

Plant diversity affects grassland yield and nitrogen use efficiency



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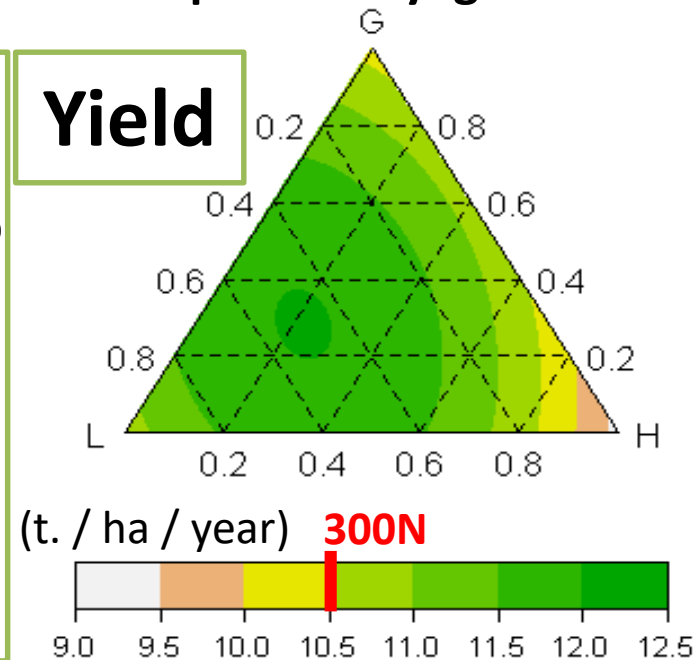
Introduction: Diversity in grassland can be explained by identity and interactions among functional groups. We investigate here the effect of diversity on productivity and sustainability under intensive management. **Can mixtures outperform ryegrass monoculture?**



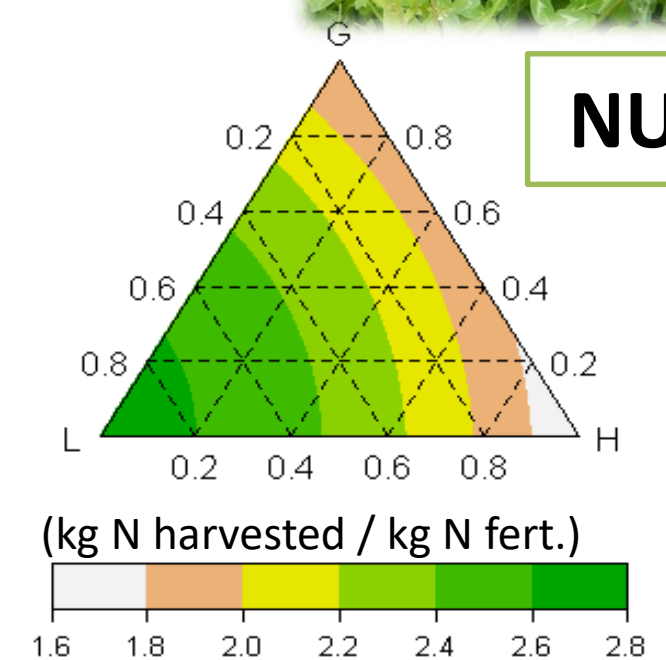
Materials and Methods

- Monocultures and mixtures of 1 to 3 functional groups: Grass, Legume and Herb
- 150 kg ha⁻¹ yr⁻¹ of nitrogen (N) fertilizer applied to each community (**150N**).
- An additional ryegrass monoculture received 300 kg of N ha⁻¹ yr⁻¹ (**300N**).
- 14 harvests over 2 years to measure total annual yield and N Use efficiency (NUE)

Yield



NUE



Results

- Mixtures of high diversity were the highest yielding (over 12 t ha⁻¹ for 30% grass, 50% legumes, 20% herbs).
- At **150N**, higher nitrogen use efficiency was achieved with higher legume content (Figure 2).
- **300N** ryegrass was strongly outperformed by most of the mixtures (especially when >20% legume).
NUE for 300N ryegrass was too small to appear on the scale (0.90 kg N harvested / kg N fert.)

Conclusions

Grassland diversity strongly influenced forage yield.

Nitrogen use efficiency was driven by legume content.

Diverse mixtures at 150N consistently out-yielded ryegrass monocultures at 300N.

