

Evolution of monoculture and mixture types in a grassland biodiversity experiment

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BACKGROUND

Ecosystem functioning generally increases with increasing biodiversity.



Communities with high species diversity are more productive than such with lower diversity. **This positive effect of biodiversity generally increases over time.** Recent studies have shown grassland plants surviving for eight years in mixed species communities have been selected for

better performance in mixed communities (mixture types) in contrast to plants selected in monocultures (monoculture types), and vice versa (Figure 1). Additionally, **mixture types demonstrated stronger biodiversity effects than monoculture types.**

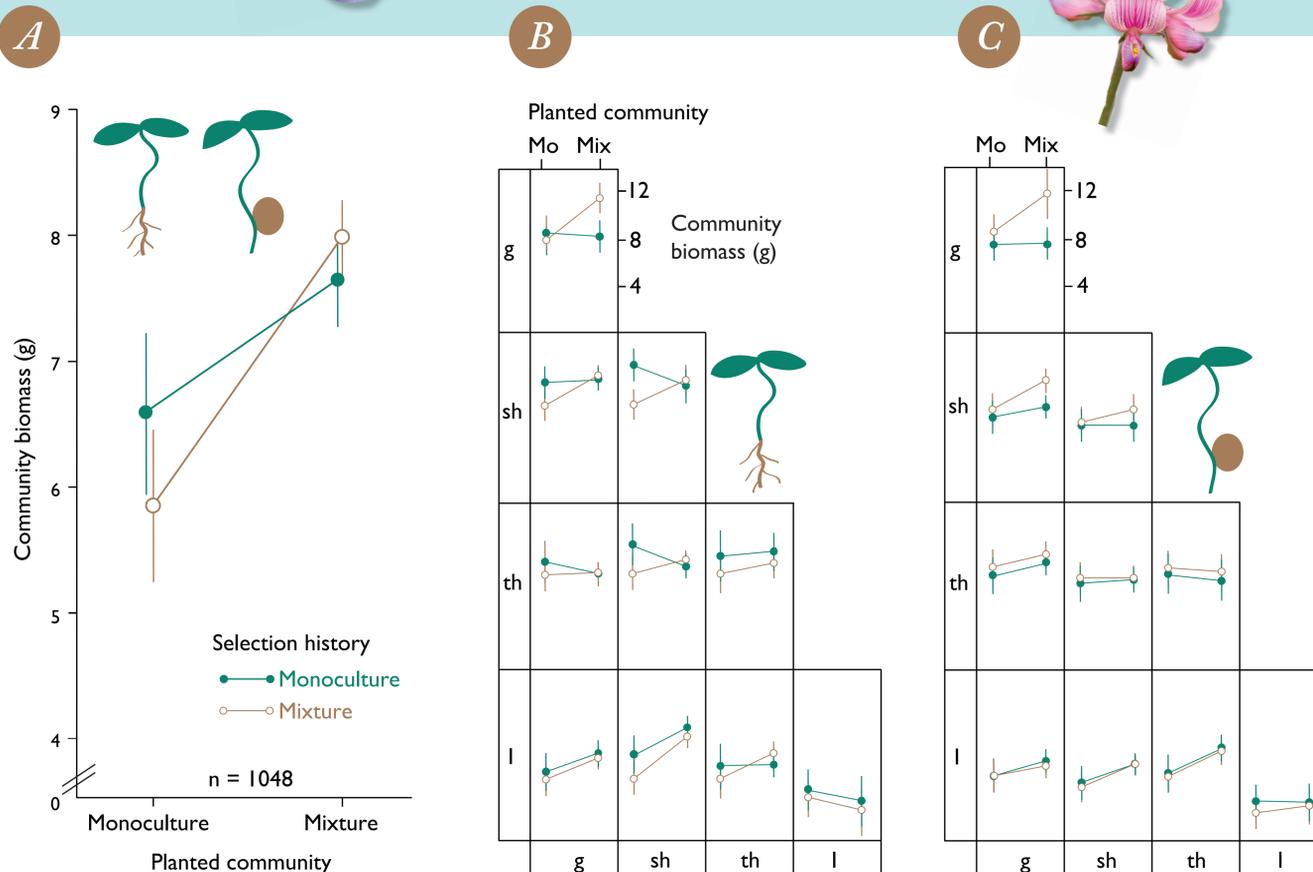


Figure 1. (A) Plants selected over 8 years in mixtures produced greater biomass in new test mixtures in contrast to plants selected in monocultures, as indicated by the difference in slopes. Such an **increase in productivity for mixture types planted in test mixtures** appeared to be a general trend for both (B) cuttings and (C) seedlings and functional group combinations. The plots are ordered to functional group combinations: grasses (g), short herbs (sh), tall herbs (th), legumes (l).

IMPLICATIONS

Different selection pressures on plants occurring within monocultures or mixtures may result in **selection for monoculture and mixture genotypes** respectively within such communities. Mixture types performed better in species mixtures due to an **increase in complementarity effects** via selection for trait divergence between species in mixtures (data not shown).



FUTURE EXPERIMENTS

I will set up a series of experiments to test for:

- 1 selection for increased combining ability** in mixtures, the ability for increased complementarity between species of mixture types in contrast to monoculture types, and
- 2 genotypic differences** between monoculture and mixture types.



OPEN QUESTIONS

What makes monocultures plants perform better in monocultures?

Have they been selected for better defenses against pathogens?



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