

Management of forb species mixtures for high biomass

production

Mortensen T., Eriksen J. and Søegaard K.

Department of Agroecology, Aarhus University, Blichers Allé 20, PO box 50, 8830 Tjele, Denmark

Implications

Including forb species in grassland mixtures may secure a more biodiversity-friendly production of biomass. The experiment showed:

Interesting perspectives for low-cost biomass production (e.g. for biomethane) by reducing the number of cuts per year.

Background and objectives

Production of biomass from species-rich grasslands is interesting in many aspects. Increasing diversity can e.g. increase yield levels (Sanderson et al. 2004) and improve yield stability (Mortensen et al. 2012).

Objective: Investigate yield of 11 forb species, a 13-species mixture and a standard mixture of red-, white clover and perennial ryegrass, when exposed to two cutting frequencies: four cuts vs. one autumn cut pr.

Key results and discussion

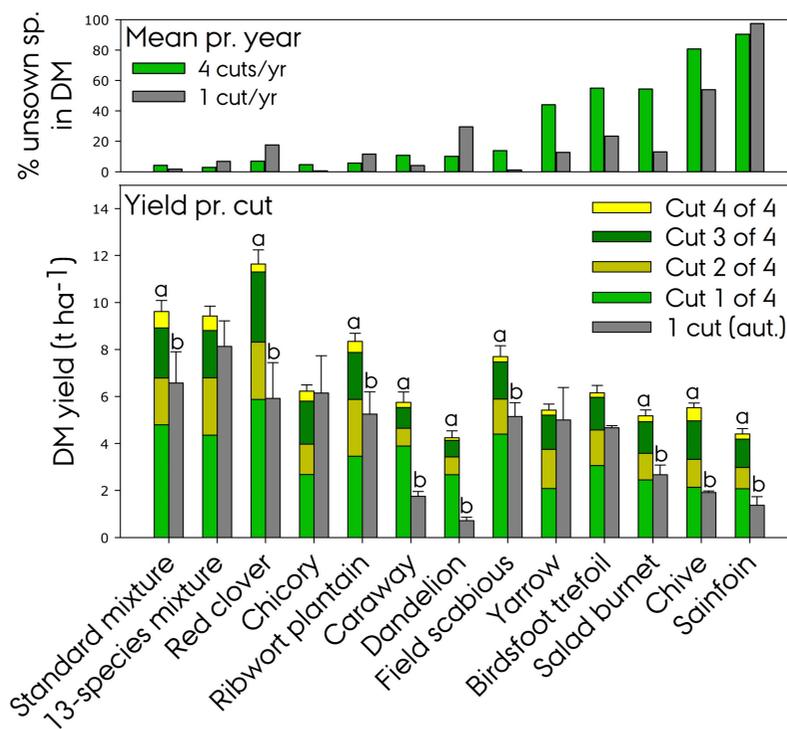
Annual DM yield

No differences in annual DM yield of the 13-species mixture, chicory, yarrow and birdsfoot trefoil with one vs. four cuts pr. year (Fig. 1).

Lower annual DM yield of the standard mixture and the remaining forbs with one than four cuts pr. year (Fig. 1) as:

- Regrowth was stimulated by defoliation.
- The degree of senescence exceeded production of new growth.

Figure 1



Annual yield (t ha⁻¹) and % of unsown species in DM of pure stands of forbs, a 13-species- (11 pure stand forbs, white clover and perennial ryegrass) and a standard mixture of perennial ryegrass, red- and white clover. Letters a and b indicate when DM yields were significantly different between the two cutting situations (4 vs. 1 cut pr. year) at the P<0.05-level. Error bars: SE.

Suppression of unsown species

Species and mixtures differed in their ability to suppress unsown species.

Highly competitive species (both with four- and one cut pr. year):

- Standard mixture
- 13-species mixture
- Red clover
- Chicory
- Ribwort plantain
- Caraway
- Dandelion
- Field scabious

Low competitiveness:

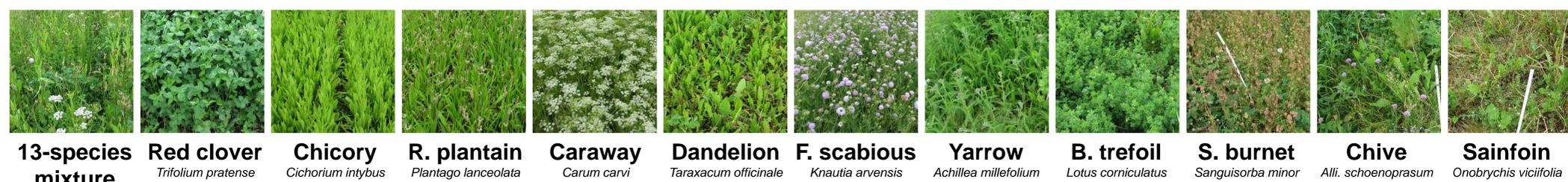
- ... at four- and high at one cut pr. year: Yarrow, birdsfoot trefoil and salad burnet
- ... at both four and one cut pr. year: Chive and sainfoin

How work was carried out?

- Plot (1.5*10 m) experiment established in 2011 at Foulumgaard, Aarhus University.
- Pure stands of forbs and mixtures (Fig. 1) sown at 25 kg ha⁻¹ in three replicates.
- Cutting management in 2012: One cut in autumn (October) or four cuts with a Haldrup plot harvester.
- DM yields determined pr. plot by oven-drying at 80°C for 24 hours.
- Botanical composition determined by hand-separating a 100-500 g subsample of herbage from each plot.
- Statistics: Mixed procedure in SAS with species/mixture, cutting frequency and their interaction as fixed- and replicates as random effect.

Pictures from EcoServe field plots

Pictures from the 12th of June 2012



References and acknowledgements

References

Mortensen T, Søegaard K, Eriksen J. 2012. Effect of seed mixture composition and management on competitiveness of herbs in temporary grasslands. Grassland Science in Europe 17, 76-78.
Sanderson MA, Skinner RH, Barker DJ, Edwards GR, Tracy BF and Wedin DA. 2004. Plant species diversity and management of temperate forage and grazing land ecosystems. Crop Science 44, 1132-1144.

Acknowledgements

The experiment was funded by the EcoServe project. Thanks to the technical staff at Foulumgaard.