

## Restoring species-rich grassland using brush-harvested seed

Brush-harvested seed taken from a species-rich donor site and spread on a species-poor recipient site is another method of restoring and recreating wild flower grasslands. Good seed sources need to be found and swept for seed throughout the growing season so that early and late flowering plants can be collected. Ask local conservation organisations if they have any brush-harvested seed from a suitable donor site that you may use. It can be a relatively cheap method compared with buying seed mixtures, but the availability of brush-harvested seed may be limited.

### Site preparation

- All wildflowers have a range of environmental limits. If soil nutrients, or pH or water levels differ between the donor and recipient, this may affect the germination and spread of the plants. Undertaking soil nutrient tests is a good method to find out whether the land falls within the expected range of tolerance of most plants. If the environmental limits are exceeded, then seeds may not germinate, so it is



important to research the current conditions. If the current conditions are not suitable for restoration, go to the information about stripping soil nutrients or consider wildflowers that can tolerate slightly more fertile conditions.

- Identification of a suitable donor site is important. The donor and recipient sites should have a similar pH, soil texture and moisture. There may be limited germination if seed harvested from calcareous grassland is spread onto acidic soil, for example.
- The future management of the recipient sites needs to be planned before undertaking the restoration. Appropriate fencing, access and water troughs may need to be installed prior to restoration or recreation, if future plans involve livestock grazing. If the site lacks specific minerals essential for livestock, these could be made available using supplements (such as mineral licks).
- Control problem weeds such as docks, thistles and nettles, either by hand-pulling, or spot-spraying (seek advice on suitable products and do not use alongside waterways). It may take more than one year to control these plants and should to be done with enough time for to be effective. Using herbicides after restoration will also kill wildflowers and grasses. The recipient site is not suitable if it has a high weed problem and an alternative site should be chosen.
- Create a short vegetation sward in the recipient field during the preceding autumn and spring, before restoration. The objective is to create bare ground - at least 50% - as all wildflower and grass seed need to touch bare soil. They also require a low level of competition with any vegetation already present to be able to germinate and survive.
- If your recipient site is a grassland, create 50-75% bare ground in July to August, or in March, by:
  - allowing livestock (ponies, cattle and sheep) to graze the recipient field, reducing vegetation growth. The recipient site should not be poached by livestock hooves. Poaching (or pugging) is where cattle, ponies and sheep leave pock-marks with their hooves in grassland, particularly after wet weather, on clay soils with poor drainage. This denudes large areas of any vegetation and can cause damage, particularly compaction. It can also increase weeds such as docks. Livestock should be removed from the field if there is very wet weather or if poaching in gateways or along fence lines starts to become apparent.
  - livestock grazing can be by pulse grazing (increasing, and then decreasing, the number of livestock for a short period of time) or by extensive grazing (a lower number of livestock are allowed to graze for a longer period) to reduce the vegetation cover and create bare ground. This is not an exact science, and livestock should be removed if they start to cause damage or there is not enough fodder. Alternatively, animals could be added to increase the amount of grazing and creation of bare ground.
  - do not supplementary feed livestock (giving them additional hay or silage on top of the vegetation growing in the field).
  - additionally or alternatively, scarify the field using a disc and/or chain harrow. Tine harrows can also be used to remove grass thatch.
  - a combination of livestock grazing and mechanical management is useful in the first instance to create bare ground.



Brush-harvester

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- If your recipient site is an arable field, create bare ground in early July by:
  - cultivating the field but not sowing a crop - leave the ground bare.
  - do not fertilise the land, as wildflowers and grasses want low nutrient levels compared with arable crops.
  - there is no need to graze the recipient site as the bare ground is created through cultivation.
- If the creation of bare ground has loosened large clods of earth then it may be useful to roll the land to flatten it. This will ensure that the seeds are not buried under the clods once the brush-harvested seed has been spread and flattened.
- If there are historical features on your land, consult with the relevant authority on your proposed works, as soil disturbance to create bare ground can be damaging to buried archaeological features.
- Creating bare ground may stimulate problem weeds to grow such as thistles, docks and ragwort which may need controlling. It can also cause soil erosion.

#### Active restoration / recreation

- Brush-harvested seed should preferably be spread between late-July and early-September, as this is the time when most grassland plants shed seed, or in the spring (March-April):
  - for larger recipient fields, a modified seed hopper could be used to scatter the seeds. It needs to be modified with additional agitators, as brush-harvested seed tends to contain large amounts of extra material such as stalks and leaves termed 'chaff', which can clog up the machine.
  - alternatively, seed can be spread by hand. Seed should be mixed with dry sand or another type of inert biodegradable material to bulk it out, and should be a contrasting colour

with the soil to show where the seed has been spread. The seed should be scattered evenly by hand using a line of people walking in a row across the recipient field. A second scatter at a right angle to the first could be undertaken if there is enough un-spread material at the end of the first scatter. Or, if there are patches of the field which do not look like they have received much material, scatter more seed in these specific locations.

- a ratio of 1:1 to 1:3 should be used for donor site collected seed to spreading seed on the recipient site (ask the suppliers of the brush-harvested seed how much they collected from a hectare of land and divide this by a scaling factor for the amount that should be spread per hectare). Or, around 10-40 kg of brush-harvested seed is spread per hectare. The amount varies depending on how much chaff there is in the seed mixture. A higher ratio/weight of brush-harvested seed is required if there is a lot of chaff in the mixture. Discuss this with the seed supplier and ask how much they recommend spreading per area.
- seed should be scattered on the surface and not drilled into the soil like a crop. This replicates natural processes.
- The brush-harvested seed needs to be put in contact with the soil to germinate. This can either be done by rolling the recipient field straight after the seed has been spread, or by putting out livestock, particularly cattle.
- Following a July-September sowing, vegetation growth should be restricted in the autumn of the first year, to reduce any competition for germinating seeds. This is particularly important in recipient fields that were already under grass as clump-forming grasses, including cock's-foot and Yorkshire fog, can be very competitive and cover newly germinating seeds. Either

livestock, particularly cattle or ponies, can be put into the field to eat the grasses if they are getting high, or an extra cut can be undertaken in late autumn. Neither grazing nor cutting should be undertaken if this will cause ground problems, for example, in wet fields that may be prone to livestock poaching or compaction by heavy machinery.

- Following a March-April sowing, any livestock used to push the seeds into the soil should be taken out of the recipient field. The field should then be 'shut-up' for the growing season and managed as a hay meadow described below.

### Post-restoration/-recreation management

- Most grassland wildflowers are perennial. Seeds germinating in the first year of restoration may only form a rosette of leaves and not flower. These plants will bloom from the second year onwards. The exception to this is yellow rattle, which is an annual flower and a hemi-parasite of grasses. It helps reduce the number and vigour of grasses and is a beneficial plant in grassland restoration and recreation.
- If there is a good amount of vegetation growth over the winter, put a low number of livestock back onto the recipient site in the first year following restoration. The objective is just to reduce the vegetation and not to create bare ground. Be careful that the livestock do not nibble young shoots of yellow rattle; they should be removed if this starts to happen.
- During the flowering season of April to July in the first year, do not graze the donor and recipient fields - this will allow flowers to bloom, particularly yellow rattle. This is called 'shutting-up' the fields.
- From mid-July / August onwards take a hay cut from the recipient grassland. Cutting the vegetation too early will

remove any yellow rattle that has germinated and grown before it has had a chance to set seed. Hay making is traditionally undertaken by mowing the field and leaving the cut vegetation to dry. It should be turned at least once a day to aid this process, and loosen seeds allowing them to drop out of the hay. The hay is then baled and taken away to use as fodder over the winter.

- Leaving wide margins uncut around the edge of the fields will provide nectar and pollen for pollinators (bees, hoverflies, beetles, wasps etc.) over the summer and early autumn. Also, cutting hay across the field, or from the centre outwards, allows insects and animals to escape; cutting around the outside of the field first can trap wildlife in the uncut field centre.
- Once the grass has started to re-sprout, it should be grazed by livestock. This is termed aftermath grazing and helps to control the grasses that can be more vigorous than wildflowers.

- If pasture management is desired, the recipient field should be shut-up between April and July/August, followed by livestock grazing into the autumn.
- Livestock should be removed in the autumn if the fields become wet to prevent poaching the ground. An early spring graze could be undertaken if there has been grass growth over the winter period but livestock should be removed for the 'shut' period to allow wildflowers to grow and bloom.

Brush-harvested seed is an excellent method of preserving the local identity of wildflower grasslands and is also an effective technique of enhancing the wildflowers in a species-poor field. It can be a relatively cheap method compared with buying a seed mixture and, if several sweeps of the donor field are made throughout the flowering season, there is the opportunity to collect seeds from early, mid and late flowering plants.



Drying brush-harvested seed

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# Restoring species-rich grasslands using brush-harvested seed timeline

