

# Wild Gorse: history, conservation, and management

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## Introduction

### A landscape history

Gorse (*Ulex*) and broom (*Cytisus*) are important plants in the British landscape. Essentially a western and Atlantic group of plants all the gorse species are less frequent going east across Europe. In western areas such as Cornwall, Wales, western Scotland and Ireland, along with the Dorset heathlands, they can be particularly abundant; dominating large areas, to provide stunning vistas and important wildlife habitat. For centuries too, especially in remote areas such as the Scottish Highlands, gorse was also of great economic and cultural value. Known as whin or furze, and as *ruisg conasg* in Gaelic (meaning prickly), it was important fuel, burning well and very hot. According to Darwin (1996) gorse bark was used to produce a dark-green dye, and the flowers gave yellow and green dyes. Modern dyers on the Scottish islands have experimented with broom (*Cytisus scoparius*), and historically broom flowers produced yellow and green dyes. There are several Gaelic names for broom: *bealaidh / bealuidh* or the plant that Belus favoured (a reference to the flowers as touched by the sun's rays and the colour yellow held sacred by the Egyptian King Belus, and perhaps with Druidic symbolism too), *giolach sleibhe* (reed or cane, or leafless twig of the hill), and *sguab* (a brush made from broom). Broom was one of several plants used for sweeping. With narcotic and toxic properties broom was also associated with magic and medicine. In larger quantities it acts like hemlock as a poison, but the tops were also used for dropsy, bladder and kidney complaints, and as a heart tonic and regulator. Apparently a bunch of broom tied around the neck would stop nose-bleeds. The seeds were dried and used for 'coffee', and pickled broom buds were rather like capers. Gorse had surprisingly few medicinal uses or folklore associations in Scotland, though in Fife it was considered bad luck to give anyone gorse flowers. However, gorse or furze was traditionally an essential part of the rural economy. Important as fuel it was also bruised to provide winter fodder for livestock. It is highly nutritious; hence its armament of sharp prickles to ward off herbivores. The leaves are generally only eaten in situ in the spring when young and tender. However, the plant was grown to be cut and crushed for winter fodder for horses and cattle. This is a similar practice to the use of cultivated holly in 'hags' and 'hollins', in upland, northern England. It was used particularly in areas with extensive heath and common, but was also deliberately seeded into areas as a crop to be harvested. Gorse was also employed as quick-growing hedges and seeded onto the tops of stone walls. Gorse flowers were also used to make wine. Broom was also used for thatching cottages, but very much as a last resort in the absence of other, more suitable materials. It was not long-lasting and must have carried a severe risk of fire.

Dickson and Dickson (2000) noted the importance of gorse for heating ovens for baking, a phenomenon widely recorded across Britain. The gorse burns rapidly and hot, raising the temperature of the oven to a suitable high. Importantly the gorse produces little ash, and this is raked out as the bread is placed into the oven. For bread in early times, it was the custom to cut off the base and the four side-crusts and so remove the ash now embedded in the bread! The monks of Paisley Abbey also used gorse charcoal but the specific purpose is unknown. Angus Winchester (2000) also discusses the conflicts that arose between the need to use gorse as a hedging and boundary plant in upland areas, and the temptation to harvest it as useful fuel. Apparently legal documents illustrate such disputes in lowland Scotland and the Borders.

It is clear that gorse and its relatives were widely used and often deliberately cultivated. Indeed this was the case until very recently. Now however, the furze fields and the gorse commons lie neglected and abandoned a forgotten artefact of our cultural history. As the plants degenerate through age and a lack of management, natural capacity for regeneration declines. Common gorse (*Ulex europaeus*) is the most widespread, found from Britain to Iberia in the west, Norway to Sweden in the north, Austria to the Czech Republic in the east, and to North Africa in the south. The visual intensity of a gorse-dominated

heath or common can be dramatic. The pioneering naturalist Carl Linnaeus saw gorse in bloom on London's Putney Heath whilst on a visit to England. He was reported to have fallen to his knees and wept for joy when he beheld the sight of the heath adorned with its fine yellow flowers. He had tried unsuccessfully to grow gorse in his greenhouse in Uppsala in Sweden, but the winters proved too cold. Interestingly, when introduced to other countries such as New Zealand it has become a serious invasive, alien weed; reaching great size due to the lack of native insect herbivores to feed on it..

### **Distribution and importance in the British Isles**

Britain has three native gorse species: Common Gorse (*Ulex europaeus*), Western Gorse (*Ulex gallii*) and Dwarf gorse (*Ulex minor*). Other close relatives are Common Broom (*Cytisus scoparius*), and the Greenweeds (*Genista* spp.) including Petty Whin (*Genista anglica*). Some of these were important dye plants. Common Gorse is very widespread and locally abundant except in the English Fens and the most upland areas of Britain. In regions with extensive heath and common, and especially along the western and southern coastal zones it may be dominant and super-abundant. Western Gorse is as its name implies more or less distributed across the south-west of England, Wales and Ireland, and also but to a lesser extent along the coastal region of East Anglia. Inland it occurs north to the Peak District, Lake District and Pennines. Dwarf gorse (or dwarf furze as it is often known) is restricted to the south and south-east, particularly the New Forest and Dorset Heaths.

Common Gorse is important because of its ecology and its landscape impacts. It is widely favoured for stunning shows of yellow flowers produced mostly in winter and spring but which continue sporadically at other times too. An old folk-rhyme suggested that 'When gorse is out of season, kissing is out of fashion'; gorse does of course flower all year round. Gorse provides important habitat for other animals and plants including uncommon ones such as dodder, a 'hemi-parasite' that grows on gorse foliage. Birds such as stonechat, whinchat, linnet, yellowhammer, and Dartford warbler are all strongly associated with extensive gorse banks, and red-backed shrike when it occurs, favours gorse. Reptiles such as common lizard, sand lizard, smooth snake, and adder, all favour gorse-dominated environments. The abundant flowers are valuable sources of nectar and pollen for insects. Along with heather (*Calluna vulgaris*), gorse is visited and pollinated mainly by bumblebees and honey bees, and is very important for honey producers. It provides valuable as a food plant and as habitat for many invertebrates including moths and spiders. In abundance it can present a fire-risk, especially in urban-fringe, in heathland environments or other areas where there may be public access (official or unofficial). So farmers and landowners need to be aware of potential hazards especially during dry weather.

### **Ecology and Biology**

In ecological terms gorse is normally classed as a 'woody stress tolerant competitor'. This is also reflected in its ability, with evergreen shoots and leaves, for winter photosynthesis. Gorse is a Legume (member of the Pea family) and so able to 'fix' nitrogen for nutrition from gaseous nitrogen in the air. This is a key factor in its success in acid, low nutrient soils, mostly free-draining sands or peats. Leaves are reduced to sharp spines for two functions along with photosynthesis; warding off herbivores and reducing surface-area to minimise transpirational moisture loss. With thick, waxy cuticles of leaf and stem to reduce water loss, this is important in dry soils.

Gorse is a long-lived perennial favouring open, sunny locations; reproducing by seed from massive yearly production of fertile pods. Regeneration of established plants can be vegetative from basal shoots, as old-age causes collapse and opening of the plant, or after cutting or burning. Gorse will establish freely from shoots or from seedlings after fire has removed the parent plants. On hot summer days ripe seedpods can be heard splitting open and throwing out the seeds.

### **Conservation issues and management**

Gorse is an indicator of environmental conditions favouring heathland, a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. Mammals such as badgers will use gorse areas as safe sites for their setts. Rabbits also do well around gorse banks, in turn providing food for predators like buzzard and red kite.

Gorse may cause problems by dominating an area, eliminating other species. Mature stands *en masse* may also be serious fire hazards. Like many potentially dominant species it is good in moderation, and management should seek to achieve this. Traditionally, gorse was managed by rotational cutting and harvesting for fuel or forage for livestock. Prevention is better than cure so unwanted plants are most effectively eradicated as soon as they are noted; minimise natural spread at the earliest opportunity. This is best achieved by an annual walkover of an estate during the winter, physically uprooting plants between one and three years old. Like *Rhododendron* established plants are harder to control or eradicate.

Without strategic, long-term management planning, control and eradication are *ad-hoc*. This often means limited success and a dwindling of resources and. Aerial photographs bought on-line can help map gorse across your farm or estate; each stand identified and prioritised for conservation or management, along with invading areas. This provides an excellent record of the extent of gorse scrub at a particular time, and future assessments can monitor impacts. Each patch of gorse, once identified, can be coloured or numbered to produce a practical illustration (zone map) with priorities for conservation, management or control. This will help plan work, the management required, and non-intervention zones. It is important to remember that gorse is dynamic, subject to ageing, degeneration and death; even areas to be retained may need managing for maintenance of structural, visual, and conservation interest.

Many landowners have statutory responsibilities: sites with conservation designations such as SSSI's or SAC's, or protected species such as breeding birds, or Badger setts. Developing a relationship with the relevant conservation bodies, advisors, and agencies at an early stage in a project is beneficial and may be a requirement. Consent for work may be needed prior to undertaking operations that potentially damage important conservation features. Your FWAG advisor can help.

### **Managing gorse heathland environments**

Patches of gorse are important in both heath and coastal areas, although it may be desirable to control the extent of spread where it excludes other species. Valuable nesting and feeding sites, and cover for birds and mammals, it also shelters birds and other animals moving through the countryside. For centuries rabbits prevented the encroachment and outward spread of gorse, but following myxomatosis rabbit populations fell during the 1950's and 1960s. Gorse and other scrub rapidly colonised grasslands across Britain. The abandonment of traditional cultural harvesting of gorse was another important factor, often overlooked. Today, without management, gorse stands become increasingly degenerate losing both visual and conservation value. The extent to which gorse cover is encouraged or tolerated, particularly within designated landscapes, is generally governed by a series of accepted attributes. Targets may be developed to assist the manager to determine whether a particular site is in favourable condition or whether some form of management to restore condition is required. On dry heathland tree and scrub cover including gorse should not normally increase above 25% of the total vegetation cover; on wet heaths this is lower at around 10%. These values are purely rough guides and there may be specific reasons to increase or decrease beyond these levels. Approaches to gorse as an important component of many cliff-top and coastal sites are similar to those for heathlands.

### **In parkland and wooded environments**

The conservation targets for gorse in more fertile wooded locations are similar to those for heaths but with the expectation that it will be less abundant. It is more likely to occur as smaller patches in clearings,

along rides and glades, and in larger stands in grass-dominated park areas. The intention would be to maintain gorse in zones where it forms a 'natural' component of the site and the surrounding landscape, and where it brings visual or conservation benefit. The cyclical nature of the gorse stand can make effective management of smaller areas problematic.

### **Some Key Tips for Management**

- Management of established gorse should not be undertaken during spring and summer since this might affect nesting birds. It is therefore both bad conservation and illegal. It is prudent to carefully survey any dense gorse areas to be removed to check for badger setts or fox earths *etc.* If they are found then it is best to seek advice before carrying out any work. In the case of badger setts this is absolutely essential since they are strictly protected and the legal onus is on the landowner to avoid disturbance. Ignorance is no excuse in law.
- The most effective approach is to determine areas of the site to be under gorse and plan accordingly. In suitable situations long-term control can be by planting or allowing successional growth of trees to overtop the gorse. Other areas can be cut in rotation. Seedlings and small bushes away from desired gorse areas can be cut, pulled or sprayed.

### **Factors to consider in management**

The following are key to management:

1. On sites with statutory designations ensure contact is made with the body responsible for conservation and protection of the site, and consent is obtained prior to work. This is even when the intention is to improve wildlife habitat through scrub (gorse) removal or associated management.
2. Employ systematic control / eradication, ideally through long-term, well-structured management plans. These should prioritise work into practical and workable zones to be undertaken in areas that can be managed effectively during any one period. Bear in mind the need to return to areas in years two or three to follow-up.
3. Be careful not to over-tidy, particularly during the early programme of consolidation i.e. treating re-growth. 'Weed' growth may be unsightly but this will be self-selecting as the initial ruderal (disturbance) species give way to the longer-lived, perennials. This is the natural process of 'succession' and plant species contributing to this provide important food and nectar sources. Management may aim to create mosaics of ephemeral communities.
4. Give consideration to areas, which due to their position or function, may need extra management and that could instead be left with minimum future intervention.
6. Since larger-scale clearance work is likely to be controversial, consider the importance of communication. This may be more acute if Public Rights of Way cross the land or if it is open access. Public concerns can be allayed by articles in local newspapers, through local radio, and through signage at strategic locations on site. If a sensitive location is involved then a public meeting to explain objectives and invite comment and perhaps a site visit may be worthwhile. It is often useful to involve local natural history bodies and conservation groups at the initial stages. Clearly for small-scale operation this level of public interaction is often not necessary.

The guiding aims of gorse management are as follows. Firstly to maintain valuable gorse stands; to prevent unwanted spread of gorse, and where appropriate to reinstate areas back to former condition; and to maintain areas of thinly-scattered gorse in discreet groupings of good structural variation (age, height

diversity) as part of wider habitat mosaics. There may be a desire to re-create new areas of dense gorse as part of habitat restoration or creation schemes. With these in mind, management should concentrate on:

- Improving or maintaining existing stand condition.
- Where necessary reducing the number of stands or the amount of encroachment (outward spread) to acceptable target values.
- Removing young gorse from areas supporting other good wildlife habitat and which might be adversely affected by gorse. This should be prioritised above removal of established stands where habitat quality is already compromised.

Different management approaches can be considered, the most appropriate will depend on the problem and the intended outcome.

### **Mechanical methods of control**

Mechanical treatments utilise equipment from smaller brush-cutters to tracked machines such as a Drott or 360° Hymac. These can make significant inroads the rate of progress depends on terrain, density, size and age of plants removed. This allows grubbing-out of roots, reducing the need for follow-up spraying. Ground conditions from this method suit subsequent tree-planting and on open heathland will create important bare-ground habitat. However, it is important that such high-impact techniques are not used on sites with archaeological interest. The topography, slopes, hollows *etc.* and the nature of the surrounding vegetation will all influence techniques applied. It is important to limit damage to surrounding areas. If using contractors then a tight work-specification (with method statement covering working methods, haul routes, and disposal of cut materials) should be produced. It is advisable to engage someone to oversee the work.

In many cases it is desirable to undertake control over a period of a number of seasons, to limit disruption and spread any negative impacts. This may also spread costs over a longer period. Discreet areas or individual stands should be targeted in accordance with a long-term management plan. Through this and working to identified zones, ensures both disturbance and ecological damage are minimised.

### **Equipment for mechanical control**

**Heavy duty swipe:** This smashes and flails the gorse making access easier, but leaves a thick mat of brash. It may be necessary to remove this to expose mineral sand or underlying soil.

**Bulldozer Drott\*, Hymac\*\*:** This type of equipment uproots the plants leaving open bare ground. Further scraping and removal of brash may be required but this technique mixes nutrient-rich surface materials with nutrient-poor sand or soil below. The resulting bare ground will favour re-colonisation of typical vegetation for the location.

\* The Drott is a tracked machine with a 3-in-1 bucket that can grub-out roots, shake them and dispose of them either into a designated burning area or a trailer. Trees up to 25cm diameter can be removed though a 15cm limit is recommended. A Drott will clear around 0.1 ha of scrub per day; costing £1,000 per ha for typical gorse scrub. \*\* A Hymac technique uses a root-fork mounted on a Hymac or JCB to dig out stumps and roots; very effective in sandy soils. A long-arm Hymac is useful for larger bushes access permitting. It is good for sites with hollows and steeper slopes, coping with trees to 25cm diameter. Hymacs clear up to 0.25 ha per day at around £1,500 per ha assuming larger-sized gorse scrub.

Soil disturbance can be advantageous in promoting leaching of nutrients and creating surface disturbance. Good wildlife habitat can be reclaimed or created in this way. Mechanical clearance can be favoured if desirable vegetation has been lost through scrub invasion.

### **Manual control**

Manual control is preferred for smaller, isolated, or scattered gorse including that to be retained for landscape value. It is useful in more formal landscapes such as areas of high recreational use like parklands. Here visual character may need to be maintained but the growth checked. In some areas small-scale control of re-growth or simply occasional management to maintain condition may be required. This involves use of chainsaws or pruners by certificated and suitably-protected operators. Manual control may be applied to clearance of newly-established outward spread, or the regeneration of existing mature or degenerate gorse. If clearing smaller areas of gorse using chainsaws then it is likely that re-growth during the second and third year will need to be chemically or physically removed. However, this can be reduced by follow-up work using root-cutting chainsaws.

When regenerating existing gorse different approaches can be considered. First is to cut-back old stands to 150mm of ground-level to encourage natural regeneration. Scraping, collecting, and spreading cut litter encourages seedling establishment. This is a backup should vegetative regeneration fail. The second approach is more subtle, has less visual impact and keeps greater structural interest. This involves arbitrarily sectioning each stand; then managing one section every 2–4 years depending on re-growth and recovery. This needs careful planning with a zone map coloured to show priorities and time-scales. This can be more labour-intensive and for larger areas is costly. It works out around £8-£10 per metre length or up to £1000 per hectare depending upon density of growth and how brash is disposed of. Chainsaw work may be per area i.e. working on a rate for clearing 0.05 ha per day, a cost of £1500 per ha.

### **Hand-pulling seedlings**

Small seedlings can be hand-pulled during routine maintenance and an annual estate walkover. More firmly-rooted young bushes will need cutting and roots grubbing out using a root-cutting chainsaw, or chemically treated.

### **Use of a root-cutting chainsaw**

Roots can be removed with a mattock, but this is slow and heavy work. An effective alternative is the portable, small and cost-effective mechanical root-cutter. Root-cutters remove all of the bud- and shoot-producing material. Remaining roots rot in the ground; working well in most soil-types but not in very stony situations. They help decrease re-growth vigour.

### **Chemical control**

Chemical control is not normally used to kill individual mature plants or older gorse stands. However, it is effective for re-growth. A list of approved chemicals is provided in Table 1. On sensitive conservation sites particular care is needed as the chemicals are non-specific and kill surrounding vegetation. On heathland sites it may be worth considering a weed-wipe application. Control can be effective if heather is first 'topped' at around 150mm. This is left for a year to allow more rapidly growing gorse to overtop the heather and achieve a height appropriate for weed-wiping. It is important to ensure full foliar coverage of the target plants, and re-treatment on a cyclical two- to three-year basis may be required. Foliar spraying is likely to cost around £400 per day.

**Table 1. Approved chemical herbicides for gorse**

Active Ingredient	Product	Supplier	Use	Notes
Ammonium sulphamate	Amcide Rootout	Battle Hayward & Baur Dax products	Rhododendron and other woody weed control in forestry.	General purpose non-selective herbicide and tree killers.
2,4-D + dicamba + triclopyr	Broadward Nuform Nu-Shot	United Phosphorus Nuform White	Perennial in woods, weeds in forestry and established grasslands	Translocated herbicides
Glyphosate	See current UK pesticide Guide for listing	-	Control of woody weeds including weed wipe application	Total vegetation control for gorse and rhododendron
Clopyralid + triclopyr	Grazon 90	Dow	Woody weeds in amenity and established grassland	Approval covers gorse, bramble and broom. Rhododendron not specified
Triclopyr	Chipman Garlon 4  Convoy Garlon 4 Truptin 48EC Garlon 2	Nomix Chipman  Nuform White Dow United Phosphorous Zeneca	Control of perennial woody weeds in forestry  Control of perennial woody weeds in established grasslands	Approval covers gorse only

From Taylor *et al.*, 2003

### Chemical methods of stump control

Conventional stump clearance following cutting tends to rely on chemicals. However, due to its high resistance to herbicides, gorse is not easily killed by chemical stump-treatment. Where bushes are isolated or hidden within larger areas of open dune or heath, stumps left after clearance may be difficult to re-locate. It is therefore good practice to undertake chemical treatment immediately after cutting.

Glyphosate painted onto stumps with a 25% solution of Roundup in water is approved for this purpose; as is Triclopyr marketed as 'Garlon 4'. Garlon can be applied as a dilution with paraffin or water at 800 ml Garlon 4 to 10 litres of dilutant, using a knapsack sprayer at low pressure. Ammonium sulphamate applied as a 40% solution is also approved for the treatment of cut stumps. However, to be effective, stumps must be sprayed within 48 hours of cutting. The cut surface, bark and immediate root area must be thoroughly wetted. Where it has not been possible to spray the stump shortly after cutting, re-growth may occur; and can be killed by spraying the stump and root zone again with a 40% solution.

### Weed-wiping

Weed-wipes are available in different sizes and increasingly are used in heathland management. However, only certain glyphosate products are approved for this use. They are especially useful for controlling invasive plant species in areas of high plant conservation value. The 'scrub' wiper can be used on any scrub which will bend under its path; the machine held at any height using the tractor hydraulics and of sectional construction can be used on rough terrain. The available machines were originally designed by the former English Nature team with the Royal College of Cirencester; now marketed under Allman 'Eco-wipe' weed-wipers.

## **Burning**

Burning is a traditionally-established technique of heathland vegetation control. When implemented correctly it will stimulate seedling germination; a useful aid to gorse regeneration where required. However, it is also an approach that has obvious risks! Controlled conservation burning is very exacting, governed by law, and in many situations not appropriate. It is essential that temperature is controlled at around 500°C since greater heat kills rather than stimulates the seed-bank. Intense heat may kill animals burrowing to escape the fire. Legislation requires at least three people in attendance at a burn; and where larger stands are targeted fire-breaks should be cut to prevent the fire from accidentally spreading beyond target areas. This easily happens if the wind picks up or changes direction, and because gorse and its litter are so flammable. Burning is only allowed during the wetter periods of the year (1<sup>st</sup> November to 31<sup>st</sup> March in lowlands; 1<sup>st</sup> October to 15<sup>th</sup> April in uplands). Written notification of intention to burn should be given to neighbouring dwellings or land-holdings affected. This should be at least 24 hours before the work.

Burning of brash following mechanical or manual removal is subject to legislation. Burning is a major source of environmental pollutants, and should only be undertaken according to best practice guidance and if other approaches are not appropriate. Larger roots and other cut materials can be burnt on-site, still an accepted practice in the UK. Because this practice causes pollution and in a small way contributes to greenhouse gas production, burning is now banned in some countries including Belgium, Holland and Germany.

## **Restoration after clearance - Disposal of brash and cuttings**

The options for disposal of cut materials are:

1. To leave on-site
2. Dispose of on-site
3. Dispose of off-site

The feasibility of the different options depends in part on the size of the task and of the overall estate being managed. The first option looks unsightly in situations with public access, results in nutrient-enriched soil, and on drier heathlands might be a serious fire-risk. Disposal on-site can be a more practical alternative if smaller brash is chipped and spread into areas of pasture, arable land, or woodland. However, it is important to assess any woodland conservation interest before disposal to avoid damage. Larger roots and other materials can be similarly treated, collected from the gorse areas and stockpiled as 'eco-piles', left to decompose naturally. Use can be made of chippings to re-form footpaths and bridleways. If sufficient are produced, chippings can be set aside to compost and sold on to farmers or local people. (Timber merchants will sell chippings at around £1.00 per small sack). Brash and roots may be buried if space and the site (adjacent arable land for example), permit. If material is buried on-site in a sandy or heathland area (not recommended), it must at least 1.0m below the surface, to prevent nutrient enrichment.

## **Creating bare ground wildlife habitats**

Bare ground is an important heath and dune habitat component. However, once created by gorse removal it will not remain for long. The initial open-ground conditions, particularly within a heathland, fixed dune, or grassland, are of high conservation value, benefiting wildlife species, including lizards, snakes, burrowing sand wasps and mining bees. To conserve this important habitat, it is best to consider small-scale, on-going, clearance work. This is preferable to larger-scale, intensive operations over year or two, and minimises visual impacts. Also avoid being too tidy in working operations and in tidying up. Rather than smooth, re-graded or flattened areas, it is better for wildlife to create surfaces of different shapes and sizes, with different aspects to facilitate basking habitat for reptiles, and hotspots for other fauna. Some surface smoothing may be required following clearance of debris and more nutrient-rich soil. It may also

be desirable to speed recovery by sowing the area with a native grass seed mix collected from nearby areas during the previous summer. Seed and debris can be spread at a sufficient rate to provide seed without allowing smothering the surface with brash. An appropriate rate is 800–1,250 gm<sup>-2</sup>. Seed should be worked into the soil surface to protect against wind-blow and surface drying.

### **Planting and seeding gorse**

Gorse can be easily established on suitable sites, providing ground conditions with low available nutrients and preferably acidic soil (optimum pH 4.5) have been produced. Gorse can be purchased as seed, root-trained, or container-grown stock, the latter are relatively cheap and easy to handle. However, the easiest and cheapest way is to collect seed on site and spread liberally over the receiver area. If planting then the gorse must be protected from grazing and browsing by individual shrub-guards or by fencing the whole plot with a small-gauge chicken-wire fence. Individual plants should be notch- or pit-planted during autumn / winter period with close spacings not exceeding 1m<sup>2</sup> (0.5–0.8m<sup>2</sup> is ideal). Surface preparation may include chemical weed control of existing vegetation or upturning turves around the planted gorse. Once planted the surface around each plant should be firmed and watering and protection thereafter continued as required during the first spring period. Seed collected off-site can be applied on prepared surfaces at a fresh material rate of 400–600 gm<sup>-2</sup> (assuming debris in the seed mix). Ideally seed should be applied during early spring i.e. February to March, or alternatively autumn between September and November. The seed must be worked into the immediate surface by raking or brushing, and scarification or light aeration prior to seeding is helpful.

### **General maintenance**

An individual gorse bush has a life-cycle of around 30 years. During this time the plant will become increasingly woody with a gradual loss of structure and capacity for vegetative re-growth. Maintenance of existing gorse involves management to retain elements of the juvenile to mature condition (with maximum regenerative capacity). Management is most effective if directed by a longer-term, well-structured management plan. This should outline a practical rotational programme of management that, over a pre-determined time-period (8–12 years or perhaps 15 years), covers all relevant areas of the site. Managing and returning to consolidate the work achieved will help retain the quality of the gorse and also the wildlife benefit through provision of optimum structural and ecological interest. Rotational cutting of individual plants or stands should involve topping back to within 150mm of ground level and scraping through the brash / litter layer using a rake to encourage seedling germination. The site should be re-visited every 2–3 years to check and deal other weed invasion such as by bramble or to control unwanted re-growth.

### **Conclusions**

Gorse is a hugely important plant in the Scottish landscape, and also has a depth of cultural association often now forgotten. However, in the absence of traditional management, and with its short life-cycle, it does need management. Its use in hedging too makes a dramatic impact on landscape and on wildlife. Not only this, but it is a useful and cost-effective solution to boundary problems. Now often considered a weed species spreading uncontrolled across many areas, it is much more than this. Sensitive management can keep problem areas in check, but also help to celebrate this dramatic and often spectacular plant. Enhancing the visual quality of many areas, gorse brings a new and contemporary economic benefit, that of encouraging tourism, so important in rural Scotland today.

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**Note: Ian Rotherham is collecting information about the uses of plants such as broom and gorse and particularly for fuels or fodder. This is part of a long-term study on the relationships between traditional peoples and the environment. The research focuses especially on uses of peat and turf, and bracken or birch across the British Isles. We are keen to hear from anybody with memories, records or photographs of any of these.**

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