

Seed sources for grassland restoration and re-creation in Environmental Stewardship

Wildflower and grass seed is used widely in agri-environment schemes for enhancing existing species-poor grassland or for creating new species-rich grassland, field margins and beetle banks. Seed can come from a variety of sources, from natural regeneration from the seedbank to the addition of complex commercial seed mixtures. This note provides guidance on how to select the most appropriate source for specific sites and situations. Other information notes provide guidance on site selection and preparation and or sowing and spreading seed.

Establishing grassland

There are four requirements for successful grassland establishment:

- clear objectives;
- appropriate soil conditions;
- an agreed regime for both establishment and longer-term management; and
- a suitable seed source.

You should not consider seed addition until the first three conditions are in place and you have assessed potential for natural regeneration and colonisation. When selecting seed, you should consider both its origin and its source (or method of collection).

Seed origin

If seed is used in the restoration or re-creation of species-rich, semi-natural grassland it should be of British native origin. This means that it has originated from native plants growing in natural or semi-natural habitats in the wild in Britain. Seed of British native origin will better represent the genetic diversity and adaptive capacity of wild plants compared with imported stock or with commercially bred agricultural and amenity varieties. Where appropriate a capital grant is available for purchasing British native origin

seed under the Environmental Stewardship Higher Level.



Capsule of greater sea-spurrey showing winged seed (Liz McDonnell)

The use of seed that is not of British native origin can cause problems in the wild. For example, differences in traits such as flowering time or growth form can have knock-on effects on associated insects. Large scale introductions may affect these traits in neighbouring populations of wild plants. In

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addition, agricultural or amenity varieties can have higher nutrient requirements, out-compete wildflowers or be less readily grazed by stock.

When buying seed, you should specify not only the species required but also the origin, eg 'Yarrow *Achillea millefolium*, British native origin', adding specific details for local origin seed (see Terminology section).

There are three situations where seed that is not of British native origin may be used in agri-environment schemes:

- To provide a grass nurse or matrix crop for sown wildflower species on former arable land (see section on selecting the most appropriate source). This may be important where soil erosion is an issue or where British native-origin grass seed is not available.
- To establish artificial wildlife habitats for invertebrates in arable fields, (eg pollen and nectar mixes, grass margins and beetle banks). Nonetheless, where seed mixtures for artificial habitats contain agricultural or amenity varieties of wildflowers such as red clover, they should not be sown next to existing semi-natural grasslands. Or
- To establish simple grass mixtures that prevent diffuse pollution or run-off, buffer boundaries or protect archaeological sites (unless you are also trying to re-create semi-natural grassland).

Terminology

Donor site: grassland from which the seed has been collected.

Local origin seed: seed originally sourced from wild populations growing in the same geographical area as the site on which it is to be sown. This could be the same region, County or Joint Character Area.

Native: occurring naturally in an area and not introduced by man. British native plants occur naturally in the wild and colonised the British Isles by natural dispersal, without deliberate or accidental human intervention. A full list of species is given in the *New Flora of the British Isles* by Clive Stace and the *New Atlas of the*

British Flora (Preston, C.D., Pearman, D.A. & Dines, T.A. eds 2002).

Origin: the geographical location of the wild plant from which the seed originated.

Species: a taxonomic classification. Individuals within a species can breed freely with one another to produce fertile progeny.

Provenance: the term provenance is used in UK legislation to mean 'origin'. It is occasionally used to refer to seed from plants grown in the local area in, for example, a nursery but originating from some distance away. The term can be misleading and 'origin' should be used in preference.

Receptor site: land on which the seed is to be sown.

Variety (cultivar): a distinct, uniform and stable assemblage of individuals within a species, developed through cultivation, selection and subsequent improvement, maintained by vegetative propagation or inbred seed. The name must be registered eg *Lolium perenne* 'Hercules'. Varieties have usually been selected for specific agricultural or amenity use (eg sports turf or lawn grass).

Seed sources

There are three main sources of seed for habitat restoration or re-creation:

- natural regeneration (from the soil seed bank) and colonisation (seed dispersal);
- directly harvested mixtures (including green hay); and
- mixtures or individual species compiled from field cropped seed.

The advantages and disadvantages of each source are discussed below.

Natural regeneration and colonisation

Soil seed banks on arable and improved grassland are usually dominated by undesirable species (common couch, black grass, creeping thistle and docks can be especially problematic). Very few species typical of semi-natural

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grassland form persistent soil seed banks. Additionally, seed of many semi-natural grassland species tends to disperse only over short distances. For this reason, natural regeneration and colonisation are best confined to a limited number of sites:

- Land that has been in intensive production for less than 5 years on sites that were previously species-rich, as there is the possibility of a residual seed bank.
- Arable land over shallow, inherently infertile soils or similar, that has been managed less intensively or is known to have a lower weed burden, especially where they also meet the third criteria.
- Land adjacent to existing species-rich grassland, especially where seed is likely to be carried in by machinery or grazing animals.

Natural regeneration and colonisation is a cheap method of establishing species of British native-origin, adapted to local soil and climatic conditions. However, it often requires careful management to control weed growth during the site preparation and establishment phase in the first two years. There is a risk that desirable species will not colonise but it can be successful and should always be the first consideration.

Directly harvested seed

Directly harvested seed is seed collected from a donor site and then used, as collected, without further bulking up as a wildflower crop. The main methods for direct seed harvesting are brush or combine. Most directly harvested seed is collected for specific contracts and is usually cleaned and dried before sowing. However, some companies do sell bagged seed mixes on the open market. The main advantages of directly harvested seed are that:

- it allows seed to be selected from a local site that closely matches the soil, climate and habitat type on the receptor site;
- the seed is typical of the genetic variation found in the wild in the local area; and
- a wide range of species will be collected.

The main disadvantage is that the precise composition and germination rate of the seed is

not known. The composition will largely depend on which species are setting seed at the time of collection. Ideally harvesting should take place more than once during the season to maximise collection seed of the full suite of species. It may require specialist machinery and operators, that may not be available in the local area.

A related method of directly harvesting seed is to collect 'green hay'. Green hay is herbage collected immediately after cutting, without wilting or turning, and spread directly on to the receptor site. Seed is then shed as the hay dries. This method has the added advantages of not requiring specialist machinery, and ensuring that fresh seed is used.

Field cropped seed

Field cropped seed is the principal method employed by the commercial seed industry. Seed is collected from the wild (or in the case of amenity and agricultural seed, from registered seed stock). It is then grown in rows as a crop for bulking up, harvested and then used to make up mixtures.

Field cropped seed can be divided into the following broad categories:

- alien species (seed of species that do not occur in the wild in Britain);
- seed of species which are native to Britain but which are sourced from outside Britain;
- certified agricultural or amenity varieties, often derived from native species; and
- seed originally collected from wild UK populations and then multiplied as a field crop.

Of these, the first two should not be used in Agri-environment schemes and only the last is considered of British native origin. Seed continues to be of British native origin for up to six generations after being removed from the wild parent, providing no artificial selection has taken place in cultivation.

The main advantage of using field cropped seed is that the precise composition of the mixture is known and a mixture tailored for particular habitat types can be obtained. However, there is generally only a restricted range of species that

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can be bought in this way and some species (especially native grasses) are currently expensive as they are difficult to grow and harvest.

Certain agricultural or amenity varieties of grass species are already widely sown in the countryside and their continued use should not present an additional risk to populations of wild grasses. Therefore, although use of British or local origin grass seed is preferred in Agri-environment schemes, due to limited supply of native grass seed, agricultural or amenity varieties of native grass species can be used as nurse or matrix crops (see below).

Note that if you use agricultural or amenity varieties it could prejudice their potential use as seed sources for further restoration (unless you could demonstrate that the varieties were no longer present) because of the restrictions on re-sale of certified varieties (see section on Regulatory Framework).

Selecting the most appropriate seed source

Selection of the most appropriate seed source will depend on the site objectives, soil conditions, proximity to other grassland and the availability of seed locally.

Objective 1: To restore or create species-rich semi-natural grassland

All seed should be of British native origin. Where the site is adjacent to a Site of Special Scientific Interest (or, if known, any existing area of semi-natural grassland) then only the use of 'natural regeneration and colonisation' or 'field cropped/directly harvested seed of local origin' should be used. On other sites, away from existing semi-natural grassland, any seed of British native origin (or natural regeneration and colonisation) may be used.

Local origin seed should ideally originate from within the same Joint Character Area (JCA) as the receptor site. However, this is not always possible and in many cases, seed from JCAs elsewhere in the region will be equally acceptable provided the geology, soil, climate and cutting or grazing management on donor

and receptor sites are matched as closely as possible. Local origin seed will usually mean the use of directly harvested seed or green hay, although some companies do offer regionally sourced mixtures of field cropped seed.

In all cases, agricultural and amenity varieties of grasses or cereal can be added as either:

- a nurse crop (consisting of annual species such as a spring barley); or
- a matrix of agricultural and amenity varieties of perennial grasses such as red fescue, cocksfoot, Timothy or smooth-stalked meadow grass.

The sowing rate should not be so high as to produce a completely closed sward and swards should be managed to prevent over-topping of desirable species.

If perennial agricultural and amenity grass varieties are used, they should be used with care. Research has shown that some species such as the fine-leaved fescues or smooth-stalked meadow grass, can produce a tight, closed sward, inhibiting establishment of desirable species. Some amenity grasses in particular are not readily grazed by livestock. If used at all, their sowing rate should be kept low, with no individual species making up more than 20% of the mixture by weight, and the fine leaved fescues combined making up no more than 30% by weight.

There are opportunities for combining methods. For example, on large sites, combinations of natural colonisation with selected areas sown with a suitable seed mix may offer the best value for money.

Objective 2: To create grassland to protect archaeological sites, strengthen landscape character or prevent erosion/pollution

The use of simple seed mixtures of certified agricultural or amenity grass varieties is acceptable in landscapes dominated by improved grassland. Where the landscape is more clearly characterised by semi-improved or semi-natural grassland, seed mixtures with

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limited British-native wildflower content may be appropriate to match the texture of surrounding fields. If the site is also suitable for species-rich grassland creation then you should apply the same criteria as for objective 1 above.

Objective 3: To create artificial habitats in arable fields for invertebrates and birds

Commercial seed of certified agricultural or amenity grass and legume varieties is usually the best option - it is cheap and achieves the desired outcome. Such habitats are not grazed and problems with unpalatable species are less relevant. However, agricultural legumes should not normally be allowed in margins adjacent to (or ideally, within 0.5 km of) designated sites or other existing species-rich, semi-natural grasslands.

Trade certification

The charities Flora locale and Plantlife have recently developed a voluntary Code of Practice for growers and suppliers of native flora. The purpose of the Code of Practice is to encourage suppliers of native flora to be open about what they are selling and to keep proper records of the origin of their stock. The Code and a list of companies that have adopted it is available at www.floralocale.org

Organic producers

For grassland establishment on registered organic land, wherever possible seed should come from an organic source. An inspection body will expect the farmer or landowner to be able to demonstrate that they attempted to obtain suitable British-native origin seed from an organic source. Where this is not available, seed originally sourced from any other semi-natural site will be acceptable.

Regulatory framework for seed marketing

The marketing of fodder plant seed (including some grass and wildflower seed) is regulated in England by the Seeds (National List of Varieties) Regulations 2001 and the Fodder Plant Seed (England) Regulations 2002.

Any seed of certain grass and legume species, including many used in grassland creation, must go through a variety testing procedure and be

entered on the National List of Varieties before they can be certified and marketed in the UK. (Species not appearing on the prescribed lists can be marketed without certification).

In 2005, the UK Government agreed an amendment to the Fodder Plant Seed (England) Regulations 2002, allowing uncertified seed to be sold in mixtures for the restoration and re-creation of semi-natural habitats ('preservation mixtures').

Suppliers must register with Defra's Seed Certification Branch, be authorised to market preservation mixtures and agree to keep records identifying the source of all seed. Source sites must have no history of sowing of agricultural varieties since 1970.

Further information

Useful contacts

Flora locale, Denford Manor, Hungerford, Berkshire. RG17 0UN. Website: www.floralocale.org

Seed Certification Branch, Defra Seeds Division, White House Lane, Huntingdon Road, Cambridge. Tel: 01223 277151. Website: www.defra.gov.uk/plant/pvs/seedcer.htm

E-mail: enquiries.pvro@defra.gsi.gov.uk

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