Sward enhancement: choice of methods

Sward enhancement refers to management techniques which aim to increase the botanical diversity (mainly the wildflower component) of species-poor grassland. Such work can be funded under Environmental Stewardship, in particular Higher Level Stewardship. This note provides guidance on choosing the best method of sward enhancement for a particular site. Other notes provide guidance on how to select suitable sites and describe the main methods that can be used.

Key points

- Sites must be carefully selected to ensure the best chance of success.
- In some cases management changes can allow the sward to diversify naturally without adding seed.
- Seed may need to be added if there are no natural seed sources for colonisation.
- There are established techniques of enhancing swards by adding seed, but the best method will vary with each site.

Introduction

Not all grassland is suitable for enhancement. The main requirements include low soil fertility and low/no weed burden. Enhancement methods usually involve disturbance to the sward, therefore some sites may not be suitable eg where it could damage historical or bird interest, or increase the risk of soil erosion. For more information see Technical Information Note TIN061 - *Sward enhancement: selection of suitable sites*.

Choice of methods

Is it always necessary to introduce wildflowers?

If a site has potential for enhancement, the introduction of wildflowers is not always necessary or desirable. On many sites, wildflowers may already be present at low numbers in the sward. If they have not been allowed to flower, they may occur only as vegetative rosettes which are easy to overlook. In addition, the margins of the field, or adjacent grassland and road verges, may be species-rich and provide a natural seed source.

A meadow near Stonehouse, Pennine Dales

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First consider whether changes to the management of the grassland are sufficient to diversify the sward. The most influential management practices are:

- Reduce the grazing pressure in pastures in the spring/summer to allow plants to flower and set seed. Maintain or increase grazing in autumn so that hooves press in seeds and create gaps for re-establishment.
- Delay the hay cut in meadows until after flowers have set seed, for example until after mid July.
- Do not apply inorganic fertiliser or slurry.
- Do not apply general broadleaved herbicides except by spot spraying or other methods that target specific non-desirable species.

One option is to change the management for a number of years and then assess the sward again and see if this is sufficient or if additional measures are required.

Introducing wildflowers

Where there are no natural seed sources, either in the grassland itself or on adjacent areas, then the introduction of wildflowers may be essential to diversify the sward.

Establishing new species from the existing soil seed bank cannot usually be relied upon to increase species diversity because agriculturally improved swards typically have very poor seed banks.

Many grassland species rely on rapid germination in the autumn and spring following seed shedding, and their seed is short-lived. Natural colonisation by some species has been found to occur over long distances. However, this can be a very slow and unreliable process.

The lack of natural seed sources for re-colonisation is thus a major constraint in sward diversification.

Where grassland is next to a Site of Special Scientific Interest (SSSI), seek advice from your local Natural England adviser before seed or plants are introduced, because non local seed may have harmful effects on species within the SSSI.

On sites adjacent to species rich grassland there is a greater chance of natural colonisation and this may be the best option in these cases.

Where competitive species dominate it may be possible to control them by establishing yellow rattle *Rhinanthus minor* before introducing any other species. Yellow rattle parasitizes a wide range of grass and wildflower species and consequently, it has the potential to reduce the vigour of its hosts and hence overall grassland sward productivity. For further information see Technical Information Note TIN060 - *The use of yellow rattle to facilitate grassland diversification.*

How can wildflowers be introduced?

The main techniques are:

- over-sowing with wildflower/grass seed;
- slot seeding with wildflower/grass seed; and
- spreading species-rich green hay.

In a limited range of circumstance pot-grown wildflowers or seedling plugs can also be used to add supplementary species. For further information see Technical Information Note TIN065: *Sward enhancement: diversifying grassland using pot-grown wildflowers or seedling plugs.*

The means of diversifying existing grassland is currently a major topic of research, and detailed advice may change as more information becomes available.

There is no overall best method. Success or failure depends on many factors. The most appropriate technique for a particular site will depend on a number of issues, in particular:

- the seed sources;
- the livestock and machinery available; and
- what method best fits in with the management of the site.

Soil characteristics, eg soil type, depth, texture and wetness, may vary across a site - providing opportunities for differential treatment.

To aid decision making, the main requirements of each method are outlined in tables 1 - 4 below. Details of each method are also given in

separate information notes and further information on these can also be see below.

Whichever technique is used, appropriate management, both in the establishment phase and in the long term, is essential. In many cases this will require a change from the previous management, and there must be a commitment to continued the changed practices order for the sward enhancement to succeed.

Further information

Natural England Technical Information Notes are available to download from the Natural England website: **www.naturalengland.org.uk**. In particular see:

- Technical Information Note TIN035: *Soil sampling for habitat recreation and restoration in agri-environment schemes*
- Technical Information Note TIN036: *Soils and agri-environment schemes: interpretation of soil analysis*
- Technical Information Note TIN038: *Seed sources for grassland restoration and re-creation in Environmental Stewardship*
- Technical Information Note TIN050 *Selecting indicators of success for grassland enhancement*
- Technical Information Note TIN060: *The use of yellow rattle to facilitate grassland diversification in agri-environment schemes*
- Technical Information Note TIN061: *Sward enhancement: selection of suitable sites*
- Technical Information Note TIN063: *Sward enhancement: diversifying grassland by spreading species-rich green hay*
- Technical Information Note TIN064: *Sward enhancement: diversifying grassland by oversowing and slot seeding*
- Technical Information Note TIN065: *Sward enhancement: diversifying grassland using pot-grown wildflowers or seedling plugs*

For further information contact the Natural England Enquiry Service on 0845 600 3078 or e-mail **enquiries@naturalengland.org.uk**.

This note does not supersede prescriptions in agri-environment scheme agreements. If there is any conflict between the information in this note and your agreement please contact your local adviser.

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Table 1: Oversowing with wildflowers/grass seed

Requirements:	Most suitable if:	Also possible if:
Seed of appropriate species and origin[1].	Appropriate seed is available	
Bare ground/gaps must be created in August/ September before seed is sown.	Cattle can be used to create bare ground by hard grazing and treading.	Sheep are available and the site is damp enough for their hooves to create bare ground; or machinery can be used, eg power harrow, discs.
Seed must be broadcast on the surface.	Suitable machinery is available, eg fertiliser spreader, slug pellet applicator, grass seed box, modern arable seed drill capable of broadcasting seed.	Seed can be broadcast by hand.
Seed must be bedded in.	Cattle can be used to tread in the seed.	Sheep can be used to tread in the seed; or machinery is available, eg a flat roller.

Table 2: Slot seeding with wildflower/grass seed

Requirements:	An option if:
Seed of appropriate species and origin[1] (which must be clean, ie free of chaff).	Appropriate seed is available.
Specialist machinery ie a suitable slot seeder, fitted with a band sprayer	Machinery is available, eg adapted Stanhay/ Gibbs sugar beet drill, Howard rotor seeder, Gallagher/Aitchinson seedmatic.
Ground which is not water-logged, as slots may fill with water.	Ground is damp enough to allow slots to be cut, but not to fill with water.
Slug populations are low.	Slug populations are already low, or can be reduced by the application of slug pellets.

[1] See Technical Information Note TIN038: *Seed sources for grassland restoration and re-creation in Environmental Stewardship*.

Table 3: Spreading species-rich green hay

Requirements:	Most suitable if:	Also possible if:
Requires a source of species-rich green hay.	A suitable donor site is present on the same farm, or very close by.	
After cutting, hay must be immediately collected, transported to and spread on the receptor site.	Suitable machinery is available (eg mower and baler) and the operation can be carefully organise.	
Bare ground/gaps must be created before hay is spread.	Cattle can be used to create gaps by hard grazing and treading.	Sheep are available and the site is damp enough for their hooves to create bare ground; or machinery can be used eg power harrow, discs.
Hay must be bedded in after spreading.	Cattle can be used to trample the hay and tread in the seed.	Sheep can be used to trample the hay and tread in the seed, or machinery is available, eg a flat roller.

Table 4: Supplementary method - Plug planting

Requirements:	An option if:
Plug plants of appropriate species and origin.	Additional species are required in the sward which have not been introduced by the other enhancement methods.
	Particular species are required to meet other site objectives eg a butterfly food plant.
	Particular species are required to meet other site objectives eg a butterfly food plant.
	Certain species are being introduced to small areas of the site e.g. damp areas, banks with different soil conditions.