Bramley apple orchard, Cambridgeshire.
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7. Traditional orchards

Climate change sensitivity: **Low**

Introduction

The species composition and structure of traditional orchards are determined by management, which provides a mechanism to respond to the impacts of climate change. Orchards are sensitive to the impacts of drought, warmer winters, and the potential for more frequent storms, but these impacts can be mitigated by changes in management and appropriate replacement and replanting. Although it may be possible, in the long term, to plant new varieties in response to climate change, fruit trees live anywhere from 70 to 200 years, or more, so there is a risk of existing trees either dying or being replaced because they are not commercially viable, before any new planting matures enough to create replacement habitat. This would also have a detrimental impact on the genetic conservation of rare varieties. Indirect impacts, such as changes to the economics of orchards and a shift from traditional crops to new ones that require more intensive management, may pose a greater threat.

Habitat Description

Traditional orchards are defined as groups of fruit and nut trees planted on vigorous rootstocks at low densities in permanent grassland orchards and managed in a low-intensity way. This contrasts with orchards managed intensively for fruit production which often use short-lived, high-density, dwarf or bush fruit trees, and are characterised by the input of chemicals such as pesticides and inorganic fertilisers, and frequent mowing of the orchard floor rather than grazing or cutting for hay. Habitat structure, rather than vegetation type, topography or soils, is the defining feature of orchard habitats.

Traditional orchards are structurally and ecologically similar to wood-pasture and parkland, with open-grown trees set in herbaceous vegetation. They are distinguished from this habitat by the species of tree (being primarily of the family *Rosaceae*), the generally denser arrangement of the trees, and the small size of individual habitat patches.

Management of the trees is the other main feature distinguishing traditional orchards from wood-pasture and parkland. Trees in traditional orchards are, or were, grown for fruit and nut production, usually achieved through practices such as grafting and pruning; whereas the main product from trees in wood-pastures and parkland has been timber, mostly derived from pollarding or selective felling, although beech mast, acorns and chestnuts are all products of wood-pasture systems.

Grazing or cutting the understorey is integral to orchard management. The presence of scrub, mostly in the form of hedgerows on the site boundaries, or sometimes, especially in unmanaged orchards, among the orchard trees, is analogous to the frequent occurrence of scrub in wood-pasture and parkland, and plays a similar ecological role. Ponds and other wetland features are often present, being used now or in the past for watering livestock.

Traditional orchards are found throughout the lowlands of England, although there are concentrations in Kent, Cambridgeshire, Somerset, Herefordshire, Worcestershire and Gloucestershire. The estimated area in England is 17,000 ha.

Potential climate change impacts

Cause	Consequence	Potential impacts
Drier summers	Drought	■ A reduction in available moisture during the growing season can lead to root stress, possible defoliation, premature fruit drop, or low fruit size.
Warmer summers	Warmer temperatures and a longer growing season.	■ Temperatures constantly in the high 20°Cs, when associated with drier conditions, can cause heat stress (see above). Continued warm autumn weather with adequate moisture may compensate for some of these effects. ■ Hotter, drier summers may see an increase in the occurrence of powdery mildew *Podosphera leucotrica*, especially in the south west. ■ Fire blight *Erwinia amylovora* bacterium favours warm, humid conditions and so could become more widespread in wet springs. ■ Warmer summers may result in increased pest damage, where pest populations increase or new pests arrive from overseas. ■ Warmer conditions could lead to traditional orchard fruit species being replaced by fruit currently grown in more southern locations, such as peaches, that require more intensive management and which probably don't support the same suite of wood decay species e.g. noble chafer *Gnorimus nobilis* and some lichens. ■ Warmer, drier summers may change the composition of species-rich swards, as with other grassland.
Warmer winters	Fewer frost events	■ Fewer frosts will result in greater over-wintering survival of insect pests, leading to higher populations and greater pressure on trees. ■ Apple trees need several weeks of relatively cold weather to complete dormancy. Warmer average winter temperatures will give inadequate periods of vernalisation[3]. This will affect different apple varieties in different ways: some may flower too early, risking damage from late frosts; some may flower at a different time from their pollinator; and varieties requiring a longer dormancy may develop 'blind buds' that fail to develop in spring. ■ Sporadic flowering over a prolonged period may lead to pollination problems. ■ Poor leaf quality at flowering time will lead to poor fruit set.
Wetter winters		■ Wet and warm weather from autumn to spring could increase the risk of scab *Venturia inaequalis*. ■ Wet soil conditions will increase the risk of wind throw in windy weather. ■ Prolonged wet soil conditions with poor drainage will increase the risk of tree death from water-logging, or crown rot caused by *Phytophthora spp.*
Increased frequency of extreme events	Heat waves Extremes of soil temperature and moisture Increased frequency of storms	■ Some varieties of apple can suffer from sun scorch in hot weather. ■ High winds, coupled with water-logged soil, may increase the frequency of wind throw, leading to the loss of mature and veteran trees. ■ Severe storms can increase the spread of pests and diseases such as fire blight.
In combination		■ General disruption of the natural yearly fruit tree cycle may increase biennial cropping. Extreme weather such as warm springs followed by late frosts, unseasonal wet weather and hail storms can have negative impacts on pollination and fruit set. ■ Warmth-loving invertebrates associated with dead wood, possibly including the rare noble chafer beetle Gnorimus nobilis may spread northwards, but could be lost in the south. ■ Bird species that nest in orchards, such as redstart *Phoenicurus phoenicurus* and woodpeckers, may be lost, while other species, including Wryneck *Jynx torquilla* and Hoopoe *Upupa epops*, may become established. ■ Current winter species, including redwing *Turdus iliacus* and fieldfare *Turdus pilaris*, may no longer visit. Other species may start wintering here with warmer winters, e.g. blackcap *Sylvia atricapilla* have started wintering in south east England and may spread (they feed on mistletoe berries and may be responsible for increasing the spread of mistletoe in the south east).

3 The subjection of seeds or seedlings to low temperature in order to hasten plant development and flowering.

Adaptation responses

The influence of historic and current management on the structure, function and condition of traditional orchards provides a high degree of flexibility in designing appropriate adaptation strategies and managing change. Continuing, or reintroducing, low input active management of traditional orchards is a key adaptive response. Increasing the species and structural diversity of orchards at a site and landscape-scale will also reduce vulnerability. Selection of the appropriate species and cultivars for the site will also play a role in future proofing orchards against climate change.

Some of the potential adaptation options for this habitat are outlined below:

- Ensure continued extensive management of orchards, with little or no agrochemical input, and using grazing rather than machinery to manage the understorey.
- Adjust grazing levels according to environmental conditions to avoid under and over-grazing and compaction.
- Minimise soil erosion by grassing-down alleyways. Alleyways are a feature of bush orchards rather than traditional orchards, which have permanent grass swards.
- Increase the age structure and variety of species within orchards through management and replanting.
- Consider selecting more drought-tolerant species, or provenance from the southern part of a species' range when replanting. This may not always be possible, for example if no cider varieties are able to be grown, then the cider industry would have to import fruit and therefore have no reason to conserve orchards.
- Select varieties with lower dormancy requirements. Many late-flowering, late-maturing varieties, especially cider apples, require greater cold vernalisation than early flowering varieties. This may conflict with the genetic conservation of rare, localised varieties.
- Ensure that all planting material complies with the EU plant passport scheme, which includes a requirement for freedom from fire blight.
- Establish windbreaks for shelter prior to planting trees and use strong tree support systems on exposed sites.
- Manage mature trees to reduce the threat of wind rock and wind throw. For example, encourage sustainable mistletoe harvesting from trees exposed to high winds.
- Plan for changes in the availability and demand for water by, for example, increasing on-farm water storage capacity or installing a trickle irrigation system.
- Ensure the continued presence of decaying wood within live trees by prolonging the life of old trees. Retain dead wood, both on the trees and where it falls.
- Develop contingency plans for outbreaks of new pests and diseases and other extreme events.
- Ensure regular monitoring of pests and diseases and adhere to best practice in integrated pest management.
- Consider the use of natural products and biocontrol agents for mildew control, and select resistant varieties in new planting.

Apple blossom. © Natural England/Ian Dalgleish

Relevant Countryside Stewardship options

BE4 Maintenance of traditional orchards

This option aims to maintain existing traditional orchards that are generally in good condition and that are being managed extensively for wildlife and historic landscape benefits, or to restore degraded orchards by re-planting traditional varieties of orchard trees to return tree numbers to an appropriate level. Ongoing management will require suitable livestock grazing and the protection and maintenance of the trees.

BE5 Creation of traditional orchards

This option aims to re-create orchards on sites that are known to have previously been orchard sites, sites where less than one-third of the original stations are occupied by trees over 25 years old, and sites where creation extends, links or buffers existing areas of a traditional orchard.

Further information and advice

Natural England has produced a number of publications about orchards, including series of Technical Information Notes. These can be found **here**.

Farming Futures Climate Change Series Fact Sheet 16 - **Focus on apple and pear orchards**.

The **Orchard Network**. A partnership of organisations working together for the conservation of traditional orchards as a wildlife habitat.

JNCC (2008) UK BAP habitat description **Traditional Orchards**.