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Effects of biodiversity on the functioning of ecosystems: a summary of 164 experimental manipulations of species richness

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Abstract. Over the past decade, accelerating rates of species extinction have prompted an increasing number of studies to reduce the number of species experimentally in a variety of ecosystems and examine how this aspect of diversity alters the efficiency by which communities capture biologically essential resources and convert them into new tissue. Here we summarize the results of 164 experiments (reported in 84 publications) that have manipulated the richness of primary producers, herbivores, detritivores, or predators in a variety of terrestrial and aquatic ecosystems and examined how this impacts (1) the standing stock abundance or biomass of the focal trophic group, (2) the abundance or biomass of that trophic group's primary resource(s), and/or (3) the extent to which that trophic group depletes its resource(s). Our summary includes studies that have focused on the top-down effects of diversity, whereby researchers have examined how the richness of trophic group *t* impacts the consumption of a shared resource, and also studies that have focused on the bottom-up effects of diversity, whereby researchers have examined how the richness of trophic group *t* impacts consumption of *t* by the next highest trophic level. The first portion of the data set provides information about the source of data and relevant aspects of the experimental design, including the spatial and temporal scales at which the work was performed. The second portion gives the magnitude of each response variable, the standard deviation, and the level of replication at each level of species richness manipulated. The third portion of the data set summarizes the magnitude of diversity effects in two ways. First, log ratios are used to compare the response variable in the most diverse polyculture to either the mean of all monocultures or the species having the highest/lowest value in monoculture. Second, data from each level of species richness are fit to three nonlinear functions (log, power, and hyperbolic) to assess which best characterizes the shape of diversity effects. The final portion of the data set summarizes any information that helps parse diversity effects into that attributable to species richness vs. that attributable to changes in species composition across levels of richness.

Key words: biodiversity; ecosystem efficiency; ecosystem functioning; ecosystem services; productivity; species richness; trophic efficiency.