

Orchard Biodiversity



Orchards – groups of trees cultivated to produce food – have a long history in the British Isles. The Romans are known to have brought fruit cultivars with them, including the domestic apple, *Malus domestica*, which originated in what is now Kazakhstan. However, it is possible that trees have been planted for the production of fruit as far back as the Neolithic. Orchards eventually became widespread throughout Britain, with every farm and significant hall having its own orchard.

However, orchards are under threat. It is estimated that there has been a 63 per cent reduction in the area of England given over to orchards since the 1950s. But orchards are important, not just for food, but also for biodiversity. A study by Natural England in 2004 surveyed the wildlife of six English orchards, looking specifically at the mosses, liverworts, lichens, fungi and invertebrates. Between 200-300 species were recorded in each orchard. This included between 44-80 species of lichen and 12-42 mosses and liverworts. In 2012, NE published a report on orchards in Herefordshire which found similarly high numbers of species.



These reports show that orchards can be hotspots of biodiversity. They often contain a mosaic of habitats (for example, fruit trees, scrub, hedgerows, the orchard floor, dead wood and sometimes ponds). This means there is a wide range of places for animals and plants to live.

The importance of these habitats has been acknowledged in the current Biodiversity Action Plan for Traditional Orchards with many local authorities producing their own regional, Habitat Action Plans. This has led to an increased public interest in orchards which has, in turn, led to the creation of community orchards, either through new plantings or through the regeneration of previously abandoned orchards. These community orchards are managed for fruit production as well as the conservation of local cultural heritage and biodiversity.

Biodiversity Grows on Trees

One aspect of diversity which is particularly of interest within orchards is the cultivated trees themselves. Different species of fruit trees, for example apples, pears, cherries and plums, are often found within the same orchards, as well as nuts such as walnut. Within these different fruit species, different varieties are often planted.

While it has long been known that some species of tree are better hosts for epiphytes (plants that grow on other plants) than others, it has recently been found that this also applies to different varieties of the same species. For example, surveys of Laxton's Fortune

and Cox's Orange Pippin in the same orchard found that Laxton's Fortune hosted more moss species per tree. Similar results have been found in other orchards.

Small is beautiful

Mosses and lichens form an important part of the world's biodiversity. However, it is easy for these small, less obvious organisms to be overlooked. Orchards have been found to be important habitats for these groups. But what are these organisms, and why is it important to know more about them?



Mosses

Mosses, along with liverworts and hornworts, belong to a group of plants called bryophytes. Bryophytes are small, green plants. They are different from most other plants, in that they take up water and nutrients across the whole plant, rather than through a system of roots. They have evolved to cope with periods of drought by drying out and shutting down their metabolism until water is available. Mosses can reproduce in a number of ways; from spores, from special asexual propagules called gemmae, and from leaf fragments.

More than 60 per cent of the European bryophytes can be found in the UK, making these islands on the whole an important habitat for these plants. British woodlands are habitats of international importance for the conservation of lower plants, including bryophytes, and it may be that orchards are just as important.

Visit the website of the British Bryological Society: <http://www.britishbryologicalsociety.org.uk>

Lichens



Lichens are a very different type of organism. In fact, lichens are a symbiotic relationship between two or more organisms, a fungus and one or more photosynthetic partner. The photosynthetic partner is often an alga or a type of bacteria, known as cyanobacteria, will take this role, on its own or in combination with an alga. The lichen species names are based on the fungal partner and it is this partner which is visible in the field.

Despite these differences, lichens have many functional similarities to mosses. They too take up water and nutrients across all surfaces. Like mosses, lichens reproduce from spores, from asexual propagules as well as from fragments of already established organism. The spores are produced by the fungus which then must combine with a suitable partner before developing into a lichen.

Visit the website of the British Lichen Society: <http://www.britishlichensociety.org.uk>

Lichens are particularly sensitive to air pollution, making them important bioindicators. For more information on this, see the OPAL Air Survey: <http://www.opalexplorenature.org/AirSurvey>

The role of mosses and lichens

Mosses and lichens play a number of important roles in ecological systems. Their ability to grow in habitats unavailable to other plants means that they are important as pioneer species, and by, for example, stabilising inhospitable surfaces, eventually allow vascular plants to begin colonisation.

In established habitats, for example forests, they have been shown to be important in the cycling of nutrients through these systems and their capacity for holding water means that they play a vital role in intercepting rainfall. They can also make important contributions to the overall biodiversity of a habitat, both by themselves and by providing microhabitats for insects.

Although in the past people considered both mosses and lichens to be an indicator of an unhealthy tree today we know that they cause no damage to the tree itself. Mosses and lichens are not parasites, they do not have roots which dig into the tree's bark and take no nutrients from the trees themselves.



Surveying your orchard

The rise in the number of community orchards has brought with it an increase in the number of people interested in finding out about the species an orchard can support. Knowing more about the biodiversity of your orchard is more than just interesting. It may be that keeping records of species spotted in your orchard will help you to understand the effect your management strategy is having on the wildlife.

The first step in recording the biodiversity of your orchard is to think about why you are surveying. You may just be interested in a list of the species you find in your orchard. However a more structured approach can be more helpful in getting to know the habitat, as well as making the data more useful to other people.

Here, we outline a suggested approach for a more in-depth survey of the mosses and lichens in your orchard.

The idea is to produce a systematic survey of the moss and lichen species in your orchard. By using a systematic approach it is then possible to link information collected to previous surveys. We would encourage you to consider the biological monitoring of your orchard as an ongoing process, allowing you to see changes in the biodiversity over time. These changes may be related to orchard management as well as to the increasing age of the trees, so it is important to keep records of work carried out in your orchard.



Orchard tree layout

Recording orchard tree layout is important as it allows you to be sure of where your records came from - you want to be sure that this year's "tree one" is the same as last year's "tree one".

A rough plan of your orchard, indicating the numbering system, can be very helpful here.

Recording

A basic recording sheet, which can be used year after year, should include space to record the date, tree number, tree species and variety. Other information, such as tree structure (standard, cordon etc) time since last pruning and some physical variables such as trunk girth may also be recorded.

Make a list of all the moss and/or lichen species you can see on the trunk and branches using the OPAL guides to epiphytic mosses and lichens. At first you may find this process a little tricky but with a little practice you will find you start to easily recognise the more

common species. For some species a more detailed field guide may be needed and you also may wish to check by uploading a photograph to iSpot: <http://www.ispot.org.uk>

It is important that you record the scientific names as common names can vary. Additional information which is interesting to record includes the presence of fruiting bodies (capsules) or gemmae. You may also want to record changes in how much moss and lichen cover is on your trees, either in total or of individual species. A good way to estimate this is to use a visual guide such as a square of known dimensions. For detailed records of individual species, a 2x2cm square has been found to be useful.

It may be possible to survey all of the trees in your orchard in this way but in larger orchards you may prefer to select some to look at each year.



What to do with the data

You may be surveying purely for your own interest. However, do bear in mind that there are other people who will be interested in your work. The UK has a long tradition of amateur naturalists making great contributions to what we know about species distributions, for example on the National Biodiversity Network Gateway: <http://data.nbn.org.uk>

Yearly – or other regular records – of habitats can be invaluable to ecological researchers interested in the possible effects of management as well as the impact of changes in climate and air quality on orchard species.

