

Formative Shaping of Broadleaf Trees for Quality Timber

SOURCE: JOHN CASEY (2025).

Teagasc

Why Shape Broadleaf Trees in Agroforestry?

In agroforestry systems, broadleaf trees serve multiple purposes: timber production, biodiversity enhancement, shelter provision, and soil improvement. To fully realize these benefits, especially timber quality, formative shaping is an essential practice. Shaping is the strategic removal of structural defects such as forks and large competing side branches in young trees to encourage a single, straight, dominant stem.

In silvopastoral systems, well-shaped trees reduce the risk of windthrow, facilitate machinery access, and enable the integration of productive forestry with livestock or crop enterprises. Straight, defect-free stems can command significantly higher market value in timber markets. In addition to structural benefits, shaped trees can support better canopy development, reducing shade on pasture and arable crops and improving understorey growth.



FIGURE 1. PRODUCING QUALITY TIMBER (OAK)

Understanding Tree Form

Tree form refers to the physical structure and architecture of a tree, especially the stem's straightness, the presence of a dominant leader, and the distribution of branches. A well-formed tree typically has a single, vertical main stem (or leader), minimal forking, and evenly spaced, subordinate branches. Good form is essential in timber trees because it determines the quality and usability of the harvested wood. Poor form, such as crooked stems, multiple forks, or large competing limbs, results in lower-grade timber and reduced economic return.

Initial Planning and Site Considerations

Formative shaping must be integrated into the broader agroforestry management plan. Trees should be sourced with quality in mind, prioritizing provenances with traits such as straightness and vigour. Protection from browsing animals and early weed control are critical to establish healthy, competitive trees.

Agroforestry layouts often include alley cropping or silvopastoral strips, where shaped trees not only improve timber output but also maintain the aesthetic and functional layout of the farm. Tree lines should be assessed for accessibility with tools and consideration given to the space needed for future maintenance.

Silvicultural guidelines emphasize maintaining good leader dominance early, encouraging stable root-to-shoot ratios, and managing spacing to optimize canopy cover. Trees planted too densely may produce slender, unstable stems; those too sparse may overbranch. Balancing light availability and early competition is key to promoting quality form. Formative shaping offers farmers the possibility of producing quality timber, even amongst the more widely spaced trees normally associated with agroforestry.

Tree Form Categories and Timing

Broadleaf trees are graded into four stem form categories to determine the need for formative shaping. Category 1 trees have straight stems, a single dominant leader, and light branching. Category 2 trees are slightly less straight, may have a co-dominant or large branch, and reduced apical dominance. Category 3 trees show defects such as forks, whorls, or kinks, while Category 4 trees have multiple forks, heavy branches, and crooked, bayonet-shaped stems. The goal is to have at least 60% of trees in Categories 1 and 2 by the time of grant assessment or thinning. In agroforestry, early shaping ensures trees develop merchantable form before they face competition from crops or livestock.

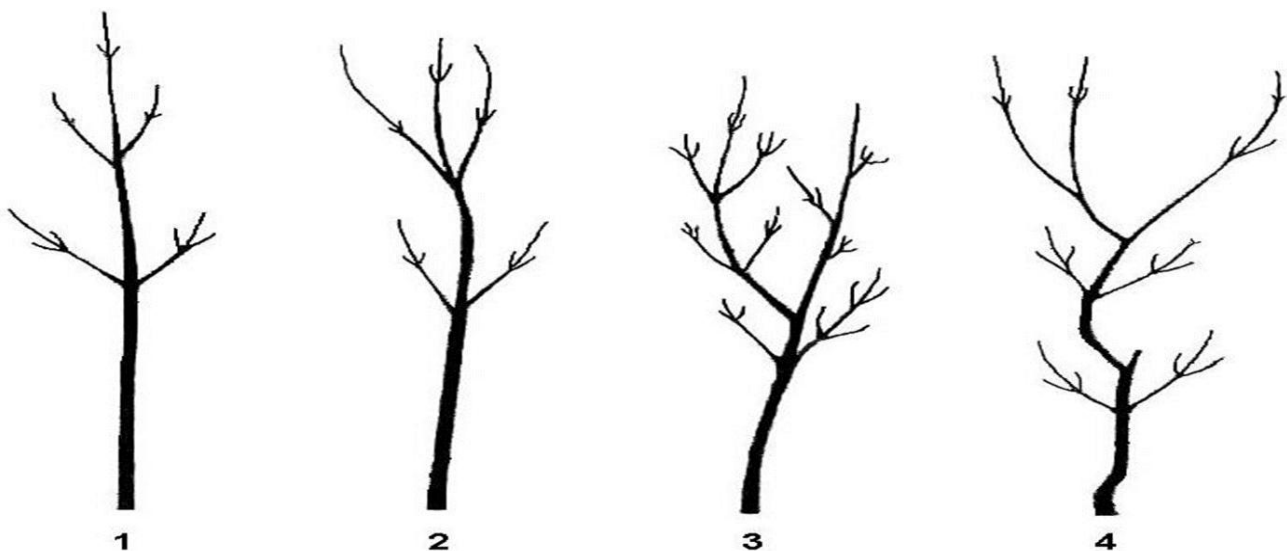


FIGURE 2. PRODUCING QUALITY TIMBER (OAK)

Shaping timing depends on species and site conditions. Winter offers good visibility and access, but some species respond better to summer shaping. Oak (*Quercus robur*, *Q. petraea*) is best shaped in December or June–July. Ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*), and sycamore (*Acer pseudoplatanus*) shape well in summer or mid-winter. Wild cherry (*Prunus avium*) should only be shaped in summer. Walnut (*Juglans regia*, *J. nigra*) benefits from July–August shaping, with late winter as a backup. Sweet chestnut (*Castanea sativa*) prefers summer, and wild service

tree (*Sorbus torminalis*) responds to summer or winter shaping. Avoid shaping in spring and autumn, when trees are most vulnerable to damage and disease.

Formative Shaping Techniques and Equipment

Formative shaping of broadleaf trees requires precision and restraint to ensure healthy growth and high-quality timber. The process begins by selecting and retaining a strong, upright leader—the straightest, most vigorous vertical shoot. Early removal of forks and co-dominants prevents weak junctions, while large side branches (over half the diameter of the main stem) should be pruned if they compete with the leader. No more than one-third of the foliage should be removed to maintain tree vigour.

Cuts must be clean and precise—just outside the branch collar, avoiding stubs or flush cuts. Use sharp, sanitized

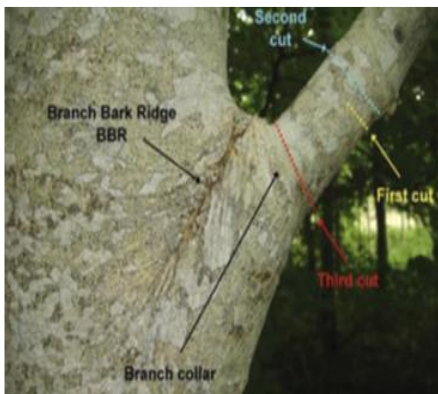


FIGURE 3. SHAPING CUT LOCATIONS



FIGURE 4. SHAPING EQUIPMENT



FIGURE 5. HIGH PRUNING EQUIPMENT

tools such as secateurs, loppers, or pruning saws, depending on branch size.

Proper technique helps wounds heal quickly and reduces decay risk. This is particularly vital for sensitive, high-value species like walnut (*Juglans regia*, *J. nigra*), which should be shaped in summer to minimize sap loss. Tool choice depends on tree size and access—secateurs for fine work, loppers or saws for larger branches, and telescopic tools for taller trees in alley or silvopastoral systems. Always clean tools between trees to prevent disease spread.

Shaping practices should be adapted to species traits. Sweet chestnut (*Castanea sativa*) tends to fork and needs early shaping. Wild service tree (*Sorbus torminalis*) should be shaped lightly in sheltered areas. Sycamore (*Acer pseudoplatanus*) tolerates shaping well but should not be pruned late. Hornbeam (*Carpinus betulus*) and field maple (*Acer campestre*) benefit from early intervention to avoid multiple leaders and dense crowns.

Shaping is an ongoing process, especially in agroforestry where trees interact with crops and livestock. Regular checks over the first two to six years help develop straight boles up to six metres tall. Depending on growth, shaping may be repeated every two to three years. Ongoing assessment ensures long-term tree quality and value.



Impact on Agroforestry Outcomes

Shaped trees significantly enhance the productivity and functionality of agroforestry systems. Formative shaping improves stem straightness, reduces knots, and increases timber value. It also promotes animal welfare by reducing low branches and improving light penetration for pasture growth. In crop systems, better tree form supports efficient alley layouts and limits shading. Structurally sound trees also boost biodiversity by creating layered habitats and contribute to carbon storage and soil health by extending rotation age and stabilizing soils.

Formative shaping is a cost-effective, essential practice for producing high-quality broadleaf timber in agroforestry. Applied with proper timing and species-specific techniques, it can yield straight, valuable stems while supporting the multifunctional goals of the farm. Formative shaping can boost economic returns and enhances ecological resilience. Following silvicultural best practices ensures trees reach their full potential within sustainable, productive agroforestry systems.

References

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Additional Information:

The Teagasc Forestry YouTube channel has many useful videos, including how to identify quality broadleaf trees. The YouTube Channel can be accessed at: www.youtube.com/teagascforestryvideos

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