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# Poplars in Agroforestry: Sustainable Timber Production and agriculture

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## Poplar outside of forest

The Populus genus, part of the Salicaceae family, comprises around 40 species and varieties that are native to the temperate and cold regions of the northern hemisphere. These trees are both hydrophilic and heliophilic, meaning they thrive in moist environments and require ample sunlight—traits that enable them to adapt exceptionally well to a wide range of climatic conditions and soil types.

Poplars have a long-standing presence in agricultural landscapes, from the native black poplar (Populus nigra) to various white poplars and modern hybrids. Their cultivation has historically been driven by the demand for rapid wood production. One of the primary uses of poplar wood in Europe is for rotary veneer, particularly in the production of plywood and packaging such as fruit and vegetable crates. This sector relies heavily on fast-growing hybrid poplars (Populus spp.) grown in planted forests.

**FIGURE 1:** ***POPULUS X CANADENSIS 'KOSTER'***

As global demand for plywood and veneer is projected to increase by 102% by 2050 compared to 2020 (Cordier et al., 2025), there is a pressing need to find sustainable sources of feedstock. This is where poplars grown as Trees Outside Forests (TOF) come into play. According to the FAO, TOF are all trees and shrubs not classified as “Forest” or “Other Wooded Land” (Van Acker and Crespo, 2024). In this context, poplars are increasingly being recognized for their potential in agroforestry systems.

The hybrid poplar, such as Populus x canadensis, is especially well-suited for agroforestry due to its pronounced pioneer character. These trees make optimal use of light-rich environments, contribute to soil fertility through their well-decomposing leaves, and provide early yields thanks to their fast growth (Van der Heyden et al., 2020). Remarkably, individual poplar trees in TOF or agroforestry systems tend to grow even faster than those in traditional plantations, further enhancing their value.

This dynamic growth and ecological contribution make a strong case for the renewed appreciation of poplars in the rural landscape. A revaluation of poplar wood, particularly through cascading uses that maximize each stage of wood transformation, can significantly enhance its economic and environmental value. Integrating poplars into agricultural land use systems thus offers a viable path to meet future wood demands while supporting sustainable land management practices.

# Processing poplar into high-quality applications

Poplar (Populus spp.), especially hybrid varieties, has long been a cornerstone in the production of rotary-cut veneer and high-value applications like multiplex (plywood). As a fast-growing, adaptable tree species, it offers significant potential to meet the growing demand for engineered wood products (EWP), especially as a complementary material to traditional softwoods.

One of the key opportunities lies in applying the cascading use principle more effectively. This means prioritizing high-value applications such as plywood before lower-value uses like energy production. Additionally, valorising high-quality lower stems, which are most suitable for veneer peeling, can enhance the economic value of poplar wood, particularly in agroforestry systems or trees outside forests (TOF).

The global demand for plywood continues to rise, and industrial developments reflect this trend. A prime example is Garnica's new factory in Troyes, France, which is geared toward increasing production of poplar-based plywood, using innovative approaches and diversified feedstock sources.

FIGURE 2: GARNICA POPLAR CONSTRUCTION WOOD PANELS

Hybrid poplar wood, in particular, is gaining attention for its potential in engineered wood products. However, growing conditions significantly affect wood quality. Trees outside forests or plantations, such as those in windbreaks, riparian buffers, or alley cropping systems, often grow faster due to less competition for light and nutrients. But they also face more environmental stress, especially from wind. This exposure leads to greater formation of reaction wood, specifically tension wood in poplar. Tension wood can alter trunk shape causing eccentric or oval growth and negatively impact peeling yield. It also increases the risk of buckling or warping during the drying process, which can present challenges for multiplex production.

Despite these challenges, experience shows that poplar from agroforestry systems such as windbreaks, ally cropping, riparian buffers can still be processed into high-quality plywood and engineered wood products. Trees growing at the edges of plantations are exposed to similar environmental conditions as those in TOF systems and are already widely and effectively used in industrial applications. Through careful selection, tailored processing methods, and advances in sorting and veneer preparation, the specific characteristics of TOF poplar can be accommodated, enabling its full valorisation without compromising end-product quality.

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