Grasping the craft of cladding facades with wood: alder as a case study.

BRUN Géraldine[1], ALMEVIK Gunnar[1], JOHANSSON Karin[1], BJÖRLING Nils[2]

[1]Department of Conservation, University of Gothenburg
[2]Chalmers University of Technology
geraldine.brun@gu.se

Key words: Alder, wood cladding, craft, durability, historical literature, regenerative architecture.

Background and goals

Already in antiquity, alder had proved to perform well underwater while being non-durable above the ground (Vitruvius 1547). Today, the European standard EN 350:2016 informs us that black alder (alnus glutinosa) is not durable to attack by termites, not resistant to trichoferus holosericeus, and prone to decay from basidiomycete fungi and soft rotting micro-fungi. The latter is determined either by observing the mass loss when contaminated by the organism, or by looking at the longevity of stakes in ground-contact (EN 350:2016).

My observations of crafted wood claddings in France and Scandinavia completed by literature review revealed that alder has been used in different places as a building envelop material. Fig. 1 shows a cladding in Champagne, where the tradition of using black alder as a façade material is today marginal. Fig. 2, 3, and 4 show different alder claddings in a region of Sweden, where only few objects have been identified. In another area of Sweden and in Finland, alder has been used to craft shingles for the roofs of churches and belfries (MiGo:byggnadsvård 2020).

Alder seems to have been chosen for outdoor use in architecture in multiple locations, even though it is recognized as non-durable. The use of species ranked as non-durable in EN 350 is disapproved for cladding purposes by French recommendations, thus panels of conifers or other non-local species are taking over in Champagne. Before it disappears, I see the need to learn from the craft of cladding facades with alder and to answer the question: can alder wood be more durable than expected outdoor or can claddings of non-durable wood perform well?

Fig. 1: shiplaps on a barn, Champagne. Photo by the author.

Fig. 2: boards on boards on an outhouse, Västra Götaland. Photo by the author.

Fig. 3: inbuilt boards on a house, Västra Götaland. Photo by R. Carlsson.

Fig. 4: inside of boards on boards on a barn, Västra Götaland. Photo by R. Carlsson.

Approach and methods

Previous research on pre-industrial building craft has taught us how to develop sustainable constructive solutions, for example stone adhesive based on wood tar (see Ebert 2024), as well as inspired design solutions, for example in the case of wooden bridges (see Kromoser et al 2024). My research attempts to grasp the potential that the craftspersons' skills and knowledge have in helping us developing sustainable and regenerative design solutions for wood claddings. Through the case study of alder as a cladding material, I investigate how both our immaterial and built heritages can be used to reactualize traditional know-how of interest. Historical literature and field observations with craft analysis are the main sources of information.

To conduct craft analysis, I solicited professionals of the built heritage. In Sweden, I got the support of the craft researcher-practitioner Robert Carlsson for observations and discussions. In Champagne, the practitioner Laurent Roussel and the built heritage technician Jean-Marc Marande guided my fieldwork and my interpretations. The species identification was confirmed with microscope because alder wood is hard to recognize when weathered (Lindblad et al 2023).

To make sense of my observations and grasp the explanations from the practitioners, I started to make alder cladding elements by hewing and hand-planning boards and splitting shingles at the craft laboratory in Mariestad, Sweden (see Fig. 5 to 8). Finally, I attempted to get a broader knowledge of alder, both by experiencing its properties through carving, and by understanding its diverse uses through reading archaeological reports.

Fig. 5: hewing the edge of a board, photo by the author.

Fig. 6: planning a board by hand, photo by the author.

Fig. 7: hewing the surface of a shingle, photo by the author.

Fig. 8: cutting away a dead knot with a handsaw, photo by the author.

Results and discussion

Alder claddings typologies

In Champagne, claddings of *tavillons* are generally found on the buildings' west facades to protect the oak posts and the wattle-and-daub filling from erosion by the rain. To resist mechanical abrasion, the thin shiplap boards are kept in place by vertical battens (see Fig. 1) which cover the joints and limit the vibrations from the wind. Without those battens, the erosion of alder around the fasteners results in the boards detaching from the wall (Brun 2023). Tab. 1 shows the general characteristics of the observed claddings of alder both in France and Sweden.

Table 1: Observed cladding typologies.

Location	Cladding type	Dimensions (m)	Coating	Illustration
Champagne	Horizontal shiplaps	0,012x0,15	Raw or motor oil	Figure 1
Västra Götaland	Board on board	0,021/0,027x0,19	Apparently raw	Figure 2
Västra Götaland	Boards and battens	0,026x0,15	(Oil?) paint	Figure 3
Västra Götaland	Board on board	0,025x0,1/0,3	Breathable paint	Figure 4

Alder peculiarities

In Swedish woodlands, alder and spruce are often found together (Hallander 1930, Herlitz 1932) and it seems like they have been perceived as equivalent for cladding the barn shown on

Fig. 4. Aspen is also found used together with spruce in Västra Götland (R. Carlsson, personal communication, April 2023). In Champagne, observed *tavillons* were made of alder, oak, or poplar. Alder deforms less than oak and poplar, possibly because it shrinks little (Gaudin et al 1999) and is the deciduous species with the straightest trunk (Grindhal 1941).

Another advantage of alder for cladding is that it is easy to process and lightweight (Herlitz 1932). It is also claimed to not be prone to cracking (Gibaja et al 2024, Mahn 1855). Anyhow, my field observations show that alder boards tend to crack in the ends. Alder shingles split from green wood were found to crack under drying for thicknesses under five millimetres (MiGo:byggnadsvård 2020). Also, some of the twenty-two millimetres boards sawn for my craft experiment presented a crack on the top end while some of the twelve millimetres boards cracked on the root end during drying in a cold ventilated room (see Fig. 9 and 10). The stocks were sawed rapidly after taking down the trees and the tension in the wood damaged the blade as shown on Fig. 11. Few sawmills know that alder stocks should rest for several months after falling and before sawing to let the tension dissipate (P. Jeuneux, personal communication, February 2024). A hypothesis is that alder boards or shingles crack due to tensions in the wood when the stocks did not rest for long enough.

Roussel (personal communication, July 2023) recommends installing alder shiplaps half dry instead of waiting to obtain a lower level of sixteen percents of moisture in the wood as for other species. According to the craftsman Nils Andersson, alder claddings perform best on north facades and should stay uncoated (R. Carlsson, personal communication, April 2023).

Alder claddings sustainability

Fifty years old alders normally give timbers of good dimensions (Hallander 1930). Older trees grow much slower (Mahn 1855, Herlitz 1932) and tend to rot in the centre according to Roussel who selects trees about fifty years old for panels (personal communication, July 2023).

Raw panels of alder over seventy years old have been observed in Champagne, some of them in a good shape, some other presenting cracks and erosion around fasteners (Brun 2023). Both Roussel and Marande (personal communication, 2024) have observed that weathering forms a hard layer on alder wood which, they assume, makes the wood naturally durable. They added that alder claddings perform well in humid climates, while conifers' wood behaves better in drier conditions (personal communication, 2024). Anyhow, after a few months on a north wall at the craft Laboratory, fungi colonized the surface of the sawn alder panels (see Fig. 12). Alder wood is particularly smooth (Linnaeus 1749), and its surface should be less prone to fungal attacks than rough woods. Planning it would be a good way to obtain an even smoother surface.

Alder is a well-represented archaeological wood often found used in humid environments like in Crannogs in Scotland (Crone 1988) or in platform settlements and pile dwellings in Italy (Grassi and Mangani 2015, Perini 1984). Several archaeologists performing xylotomy on alder noted how rapidly the blades get worn. This was also experienced by a craftsperson when planning alder wood. They agree that it seems like alder absorbs and fixes minerals, which might be another factor explaining the damaged sawmill blade on Fig 11. Mahn provides a recipe to improve alder durability by iron impregnation: "Split a shingle from a mature alder and burry it in waterlogged ground, for example in a bog containing bog iron, and leave it there for three years to obtain a durable roofing material" (Mahn 1855, translation by the author).

Finally, black alder is a fast-growing species well distributed in Europe, possibly explaining its use in construction. Also, near rivers or lakes shores, as well as in marshes, it often represents the only alternative for wood production (Grindhal 1941, Hallander 1930).

Fig. 9: pith crack on the top end of a twenty-two millimetres board, photo by the author.

Fig. 10: pith crack on the root end of a twelve millimetres board, photo by the author.

Fig. 11: damaged teeth of the sawblade, photo by Mats Karlsson.

Fig. 12: fungi colonization on the cladding at the craft laboratory, photo by the author.

Conclusion and perspectives

The preliminary results indicate both that alder wood can be more durable than expected outdoor and that cladding made of non-durable wood can perform well. Unlike for spruce or oak, there is no evidence that a cladding of alder can last for centuries. Anyhow, a durability of seventy years overreaches the time of natural resource replenishment, meaning that cladding a façade with alder can be sustainable and relevant for regenerative architecture. Cladding facades durably with alder requires a specific knowledge which I haven't grasp totally yet. The issue of cracking and the question of improved durability by natural impregnation must be further studied. This will be done through the next stages of my craft experiment; by extending my literature review, and during coming fieldwork in Thiérarche region where alder is traditionally used for cladding as well (Claessens 2006, Gaudin et al 1999, Streith 1989).

The use of alder wood requires the adaptation of the production chain and project pace. The impossibility to work in *flux tendus* and the difficulty to exploit a resource in wet environments make alder noncompetitive. Anyhow, to foster resilience and diversity in both our built and natural environments, it is important to give priority to local craft in decision making processes. This is possible in small projects like the construction of detached or semi-detached houses which represent over half of the housing in Europe (Eurostat), or potentially in the public sector.

Acknowledgements

The research was financed by the institution of conservation at the University of Gothenburg. The fieldwork was partly founded by the Adlerbertska Research Foundation.

References

Brun G (2023) When Wood Cladding Degenerates: Lessons on durability from traditional wood claddings after long weathering in real conditions. FORMakademisk, 16(4).

Claessens H (2006) Réflexion sur la place de l'aulne en sylviculture. Forêt wallonne 80.

Crone BA (1988) Dendrochronology and the study of crannogs. [Doctoral dissertation]. University of Sheffield.

Ebert B (2024) Learning from the Past: Rediscovering Traditional Medieval Wood Tar Adhesives for Sustainable Stone Conservation and Built Heritage. Studies in Conservation, 1-9.

Eurostat (2021) House or flat: where do you live? Eurostat.

Gaudin S, Labbe S, Lebleu, G (1999) L'aulne glutineux en Champagne-Ardenne. Etude réalisée pour le compte du CRPF Champagne-Ardenne. CRPF Champagne-Ardenne. Châlons en Champagne, France. 47p.

Gibaja JF, Mineo M, Santos FJ, Morell B, Caruso-Fermé L, Remolins G, Masclans A, Mazzucco N (2024) The first Neolithic boats in the Mediterranean: The settlement of La Marmotta (Anguillara Sabazia, Lazio, Italy). Plos one, 19(3), e0299765.

Grassi B, Mangani C (2015) Guida alla palafitta di Bodio centrale o delle Monete. Grassi B, Mangani C (Eds.).

Grindhal T (1941) Al. Eken. Skogsägaren, 17. Jönköping, p. 262–264.

Hallander Å (1930) Klibbalen, ett förbisett trädslag. Skogsägaren. Jönköping, p. 186–187.

Herlitz N (1932) Om alen i sydsvenskt skogsbruk. Skogsägaren, 8. Jönköping, p. 123–126.

Kromoser B, Spitzer A, Ritt M, Grabner M (2024) Wooden Bridges: Strategies for Design, Construction and Wood Species–From Tradition to Future. International Journal of Architectural Heritage, 18(4), 652-668.

Lindblad L, Melin KM (2023) Field Method for Characterization of Deciduous Wooden Shingles. FORMakademisk 16(4).

Linnaeus C (1749) Flora oeconomica eller Hushållsnyttan af de i Sverige wildt wäxande örter.

Mahn JHF (1855) Sveriges löfskogar, deras plantering, vård, nytta och mångfaldiga användbarhet i landthushållningen, medicine m.m.. Stockholm.

MiGo:byggnadsvård (2020) Slutrapport för projekt byggarbete i virket al. Länsstyrelsens diarienummer 8423-2019.

Perini R (1984) Scavi archeologici nella zona palafitticola di Fiavé-Carera. 1. Situazione dei depositi e dei resti strutturali: campagne 1969-1976. Servizio Beni Culturali della Provincia Autonoma di Trento.

SS-EN 350 (2016) Durability of wood and wood-based products – Testing and classification of the durability to biological agents of wood and wood-based materials.

Streith M (1989) L’habitat. L’élevage. La thiérarche rurale et herbagère.

Vitruvius Pollio M (1547) Le premier livre d'architecture (J. Martin, Trans.). Michel de Vascosan (Ed).