TALKING TIMBER

COPPICE CONSTRUCTION

***George Fereday** explores the potential of coppiced sweet chestnut in buildings*

Coppicing provides fast-growth, regenerative hardwood, net-gain biodiversity and supports local woodland jobs. Despite these benefits, very little coppiced sweet chestnut is converted to useful timber. Unmanaged or 'overstood' coppiced trees are typically burnt as biomass or logs, releasing decades of sequestered carbon into the atmosphere.

To explore why coppiced sweet chestnut is so seldom used in construction, and to better understand the barriers and opportunities to building with coppice, we ran two focus groups with regional stakeholders in the coppiced sweet chestnut supply chain. Findings from the focus groups influenced our design process ensuring it: (i) utilised a wide range of roundwood diameters; and (ii) linked the design of coppiced sweet chestnut building components, to widely available, high-yield processing methods (mobile sawmill, cleaving).

By using shorter length coppiced materials (≤1000mm) to produce structures like space frames or trusses, we found we could utilise more non-straight growth poles. Although they require a higher frequency of joints, using shorter lengths of timber also means you can avoid defects such as knots or curved growth, resulting in a higher yield from a coppiced woodland.

Our more recent project 'Home Grown Cabin' was funded by the Forestry Commission in partnership with Grown in Britain. The aim was to understand barriers and opportunities for using coppiced sweet chestnut in scalable, modular construction. Central to this project was the development of experimental structural insulated panels (SIPs) made from unseasoned timber, as an example of an engineered timber building component made from locally sourced hardwood.

Preliminary findings are that building designs which accommodate non-straight growth, as well as straight coppiced poles, offer the best prospect of opening new construction markets for coppiced timber. This is because building products like SIPs are made from the straightest growth poles, representing only 10% of coppiced sweet chestnut trees. The remaining 90% of the trees in a typical coppiced woodland are not 'straight growth', so finding viable building use as segmented short lengths (for example, exterior cladding, or for the manufacture of struts and dowels), is an efficient use of this more prevalent material.

Our studies also suggest sweet chestnut can be used in a green, unseasoned state, if detailed appropriately. Not kiln-drying timber saves significant amounts of embodied energy and carbon, whilst supporting green woodworking skills to thrive in new and diversified ways.

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To build with unseasoned timber, however, requires an understanding of green wood behaviour. The unseasoned sweet chestnut timber used to stiffen our SIPs had sufficient vapour permeability that the timber could dry in-service without trapping interstitial moisture that might degrade the timber over time. Sawing into half-rounds or cleaving into smaller cross-sectional volumes helped accelerated atmospheric seasoning of the coppiced sweet chestnut timber prior to use. Some growth tension within the poles was also released, making the timber less prone to the fissures seen in unseasoned coppiced roundwood like fence posts. This finding is significant because fissures in green timber for construction must be factored into structural calculations.

Our speculative research has showcased the construction possibilities with coppiced sweet chestnut in the south-east of England. Bringing neglected woodlands into management and diversifying markets for coppice could also: (i) support local skills and forestry jobs; (ii) enhance woodland ecologies; (iii) reduce reliance on imported timber for construction; and (iv) divert biomass carbon emissions into long-term carbon storage in buildings.

Below: Coppiced sweet chestnut A-frame

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