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Presenter Information

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Dynamics of 4-species plant systems over three years at 19 sites across Europe

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Introduction The ability of a community mixed plant species to remain stable over time may depend on a number of factors including the species present, the initial evenness and the climatic conditions. Previous work on grassland mixtures shows that diversity benefits in respect of yield and unsown species are higher when the proportions of four species are relatively evenly distributed (Kirwan *et al.*, 2007). In this paper we examine results from a multi-site agrobiodiversity grassland experiment carried out under the auspices of COST852 and assess the development of the dynamics of the experimental 4-species communities over three harvest years. Mixtures that remain somewhat evenly distributed over time may be superior at delivering important ecosystem functions.

Materials and methods A common experiment was carried out over a wide climatic gradient at 19 sites across Europe using four species (two grasses and two legumes) and is described in full in Kirwan *et al.* (2007). At each site, fifteen experimental communities were established at each of two sowing densities (low being 60% of high). There were four monoculture communities (one for each species) and 11 four-species communities where the initial proportions of each species was varied; of these 11, there were four communities with one dominant species (70%, 10%, 10%, 10%), six communities with two species dominant (40%, 40%, 10%, 10%) and a centroid with each species equally present (25%, 25%, 25%, 25%). One of two species-groups was used at each site; the Mid-European group (ME) with species *Lolium perenne* (G₁), *Dactylis glomerata* (G₂), *Trifolium pratense* (L₁) and *Trifolium repens* (L₂) was sown at 14 sites and the Northern-European group (NE) with species *Phleum pratense* (G₁), *Poa pratensis* (G₂), *Trifolium pratense* (L₁) and *Trifolium repens* (L₂) was sown at the remaining five sites. A number of harvests was taken at each site over a period of three years and the annual total yield of each of the sown species and of unsown species was recorded.

Results and discussion For the ME group, *Dactylis glomerata* (G₂) became increasingly dominant over the three years and in year 3 it dominated on average 61% of annual harvest [Figure 1(a)]. For the NE group the grasses *Phleum pratense* (G₁) and *Poa pratensis* (G₂) became dominant, and in year 2 and 3 together accounted for more than 60% of annual harvest while the legumes in this group decreased slightly over the three years [Figure 1(b)]. Unsown species increased in the third year in the ME group but remained stable over the 3 years in the NE group.

Conclusions In both groups grasses became dominant over legumes over the three year period, however the relative importance of the two grass species changed over time. In the ME group both grasses were strong in year 1 but G₂ dominated in year 2 and 3. In the NE group G₁ dominated in year 1 but both G₁ and G₂ were dominant over legumes in year 2 and 3.

Reference

Kirwan, L., *et al.*, (2007). Evenness drives consistent diversity effects in an intensive grassland system across 28 European sites. *Journal of Ecology* 95, 530-539.

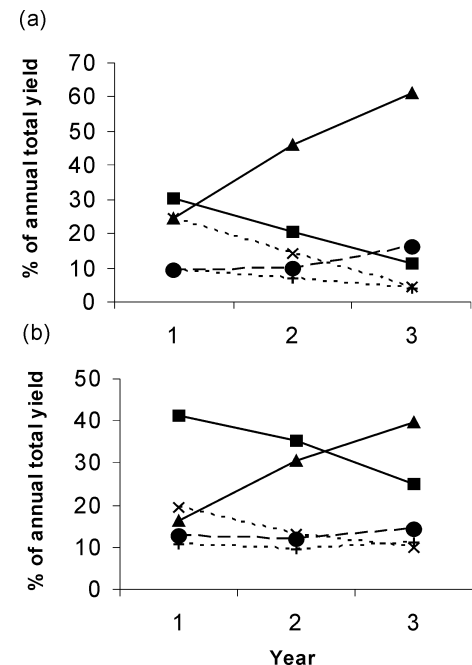


Figure 1 Annual average percentage of total yield for each of the four species (G₁ ■; G₂ ▲; L₁ ×; L₂ +) and for unsown species (●) for (a) the ME group and (b) the NE group.