



# Collecting tree seed for direct selling

## Introduction

There is increased interest in collecting tree seeds by community woodland groups in Wales, to provide a small income source by selling seed, to grow-on in small nurseries for eventual sale as seedlings or transplants, or simply to plant for woodland creation or re-stocking. Knowing when, where and how to collect seeds correctly from wild trees is important - if done well it can be an enjoyable, productive woodland activity, but done badly may result in the collection of low quality seed, poor growing stock and wasted efforts. Newly planted seed may not mature into adult trees for hundreds of years so it is well worth pausing at this first stage to do things properly, otherwise future generations may be disappointed by the results! The purpose of this short guide is to provide a brief checklist on how to sustainably collect high quality seed from native trees and to point readers towards relevant sources of more detailed information. It is mainly aimed at woodland managers wishing to collect seed from their local area to sell directly either as seed or, more likely, as grown-on nursery stock



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## Why collect?

Collecting tree seed may be a potential source of income for owners/managers of woodland but direct sales of seed is unlikely to offer large financial reward. Growing-on the collected seed has greater potential, but again, the margins for small tree nurseries are small even where volunteer labour can be used, and setting up a nursery is not for the faint-hearted. However, if you are already running a small nursery, or intend to grow-on trees for your own use, then you might consider marketing excess stock.

Seed and the grown-on seedlings / transplants grown from them are classed as “Forest Reproductive Materials” (FRM) and are regulated under the FRM regulations (2002).<sup>1</sup> It is possible simply to collect and market seed directly, but this trade is strictly regulated to ensure that all the material is fully traceable and of good quality. To comply with FRM regulations, you must be registered as a supplier, notify the Forestry Commission (FC) of all seed collections and obtain a ‘Master Certificate’ for the material before it is sold. Samples from any seed to be marketed must also be tested at an authorized seed testing facility before sale. In theory you could set up a registered seed testing facility, but due to the international standards required this is not simple. Alternatively, you will have to send seed samples away to a registered facility and there will be financial costs for this. Unless you intend to market high value tree seed (perhaps rare or unusual species) it may be difficult to compete with the existing large-scale seed suppliers.

Growing-on your collected seed to sell as seedlings or transplants may be an attractive proposition, but unfortunately the success rate for small tree nurseries is low, and it is difficult to compete with the very large suppliers that can operate much more efficiently due to the scale of their operations. Even if you intend to market small amounts of grown-on stock the FRM regulations still apply,<sup>1,2</sup> although for very small amounts of seed the testing requirements may be reduced. A summary of requirements for those marketing seed or nursery stock is given in *Legal obligations when collecting tree seed in Wales*.

## When to collect

You should always try to plan your collection well in advance. As a guide, the expected seeding periods for native tree and shrub species are shown in the **Seed Collection Calendar** document, but your plans need to be flexible - There is a great deal of variation between sites at different altitudes or aspect, and seed maturation will depend on the weather conditions that year, and also varies between individual trees. Seed needs to be collected at the correct state of maturity, often the first seeds that fall are small and not viable – but if you leave it too late then the wildlife or wind may beat you to it! Seeds should be assessed to check that they are at the right stage, viable and of good quality. Guidance on how to check for seed maturity and viability for each species is available<sup>3,4,5,6,9</sup>.

## Where to collect

Always obtain permission to collect. If you intend to sell the seed, or grown-on stock, this step is essential. You will need to become a registered supplier (see FRM regulations [2002]<sup>1,2</sup>, notify the FC with at least 2 weeks prior notice and provide information about the location of the site, collection dates, species, etc (Form FRM7). Some sites may be protected for their conservation value (e.g. SSSI or NNR etc.), if you are unsure you can check for any designations on the Welsh Government mapping portal (<http://lle.gov.wales>) – you may still be able to collect seed from these sites, but permission will be required. Even ‘commons’ are often managed by a commons committee and have a landowner. In some cases landowners may ask for additional conditions on any collecting and these must obviously be adhered to.

## What to collect - Species identification

Make sure you know your species. It is important to be able to correctly identify the species of tree you are collecting seed from – usually this is easy, but for some species it requires more care, especially when species grow together e.g. Oak (Sessile vs. Pedunculate Oak) or Birch (Silver vs. Downy Birch).<sup>3,7,8</sup> Where a group of collectors is working, make sure everyone can correctly identify the trees you need. If you are collecting seed for planting, make sure it is appropriate to your site – successful growth of trees is highly dependent on choosing the right species for the local site conditions. Forest Research have a useful online tool to match suitable species to your local site conditions (altitude, soils, exposure, etc) and also offers some guidance on selecting species in a changing climate.<sup>10</sup>

## Selection of seed stands

Get to know your woodlands. In Wales, the guidance is to plant native species of local origin, preferably from sites close to where you want to plant. Collections from naturally-occurring trees in larger (>4ha) ancient semi-natural woodlands would be a good place to begin. Knowledge of a sites history and management is invaluable, but often this is not available. As far as possible, collectors should ensure that the parent trees have not been planted. In the absence of solid information, there are other clues that might indicate a natural population e.g. evidence of historic coppicing, natural tree spacing/arrangement (not straight lines) and lack of introduced species. Newly planted trees / hedgerows should generally be avoided.<sup>12,13</sup>

## Tree health

It is very important that you only collect seed from healthy trees. Before you begin collecting, the parent trees should be inspected carefully. Forest Research provides information on current disease issues and what to look out for.<sup>14</sup> Some tree diseases are notifiable, and if seen should be reported, and seed should certainly not be collected from affected trees. Until very recently, due to Chalara (Ash dieback disease), the collection of seed and planting of Ash was banned. Research is being carried out to identify Chalara tolerant strains but until the disease is better understood planting Ash should be avoided and the natural regeneration of Ash from resistant parent trees is the preferred method of replacing trees.<sup>15</sup> Seed collection from sites where *Phytophthora ramorum* (linked to sudden Oak death) is present should also be avoided.<sup>14</sup> As always, when working in a woodland you should also be aware of more general biosecurity issues, particularly to minimise the risk of spreading pathogens between different sites.<sup>16</sup>

## Tree selection

When collecting seed the aim is generally to collect from a wide genetic base from a defined, identifiable *group* ('stand') of trees rather than from single isolated trees. Ideally the group should be a large distance from any non-native stock of the same species so that the risk of cross-breeding is minimised. If possible, equal quantities of seed should be collected from at least 20 – 30 individuals, so it is better to collect small amounts from many individual trees rather than lots from just a few. It is important NOT to select for any particular characteristics and your collection should reflect the visible growth and morphological characters present. In natural stands seed should be collected from well-separated trees, as individuals close to each other may well be the progeny of a single parent. Ideally there should be a minimum of 50 metres separation between parent trees.<sup>5,13</sup>

Even within a single tree, flowers in different parts of the canopy might have been pollinated by different male trees, so it is recommended that seeds should be taken from branches at different heights and different parts of the canopy if possible.<sup>11,4</sup>

## When to collect

It is important that seeds are collected at the correct stage of maturity, generally this is at the peak of when they are naturally being dispersed. The seed collection calendar (below) gives an indication of when to expect different tree species to be producing seed, but it is important to get to know the trees you intend to collect from as there is considerable variation between different parts of the country; between years (warm, dry summers can hasten seed maturity by up to four weeks); between sites (especially north- and south-facing aspects); and even between individual trees. Most trees in the UK do not produce large amounts of seed every year – there will be ‘mast’ years when conditions are favourable and considerable quantities of good seed are produced, interspersed with poor years where few seeds are produced, many of which will be small and non-viable. Before you begin to collect large amounts of seed it is important to assess the seed quality – e.g. by taking a sample of seeds and cutting some in half to examine them. Seed is often attacked by insects and sometimes viable seed can be identified by a ‘float test’. Damaged or unviable seed tend to float and these should be discarded. For some species, early parts of the seed crop can be tested in this way as any small, immature seed will often float. If the seed is not fully developed it may be worth delaying your collection to let the seed crop mature.<sup>3,5,13</sup>

## How much to collect:

Before beginning a seed collection, you should have a target in mind for the amount of seed you need and plan accordingly. If you intend to plant the seed in a nursery make sure you have enough space prepared: for example, as a rough guide, to grow ~100 seedlings from 1kg of Oak seed (~280 acorns) you will need about 2.6m<sup>2</sup> of prepared ground.<sup>4, 18</sup>

You should aim to collect an equal amount from each tree you have selected, so you should take your target amount into account when gathering seed. Although it is unlikely you will be able to collect all the seed from any stand, or even from a single tree, you should always leave some seed for wildlife that may rely on it as a food source, and also to allow natural regeneration of the woodland. A rough guide is never to take more than 20% of the available seeds, and never collect more seed than you need!<sup>20</sup>

## Collection techniques

Gathering tree seed can be problematic, as most trees bear the fruit and seed high up, well out of reach. Only a few species such as Beech and Oak have seeds large enough to be worth collecting from the ground.

There are lots of ways to collect seed and the most suitable method depends on the species, equipment available, and the quantities of seed you are hoping to gather:

For small quantities, fruit, nuts or cones can simply be plucked from the tree or collected from the ground provided they have just fallen. For larger amounts other techniques will be needed: The most efficient method is to fell the trees, which may sound extreme and should not be done just to collect seed, but if felling or coppicing is necessary anyway then this could be timed to coincide with seed production. For standing trees, seed should ideally be collected from across the tree canopy and in some instances professional tree climbers are employed for this task, but this is extremely risky and not to be undertaken by the inexperienced. A better alternative is to use long extendable pole pruners for fruits that are beyond arms reach. Another method is to shake the trees branches and gather falling seed onto large sheets laid on the ground below. Large scale operations have mechanical tree-shakers, but a more practical alternative is to use a line thrown into the tree from below. Care should always be taken not to cause damage when using any of these techniques. Large seed such as acorns or Beech mast can be collected from the ground, but this should be done immediately to reduce the risk of damage by pests and pathogens. Older seed lying on the ground should always be avoided. For Beech and Oak, a common technique is to lay nets or sheets beneath the trees so that they can be gathered easily and the age of the seed is known. Other species such as Birch and Alder have extremely small, lightweight seeds that are wind dispersed. For these, the slightly ripe cones must be collected from the tree before the seed is released.<sup>4,6</sup>

## Storage

Although seed can be initially gathered into buckets or plastic bags they should be transferred into hessian or paper sacks, or for very damp seeds, into net bags to allow some drying. Because tree seed is very sensitive to storage conditions (the viability of Oak falls considerably if they dry out even a little), it is important that this is done correctly, so you need to plan ahead. Keeping seed in plastic bags is not recommended as it can easily overheat or go mouldy. Very light seed should be kept in paper sacks with plenty of space for air to circulate.<sup>4</sup>

Longer-term storage of seed will depend on the type of seed and when it will be planted. First of all, seed may need to be separated from the fruit, cones, husks or shells. The most efficient way of doing this will depend on the quantities involved - small amounts of soft fruit can be mashed by hand, for larger amounts a concrete mixer might be useful.<sup>5</sup> Most, but not all, of our native trees require a period of cold before they will grow, this is called 'seed dormancy'. Some species such as Oak and Aspen are non-dormant and should be planted immediately whilst others may need one or even two winters cold before they will grow. 'Stratifying' seed is a way of mimicking the natural conditions required for germination, and each species has its own unique requirements. FC Practice guide "Raising trees and shrubs from seed"<sup>18</sup> gives suggested stratification methods for different species. The commonest method is to refrigerate the seed (at approx. 1° to 3°C for 2-24 weeks) in suitable containers, then warming (approx. 20°C) for 2-10 weeks, depending on the species.<sup>3,9,19</sup>

## Seed Testing

If you intend to market large quantities of seed or the seedlings/transplants grown from the seed you collect then you will need to have a sample of the seed tested by a registered seed testing facility. The seed sample will be tested for: the purity of the seed batch (amount of debris, etc), the germination/viability percentage of the pure seed, the weight of 1000 pure seeds, and the number of germinable/viable seeds per kg. Smaller quantities of seed (e.g. <40kg acorns, 50g of Birch seed, etc) do not need to be tested to the same extent so you should check the current regulations when you contact the FC with your notice to collect. Seed testing facilities may charge in the region of £40-£60 for each type of test and will specify the minimum quantity of seeds that they require for each species (e.g. 500 seeds for Oak, 10g of seed for Birch, etc). Guidance on how to select seed for sampling is available from the FC.<sup>21</sup> Depending on the type of test required, results may take up to six weeks.

## Labelling

All collections of seed should be labelled with the species name, date, and collection location reference. Always use waterproof labels and make sure they are well attached to any bags or containers. If the seed is to be marketed, or you intend to grow-on and sell the seedlings or transplants then good labelling is a legal requirement and essential so that the seed remains fully traceable from source, through stratification all the way to the growing stock sold in the nursery. For marketed material you must apply to the FC for a 'Master Certificate' within 9 months of seed collection or before selling the material, whichever is the earlier.<sup>1,4,6</sup>

### Key points

- ◇ Collect seed from trees of Native Origin, Local Provenance wherever possible
- ◇ Always get the landowners permission before you start
- ◇ Always check the current FRM regulations and follow them
- ◇ Organise & plan your collection days
- ◇ Make sure you can correctly identify the parent tree species
- ◇ Never collect from diseased or unhealthy trees
- ◇ Try to collect from 20-30 well-spaced trees in a defined stand
- ◇ Before collecting large quantities, check that the seed is viable and good quality
- ◇ Collect seed/fruit at the appropriate state of maturity
- ◇ Do not collect seed from the ground
- ◇ Clean, dry, and store the seed correctly
- ◇ Ensure you have suitable storage / planting space ready
- ◇ Keep good records and make sure all collections are well-labelled and can be traced from seed through to nursery stock

## Useful resources / Reading list

1. FC Forest Reproductive Material: Regulations controlling seed cuttings and planting stock for forestry in Great Britain (2019) online at: <https://www.forestresearch.gov.uk/research/forest-reproductive-material-regulations-controlling-seed-cuttings-and-planting-stock-for-forestry-in-great-britain-2nd-edition/>
2. FC The Basic Obligations for Suppliers under the Forest Reproductive Material Regulations. Online at: <https://www.gov.uk/guidance/work-with-planting-material-for-forestry-purposes#basic-material-and-forest-reproductive-material>
3. The Good Seed Guide. Tree council (undated) ISBN 0-904853-01-2
4. UK National Tree seed project Kew Botanic Gardens July 2014
5. BTCV (NI) Autumn Seed Harvest. Available online at: <https://treegrowing.tcv.org.uk/wp-content/uploads/2019/09/handbook.pdf>
6. TCV Handbook: Tree planting and aftercare (available online but subscription required) at: <https://www.conservationhandbooks.com/tree-planting-aftercare/>
7. Trees in Britain (1978) Roger Philips. ISBN 0-330-25480-4
8. rees and how to grow them (2008) Tree Council ISBN 978-1084525-060-7
9. Seed manual for ornamental trees and shrubs (1982) FC Bulletin #59. Available online at: <https://www.forestresearch.gov.uk/research/archive-seed-manual-for-ornamental-trees-and-shrubs/>
10. Ecological Site Classification (2020) Forest Research. Available at: <https://www.forestresearch.gov.uk/tools-and-resources/ecological-site-classification-decision-support-system-esc-dss/>
11. FC Practice Note August 1999 Using Local stock for planting native trees and shrubs. Available online at: <https://www.forestresearch.gov.uk/research/using-local-stock-for-planting-native-trees-and-shrubs/>
12. Flora Locale “Code of practice for collectors, growers and suppliers of native flora”. Planting with wildlife in mind 2012. Available online at: <https://cieem.net/resource/code-of-practice-for-collectors-growers-and-suppliers-of-native-flora/>
13. Maelor Forest Nurseries Ltd Procedures and guidelines for collecting local provenance native trees and shrub seed. (unpublished (Contact Maelor via their website <http://www.maelor.co.uk/>))
14. NRW Tree health in Wales <https://naturalresources.wales/guidance-and-advice/business-sectors/forestry/tree-health-and-biosecurity/tree-health-in-wales/?lang=en>
15. FC Current advice on Ash dieback: [file:///C:/Users/Desktop/Downloads/Guidance\\_note\\_ash\\_dieback\\_national\\_measures\\_March\\_2020\\_.pdf](file:///C:/Users/Desktop/Downloads/Guidance_note_ash_dieback_national_measures_March_2020_.pdf)
16. NRW How to practice biosecurity in woodlands: <https://naturalresources.wales/guidance-and-advice/business-sectors/forestry/tree-health-and-biosecurity/how-to-practise-biosecurity-in-woodlands-keep-it-clean/?lang=en>
17. FC Bulletin #111: Forest nursery practice. Available online at: <https://www.forestresearch.gov.uk/research/archive-forest-nursery-practice-2ed/>
18. FC Practice guide #18: Raising trees and shrubs from seed (2007). Available online at: <https://www.forestresearch.gov.uk/research/raising-trees-and-shrubs-from-seed/>
19. FC Bulletin #83 Seed manual for forest trees (1992). Available online: <https://www.forestresearch.gov.uk/research/archive-seed-manual-for-forest-trees/>
20. Royal Botanic Gardens, Kew: A field manual for seed collectors [http://brahmsonline.kew.org/Content/Projects/msbp/resources/Training/English\\_kppcont\\_035653\\_A-field-manual-for-seed-collectors.pdf](http://brahmsonline.kew.org/Content/Projects/msbp/resources/Training/English_kppcont_035653_A-field-manual-for-seed-collectors.pdf)
21. FC Seed testing guidance notes: Working with planting material for forestry purposes (further guidance on seed testing). Online at: <https://www.gov.uk/guidance/work-with-planting-material-for-forestry-purposes>

## Note 1: Native Species / Local Provenance / Local Origin of trees

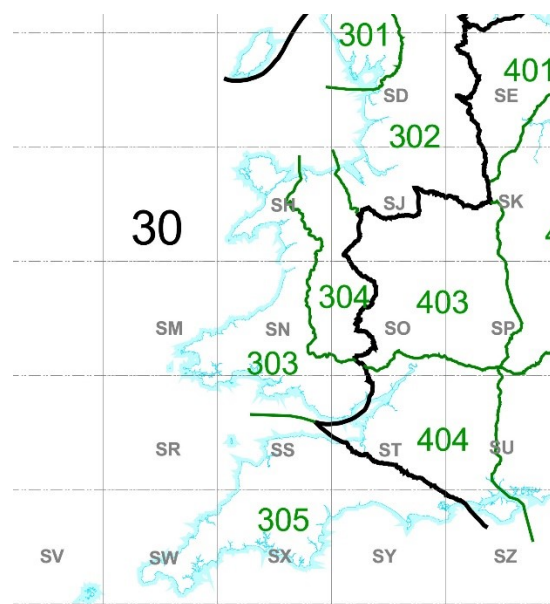
There is much debate over the most suitable trees that should be planted to provide resilience for climate change. Currently the conclusion is that we cannot predict Wales's future weather other than that we should expect more frequent and more extreme weather events. The advice remains that local site characteristics (soil type, exposure, droughtiness, etc) should always be taken into account. For woodland planting where ecological benefits are the main focus (rather than timber production), native tree species should be used wherever possible, and these should also preferably be of Local Origin, or at least, of Local Provenance.

**Native species:** are generally considered as those which colonised Wales after the last Ice Age, before humans moved seed and plants around. There are some 'naturalised' species such as Sycamore which are difficult to be so categorical about. The Forest Reproductive Materials (FRM) Regulations<sup>1</sup> give a list of 64 tree and shrub species considered as 'Native to Great Britain'. The importation of non-native planting stock can (and has) resulted in hybridisation with native British species and the potential loss of genetic diversity.

**Local Origin / Local Provenance species:** The term 'provenance' is used to describe the location of the stand from which seed was *collected*. 'Origin' is the geographic locality within the natural range where the parent tree or its wild ancestors *originally grew*. Thus it would be possible to grow a tree of a 'local provenance' that is actually of overseas origin, if the seed was collected from an imported parent tree (e.g. those planted in estate grounds or plantations).

The Forestry Commission (FC) has divided the UK into four Regions of Provenance which are then subdivided into 'local seed zone provenances', mainly based on natural ecological boundaries. The FC provide a map showing these seed collection areas and the appropriate Local Provenance (LP) area code must be provided for any seed requiring an official master certificate. Wales is mainly covered by LP zones 303 and 304, but small parts of NE, E and SE Wales come into zones 302, 403 and 404.

### Regions of provenance and seed zones for Wales





When collecting seed, the origin of the trees is often not known, but it is assumed that the parent trees growing well in an area have adapted to the local conditions. Therefore, when planting at a site, local seed should be used where possible. If seed from further away is used then the trees may not grow as well, or they may behave differently from locally adapted stock, e.g. they may open their buds earlier, their leaves may be more prone to early frosts, or flowers and fruits may develop at the wrong time for local insects to benefit from them.

If seed is collected with the intention of planting new-, or restocking existing- seminatural woodland then the UK forestry standard and the associated Forestry Practice Guides 1-8 'The management of semi-natural woodland' recommend using plants of local provenance.<sup>2</sup> The UK Woodland Assurance Scheme also seeks the use of seed of native species.<sup>3</sup>

Although Native trees of local origin and/or provenance are still recommended, more information is still needed about the range of genetic diversity present in British species and whether this is sufficient to ensure they will cope with all future climate possibilities. Consequently, the current advice is to:

Plant a mixture of species, as some species will be more tolerant to varying conditions than others  
Plant local provenance, though planting a mixture of *nearby* provenances might be acceptable.  
However, local site characteristics (altitude, aspect, soils) and local climate should still be well matched.

Further useful advice regarding selection of trees for planting is available on the Forest Research website.<sup>4</sup>

All those intending to plant trees should be fully aware of the characteristics of their site and their requirements, and use the most suitably sourced seed. Forest Research provides guidance on species selection and how to characterise your planting site and also offers some advice on planting for climate change resilience.<sup>5</sup>

### Useful resources:

FC Forest Reproductive Material: Regulations controlling seed cuttings and planting stock for forestry in Great Britain (2019) online at: <https://www.forestresearch.gov.uk/research/forest-reproductive-material-regulations-controlling-seed-cuttings-and-planting-stock-for-forestry-in-great-britain-2nd-edition/>

Forest Research Practices guides: Management of Semi-natural woodlands. Online at: <https://www.forestresearch.gov.uk/research/?search=The+management+of+semi-natural&page-type=publications&page-type=research-topics>

UK Woodland Assurance Standards. Online at: <http://ukwas.org.uk/standard/2-management-planning/#section-8>

Forest Research: Tree Species and Provenance. Online at: <https://www.forestresearch.gov.uk/tools-and-resources/tree-species-and-provenance/>

Ecological Site Classification (2020) Forest Research. Available at: <https://www.forestresearch.gov.uk/tools-and-resources/ecological-site-classification-decision-support-system-esc-dss/>



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