

Forestry & Energy

REVIEW

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THE VOICE OF FORESTRY & RENEWABLE ENERGY



MINISTER HACKETT

FUTURE VISION FOR
FORESTRY SECTOR

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TONY DAVIS (CONTRACTOR)

FORESTRY: THE GIFT
THAT KEEPS ON GIVING

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SITKA SPRUCE IMPROVEMENT

APPLICATION OF GENOMICS
FOR TREE IMPROVEMENT

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Foreword

Welcome to the Autumn/Winter Edition of Forestry & Energy Review Magazine. We are living through difficult times in the Commercial Forestry Sector at present. We believe that, if Covid 19 was not present much more focus would be placed on these issues in Government circles.

With this in mind we asked Minister Hackett to write an article outlining her vision for the Forestry Sector. She duly obliged and the article is reproduced word for word starting on page 20.

On receipt of the article, we were mildly concerned at the lack of focus in the piece on the Commercial Forestry Sector and asked for further clarification. We have published the response here:

“Minister Hackett has made it very clear that she sees a continued role for the commercial forestry sector as part of

the forestry mix, particularly given the downstream benefits of this type of forestry for timber production, energy production and the rural economy”

Many of us are feeling first hand the financial strain visited upon us by the actions of others outside of our control. We sincerely hope that the Minister is both willing and able to stand by these commitments, and that further actions will be taken if necessary..... very many livelihoods depend on it.

Hoping you all Keep safe during these challenging times.

We trust you enjoy reading this publication which will continue to provide a voice for the Forestry and Energy sectors.

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INFOMAR software is an innovative outdoor training tool for Continuous Cover Forestry management which is now being used for training forest owners and foresters in Ireland.

Teagasc National Forestry Public Events 2020

As with all public events and mass gatherings, due to the COVID-19 restrictions, the planned Teagasc forestry events for 2020 are either cancelled or postponed until further notice. Teagasc Forestry Development Department have collaboratively developed a comprehensive work plan setting out alternative options in providing support and promotion to forest owners and landowners. We propose to keep options under review and return to those events that are feasible as early as possible. The updated forestry events programme for 2020 is available – see www.teagasc.ie/forestry for particulars.

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Small Diameter Alder Research

Research at Teagasc and GMIT is currently underway investigating the working properties and potential exploitation of small diameter alder, an undervalued, plentiful native hardwood. Writes Colin Marren



In Ireland, approximately 95% of hardwoods used in the furniture and woodworking industries are imported. There is, however, a significant area of broadleaf plantations from which small diameter thinnings can be harvested. Much of that material is currently directed to the firewood market, negating any added-value potential, which could be realised through markets for better quality material. There is potential to reduce reliance on imported hardwoods through advances made in the processing of small-diameter hardwood logs and the development of innovative uses for small-sized sawn hardwoods. According to the National Forestry Inventory report, Irish alder (*Alnus glutinosa*), also known as Black or Common alder, makes up 2.7% of forestry in Ireland, equating to 17,910 hectares or over 6 million trees. With 76.4% of stocked forest area considered available for wood production, this leaves over 13,500 hectares or around 4.5 million alder trees of various sizes and ages available with no value-added markets of great significance existing (Forest Service, Department of Agriculture, 2018). Historically alder was used for underwater piles along canals due to alders' resistance to rot when submerged in water, Venice being a prime example of this. Clogs were often made from alder also due to its natural anti-bacterial properties. In more recent times, alder has been used in instrument construction, veneer making, plywood manufacture, joinery, and pulp production. Alder wood has a striking resemblance to cherry and is often referred to as the poor man's cherry. Alder can grow on various soil types with varying nutrient status and can tolerate flooding and high-water tables. It has a diffuse-porous cell structure resulting in closed pores and fine, even grain, making it ideal for staining, painting, and finishing. It is consistent in appearance, doesn't present variation between heartwood and sapwood, and is not troubled by resin-filled knots. When first cut, planks are white in appearance and change to a reddish-brown colour on exposure.

Interestingly, the American species, red alder or *Alnus Rubra*, was once considered a weed and is frequently used throughout the United States and the world. In 2014 red alder became the third most extensively exported hardwood in the United States following an aggressive marketing campaign beginning in the '80s (Kaiser, 2014). Though a little different in appearance, the red alder and Irish grown black alder's mechanical properties are quite comparable. The transformation of mentality and approach to red alder in the United States certainly give reason to be optimistic about the future of Irish alder if the quality is controlled. Previous studies and research have been conducted on Irish alder by Dermot O'Donovan (GMIT) and Teagasc through the Alder Improvement Programme and EARTH project (Exploitation And Realisation of Thinnings from Hardwoods). The EARTH project - a two-year project led by NUIG that did some

preliminary studies on four species as they relate to their applicability to the construction industry). Results for alder from the EARTH project showed limited potential for this species in the construction industry. Therefore, alternative avenues for marketing alder thinnings are being sought.

PROJECT DETAILS

The current two-year project will establish the characteristics, working properties, and utilisation potential of small-diameter (20 – 30 cm) Irish-grown alder (*Alnus glutinosa*) to support woodland owners in developing new markets and small enterprises wishing to use Irish timber. To establish what other markets exist for this material, opportunities to add value and establish new utilisation potential of alder is being explored by establishing the working and finishing properties and investigating innovative uses. The research project will demonstrate the working properties of small diameter alder in relation to seasoning/kiln drying, processing (planing, sanding, milling, and boring), nailing /screwing, gluing, and finishing. Outcomes will include the development of product prototypes and resources designed based on maximising the species' utilisation potential. It is anticipated that the findings may have broader application to other species and larger diameter material and will also help close the knowledge gap existing between woodland owners and their potential markets. This 24-month project is funded by Teagasc in partnership with GMIT Letterfrack. The project team consists of M.Sc. student and Walsh Scholar Colin Marren, Dr. Ian Short (Teagasc), Mr. Sean Garvey (GMIT), and Mr. Dermot O'Donovan (GMIT). The extended team includes Dr. Kate Dunne (GMIT), Mr. Kevin Maye (GMIT), and Dr. Robert Bush (Virginia Tech).

WORK COMPLETE

The majority of the testing phase has been completed, and results are now in the analysis phase. The testing of the alder was completed at GMIT Letterfrack, the national centre of excellence in woodworking. Conversion of logs to planks and the drying process was performed onsite with a Norwood saw and a 6m3 steam-drying kiln. Machinability and mechanical testing procedures were conducted in the GMIT Letterfrack machine hall and laboratory. It was noted that the longer the duration that logs were left before processing, the more spalting that occurred.

If cutting alder, it would be advised to convert logs to plank form as soon as possible to avoid this, unless spalting is desired for decorative timber. The drying tests compared the recommended Schedule J drying method with new novel approaches, removing the pre-air-drying process and using a much more aggressive drying schedule to speed up production and turnaround time. It appears that there is not a significant effect on mechanical properties as a result of the drying methods tested, but this remains to be confirmed through statistical analysis of the results data. There is potential for one further test to be conducted in this category, which would combine the removal of air drying and increasing the temperature in the kiln to dry the material as aggressively and fast as possible. Unfortunately, the kiln used in the testing has temperature restrictions, limiting how far this can be tested. After removal from the drying kiln, visual inspection of the material showed little to no cracking, splitting, cupping, or twisting throughout the stack of planks. Typically twisting and cupping can be an issue with small diameter and juvenile logs. Cupping and twisting are due to the plank's proximity to the tree's pith, while cracking and splitting would indicate an overaggressive drying schedule. Preliminary observations from testing are promising, with the alder showing impressive machinability and stability levels. Machinability tests included planing,



Figure 1 Spalted alder.



Figure 2 Alder cut soon after felling.



Figure 3 Alder after drying



Figure 4 Test samples before testing



Figure 5 Test sample after CNC profile test.



Figure 6 Cabinet made from juvenile alder by Martin Kearney, GMIT.

sanding, CNC routing, and boring, which all produced little stress on machinery and produced visually pleasing results. The routing and boring tests were performed on a flatbed CNC router and tested straight cuts, profiled cuts, and boring. Fifty samples were tested in each category, producing promising results across the board. Samples were evaluated on a scale of 1-5 (1 being defect-free and five being severely defective) across multiple criteria according to the ASTM D-1666 standard.

The profiled cut produced the most defects but require little sanding to bring them up to par. 52% of samples were deemed acceptable when cutting with the grain, 88% when cutting across the grain, and 80% cutting on the end grain. Straight milling tests resulted in 100% of samples being defect-free when cut with the grain and on the end grain, while 88% of the samples had no defect when cutting across the grain. Boring tests also showed a high level of machinability, with 81% of samples presenting as defect-free. Planing and sanding tests also consisted of 50 samples per test, with 78% of planed and 86% of sanded samples producing defect-free results. Throughout all the machinability testing, 1700 evaluations took place, evaluating different criteria with only eight incidences receiving a grade of 5 (severely defective). Initial indications show favourable gluing properties following testing conducted on an Instron test rig. The test included bonding two samples and pulling them apart, testing the bond's shear, tensile strength. The samples also tested well in screw withdrawal tests showing a reasonable level of holding capabilities. Finishing tests were completed using the pull-off test, which measures the finish's bond to the wood; these tests showed moderate adhesion levels. Statistical

analysis will provide better insight into the results from these tests. Though the application of finish was not tested, it was notably easy to apply a water-based lacquer using only a paintbrush, resulting in an even consistent finish. It must be noted that these comments are observations and are yet to be statistically proven.

WHAT COMES NEXT?

Over the remaining twelve months of the research, statistical analyses will be conducted on data from the tests. The statistical analyses will provide further information on the material's performance, guiding the exploration of potential value-added markets. Further information on this project can be found at www.teagasc.ie/crops/forestry/research

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