

GENERAL INFORMATION

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data	

MATERIALS & METHODS

study area	3b
time period	May/July
goal	determine the effect of former agricultural land use on the aboveground nutrient concentrations (N, P and N:P ratios) and total biomass (as a measure of performance) of forest herbs with different colonization capacities
set-up	7 forest herb species post-agricultural vs. continuously forested stands two introduction experiments, 1 site with spontaneous colonization
data collection	per stand, per species: above-ground dry biomass of max. 5 individuals after flowering (first week of May for vernal species, first week July for other species) plant material: total N, total P
remarks	

ABSTRACT

The colonization rates of understorey plants into forests growing on former agricultural land differ remarkably among species. Different dispersal and recruitment largely account for the contrasting colonization rates, but different effects of the soil legacies of former agricultural land use on plant performance may also play a role. Seven herbaceous forest species were sampled in paired post-agricultural and ancient forest stands to study whether land-use history has an effect on the aboveground nutrient concentrations (N, P and N:P ratios) and biomass of forest herbs and, if so, whether slow and fast colonizing species respond differently. Results showed that P concentrations were significantly affected by former land use with higher concentrations in the post-agricultural stands. N concentrations were unaffected and N:P ratios were significantly higher in the ancient stands. Nutrient concentrations varied considerably among species, but the variation was unrelated to their colonization capacity. Six out of the seven species had higher biomass in the post-agricultural stands relative to the ancient stands, and the degree to which the species increased biomass was positively related to their colonization capacity, i.e., the

fast colonizing species showed the strongest increase. Such differential responses to past land use may contribute to the contrasting colonization capacity of forest plants. Land-use history thus affected both the nutrient concentrations and biomass of forest herbs, and only the biomass response was related to colonization capacity.

RESULTS

The total N concentration in the aboveground biomass of the seven forest herbs was unrelated to the former land use, the colonization capacity and the biomass of the sampled plants. The total plant P concentrations did differ between stands with different land-use histories. In post-agricultural forest stands, P concentrations were consistently higher in all species compared to ancient stands. There was also considerable variation among species, but this variation was unrelated to the colonization capacity of the species. Land-use history had a significant impact on the N:P ratios, which were consistently lower in post-agricultural versus ancient stands.

Six out of the seven forest herbs tended to increase their biomass in the post-agricultural stands relative to the ancient stands. The degree to which the species increased their biomass in post-agricultural versus ancient forest stands was significantly related to the colonization capacity index, i.e., the slowest colonizers showed the smallest relative increase in biomass.