



## Uses for Scottish Aspen Timber

### A summary report by Eadha Enterprises

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### Historical uses

Forest Research (David C Jardine) have produced a paper on the qualities of aspen timber and the following extract about historical uses is taken from his paper “Not Merely a Habitat: Utilisation of Aspen”, 2008.

Historically aspen’s foliage was used as fodder for sheep and cattle, both in a green and a dry state. Our predecessors recognised the low density of aspen and poplar wood and used it in situations where heavier wood would have been less suitable, such as to straining hinges so it was used for doors and gates, particularly those of large dimension. Its soft and even grained texture meant that it was easily carved, leading to its use in furniture and clogs and the ability to peel it into veneers allowed its use in basket making and more recently in use for matches. It does not splinter or crack when nails are used on it, so, like willow, it was valued for cladding of carts, barrows and wagons. Aspen logs were also commonly used for dugout canoes of the type which operated in the Baltic Sea from the Iron Age up to 1900.



The twigs and branches were used in the making of the shafts of arrows and were also believed to have divinatory qualities. The name Aspen itself is derived from the greek word for a shield (aspis) and apparently the Celts used Aspen for shield making.

A number of other historical uses would now come under the modern term of ‘ecosystem services’ and indeed are uses of Aspen which are increasingly being re-recognised. The contribution of Aspen to bank stabilisation to prevent soil erosion and to provide river-bank stabilisation has long been recognised, but is now being re-advocated

In addition to the above, it is worth noting that Oliver Rackham (Trees and Woodland in the British Landscape, 1976), suggests that after oak and elm, the next most common species for use as traditional building timber was ash and aspen.

### Modern Uses

Due to the limited aspen resource on Scotland, few woodworkers are using the timber and consequently there are no established product lines for aspen. A guide to the potential range of products for aspen is provided by the data from the United States notwithstanding that this is a different species of aspen (*Populus tremuloides*). Here aspen timber usage reports show about 75% is used for shipping containers, 14% for building purposes, 8% for plywood core stock, 1.5% for furniture and 1.5% for novelties, Venetian blinds, woodenware, etc., but this did not include pulp logs or bolts used for props, excelsior and wood wool. The woodworking properties of North American aspen are provided in appendix 1 as a guide.

There have been some trials and demonstration projects in Scotland looking at the potential uses for a range of hardwoods. For example the report “Investigating the Scottish Hardwood Market” by Line Hoem (2004) lists aspen as ideal for internal cladding in particular for ceilings due to its light weight. Aspen is a beautiful knot-free almost white wood.

While interior softwood claddings often undergo a finishing treatment as painting, pigment, stain, varnish or oil for not turning yellow during a relatively short time, light coloured aspen cladding keeps its natural colours for many years.



Aspen ceiling (Heom 2004)

Elsewhere in Europe, in particularly in the east where aspen predominates, there are established industries built around the use of aspen, in particular the fibreboard and paper making industries where aspen is a superior material compared to softwoods. However there is also evidence of the domestic use of aspen. The images below demonstrate the use of aspen in shingles on a modern property.



Aspen Shingles, Latvia (Scottish Native Woods)

## Sauna Production



Aspen sauna panels (4plus, Latvia)



White aspen sauna (Superiorsaunas.com)

Aspen wood is one of the most popular and exclusive materials for sauna production due to its low heat conductivity.

## Animal Bedding

Kiln dried aspen fibres are popular choice for herpetoculturists. This material provides a soft, odourless and highly absorbent substrate for burrowing or nesting reptiles. Aspen pellets are also popular for cat, hamster, horse and poultry bedding. Aspen wood is naturally free of harmful chemicals including phenols common in pine and cedar and can also absorb ammonia. The material is typically heat-treated to reduce bacterial contamination and improve absorbency.



Pettex Reptile Products

## Containers and Packaging

The properties of aspen wood make it an ideal material for use in containers and boxes, in particular for shipping food products. It is free from any pronounced taste or odour and is therefore popular for packaging cheese, fish, meat and butter. Other beneficial characteristics of Aspen wood are:

- It is lightweight but strong;
- It doesn't split under stress;
- It wears smooth;
- It takes paint, ink and glue well.

Aspen wood fibres are also a popular material for use as a packing material.

## Domestic Wood Fuel

Aspen burns hot and fast. It is a low pitch wood and can help to reduce creosote build-up in chimneys if combined with softwoods.



Aspen briquettes (4plus)

## Wood Processing

The following extracts about wood processing are taken from Jardine, 2008.

While a number of the wood properties are promising for utilisation is also sensible to review the some of the issues in its utilisation. Aspen has a number of characteristics which present utilisation challenges:

- Wet wood pockets which makes uniform drying difficult
- Discoloration and decayed wood which can limit the end-use value
- The development of tension wood in branches and leaning stem

It is therefore not surprising that a study in Finland found it difficult to find high quality Aspen for use in the sawmilling industry. This study also found that most of the processing problems appeared during the sawing and drying stages, and especially successful drying. Optimisation of the yield of quality Aspen material was achieved by concentrating on the manufacture of relatively short components. To avoid deformation during drying, the boards should be relatively narrow, cut to short lengths and be free from pith and un-edged. Notwithstanding the difficulties found in Finland to find high quality material, sawmills in the Aspen belt in North American have been sawing Aspen for several decades and Aspen has been used in large section in Fennoscandia. In North America average sawing costs for Aspen are higher than competing conifers because the high incidence of decay and small log diameter. However, visually stress-graded Aspen is used for framing applications and non stress-graded material is used in a broad range of products e.g. boxes, pallets, crates, furniture components.

## Developing Craft Uses in Scotland

Eadha is keen to explore new craft uses for aspen and is looking for partners to develop innovative new products. Oars and paddles were apparently a traditional use for aspen timber due to its light weight nature and ability to withstand rot in water. Eadha has recently been working with two rowing clubs, Whiteadder and Dunbar providing them with some aspen timber for the production of oars as a pilot project. The latter club is part of the national network of clubs working on the St Ayles Rowing Skiff Project. It is hoped that other boatbuilders in this network will also come on board.

Another project has been developed by Eoin Cox the furniture maker who again, Eadha supplied with some aspen timber. Eoin did some tests and trials and came up with some rustic furniture. He hopes to go on to develop other products using aspen.

Other possible uses for aspen in wood crafts include Ski Construction, where aspen is traditionally used as the core wood due to its flexibility, elasticity, and low weight and sustainable disposable cutlery due to its ideal combination of strength and flexibility.



Aspen Rustic Chair (Eoin Cox, 2013)

## Biomass Energy

Aspen is one of the key species for Short Rotation Forestry systems (SRF), harvested in 15 year rotations. Aspen offers superior benefits over other native species in terms of its ability to grow on marginal sites and its high landscape and biodiversity value. A species comparison table included yield potential is included in appendix 2. Eadha is developing a national collection of aspen clones which will allow the selection of superior clones for productive systems.

Over and above its fast growth potential, the unique characteristic of aspen which sets it apart from other trees and which can lead to superior productivity in successive rotations, is its ability to sucker profusely. Suckering can be viewed as a response mechanism and is promoted by harvesting. Trials in Germany have indicated that where a crop of aspen is planted at 4167 stems per hectare (2.0m x 1.2m spacing), a yield in the region of 70t dry biomass per hectare can be achieved at the first 10 year rotation. Following harvesting, as much as 187,000 stems can regenerate which naturally reduces to about 40,000 stems after 5 years through competition. On average two shoots develop from the rootstocks and three from suckers from each plant potentially producing significantly more biomass in subsequent rotations. This characteristic also means that initial planting densities can be lower with the assumption that future suckering will increase this, resulting in lower establishment costs.

## Wood Pasture

Wood pasture is a UKBAP habitat and is recognised for its landscape and biodiversity value. It is a traditional system for which there is evidence across Scotland, and with some remnants still visible to this day. Aspen is a highly palatable tree species and was traditionally used as a forage crop in wood pasture systems.

Although there have been some agroforestry trials in Scotland over the last couple of decades, notably by the James Hutton Institute (JHI) at Glensaugh, this practice has never been taken up widely by individual farmers and landowners. However this is likely to change with the predicted introduction of a new support mechanism for agroforestry in the successor of SRDP in 2014.

In a wood pasture system, trees are typically planted at a low stocking density of 400 trees/Ha, which allows for the retention of pasture for livestock grazing. In such a system,

trees are usually pollarded above browsing height at 3m to produce supplementary feeding for livestock or the timber used for biomass and other craft uses.

Again aspen's suckering ability lends itself to wood pasture, with the production of additional forage from suckers.



Poplar Wood Pasture in Eastern Europe

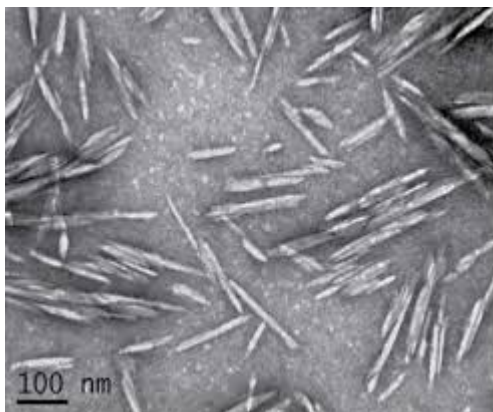
## Future Potential

Aspen wood is characterised by having a high cellulose and low lignin content which leads to high yields of sulphate pulp (in the range of 52 – 56%), significantly higher than the yield gained from conifers (44-46%) (David Jardine, Forest Research).

Nanocrystalline cellulose (NCC), which is produced by processing wood pulp, is being hailed as the latest wonder material and is now being applied to the next generation of flexible electronic displays and to create components for computers. NCC is transparent yet is made from a tightly packed array of needle-like crystals which have a strength-to-weight ratio that is eight times better than stainless steel. It is also renewable and very cheap.

It is reckoned that NCC could replace metal and plastic car parts and could make nonorganic plastics obsolete in the not-too-distant future.

NCC requires the use of wood, which has had compounds such as lignin and hemicellulose removed, so aspen's chemical composition makes it especially suitable for pulping to make NCC.



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## Appendix 1: Aspen Woodworking Properties

**Natural color**-sapwood-whitish to very light gray, heartwood-pale grayish brown or grayish white.

**Grain**-Straight and mild.

**Texture**-Diffuse-porous, close textured.

**Color variation**-Very little.

**Specific gravity [at 12% m.c.]**-0.38

Weight per cubic foot [at 12% m.c.]-26 lbs..

**Hardness**-Soft.

**Stiffness**-Good.

**Strength**-Moderate.

**Stability [ability to stay in place]**-Good.

**Decay resistance**-Poor.

**Shock resistance**-Moderate.

**Bending**-Poor.

**Nailing and screwdriving**-Little tendency to split.

**Nailholding and screwholding**-Fair to good.

**Gluing**-Good.

**Sanding**-Fair, inclined to fuzziness. (Will polish with 3/0 without scratching, 4/0 gives best results)

**Odor and taste**-None.

**Workability with hand tools**-Good.

**General machinability**-Good.

**Sawing**-Fair to good, inclined to fuzz.

**Planing, moulding and jointing**-Fair to good, inclined to fizz when dressing. (Best cutting angles-15 to 20 degrees, finish-10 to 16 knife cuts per inch, back bevel required for best results).

**Shaping**-Good.

**Boring**-Good. (Brad-point bits with strong stubby cutting lips best).

**Turning**-Good.

**Mortising**-Good.

**Paintholding**-Good.

**Staining**-Good. (Takes practically any stain but most used in colored finishes).

**Sealing**-Good. (Takes any sealer or primer coat).

**Filling**-Seldom required as wood is very close-textured.

**Bleaching**-Not required.

**Natural finish**-Seldom used as wood has little character.

**General finishing**-Good, provides excellent paint or enamel base.



## Appendix 2: SRF Species Comparison Tables

**TABLE 1: NATIVE SPECIES**

English Name	Latin Name	Native to Scotland	Pest Diseases and	Cold Tolerance	Biodiversity Value No of associated plant-feeding invertebrate species	Soil Requirements	Dry Tonnes/ Ha/yr	Rotation	Conservation Designation
Native Aspen	<i>Populus tremula</i>	Yes	Severely browsed by hares, rabbits and deer; resistant to cankers; most resistant poplar but susceptible to leaf spot	Good	223	Broad tolerance including industrial sites and contaminated land (clonal differences)	5.6 – 10.5* <small>*estimate based on clonal performance in trials</small>	15	Rare
Common Alder	<i>Alnus glutinosa</i>	Yes	Not attacked by hares and rabbits; sensitive to diseases on poor sites;	Good	190	Broad tolerance	5.0	15	Common
Silver birch	<i>Betula pendula</i>	Yes	Severely browsed by hares, rabbits and voles; susceptible to some fungal pathogens including cankers	Good	192	Broad tolerance	5.0	20	Common
Ash	<i>Fraxinus excelsior</i>	Yes	<b>MORATORIUM ON PLANTING DUE TO ASH DIE_BACK DISEASE</b>	Frost tender but flushes late	101	Requires medium – good fertility	7.4	20	Common

### References

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 Aspen – A Neglected Species in Scottish Forestry, Alan Harrison, Forest Research, 2009  
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