Active Management of Traditional Coppice Forests: An Interface Between Silviculture and Operations

João Carvalho, Natascia Magagnotti, Valeriu-Norocel Nicolescu,
Philippe Ruch, Raffaele Spinelli and Eduardo Tolosana

Coppice and Coppice Silviculture

Coppice is a forest regenerated from vegetative shoots that originate from the stump and/or from the roots, depending on the species.

The potential of producing shoots depends on the species, tree age, season of cutting, site conditions and other factors. Most broadleaved tree species (e.g. oaks, sweet chestnut, linden, willows, poplars, hornbeam, elms, alders, black locust, eucalypts, etc.) produce shoots and can be treated as coppice.

There are different forms of coppice forests: simple coppice, coppice with standards, coppice selection and pollarding (examples in Fig. 1).

Coppice forests can provide many different products and services, such as wood and non-wood products, biodiversity, protection and heritage ecosystem services.

Approximately 16% of all productive forests in Europe are classified as coppice, covering a total area of ca. 23 million ha. These are mainly located in the far west, south and south-eastern parts of the continent. Over half of European coppice forests are situated in industrialized countries, such as France, Italy and Spain.

Since the renewal of coppice stands depends on active human intervention, abandonment is the greatest threat to the existence of coppice. The widespread abandonment that has occurred within the past century is a result of the social and economic transformation of European society, which has made traditional coppicing practices less profitable in many countries.

Converting coppice forest to high forest is an approach used to attempt to increase owner revenues and maintain active management. In some circumstances, this approach has been driven by subsidies or legal requirements. Such instruments do not, however, always achieve desirable results: Conversion requires suitable site, species and market conditions, and should not be generalized.

Under certain economic conditions there has been the opposite effect, where coppice has been degraded through overexploitation. The restoration of such coppice forests is possible and has been performed in some parts of Europe.

A new and interesting opportunity for expanding the active management of coppice stands is offered by the modern bio-economy, which is generating a large and sustained demand for biomass feedstock. Coppice management can supply this market with significant amounts of wood if the production can be achieved at competitive cost.

Coppice forests are acknowledged for providing important amenity, cultural and environmental services with the potential to generate greater revenues in the future.

Figure 1. Example of simple coppice (left) and pollarding (right) (Photo: V.N. Nicolescu)

Corresponding Author: Natascia Magagnotti, magagnotti@ivalsa.cnr.it

Coppice Products and Operations

Many wood products can be obtained from coppice forests, such as firewood, biomass chips, fencing, assorted and industrial wood (pulp, panels, tannin etc.). Coppice also offers a variety of non-wood forest products, such as truffles, mushrooms and honey.

The market for these products can be local, regional and even international. Niche markets are also available for traditional small-scale products, such as baskets and crafts.

The industrial scale of some markets (pulpwood, panels, biomass etc.) offers great opportunities for reviving active coppice management. These specific markets require a high production capacity in order to supply large amounts of wood (Fig. 2).

Figure 2. Mechanized felling and bunching in a eucalypt coppice (Photo: E. Tolosana)

High production capacity is only achievable through the increased mechanization of harvest operations, which would also help to compensate for the effects of the high cost of labour and the labour shortages that are being experienced in most industrialized countries.

Technological progress has made possible the effective introduction of mechanized felling to coppice operations (Fig. 3), significantly increasing worker safety and productivity. Professional management of mechanized harvesting can prevent or minimize undesired effects, such as soil, stump and stand damage.

The productivity of motor-manual and mechanized harvesting improves with increasing tree size and harvest intensity. Productivity is also higher on flat lands and gentle slopes than on rough terrain. Long extraction distances have a negative impact on harvesting costs.

When harvesting is mechanized, the amount of wood removed must be large enough to offset the high fixed cost of transporting machines to the worksite.

Specific harvesting techniques and equipment (whole-tree harvesting, bundling, chipping, etc.) are required for the supply of feedstock to the biomass sector (Fig. 4).

Work safety has become a priority across Europe, and the accident rate and severity in mechanized felling is much lower compared with the motor-manual option.

Figure 3. Mechanized felling and processing (Photo: P. Ruch)

Figure 4. Coppice harvesting residues are chipped into renewable fuel (Photo: E. Tolosana)

Considerations for Active Coppice Management

Active coppice management should be sustainable in all terms (economic, ecological, social), but also requires financial viability in the absence of subsidies or other financial aid. The total area of coppice forests in Europe is so large that subsidies can only be directed towards special cases.

Silvicultural prescriptions should be formulated in such a way that their practical implementation is easy and cost-effective.

The coppice silvicultural system and rotation should be chosen depending on the species and the requirements of the local, regional, national or international markets.

Abandoned, neglected or overexploited coppice forests are likely to degrade and may not fully (re-)cover their functions. Such degraded forests should be restored by using different techniques, which are seldom cost-effective and, thus, require subsidization.

Figure 5. Processor and yarder (Photo: R. Spinelli)

The financial viability of the commercial harvest of coppice in industrialized economies requires that a minimum amount of wood is removed and that a certain harvest intensity is applied. The combination of these two conditions determines the minimum harvest area. At the same time, there are maximum limits for harvest area that should not be exceeded, in order to preserve the ecological, protection and aesthetic functions of coppice forests.

Figure 6. Cable yarder extraction is the best solution when site conditions are not favourable to machine access (Photo: R. Spinelli)

Wherever labour costs are high, selective and low-intensity thinning incurs net operation losses. Mechanization can, however, increase the productivity, profitability and safety of coppice management operations. It can also compensate for the decreasing availability of rural labour in some regions. Mechanized harvesting requires specific work conditions and involves specific risks (Fig. 5 & 6).

Aside from the general conditions for successful operation, mechanization also requires sufficient annual utilization to depreciate the large capital outlay. If coppice rejuvenation is not impeded, then one may consider extending the cutting season beyond traditional practice. This is an important prerequisite when cutting is mechanized and the equipment can only be used in coppice forests.

Generally, the quality of cut in mechanized felling is poorer than that of motor-manual felling (Fig. 7). If poor cut quality compromises coppice re-sprouting and/or growth, then remedial action should be taken. On the other hand, if no adverse consequences are experienced on coppice re-sprouting and/or growth, then some tolerance for poor cut quality is advocated.

The unregulated access of machinery to the forest may result in damage to stumps, residual trees, advanced regeneration and soil. Therefore, preventive measures must be taken, especially when site conditions are unfavorable.

Whole-tree harvesting may negatively affect soil fertility, especially on poor sites and when leaves are also removed from the site. Therefore, whole-tree harvesting should be applied with caution, after a careful evaluation of site conditions and of potential undesired effects.

Figure 7. Motor-manual felling (Photo: R. Spinelli)

Concluding Statements

Coppice forests are an important renewable resource for Europe, with a large potential for providing products and services that have, thus far, only been used to a small extent.

The new awareness of the potential of coppice forests together with the existing and future markets for renewable biomass offer an ideal opportunity for reviving active coppice management.

Unlocking the full potential of coppice forests requires a strong connection between silviculture and forest operations.

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Contact:
www.eurocoppice.uni-freiburg.de
eurocoppice@fob.uni-freiburg.de
0049 (0)761 203 3789

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Editors: Alicia Unrau, Gero Becker, Raffaele Spinelli, Dagnija Lazdina, Natascia Magagnotti, Valeriu-Norocel Nicolescu, Peter Buckley, Debbie Bartlett and Pieter D. Kofman

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