

Restoring Wildflower Meadows - Common Reasons for Not Succeeding

Meadow restoration, when successful, can be extremely rewarding but it is not an easy process and success is not guaranteed. Outlined here are some of the reasons why a meadow restoration may be considered unsuccessful - it is by no means exhaustive and the issues are often interlinked. We have suggested some ways that a restoration might be successful the second time around.

Finding the right site

Not every area of land is suitable for wildflower meadow creation. Potential sites need to be:

- weed-free from thistles, docks, nettles, rushes and ragwort;
- light rather than shaded. Strips of land that are over-shaded by houses, tall hedgerows or woodland would not provide the light conditions required by meadow wildflowers but it may be worth looking at what other plants might be more suited to shady conditions, for example hedgerow and woodland plants;
- access to the site. Equipment may be needed, such as a harrow to create bare ground, and this will need to be taken onto the site. Appropriate access is essential to do this. Access may also be required for future management for equipment and/or livestock as well as infrastructure, such as water troughs and stock-proof fencing around the meadow.

If the land does not have these qualities it will make restoration of a wildflower meadow much more difficult and we suggest that an alternative site is found if the issues cannot be resolved.

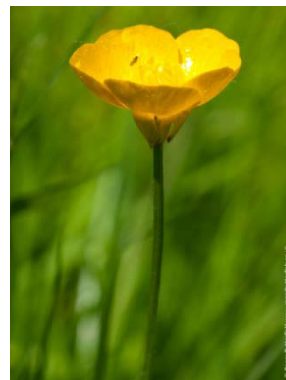
Storing seed and maintaining seed viability

It is not always possible to sow seed straight away and so it will need to be stored. If not stored in the correct conditions, seed can quickly lose its viability. For example, dampness will lead to rot and decay, and the fungus can spread between seeds quickly affecting large quantities.

Some points to remember about storing seed include:

- seed purchased from a supplier needs to be stored in a cool and dry location.
- if hand-collected seed needs to be stored then it must be dried beforehand. Storing seed in paper, hessian or cloth bags is better than leaving the seed in a plastic bag, which may retain moisture. Alternatively, plastic boxes with some silica gel packets in them can be used.

To obtain the best result, sowing should be undertaken as soon after collection or purchase of seed as possible. Even when stored in the correct conditions, some species such as yellow rattle, lose viability over time and if sowing is delayed by a year, until the next suitable time of year, a much lower germination rate should be expected.



Preparation for restoring wildflowers - soil nutrient levels

Preparation is everything! Perennial wildflowers prefer soils that are low in nutrients where they can compete against the grasses, thistles and nettles that do better in high nutrient soils. If the soil phosphorous levels are too high, then nutrient-loving plants can take over by growing taller, quickly shading out the wildflower rosette leaves and taking-up more nutrients than typical meadow flowers. As it is difficult to determine nutrient levels in the soil by looking at the vegetation above ground, a [soil nutrient test](#) should be carried out before restoration. Although it is possible to [strip soil nutrients](#), this can take a long time and success is not guaranteed. There are a range of [wildflowers that can tolerate slightly higher nutrients](#) or it might be possible to use [yellow rattle as a facilitator species](#) to reduce the grass cover. However, there is a level of soil nutrients above which it would not be suitable to undertake a restoration as the nitrogen-loving plants would out-compete the wildflowers.

[Soil pH](#) is also an important factor and should be measured prior to a restoration. Restorations have been undertaken using wildflowers that will not survive in acidic or calcareous soils and as a consequence none of the seeds have grown. Soil pH also interacts with nutrients in a complicated manner and can restrict or make nutrients more available for plant uptake.

Preparation for restoring wildflowers - creating bare ground

One of the common mistakes made in meadow restoration is insufficient preparation of the ground before seeding. All wildflower seed needs to touch bare ground to trigger germination. It is recommended that you create at least 50% bare ground before seeding, with 75-90% created on sites with very competitive grasses and legumes, like perennial rye-grass and white clover. In a grass field it doesn't matter how the bare ground is created, whether it is tine-, chain-, or power-harrowing, or livestock are used. In an ex-arable field, ploughing before seeding is recommended. As well as allowing seed to touch the soil, creating a high level of bare ground also restricts the growth of more competitive plants, giving the meadow wildflowers a better chance. For example, yellow rattle is very intolerant of shade and will not survive in grassy vegetation where the grass leaves cover the yellow rattle seedlings.

Unfortunately, creating bare ground can lead to some problems. Docks, rushes, thistles and ragwort are all problem species that like bare ground and may produce a flush after ground disturbance. This is something to consider before re-seeding and control is recommended before progressing with the restoration.



Protecting plants - slugs

Slugs can decimate young seedlings and eat seeds. Although associated with damp weather, slugs will also move through dewy grassland in the early mornings and if the winter has been warm there may be a higher number of slugs that have survived. There are a number of different options for slug control but, unfortunately, it is not always achievable:

- if slugs are known to be prevalent in the area before restoration, then it might be a better course of action to find another site with lower slug levels. This could be one of the considerations that is built into the development of a wildflower restoration or creation plan.
- plant out more sturdy plants that have several true leaves or a good base rosette. Plants of this size are less likely to be eaten by slugs than smaller seedlings.
- encourage natural predators such as birds, hedgehogs, frogs, toads, ground-beetles and slow-worms. A nearby pond is good habitat for these predators and habitat piles could be located along hedgerows to act as a refuge for wildlife during the day.
- hand-picking slugs and snails on a warm moist evening from transplanted plug plants. They should either be taken a long way away from the plants, or killed humanely in very hot water.
- traps can be set for slugs, such as a sunken container filled with beer or scooped-out halves of oranges or grapefruits with the skin side up to encourage slugs to congregate underneath. These are best placed close to plug plants to draw the slugs away. The traps should be checked regularly and any caught slugs removed. This method would only be effective in small areas.

There are two methods of slug control that may have undesirable effects on other wildlife. Although these methods are suggested by the horticultural industry, we do

not advocate using them on a wider scale:

- there is a biological control “Nemaslug” which is a microscopic nematode (eelworm) that is specific to molluscs infecting them with bacteria that causes a fatal disease. It does not affect any other animals or invertebrates. It can be purchased from some garden centres and is applied by putting the nematodes into solution and watering the soil. It best applied in the early evening onto moist warm soil (spring and early autumn) that is well-drained. It may not work so well on clay based soils. Nematodes can be too effective, removing slugs and snails from an area which are the food source for much wildlife. This could cause an imbalance in the local ecosystem and you may find that natural predators move away to find food elsewhere. The consequence of this may cause problems for natural control in the future. If you decide to use nematodes, always read the instructions before purchase and use and be aware that they can cause harm to other molluscs, such as freshwater mussels.
- slug pellets are a chemical control. They are a poison and pellets containing metaldehyde can cause severe harm to other wildlife, pets and people if accidentally eaten. They can also be a major cause of water pollution. There are organic pellets available which contain ferric phosphate which is relatively non-toxic for animals, but there is always a risk. As with biological control, if slug pellets are too effective they can cause an imbalance in the natural predator community. If you decide to use slug pellets, always read the instructions before purchase and use so that the pellets are used most effectively, and be aware that they can cause serious harm to wildlife.

Once seedlings have grown into a small plant with 5-6 proper leaves they are more resistant to slug damage.

Ecological succession - wrong choice of species

Meadow restorations are sometimes considered failures due to the type of plants that are or are not present. Annual [cornfield flowers](#), such as poppies, cornflower and corn marigold, are not normal components of meadows (as there is insufficient ground disturbance) but because of media portrayal they are now expected to be part of meadows.

The management of a site for cornfield flowers is at odds with the management of a site for meadow flowers, although occasionally the plants coexist in regularly disturbed areas such as gateways but this is not the usual situation. A high level of ground disturbance in a meadow can lead to the decline of the perennial wildflowers, but without it cornfield flowers will not grow. A decision needs to be made about the objective of seeding - whether for annual cornfield flowers or for a perennial wildflower meadow.

Ecological succession - flowers not growing

Some meadow plants have a long period of seed dormancy and even following germination, the seedlings can take a long time to grow and flower. For example, crane's-bills, devil's-bit scabious, pepper-saxifrage and cowslip, and even meadow buttercup may take up to 10 years to appear. Other plants may not be transferable between fields. For example there are no reports of dyer's greenweed being successfully grown from green hay or brush-harvested seed. Patience is required to wait for seeds to germinate and plants to grow sufficiently to flower. If particular species do not appear after a reasonable amount of, then plug plants and/or seed enhancement might be a possible method of introduction if the conditions for those plants are suitable.

Ecological succession - flushes of particular species

Not everything in nature develops at the same time and it can often be 1-2 years after restoration before wildflowers start appearing. Flushes of particular plants may also occur following restoration and can cause concern. This is part of a [natural succession following re-seeding](#).

For example, yellow rattle can peak for 1-15 years following seeding. It is rare that yellow rattle continues to dominate after 10 years as the coverage should settle down naturally within this time period but if there still seems to be a high amount of yellow rattle then small areas could be cut before it flowers and sets seed (this should reduce coverage as it is an annual species). However, high flushes of yellow rattle may be related to grass growth and reducing yellow rattle coverage may enable grasses to increase again, restricting the growth of other wildflowers.

Oxeye daisy is another species that can flush between 2-5 years following re-seeding. Individual plants are short-lived perennials surviving for 1-5 years and it readily takes to bare ground. Its quick response enables it to flower from the second year onwards before some of the other perennial wildflowers are able to get going. As other wildflowers start to appear and the bare ground disappears, oxeye daisy will also settle out.

It can take a long time for a meadow to settle with a good mix of wildflowers. We estimate that it can take longer than 15 years, but as meadow restorations have only been undertaken within the last 15-20 years the longest lived are still quite young in comparison to ancient meadows. At the moment we estimate that it may take 5-6 years for a pretty flowery sward, 10-12 years for larger herbs to establish, 150 years or more to recreate something that may be similar to Site of Special Scientific Interest!

Future management

All grasslands require [management](#). This can be through mowing and aftermath grazing or pasture. Where the grazing of livestock is not possible then other mechanical means of removing dead grass leaves and moss from the meadow sward will need to be undertaken, such as raking or for larger areas using a tractor pulled chain- or tine-harrow. All of the cut vegetation from hay-making and any dead grass gathered by raking should be removed from the meadow otherwise it will rot down, smothering the growing plants and adding nutrients to the soil.

One of the common reasons why wildflowers decline is insufficient management - they require annual maintenance otherwise dead leaves and moss build-up creating 'litter' above the soil surface. Litter has two effects, it prevents seeds from wildflowers reaching the soil surface and germinating, and it decays, adding nutrients into the soil which encourages nitrogen-loving plants. Management is essential to maintain the wildflowers and mimicking natural processes, such as livestock grazing, is the best way of encouraging them to bloom and creating space for more flowers to grow.

Realistic expectations of meadow creation

People's expectations for their meadow restoration are often one of the reasons why they are considered a failure. Many people feel they have failed if their meadow is not the colourful montage portrayed in the media. There are a number of reasons why wildflowers may not be widespread throughout a grassland, ranging from the seed source, method of sowing or enhancement, soil nutrient levels, ecological succession and management of the grassland following restoration. Having realistic expectations of what to expect is essential so as to not be disappointed. It is also important to remember that your meadow will very likely be more species rich following restoration than it was before!

If you have tried restoring wildflowers but have not succeeded then do consider trying again but make sure that some of the common issues encountered above are considered in your plans.

