# Ecological and Biodiversity Benefits of an Arboretum

With respect to the environment the planting of an arboretum on the open space within Hampshire Farm Meadows aims to address three issues; the lack of tree cover, aid in the mitigation of climate change and to enhance the biodiversity of the area.

## 1 Tree cover

The United Kingdom has a nationwide shortage of trees, it is one of the least wooded areas of Europe, having just 11.7 per cent woodland cover compared to around 37 per cent for the 27 EU states and 44 per cent for Europe as a whole (1). Trees improve the soil, help to prevent flooding with their deep root structure and cool the climate. Many of our trees are now old and replanting is not keeping up with their demise. Like the Victorians did for us we need to plant now for our future generations. However, these new trees must be able to thrive in the hotter drier summers that the UK is likely to experience in 50 – 100 years time. An arboretum allows for the planting of non-native trees and if they thrive in the new climate their seeds can be used for the next generation of trees.

## 2 Climate Change

The sequestration of carbon is one of the tools used to mitigate climate change. Whilst trees and peatlands are now recognised for their role in climate change mitigation, permanent grasslands are also significant carbon stores. Approximately 90% of the carbon stored in grassland is in its soil and roots, which remains locked away in their undisturbed soil. Mature broadleaf woodlands though store more carbon overall than grasslands, due to the large volumes of above-ground woody

biomass (2). The amount sequestered is increased by the size and health of the tree (3). It has been assessed that 50% of the dry matter of a tree is carbon and is usually stored for the life time of the tree, or longer if the timber is then used in construction. 72% of all the carbon fixed by trees is locked away because 20-30% is transferred to its mychorrhizal fungi which also act as a sink (4). Trees also have very long life spans (100 to 2000 years) (5) so will lock away the carbon for many years.

Planting trees is therefore a good tactic to help mitigate climate change, however it has to be the right tree for the right environment. Climate change, causing hotter drier summers, warmer wetter winters and extreme weather events is stressing our native trees (6). Native trees did not evolve in these conditions, drought stress makes them more vulnerable to pests and diseases some of which are moving north with the warming climate (7). For example, ash dieback is driven by mild wet winters creating ideal conditions for the disease (8). The causes of acute oak decline are thought to be due to environmental stresses, drought and waterlogging can all impact the tree. Insects, fungi and bacteria then invade vulnerable trees (9). Beech trees have a shallow root system so are potentially vulnerable to drought this may limit their future viability in southern and eastern Britain (10). An arboretum provides the option to grow non-native trees which may be better suited to our changing climate. Therefore, although some trees will be native many trees in the arboretum will be of the same genus but different species which come from warmer climates such as the Mediterranean, Caucasus mountains and the Americas. Forestry research in the UK is also taking this approach. They are now sourcing seeds from places where the climate is similar to how our climate could look 100 years from now, typically from 2-5 degrees of latitude south of their planting sites; their genetic differences should mean they will be better adapted. This is called assisted migration (11).

## 3 Biodiversity

In the Hampshire Farm Meadows open space during the summer months the grasses and flowers provide nectar for bees and Lepidoptera, and are food plants and egg laying habitat for the caterpillars. Taller vegetation creates resting places for many beneficial insects (12, 13). Birds have been shown to have a preference for foraging in the margins of fields, the majority of birds only use the outer 5m of a field, staying near to the hedges as it reduces the predator risk (14). An arboretum with trees scattered around the open space will provide many more perches from where birds can drop down to the ground and feed on seeds and insects. Native woodlands are

one of the richest and most diverse habitats for invertebrates (15), providing many niches for invertebrates to exploit from the leaf litter, bark crevices and phytophagous insects attacking the foliage. These in turn bring in bats, birds and hedgehogs to feed on them. Some trees in the arboretum will be native, the non-natives will also provide the same diverse habitats. Some researchers suggest that the use of exotic species creates opportunities for native insects and herbivores to expand their host range (16). Others state that although the greatest numbers and diversity of insects are typically found on native plant species non-natives do support unique communities of British insects, including many species that are rare on native plants. The largest numbers of insect species found on non-native plants were those that are closely related to native British plants, and on plants which grow over a large geographical area (17). The arboretum would also have under planting and open areas, this again allows for more diverse habitats which will enhance the fauna diversity.

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