Arable reversion to species-rich grassland: establishing a sown sward

The reversion of arable land to permanent grassland is a major area of work funded through Environmental Stewardship. There are a number of environmental reasons for recreating grassland land and creating a species-rich sward is one of the most significant. This note focuses on establishing species-rich grassland by sowing. Guidance on the selection of suitable sites and the early management of the new species-rich sward is given in other Technical Information Notes.

Key points

- The weed burden must be reduced to a manageable level before sowing. This may mean delaying sowing for a year.
- A fine seedbed should be created.
- The best time for sowing is usually late summer/early autumn.
- Sow an appropriate seed mix that has come from a suitable source.
- Seed should be broadcast on the soil surface and then firmed in by rolling.
- Monitor the new grassland for evidence of pest damage and take early action to deal with any pests.

Site preparation

Reducing the weed burden

The weed burden must be reduced to a manageable level before sowing a seed mix. A very low or nil weed burden is particularly important where wildflower seed is being sown, as the widespread application of herbicides to the new sward will not be permitted.

Where the aim is to create species rich grassland, Italian ryegrass (*Lolium multiflorum*) and white clover (*Trifolium repens*) should also be considered as weeds, as they can have large soil seed banks and will compete with the sown species.

Arable reversion to chalk grassland, 5-year-old sward, sown species-rich mixture

Weeds are best tackled using herbicides in the preceding crop. Where weeds are a serious problem, it is also worth delaying sowing for a year. The site should be allowed to green up and then a series of cultivations and/or applications of herbicide should be made at intervals, to progressively kill each flush of weed regrowth. The aim should be to create a stale seedbed prior to sowing.

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An alternative method of dealing with pernicious weeds, which may be useful in organic systems, is to plough the land when wet in spring, leaving the soil in furrows.

The soil should crack and dry in the clod, and may then be cultivated repeatedly throughout the summer so the under surface dries and any roots are fragmented. The aim is to accelerate root desiccation and/or progressively exhaust the weeds food reserves by stimulating re-growth from the rootstock after each cultivation. Only when the soil begins to wet in late summer is a fine seedbed produced.

Weeds with wind-blown seeds, eg spear thistle *Cirsium vulgare* and ragwort *Senecio jacobaea*, should be controlled where they occur on adjacent areas, as they can quickly invade the site.

There is a statutory requirement, specified in the Weeds Act 1959, to control injurious weeds which threaten agricultural land or production.

Preparing the seedbed

Adequate seedbed preparation is critical for soil moisture retention and the successful establishment of semi-natural seed mixes.

The aim should be to create a fine, firm and level seedbed, avoiding looseness at depth. As a guide it should be possible to ride a bicycle on it.

If a site is of archaeological importance, extra care may be needed to minimise damage by cultivations. Advice should be sought from your local adviser in these cases before any work is undertaken.

Method and timing of sowing

Seed is normally introduced by conventional sowing of a seed mixture. But it can also be introduced using 'Green Hay' ie herbage cut from a donor grassland site just before seed is shed ie at or slightly before normal hay cutting time. This has a number of benefits: the seed will be fresh, it should be of known provenance and the operation can be cheaper than seed purchase. But the green hay must be transported and spread within a very few hours to prevent heating so the donor site must be close to the receptor site. Details of green hay are given in TIN063 – this refers to use of the technique for seed introduction to an existing sward but it can be used in the same way for grassland creation on a bare seedbed.

If using conventional sowing the ideal time is **late summer or early autumn** (August and September). This is when the majority of the species being sown would germinate naturally, and those seeds that require a period of chilling (vernalisation) over winter to trigger germination in the spring are also favoured.

Many species in the seed mix, such as the finer grasses, can take up to 8 weeks to germinate, especially if it is dry. To ensure good early establishment and reduce the risk of winter kill, seed should be sown as early as possible in the late summer/early autumn period, provided that there is some residual soil moisture. Sites on heavy clays which flood should be sown sufficiently early to allow grasses to establish well in advance of any flooding.

Spring sowing is possible but there is greater risk of failure due to drought. The most severe weed problems are often associated with spring sowings.

Nurse crops

A nurse crop is a short-term crop sown with the main seed mix to aid its establishment. When sowing semi-natural seed mixes, a nurse crop is not usually necessary. However, it can be useful where there is:

- a need to protect seedlings from the extremes of winter weather on exposed sites; or
- intensive grazing by rabbits or wildfowl; or
- where there is a risk of soil erosion.

Cereals, eg spring barley, are an acceptable nurse crop. Brassicas are unsuitable because they can shade out the desired seedlings. Westerwolds ryegrass is usually unsuitable as it can be very difficult to eliminate.

Where used, the nurse crop should be sown in a conventional manner (drilled and rolled) before

the seed mix is broadcast. Where appropriate, the nurse crop can be taken off as silage.

Seed mixes

For specific advice on the most suitable seed for a particular site contact your Natural England Adviser and see Technical Information Note TIN038: *Seed sources for grassland restoration and re-creation in Environmental Stewardship*

Seed rate

Recommended seed rates for arable reversion are normally in the range of 15-20 kg/ha, with any wildflower seed component comprising approximately 10% depending on cost and site requirements.

Seed rates can be reduced in some cases, eg where an expensive seed mix is being sown. In these cases herbage production will be very low in the first few years, and careful management will be required to avoid weed problems.

Sowing techniques

Much of the seed in semi-natural seed mixes is very small and must be sown **on or very near the soil surface**. This can be done by broadcasting eg using a fertiliser spreader, slug pellet applicator, grass seed box or one of the modern drills with the coulters lifted up. For small areas, it may be possible to broadcast seed by hand using a hand-held lawn fertiliser applicator, seed fiddle or seed barrow.

Seeds of different sizes and weights may settle out in the seed box or become partitioned during sowing, causing a patchy sowing distribution. A more even coverage can be obtained by bulking up the seed with an inert carrier eg sand, barley meal, poultry chick crumbs or sawdust, and then sowing at half rate in two directions.

In drier seedbeds, especially on lighter soils, shallow drilling may be preferable to broadcasting in order to place the seed in closer contact with soil moisture.

After sowing, roll the site to ensure good seed-to-soil contact. Where soils are likely to cap, use a Cambridge roller. Otherwise use a heavy flat roller.

Harrowing or raking are not recommended as finer seeds may be blown around or buried too deep.

Post sowing

Any soil capping or frost lift that occurs post sowing can usually be remedied by rolling.

Pests

Potential pests of newly sown grassland include slugs, frit fly larvae, chafer grubs, leatherjackets, wireworms, moles, birds and rabbits. Regular monitoring is advisable to ensure that problems can be dealt with at an early stage.

Slugs can be a significant pest, particularly of wildflower seedlings, and slug control should be considered where wildflower seed is being sown.

In high risk situations slug activity should be monitored prior to cultivation and during the first autumn and winter after sowing eg using traps baited with poultry mash. Slug pellets can be applied with the seed, or broadcast later. Slug pellets should be used in accordance with statutory instructions and directions for use on the product label.

Professional advice should be sought from an agronomist before treating pests.

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 TIN066: *Arable reversion to species rich grassland: site selection and choice of methods*
- Technical Information Note TIN068: *Arable reversion to species rich grassland: early management of the new sward*
- Technical Information Note TIN038: *Seed sources for grassland restoration and re-creation in Environmental Stewardship*

- Technical Information Note TIN060: *The use of yellow rattle to facilitate grassland diversification in agri-environment schemes*

For further information contact the Natural England Enquiry Service on 0300 060 0863 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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