



Grassland management for biodiversity

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- **DESCRIPTION:** Manage grassland in a variety of ways across a farm to create a diversity of habitats and enhance biodiversity at various trophic levels, from plants, soil microbes to invertebrates (including various pollinators, e.g. butterflies) and vertebrates (amphibians, reptiles, birds and mammals)
- **RATIONALE:** European permanent grasslands (PGs) provide a unique habitat for thousands of plant species, invertebrates and higher-order vertebrates, including birds and mammals. However, the serious decline of the biodiversity of grasslands started in the 1970's due to management intensification (i.e. earlier cuts for silage, use of manufactured fertilisers and herbicides, high stocking density and frequent grazing, greater frequency of sward renewal, an emphasis on a few productive forage cultivars, or even conversion from grassland to arable land). In the 1990's many arable lands were then abandoned and converted back to grassland, but the previous grassland biodiversity could not be regenerated entirely. Furthermore, the remaining arable lands need biodiverse grasslands nearby, to provide them with pollinators and biological pest control. To meet global biodiversity goals, there is a need to reverse the decline in grassland biodiversity
 - ✓ Management practices for enhancing PG biodiversity can be adjusted to suit spatial differences in soil and habitat type at the field and farm scale
 - ✓ Strategies that can be employed include establishing new, biodiverse grasslands between arable lands, and using various methods to improve existing grassland
 - ✓ Management methods include varying the timing of grazing and cutting, mixed grazing (with different livestock species or breeds), optimising nutrient inputs (usually reduced N fertiliser rates), oversowing with desired plant species, maintaining drainage systems or allowing them to deteriorate
 - ✓ Establishing tree shelter belts and hedgerows, and setting aside field corners or margins for scrub, wildflowers and swards of various lengths can also be used.



Fig.1: Development of a new established wildflower grassland in 2020 and 2021 in the Kiskunság, Hungary. Photo: Viktor Szigeti

- **MECHANISM OF ACTION:** Supporting a range of grassland species requires creating a diversity of habitats and conditions, or establishing high diversity grasslands, including diverse plant functional groups with various floral types and flowering times
 - ✓ Regular nutrient inputs to raise soil fertility can lead to the dominance of fewer, aggressive plant species (mainly grasses) at the expense of short, prostrate plants, such as legumes and other forbs that can provide food for invertebrates, including pollinators
 - ✓ To overcome this situation, nutrient inputs should be reduced and perennial and native legumes included in the seed mixture
 - ✓ Native legumes can suppress aggressive and eventually invasive plant species
 - ✓ Increasing the herb and legume content in the sward, can also maintain or enhance PG productivity
 - ✓ If combined with a variety of cutting and grazing intervals, this can support a greater abundance and diversity of invertebrate and vertebrate species, improving the pollination service provided by PG
 - ✓ Where the aim is to re-establish species-rich grassland, hemiparasitic plants (e.g. *Rhinanthus* – rattle) can be included in seed mixes to reduce the cover of more vigorous resident grasses
 - ✓ Hemiparasites, which are present in some of the most species-rich grasslands in the world, can create gaps in the sward for forbs and invertebrates to re-establish
 - ✓ Fencing can also be used to protect habitats for biodiversity or restrict livestock to specific areas to carefully manage trampling or grazing pressure
 - ✓ Planting or allowing the regrowth of native trees, shrubs and hedgerows can enhance biodiversity and provide livestock shelter; and small areas can be set aside for the nesting of specific threatened bird species (e.g. corncrake, snipe, curlew, redshank, Black-tailed godwit, Aquatic warbler, lapwing, European roller, kestrel and skylark)



*Fig.2: Plant mixture for overseeding a humic sand grassland: *Astragalus onobrychis* L., *Trifolium montanum* L., *Anthyllis vulneraria* L., *Dianthus pontederiae* A.Kern., *Onobrychis arenaria* (Kit.) DC., *Salvia nemorosa* L., *Salvia pratensis* L., *Stachys recta* L., *Astragalus austriacus* Jacq., *Seseli varium* Trev., *Melandrium viscosum* (L.) Čelak. Photos: András Máté.*

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Potential for applying the management option

The option is applicable within any grassland farming system and in all biogeographic regions. It is most applicable in moderate to low input systems in which the farmer or land manager is aiming to reduce reliance on imported feed and fertiliser and adapt their management to the carrying capacity of the land. Thanks to dicotyledonous plant species, including diverse legumes, flower-rich grassland patches can provide adjacent arable land with pollinators and biological pest control. Grasslands enriched with various native legumes and herbs can better override drought, can improve biomass production within low input systems and enhance functional diversity. Multi-species grasslands can also improve aesthetic value (with colours changing through the growing season) and landscape function. Such grasslands are also a favourable place for many protected species, like orchids (*Dactylorhiza majalis* L., *D. maculata* L.), *Gladiolus imbricatus* L., Marsh gentian (*Gentiana pneumonanthe* L.) and many others. When sites with their presence are located in protected areas (e.g. Natura 2000), farmers must use them in accordance with the regulations in force.



Support

Current agri-environment schemes provide support for options including “low input”, “wet” and “species-rich” grassland. Proposed reforms to the Common Agricultural Policy and national legislation in most countries are seeking to reduce support for agricultural production through area payments and a move towards “public money for public goods” or “ecosystem services” payments. Reconciling the interests of different stakeholder groups is crucial for improving the biodiversity of Europe's PG. This in turn could support the more widespread management of PG for biodiversity on both high and lower input farms. Increasing the biodiversity of European grasslands is part of the implementation of the Biodiversity Strategy for 2030



Example of good practice

In the Hungarian Kiskunság region, which is characterised by nutrient-poor, sandy soil, fallow land has developed on abandoned arable fields that lack a viable population of native legumes and other valuable species to ‘naturally’ generate diverse grasslands. To support an increase in biodiversity and grassland productivity, overseeding with a seed mixture consisting of various native, drought tolerant and productive plant species is being trialled. The results after three years of overseeding show a significant increase in plant biomass (2.7 times on average in 2022) and in the number of plant species and flower visiting insects such as wild bees, honey bees, hoverflies and butterflies. However, the overseeding success rate is partly dependent on the weather and the soil type and in some cases the overseeding operation may need to be repeated. Based on the trial results, it is suggested that native and diverse species should be used to enhance the productivity and multifunctionality of these grasslands



Fig.3: Grassland development in the control (a) and oversown (b) parcels of low productivity fields in May 2023, Kiskunság, Hungary. Photos: Eszter Lellei-Kovács



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Fig.4: Species established from seeds after oversowing of lowland hay meadow in Poland:
 1) *Achillea millefolium* L., 2) *Centaurea jacea* L., 3) *Daucus carota* L., 4) *Leucanthemum vulgare* Lam., 5) *Plantago lanceolata* L.,
 6) *Silene flos-cuculi* (L.) Greuter & Burdet, 7) *Tragopogon orientalis* L., 8) *Knautia arvensis* L. and 9) a butterfly (*Euphydryas*) on
 the flowers of *Silene flos-cuculi*. Photos 1-9: Maria Janicka

