspects at high temporal and spatial scales, highlighting the importance and val-ue of bio-di-ver-si-ty re-search for so-ci-ety. Additionally, we are building a pollen trait database that includes traits related to pollen size, morphometry, physiology and stoichiometry by using imaging flow cytometry as well as standard analytical methods.

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Standard talk

Barry, Kathryn

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SimNet – A collaborative network of modelers to better understand how community assembly influences ecosystem functioning

Worldwide, humans are propelling environmental changes leading to biodiversity loss at the global scale. This biodiversity loss is predicted to cause global declines in ecosystem functioning. However, these predictions largely come from small scale experiments where species are lost randomly or models that focus on specific ecosystems or single processes that affect community assembly (e.g., competition, facilitation, or dispersal limitation). Further, outside of experiments biodiversity change is more complex than simple random species loss. Thus, these predictions may not be applicable to global ecosystems. Ultimately, biodiversity change and its effect on ecosystem functioning are influenced by the interplay between local and regional community assembly processes. Understanding how these processes interact to affect ecosystem functioning is crucial for predicting the consequences of global biodiversity change.
Here, we present the preliminary results and conceptual framework from the pilot project of the SimNet collaborative modeling network. By running standardized "experiments" on a suite of models that individually cover different community assembly processes, we explore the effects of community assembly and species loss. Further, by pairing these model intercomparison projects with simultaneous conceptual syntheses, we (SimNet) plan to provide a more comprehensive view of how community assembly affects ecosystem functioning.

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Standard talk

van der Plas, Fons

Leipzig University

Predicting multiple ecosystem functions from plant traits: holy grail or mission impossible?

A key challenge in ecology, coined as "the Holy Grail", is to predict how changes in the identity and diversity of co-occurring plant species and their traits drives the functioning of ecosystems. Here, we analyze the extent to which 43 different ecosystem functions can be predicted by 41 plant traits, in 78 experimentally manipulated grassland plots, over 10 years. Despite the unprecedented number of traits that we analyzed, the average percentage of variation in ecosystem functioning that they could jointly explain was only 12.0%. Most other studies linking ecosystem functioning to plant traits analyzed no more than five traits, and when including only five random or the five most frequently studied traits in our analysis, the average percentage of explained variation in ecosystem functioning dropped to 3.7% and 4.3% respectively. Furthermore, different ecosystem functions highly varied in the traits by which they are driven, with on average only 9.4% overlap in significant predictors. Thus, a small set of key traits able to explain variation in multiple ecosystem functions does not exist. Thus, there are strong limits in the extent to which we can predict the consequences of the ongoing, rapid changes in the composition and diversity of plant communities.

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Standard talk

Albert, Georg

Friedrich Schiller University Jena

Joined effects of niche and trophic complexity on ecosystem functioning

Over the last decades, ecosystem functioning has become one of the central topics of ecological research. Nevertheless and despite recent advances, mechanisms underlying the generally accepted positive relationship between biodiversity and ecosystem functioning remain poorly understood. This is especially true when taking the differences between trophic levels as well as their interactions into account. Dynamic simulations of food webs enable us to precisely manipulate ecosystems beyond the limits of real world systems. In doing so, we show how niche complexity of primary producers and trophic complexity of higher trophic level species jointly contribute to sustaining biodiversity itself and how they consequently shape BEF relationships.

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Speed talk

Antunes, Ana Carolina

Friedrich Schiller University Jena

Future vertebrate food webs and ecosystem services under a climate and land-use change scenario.

In a scenario of continuous climate and land-use change, the expected high loss of biodiversity affects the functioning of ecosystems and the ability of natural ecosystem to deliver ecosystem services. Yet, there is no mechanistic underpinning of this expected change to generate quantitative predictions. In this study, we will use metabolic theory to predict the total energy fluxes between consumers and resources in a vertebrate food web, and directly relate these fluxes to specific ecosystem functions and services provided by vertebrates (pest control, regulation of open areas, regulation of herbivores, cultural services). Pixel-based distributions of the vertebrate food web across Europe will provide quantitative estimates of ecosystem services at a resolution of 1km. Both climate and land use change modify the population abundances and probability of presence, which will be accounted for in new allometric scaling relationships. Changes in food-web structure caused by species extinctions modify all fluxes in the food web via direct and indirect effects. Together, these relationships facilitate the modelling of food-web energy fluxes and the resulting ecosystem functions under future conditions of higher ambient temperatures, different land-use types and lower species richness.

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Speed talk

Felipe-Lucia, María

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Friedrich Schiller University Jena

Land-use intensification alters the structure of biodiversity-functioning-services networks

The relationships between biodiversity, ecosystem functioning and ecosystem services are complex but understanding the linkages between these three aspects of ecosystems can provide critical information on the consequences of biodiversity change for the functioning of ecosystems and human wellbeing. We tackled this complexity by using correlation networks, i.e., considering species richness of a given trophic group, the level of a particular ecosystem function and ecosystem service as a node and using the correlation coefficient between each pair of elements as the link or edge. We used 300 plots distributed along a land use intensity gradient in forests and grasslands with data on species richness of 21 trophic groups, 10 ecosystem functions and 14 ecosystem services. In particular, we analysed the effect of increasing land use intensification on i) network structure (density, modularity and evenness); ii) the composition of modules of highly correlated nodes, and iii) the identity of the hubs. We found that land use intensification affects ecosystem structure by altering all metrics studied and the identity of the hubs in both habitats, markedly in forests. Our work have implications for ecosystem stability and resilience and can inform policy makers about the ecological consequences of different land use intensity levels.

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Speed talk

Beugnon, Rémy

Leipzig University

Effects of tree functional dissimilarity on soil community composition and functions

Human management is known to alter tree diversity in forested ecosystems, thereby reducing ecosystem functioning such as biomass production and soil carbon storage. Tree diversity is expected to influence a range of environmental parameters like microclimate, soil quality, and biotic conditions. Microbial communities are strongly affected by these parameters and drive important ecosystem functions like carbon storage, decomposition, and mineralization. However, mechanisms linking tree diversity with soil microbial communities and related functions are still unclear. Such knowledge can be gained by studying tree functional traits that modulate environmental local conditions. Here, we tested effects of local (at tree species pair level) and global (at plot level) tree functional traits dissimilarity on local environment and cascading effects on soil microbial community composition and functioning within subtropical climate in South China. We expected tree functional traits dissimilarity to have a positive effect on soil microbial community composition and related functions by mediating environmental parameters. We estimated tree diversity effects on environmental parameters, while microbial community composition was assessed by fatty acid analysis and microbial functions were assessed by substrate-induced respiration. We observed that tree diversity modified environmental conditions. These modifications of local environment had consequences on soil microbial communities and functioning.

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Speed talk

Rutten, Gemma

Martin-Luther-University Halle-Wittenberg

Mycobiome assembly along tree richness gradients across various systems

Biodiversity-Ecosystem Functioning (BEF) experiments in forests can be used to test the impact of diverse tree plantations as a climate change mitigation strategy. Therefore, the next aim of BEF-China is to disentangle the relative contributions of specific biotic and abiotic drivers to the outcome of biodiversity and ecosystem functioning relationships.
Addressing this requires bringing data from different systems together. Besides tree diversity, we will include environmental conditions that modify BEF-relationships, and those that are affected by the system's diversity. For the responses, we will focus on the mycobiome in various plant compartments, e.g. leaves, leaf litter and plant roots. The current state of knowledge suggests that fungi in different plant compartments, are often influenced by the diversity of the associated plant communities. Yet, the patterns are inconsistent and it remains unclear whether the mycobiome in different compartments is affected by comparable mechanisms.
Here, we summarize existing knowledge-gaps and present follow-up study ideas accompanied by preliminary results, which assists our future aim to base the relationships on different BEF platforms at iDiv. Eventually, a better understanding of biogeographic patterns of the plants' mycobiome and the effects of various drivers will facilitate predictions about the functional responses of ecosystems to environmental changes.

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Poster

Andraczek, Karl

Leipzig University

Will "Insect Armageddon" affect litter decomposability in grasslands?

Several studies now show declining insect populations. This insect decline may have devastating consequences for how plant communities cycle nutrients. Insects provide more decomposable nitrogen sources than plants via their frass and carcass which are richer in nitrogen than plant litter. Additionally, insect herbivory induces changes in leaf litter quality by causing plants to divert C and N from roots to leaves. These changes may increase the litter (including insect and plant inputs) decomposition rates and thereby increase the rate of nutrient cycling.
We collected insects monthly from a natural grassland community at 100%, 25%, and 0% of their natural abundance to mimic insect decline and put these insects in the iDiv Ecotron with 12 common grassland species. We installed litter traps, separated throughfall weekly into frass, carcasses, and fallen leaves, and collected fine root biomass from the upper 0-5 cm of the topsoil. Finally, we measured the C/N ratio of the frass, carcasses, leaves, and fine roots to test the hypothesis that insects increase the total litter quality and concomitantly change the C/N ratio of fine roots. This increase in the total litter quality is likely to increase the rate of nutrient cycling in grasslands where insects are abundant.

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Poster

Smith, Linnea Catherine

Leipzig University

Patterns and drivers of soil respiration across European land-use types

Soil ecosystem functions play a key role in supporting biodiversity and vice versa, making it important to quantify these functions and to understand the mechanisms behind them. To this end, we measured soil basal respiration, microbial biomass, and microbial diversity (fungi and bacteria) in 881 soil samples from the Land Use/Cover Area frame statistical Survey. These samples come from across Europe and represent a variety of land cover types including agriculture, forest, and grasslands. We will investigate the differences in soil microbial properties across land cover types in order to distinguish between various mechanistic and functional processes associated with different land-use types over the European environmental gradient. We expect that natural ecosystems will have higher microbial biomass, diversity, and basal respiration than agricultural systems. We also predict that soil properties such as water content will be significant drivers of soil ecosystem functions in all land-cover types. However, climatic variables such as precipitation will be less significant in managed than in natural ecosystems, due to the influence of anthropogenic inputs (e.g. artificial irrigation). This Europe-wide survey will both provide a baseline for the current state of soil microbial properties and allow wide-scale investigation of their driving mechanisms.

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Poster

Marr, Susanne

Martin Luther University Halle Wittenberg

Leibniz Institute of Plant Biochemistry

Secondary Metabolite Profiles are Ídentifying Grassland Plant Species Across Seasonal and Community Dynamics

How plants respond to changing environments is commonly studied in semi-natural biodiversity experiments and analysed on a morphological trait level. On the other hand, secondary metabolites, known to play a key role in, e.g. plant defence strategies, are mainly studied under controlled conditions. However, changes in plant communities and across seasons are likely to be reflected in the metabolic fingerprints. Understanding those dynamics will help to unravel the underlying mechanisms of ecosystem functions.
We analysed 13 grassland species in the Jena Experiment for their secondary metabolites. Leaf material was collected from communities, consisting of 1 to 8 different species. The plants were collected at four time-points across the growing season to capture seasonal differences.
Our global workflow is enabling data of large scale ecological experiments, including many diverse metabolomic profiles, to be analysed on high-throughput analytical tools and compared within one dataset.
The fingerprints, obtained with a UPLC-ESI-QToF-MS, identified each species across the different sampling conditions with high reliability. Overall, herb species were found to have a generally higher number of features than the grass species. In addition, we found different responses to plant communities and seasonal dynamics across all 13 species, indicating species-specific strategies of adaptation to changing environments.

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Poster

Ma, Xuanlong

Max Planck Institute for Biogeochemistry

Integrating new optical and radar satellites for remote sensing of plant functional diversity

Assessing plant functional diversity (FD) from space may provide an unprecedented way to monitor global FD change in a consistent and efficient way. The potential of operational satellites for inferring FD, however, remains to be demonstrated. Here we studied the relationships between in-situ measured FD and satellite observations over 118 field plots located in 6 major European forest types. Satellite data include spectral reflectance measurements taken by Sentinel-2 multispectral satellite and backscatter measurements taken by Sentinel-1 C-band Synthetic Aperture Radar (SAR) satellites. Based on in-situ data we computed functional dispersion (FDis), a measure of FD, using both leaf and whole-plant traits of known ecological significance. We applied partial least squares regression jointly using Sentinel-1 backscatter, which is more sensitive to whole-plant traits such as tree height, and Sentinel-2 surface reflectance, which is more sensitive to leaf traits such as leaf %N and SLA, as predictive variables to model FDis. The calibrated model can predict, in cross-validation, more than 60% of variance in FDis across forest types. To our knowledge, this study is the first attempt to quantify FD by integrating spaceborne optical and radar measurements at a continental scale, and hence represents a key step forward towards global biodiversity monitoring.

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Poster

Kretz, Lena

Leipzig University

From the leaf scale to the floodplain: Effects of herbaceous vegetation structure on sediment retention

Worldwide, stream water is increasingly loaded with sediments and nutrients, due to processes such as accelerated soil erosion and overfertilization caused by agricultural intensification. This leads to problems related to eutrophication and silting-up, which is even stronger if rivers are dammed and straitened. Floodplains can play an important role in mitigating these problems, by removing sediment from rivers through water filtration and retention of sediments and nutrients. Here, we investigate how the vegetation structure, species identity and diversity of floodplain plants drive their sediment retention. Our study contributes to our understanding how plant biodiversity controls the important ecosystem services of nutrient retention in floodplains.
In a first study, we experimentally investigated how sedimentation capacity on single leaves of 30 species is driven by multiple leaf traits. We found that sedimentation increases with a high density of adaxial hairs and that the leaf area negative influences sedimentation, but only for species with no or few hairs. Furthermore, we found that for size-standardized leaves, leaves with a rougher surface trapped more sediment.
In further studies we will investigate the species identity and diversity effects of structural characteristics of whole plant patches on sediment retention in experiments as well as in field studies.

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Poster

Xenophontos, Constantinos

Friedrich Schiller University Jena

Phylogenetic and functional dissimilarity have contrasting effects on the ecological functioning of synthetic bacterial communities

Biodiversity can have a positive impact on ecosystem functions because greater species numbers can contribute to overall ecosystem functioning. The relative contributions in microbial communities due to phylogenetic versus functional diversity are challenging because many microbial species functions are unknown. We used synthetic bacterial communities to test the independent effects on ecosystem functioning of phylogenetic and functional dissimilarity, expecting that greater phylogenetic and functional diversity is associated with increased ecosystem function. Therefore, we used bacterial isolates to construct communities with different diversity traits and employed exoenzyme activities (EEAs) as proxies of bacterial functioning. Overall, EEAs increased with higher phylogenetic dissimilarity but decreased with functional dissimilarity. Higher phylogenetic dissimilarity led to less extreme changes in community EEAs. Furthermore, effects of phylogenetic and functional diversity differed between EEAs investigated: EEAs on carbohydrates were positively correlated with phylogenetic dissimilarity, negatively correlated with functional dissimilarity and EEAs on fatty acids showed no correlation at all. We concluded that the effects of the dissimilarity treatments are more complex than expected, as phylogenetic and functional dissimilarity can have contrasting effects, also depending on the ecosystem function under examination. This highlights the importance of investigating these aspects of biodiversity individually, to improve understanding of microbial ecosystem functioning.

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Poster

Perles-Garcia, Maria D.

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Spatio-temporal dynamics of individual-tree crown plasticity as affected by local neighbourhood interaction in BEF-China

In closed-canopy forests, light is one of the key resources. In species mixtures, competition for canopy space is an important process that can result in an interspecific complementarity in light harvesting through niche differentiation. Traditional inventory methods to measure crown dimensions are not efficient and deal with several inaccuracies. To overcome these limitations, we use Terrestrial Laser Scanning (TLS), which is a light detection and ranging (LiDAR) system capable of acquiring rapidly three-dimensional structural information non-destructively with a very high resolution. TLS data of plots with different levels of tree species richness (ranging from 1 to 16 species) have been recorded in BEF-China since 2012. These data allow studying the development of the individual-tree crown plasticity over the years in relation to the tree species richness of the local neighborhood. We quantify the displacement of crown centers from the stem base and analyzed the direction and extent of 3D crown asymmetry. Size, position, and distance of neighboring trees are used to construct vectors of neighborhood asymmetry. Both vectors are used to quantify to what extent trees position their crowns away from local neighbors and how this is modified by tree species richness.

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Topic Session 5: Biodiversity and the Functioning of Ecosystems, 30. Aug., 09:00 - 10:45

Poster

Gottschall, Felix

Leipzig University

Tree species identity determines wood decomposition via microclimatic effects

A rich set of ecosystem functions and nature's contributions to people in forests depends on several facets of tree diversity. One important function of this set is the decomposition of deadwood that plays a vital role in carbon and nutrient cycling and is assumed to be determined by above- and belowground interactions. However, the actual influence of tree diversity on wood decay in forests remains inconclusive. Recent studies advocate a systematical consideration of small-scale environmental conditions such as microclimate. We studied the influence of tree species richness, tree species identity, and microclimate on wood decomposition in a temperate tree diversity experiment. We assessed wood decay, soil microbial properties, and soil surface temperature. We show a significant influence of tree species identity on all three variables. The presence of Scots pine strongly increased wood mass loss, while the presence of Norway spruce decreased it. This could be attributed to structural differences in the litter layer that were modifying the capability of plots to hold the soil surface temperature at night, influencing wood decomposition rates. Our study confirmed the critical role of microclimate for wood decomposition in forests and showed that soil microbial properties alone were not sufficient to predict wood decay.

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Poster

Ulrich, Josephine

Friedrich Schiller University Jena

Invertebrate decline affects plant species abundance and phenology

Land-use and climate change lead to phenological changes in plants and insects, but to a different extent. In combination with the massive decline of insect biomass, this might result in mismatches of plant-insect interactions, with consequent losses of ecosystem functions. We aim to identify the potential links between invertebrate density, plant phenology, and resultant effects on ecosystem functions.
Using the iDiv Ecotron, we assessed the effects of invertebrate decline on an artificial grassland community. Invertebrates from a meadow were caught using nets with different catching efficacies to simulate no invertebrate decline and a decline of 75% and were transferred into eight units, respectively. Another eight units received no fauna. The plant species were observed weekly for 18 weeks. We observed a distinct species abundance, with respect to the invertebrate treatment and could show that the species shifted their flowering phenology as a response to the invertebrate densities. The peak flowering was more dispersed in time when invertebrates were present. Thus, there are also biotic components that drive phenological changes in plant communities. This study clearly suggests that invertebrate decline may contribute to already observed mismatches between plants and animals, with potential corresponding negative consequences for ecosystem services and plant biodiversity.

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Poster

Sendek, Agnieszka

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Drought modulates interactions between arbuscular mycorrhizal fungal diversity and barley genotype diversity

Droughts associated with climate change alter ecosystem functions, especially in systems characterized by low biodiversity, such as agricultural fields. Management strategies aimed at buffering climate change effects include the enhancement of intraspecific crop diversity as well as the diversity of beneficial interactions with soil biota, such as arbuscular mycorrhizal fungi (AMF). However, little is known about reciprocal relations of crop and AMF diversity under drought conditions. To explore the interactive effects of plant genotype richness and AMF richness on plant yield under ambient and drought conditions, we established fully crossed diversity gradients in experimental microcosms. We expected highest crop yield and drought tolerance at both high barley and AMF diversity. While barley richness and AMF richness altered the performance of both barley and AMF, they did not mitigate detrimental drought effects on the plant and AMF. Root biomass increased with mycorrhiza colonization rate at high AMF richness and low barley richness. AMF performance increased under higher richness of both barley and AMF. Our findings indicate that antagonistic interactions between barley and AMF may occur under drought conditions, particularly so at higher AMF richness. These results suggest that unexpected alterations of plant-soil biotic interactions could occur under climate change.

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Poster

Klusmann, Carla

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Does plant diversity ameliorate abiotic stress from soil compaction?

Over the past 50 years, humans have driven devastating land use change by expanding agricultural and urban areas. This land use change has led to increasing soil compaction for global ecosystems. More diverse communities may be better at coping with soil compaction because species may facilitate each other in mixture. Individuals may benefit from neighboring plants which make the soil more porous, better aerated, better able to retain water, and better able to cope with periodic disturbances.
We conducted a greenhouse experiment at the Leipzig University botanical garden including four forbs in all possible one-, two- and three-species mixtures. These species were seeded on pots with compacted and non-compacted soil. We measured plant height weekly and harvested the above- and belowground biomass at the end of 10 weeks. We predicted that species in mixtures would grow better in terms of height and biomass compared to monocultures. Further, we expected the difference between high and low diversity pots to be greater on compacted soil because monocultures would perform worse under stress. Understanding the effects of biodiversity on ecosystem functioning is important for establishing realistic expectations regarding future ecosystem development under changing global conditions.

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