COMBINING HORTICULTURE WITH FORESTRY

ESTABLISHING A AGROFORESTRY HORTICULTURAL SYSTEM IN IRELAND




1. Varied vegetable crop with *Salix* spp. shelterbelt 2. Aerial view of an aronia crop, interspersed with trees and the grass crop recently harvested 3. Kale, lettuce, salad leaf crops in tree sheltered plot 4. Potato lines between shletering trees

WHAT AND WHY

"Why horticulture and forestry can be mutually beneficial"

In Ireland's temperate climate, natural succession describes the process by which ecosystems develop in complexity over time, transitioning from bare rock to old-growth forest. This progression begins with lichens and mosses colonizing exposed rock, followed by fast-growing annuals, perennials, pasture, scrub, and eventually mature forest ecosystems such as native oak woodlands. Each stage reflects increasing soil depth, organic matter accumulation, and ecological diversity.

Traditional horticulture in Ireland, like most other regions, focuses on annual crops. In natural systems, annual plants thrive in early successional stages, often following a disturbance such as soil turnover caused by grazing or rooting animals. These plants germinate quickly, protect bare soil, and contribute organic matter, mimicking the initial stages of natural succession. Horticultural practices, such as ploughing and tilling, replicate this disturbance to create conditions favourable for annual crop growth.

Soil health evolves throughout succession. Early successional soils are bacterially dominant and relatively simple, while later successional soils, such as those found in hedgerows and forested areas, are more complex and fungi dominant. These soils support nutrient cycling, soil structure, and nutrient-dense plant growth. In resilient Irish horticulture, the goal is to grow nutrient-dense annual crops by fostering later successional soils. Integrating trees and woody shrubs, such as hazel (*Corylus avellana*), blackthorn (*Prunus spinosa*), and elder (*Sambucus nigra*), into horticultural systems mimics native Irish ecosystems. This integration enhances ecological complexity, supports perennial habitats for fungi critical to soil health, and ensures the long-term productivity of Irish horticultural soils.

HOW THE CHALLENGE IS ADDRESSED

"How to establish an agroforestry horticultural system"

An effective agroforestry design begins with assessing site-specific factors such as soil, climate, topography, and land use, alongside desired outcomes. Key considerations include row spacing and compatibility with machinery.

Goals often include increasing food production, providing woodchip or timber, and enhancing ecosystem services such as wind shelter, water infiltration, erosion control, and biodiversity. A well-designed system balances these outcomes with the needs of the land and integrates trees in a way that maximizes their ecological, economic, and practical benefits.

In Ireland, trees in horticultural systems can sometimes cause challenges such as shading, competition for water and nutrients, or occupying valuable cropping space. These impacts can be addressed through careful planting design and active management methods such as pruning, coppicing, pollarding, and training. These techniques not only mitigate these challenges but also enhance biodiversity and provide valuable resources.

Espalier: Fruit trees such as apple (*Malus domestica*), pear (*Pyrus communis)*, or plum (*Prunus domestica*) are well-suited to espalier training in Ireland's temperate climate. This method maximizes space by forming high-yielding, narrow rows between growing beds. Espaliers also improve light penetration and airflow, reducing the risk of fungal diseases common in humid conditions.

Coppicing and Pollarding: Native and fast-growing species such as hazel (*Corylus avellana)*, willow (*Salix* spp.), and alder (*Alnus glutinosa*) are ideal for coppicing or pollarding in Ireland. These methods produce poles that can be used for garden structures, fencing, or firewood. Hazel coppice, traditionally used for wattling and hurdles in Ireland, remains a versatile and sustainable resource.

Polewood Uses: Coppiced or pollarded polewood can be chipped into ramial woodchip for mulching, pathway creation, or compost enrichment. Native broadleaf tree species such as *Betula* spp. (birch) or *Quercus* spp.(oak) are excellent for processing into fuel or biochar. Biochar is particularly valuable in Ireland's often leached soils, as it enhances nutrient retention, improves drainage, and promotes soil microbial health.

Cultivation near young trees prunes lateral roots, encouraging deeper root development below the root zone of annual crops. This process minimizes competition for water and nutrients, enhancing resource efficiency and promoting better integration within agroforestry systems

Keywords: Ireland, Horticulture, Biodiversity, Soil, Biochar

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ADVANTAGES

By fostering interconnected species and habitats, farmers can enhance ecological stability, resource efficiency, and pest control while reducing environmental risks.

Integrated pest management (IPM)

A well-planned tree layer with an understory can naturally control pests. Plants that attract pests, like aphids, act as trap crops, reducing pressure on annual crops. These areas support natural predators such as ladybirds, lacewings, and birds, ensuring a balanced ecosystem and minimizing the need for chemical inputs.

Perennial habitat creation

Native Irish trees like Quercus robur (oak), Fraxinus excelsior (ash), and Corylus avellana (hazel) provide nesting sites for birds, shelter for insects, and microhabitats for pollinators. Undisturbed understory vegetation creates wildlife corridors for species such as hedgehogs, frogs, and toads, enhancing pest control and nutrient cycling. These habitats are essential for maintaining biodiversity and ecological resilience.

Alternate cropping areas

The understory can support soft fruits (e.g., Ribes nigrum (blackcurrants), Rubus idaeus (raspberries)), perennial crops (e.g., Rheum rhabarbarum (rhubarb), Asparagus officinalis (asparagus)), and herbs (e.g., Lavandula angustifolia (lavender), Mentha spicata (spearmint)). These crops thrive in partial shade, suit Ireland's climate, and offer additional revenue streams, making horticulture a vital component of diverse farming systems.

HIGHLIGHTS:

- **Trees copy nature's way of building soils, creating fungi-rich ground that grows more nutrient-dense crops. Fruit trees like espalier apple, pear, and plum improve airflow and cut fungal disease.**
- **Coppiced hazel, willow, and alder provide poles, mulch, and even biochar – valuable materials for the farm.**
- **Tree layers help trap pests and attract their predators. Understory crops like blackcurrant, raspberry, rhubarb, asparagus, and lavender can bring extra income opportunities.**

An example of alley cropping in Ireland

Further Information:

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