.

Forestry and Wood Update

SEPTEMBER 2005 - Volume 5 Number 9

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COFORD’s activities are funded by the Irish Government under the National Development Plan, 2000-2006.

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# Wood biomass harvest and supply chain workshop

The ***wood biomass harvest and supply chain workshop*** will take place on 15 September at the Hotel Minella, Clonmel, Co Tipperary, starting at 9:30. [**Click here for more details and registration form**](http://www.coford.ie/seminars2005/woodbiomass.pdf)**.**

The workshop will be presented by Pieter D. Kofman (Wood Energy Consultant), Tom Kent (Waterford Institute of Technology) and Tim Ryan (ClearPower Ltd). It is a vital event for forest managers and all others wishing to get involved in the supply chain of the emerging wood biomass sector. Workshop contents are:

• Introduction to wood biomass

• Overview of supply chain

• Wood biomass harvesting, transport and storage

• The Ten Commandments of wood biomass usage

• Quantification (tonnes, m3, kWhrs, GJ, etc.)

• Irish case study

• Biomass supply contract preparation

• Chipping and biomass boiler demonstration

COFORD wishes to thank Jack O’Donnell for facilitating the chipping and wood boiler demonstrations.

Please note that this workshop and demonstration is limited to a maximum of 20 participants. Places will be allocated on a first come first served basis. The registration fee of €100.00 will include course material, biomass calculator software and refreshments.

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# Evening seminar: Short rotation coppice - An Irish oil well?

COFORD presents an evening seminar on ***Short rotation coppice – An Irish oil well?*** This event will take place from 5 to 8 pm on 15 September at the Hotel Minella, Clonmel, Co Tipperary.[**Click here for more information and the registration form**](http://www.coford.ie/seminars2005/1509Seminar.pdf).

The seminar will explore Danish and Irish experiences with the growing and harvesting of short rotation coppice for the production of wood chip for energy generation. Chaired by Matt Dempsey, Editor, Irish Farmers’ Journal, the seminar will include the following presentations:

* *Welcome* by David Nevins, Chairman, COFORD
* *Opening address* by John Browne, T.D., Minister of State at the Department of Agriculture and Food
* *Introduction to Wood Biomass Potential in Ireland* by Joe O’Carroll, Operations Manager, COFORD
* *Short-rotation Coppice – Establishment and Harvesting Lessons from Denmark* by Pieter Kofman, WEC, Denmark
* *Short-rotation Coppice – The Irish Experience to Date* by John Gilliland and Michael Doran, Rural Generation Ltd

There will be time after the presentations for an open discussion. Two COFORD products will be launched by John Browne, TD, at this event: a new report by Fionan Russell and Donal Mortimer “***A review of small-scale harvesting systems in use worldwide and their potential application in Irish forestry”*** and a CD-rom listing details of available wood biomass harvesting equipment. These will be available from the COFORD office or via the website after they have been launched.

For more information visit www.coford.ie and www.woodenergy.ie

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# Plant quality conference

On 20 and 21 September, COFORD will host a conference on ***Plant Quality - Key to success in forestry*** at the Mt Wolseley Hotel, Tullow, Co Carlow. [**Click here for more information and a registration form**](http://www.coford.ie/seminars2005/PQ-brochure.pdf)**.**

The programme includes the following presentations:

* Applying the target seedling concept to nursery plant quality
*Dr Tom D Landis, USDA Forest Service*
* Reaping what you sow - seeds and plant quality
 *Dr Conor O’Reilly, UCD & Pat Doody, Coillte*
* Weed and pest control in nursery production and their impact on plant quality *Dr Heinrich Lösing, Germany*
* The role of tree improvement in plant production and quality
*Dr David Thompson, Coillte*
* Practical management of quality in nursery production
*John Kavanagh, None-so-Hardy Nurseries*
* Improvement of plant quality through nursery research and added value *Pat Long, Coillte*
* A Canadian approach to evaluating effects of lifting, handling and storage on plant quality
*Dr Steve Colombo, Centre for Northern Forest Ecosystem Research, Canada*
* Integrating establishment practices and plant quality
*Dr Mike Perks and Alan Harrison, Forestry Commission, UK*
* Forest Service requirements for nursery stock
*John Connelly, Forest Service*
* Plant quality - what the grower needs
*John O’Reilly, Greenbelt Ltd*
* Containerised plants and mechanised planting - the way forward?
*Dr Mick Keane, Coillte*

In addition to the presentations visits have been arranged to Coillte’s Ballintemple nursery and the containerised nursery and vegetative propagation unit at Aughrim.

If you wish to find out more about the event, please contact John Fennessy at COFORD, 01-2130725 or email: john.fennessy@coford.ie.

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# Third Workshop on Irish Sitka Spruce Dynamic Yield model

The third workshop on **Irish Sitka spruce dynamic yield models** will take place on 22 September 2005 at GMIT, Galway. [**Click here for more information**](http://www.coford.ie/seminars2005/DYM3-programme.pdf)**.**

The workshop will be presented by Paddy Purser (PTR Ltd.), Jacques Hamel (PTR Ltd.) and Ted Lynch (Coillte), and will include a morning refresher course on stand measurement at a local forest property. The field exercise will be a revision course on collecting field data (basal area, diameter at breast height, stocking (stems/ha), top height) which are necessary inputs (along with species and age) into the dynamic model. Thinning volumes and the factors which influence how these are determined will also be discussed.

The afternoon will be spent in the computer laboratory, and delegates will be taken through a demonstration of the model, and then work through exercises with the assistance of the presenters.

As this is a hands-on workshop, the number of delegates will be restricted to a maximum of 30 – early registration is therefore essential as places will be filled on a first come first served basis. If you wish to attend, please contact COFORD as soon as possible – either by telephone 01-2130725 or email info@coford.ie, or return the registration form provided on [www.coford.ie/seminars2005/DYM.html](http://www.coford.ie/seminars2005/DYM.html).

The cost of attending will be €100.00. This includes a copy of the software and manual as well as lunch and other refreshments.

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# BIHIP Field Day and AGM in Ireland

The AGM and Field Day of BIHIP (the British and Irish Hardwood Improvement Programme) will take place at the Straffan Court Hotel in Maynooth on 27 and 28 September 2005. This is the first time that the BIHIP AGM is to be held in Ireland and the event will be hosted by COFORD. The programme is designed to:

* Bring participants up to date on the most recent developments in BIHIP and its improvement programmes based on seven individual species
* Update participants about historical and latest progress in tree improvement in Ireland with particular emphasis on ash, oak, sycamore and birch
* Provide an opportunity to explore the potential and problems for growing quality broadleaves in Ireland
* Provide participants with the opportunity to learn more about the general principles and issues underlying tree improvement and provenance choice.

The field day on 28 September will be of interest to all foresters, growers, merchants and processors of broadleaves. The day will include visits to Donadea Forest Park to discuss BIHIP improvement programmes, historical developments and broadleaf tree improvement in Ireland, the EU ECLAIR Programme and plus tree selection, registration and management of seed stands; as well as to Larch Hill (plantations of Joe Barry) where discussion will take place around the performance of young oak, sycamore and ash plantations and an introduction to the COFORD BroadForm programme, designed to develop treatment protocols for the early management of broadleaf species, up to first thinning stage.

If you are interested in attending, contact John Fennessy (email john.fennessy@coford.ie) or complete and return the [registration form](http://www.coford.ie/seminars2005/bihip.pdf).

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# Forest biodiversity conference

On 26 and 27 October, COFORD and the EPA will co-host the conference***Biodiversity in Irish forest plantations*** at the Heritage Hotel, Portlaoise.
[**Click here for more information**](http://www.coford.ie/seminars2005/AN-1.pdf)**.**

This conference will be a platform to present the findings of this research conducted by the BIOFOREST project team, and highlight the recommendations arising from the results. The aim is to provide direction for future biodiversity policy in relation to forestry development in Ireland. Presentations will be set in the context of international developments in the area, with keynote presentations from local and international experts.

The conference will provide an opportunity for networking and discussion, bringing together academics, researchers, policy makers, practitioners and anyone interested in maintaining and enhancing the biodiversity of Irish plantation forests. In addition to the presentations, the event will include a demonstration of the BIOFOREST database, a field visit showing biodiversity change throughout the forest cycle, as well as a poster session.

Further details will be made available during the next weeks, as soon as the programme is finalised.

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# Survey on COFORD’s performance

COFORD will be conducting a survey during September 2005, to find out how you evaluate our activities, products and services. Please take the time to fill in the questionnaire (included with this email) and return it to COFORD before the end of September. The survey will also be available to complete on-line in the near future. The objectives of the survey are to evaluate the effectiveness of COFORD’s activities, to identify areas where we need to improve, and to obtain feedback from users of our services and products. The findings will assist us in improving our operations and make them more responsive to current user requirements.

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# CARBON CORNER

## Approaches to inclusion of forest sink carbon in greenhouse gas compliance regimes

Under the Kyoto Protocol and Marrakech Accords there is provision for Parties with greenhouse gas emission targets to use carbon sequestered in forest sinks for compliance purposes during the first Kyoto commitment period. However, within the EU there is uncertainty to the extent, if any, that Parties will use removal units (RMUs) generated from forestry, or other activities elected under Article 3.4, to help in achieving national emission targets. Even outside the EU, Parties such as Canada, which alone has a potential annual forest management sink of 44 million tonnes of carbon dioxide (over 70% of annual Irish greenhouse gas emissions), have not finally decided whether or not to opt for Article 3.4.

Parties that do elect the forest management activity under Article 3.4 will have to put in place verifiable and transparent systems to track changes in forest carbon stocks, in accordance with the Good Practice Guidance on Land-Use, Land-Use Change and Forestry of the Intergovernmental Panel on Climate Change (IPCC). For Parties with extensive forest resources this will present considerable methodological and financial challenges. Of course, all Parties must report changes in carbon stocks arising from afforestation, reforestation and deforestation since 1990, which falls under Article 3.3, and again reporting has a need to comply with the IPCC model.

But to return to the point about using RMUs for compliance – at present, as far the EU is concerned, these are for use at national level only. There is no provision in the Linking Directive (which links the Emissions Trading Directive with the mechanisms in the Kyoto Protocol) for including domestic sinks in trading. This, therefore, effectively shuts out RMUs for use at an installation or sectoral level, as they have no value in that arena. That being said, the extent of RMUs issuance and use for compliance at a national level may influence government policy at the level of allocating emissions to installations involved in emissions trading. A simple example is say, a government must meet an emissions target of 100 million tonnes carbon dioxide per annum over the first commitment period, of which the trading sector is expected to contribute 50 million tonnes. It expects an overshoot of 6 million tonnes per year over the five years, in the absence of any policies and measures, and the increase is expected to come half and half from the trading and non-trading sectors. It could decide to allocate 50 million tonnes to the trading sector and expect it take up the slack of the 3 million additional tonnes by either reducing emissions or trading. It still needs an extra 3 million tonnes of reductions to take emission down to the 100 million tonnes. To achieve this it puts in place policies and measures in the non-trading sector that achieve a reduction of 2 million tonnes, and it buys the remaining one million tonnes at a cost of say, €20 million, to bring it to its target. If, however, there are sink credits available nationally, the government’s flexibility is immediately increased. It can decrease the burden on the trading sector, decrease purchases or combine both approaches. Either way sinks have a value. But currently the grower is still outside the loop, unless there are changes to the way the Linking Directive is formulated or a government introduces targeted support for carbon sequestration.

Outside the EU, however, there are already proposed and existing carbon offset schemes in New Zealand (<http://www.maf.govt.nz/forestry/pfsi/bulletin/issue-1/index.htm>) New South Wales (<http://www.forest.nsw.gov.au/env_services/carbon/credits/default.asp>) and Canada (see article below). All schemes place a direct value on carbon stored in forests. The NSW scheme is one of the more advanced in terms of implementation and ability to trade allowances or offsets. However, all systems show that there are ways whereby carbon sequestration can be directly valued and traded, subject to rigorous stock change estimation and permanence protocols, which must be adhered to if the system is to have credibility.

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# Strategic timber research - Making best use of the home grown resource

On 13 September 2005 a seminar on ‘***Strategic Timber Research - Making Best Use Of The Home Grown Resource***’ will take place at Forest Research, Northern Research Station, Roslin, Midlothian, EH25 9SY.

The Strategic Integrated Timber Research (SIRT) programme (http://cte.napier.ac.uk/SIRT/) is a joint initiative involving Napier University, Glasgow University and Forest Research that is supported by funding from the Scottish Higher Education Funding Council (SHEFC). The programme is aimed at providing a strategic direction for research on timber in Britain.

The objectives of the seminar are to present the latest research into wood and timber which is of relevance to the British forestry and wood processing industries. It follows the International Forestry Woodchain Conference at Heriot-Watt in September 2004 and the “Advances in Timber Quality Research” at Northern Research Station in October 2003. It represents the first seminar under the auspices of the SIRT programme and is planned to be held annually.

The programme includes the following presentations:

* Wood and Fibre Properties in Forest Resources - Sven Olof Ludqvist, STFI, Stockholm
* The SIRT Research Programme - Ute Seeling, Napier University, Edinburgh
* New Dynamic Yield Models for British Forestry – Robert Matthews, Forest Research
* Wood at the Cellular Level – Mike Jarvis, Glasgow University
* Timber in Construction – Ed Suttie, BRE, Garston
* The Research Needs of the Forest and Wood Processing Industries - David Crichton, CONFOR

To reserve a place at the seminar, or for further information, please send an email to evelyn.hall@forestry.gsi.gov.uk

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# World Bioenergy 2006 and Pellets 2006

The first announcement and call for papers has been made for the World Bioenergy 2006 and Pellets 2006 conferences which take place from 30 May to 1 June 2006 at Jönköping, Sweden

The organisers are currently soliciting papers for World Bioenergy 2006. The second world conference on pellets, Pellets 2006, will be held as part of World Bioenergy 2006 under a separate programme.

The organisers of World Bioenergy 2006 are interested in papers related to the following topics:

* Policy and steering instruments for speeding up bioenergy implementation
* Information and communication technology (ICT) applications for bioenergy
* Raw material resources (forestry, agriculture, etc.)
* Fuel production including refining (e.g. biomass gasification technologies, liquid biofuels, densification)
* Logistics and distribution
* Conversion technologies (e.g. combustion, fermentation)
* Small-scale combined heat and power (CHP)
* Bioenergy markets (e.g. international trade, drivers and barriers, developing countries)
* Environmental issues (e.g. ash recycling, emissions, closed loop bioenergy systems)

The organisers of Pellets 2006 are specifically looking for papers related to raw material resources, pellets production technologies, transport and logistics, pellets burning technologies, small scale cogeneration, and environmental issues.

For further information, consult the websites [www.worldbioenergy.se](http://www.worldbioenergy.se) and [www.pellets2006.com](http://www.pellets2006.com)

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# Review of “Growing Broadleaves”

***Growing Broadleaves*** was first published by COFORD in 1998 and soon became the standard reference book for foresters, forestry students and all those working in the broadleaf woodland sector in Ireland.

In the intervening years forestry and particularly broadleaf forestry has seen many changes. In 1998, 12,928 ha were afforested of which 15.9% was broadleaf plantation, while in 2004 some 9,379 ha were afforested of which 28.8% were broadleaves. This represents an increase of broadleaf planting by almost one hundred percent in less than ten years. Other changes include the increase in the number of species planted as well as the range of soil and site types. In order to accommodate these changes COFORD is carrying out a review of ***Growing Broadleaves*** to bring the publication up-to-date, with the intention of covering a greater range of species. It is also planned to incorporate new sections dealing with issues such as utilization and marketing.

COFORD welcomes suggestions on what additional information you would like included. Please send any observations and comments, addressed to Broadleaf Review, COFORD, Arena House, Arena Road, Sandyford, Dublin 18 on or before 30 September 2005, or contact John Fennessy (tel: 01-2130725, email john.fennessy@coford.ie).

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# Report on COFORD Broadleaf Tour, 2004-2005

During 2004 and again in early 2005 COFORD held two regional tours of broadleaf plantations established over the past ten to fifteen years. The specific objectives of the tours were:

* To review the general performance of pre-1997 broadleaved plantations,
* To examine the results of post-1997 planting guidelines and evaluate their effec­tive­ness and,
* To formulate a strategy for establishment and future management of grant-aided broadleaved plantations.

We have found that overall, the performance of grant-aided broadleaf plantations is generally good but stem quality of the pre-1997 plantation can sometimes be mediocre. However, the outlook for these is one of increasing optimism that they have the potential to produce a final crop of commercial timber. In the post-1997 plantations (under the spacing and mixture guidelines introduced at that time) all the indications are that the crop will offer the grower a wider choice and a better quality of plantation, depending on soil and topography. Timely and effective management will however, be necessary to secure a good intermediate and final crop. Farmers and landowners need take an active role in the management of their crop.

Home-collected seed is to be preferred as it is better adapted to Irish growing conditions, may be of better quality and its collection and specification can be more easily monitored. Consideration must be given at the national level to identifying the best seed stands and proactively managing them towards seed production. At present, COFORD, in co-operation with the Forest Service, is co-ordinating a review of national policy on forest reproductive material which addresses this issue.

The presence of ‘brown bud’ ash was observed in a number of plantations. The report recommends its complete removal.

The report also recommends that continued investment in farmer and professional training in forestry is an essential component of developing the broadleaf resource. To this end, demonstration plots for continued monitoring and management need to be established to provide a facility for practical demonstrations to foresters, farmers and others involved in the management of broadleaves.

Both deer and grey squirrel were also identified as a major threat to young broadleaf plantations and adequate control must now be put in place at national level.

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# Making the Grade – A guide to appearance grading UK grown hardwood timber

May 2005 saw the launch of ***Making the Grade,*** which, as the title suggests, is a guide to appearance grading UK grown hardwood timber. The guide was commissioned by the Forestry Commission, the Welsh Development Agency, Northern Ireland Forest Service, Scottish Enterprise and the Scottish Forestry Trust.

 In its introduction, the guide sets its objective as to encourage greater use of UK grown hardwoods while it provides information on the range of quality available from UK sawn hardwood timber and highlights the special features. The guide also gives information on timber measurement, the properties and uses of UK hardwoods and an illustrated technical glossary.

It then goes on to explain the appearance grading system used in the guide and continues with detailed grading criteria for several species including ash; beech; oak; sycamore; sweet chestnut; cherry; lime and elm.

A working system for hardwood grading in Ireland is outlined in the COFORD publication ***Guide to Irish Hardwoods***. COFORD is now co-operating with the industry in harmonising this system with the UK model.

For further information or a copy of ***Making the Grade*** please contact: Forestry Commission Publications, PO Box 25, Wetherby, West Yorkshire, LS23 7EW, UK. Telephone: 00 44 870 121 4180 or it can be downloaded as a PDF file from: [www.forestry.gov.uk/hardwoods](http://www.forestry.gov.uk/hardwoods). Alternatively you can contact COFORD at 01 213 0725.

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# Government of Canada moves to create market for emission reductions in all sectors of the economy

 The Government of Canada took another step to honour its Kyoto commitment on 11 August, proposing a set of rules for a domestic offset credit system, which will reward innovation and provide incentives to reduce greenhouse gas (GHG) emissions.

As promised under *Moving Forward on Climate Change: A Plan to Honour Our Kyoto Commitment*, the Government issued a consultation paper setting out the system’s proposed rules. Following consultations with provinces, territories, industry and Aboriginal groups, the system will begin operating early in 2006. Other public comments on the consultation document are invited until September 30, 2005.

“Enacting this system is a major step forward for our climate change plan,” said the Honourable Stéphane Dion, Minister of the Environment. “Consultations will maximize its effectiveness in directing innovation to reduce greenhouse gas emissions for cleaner air, a healthier environment and a strong, sustainable, competitive economy.”

The proposed system will encourage innovative Canadian projects that use new practices and technologies to reduce greenhouse gas emissions. Examples include:

* property developers that include renewable energy elements in their plans for new subdivisions;
* farmers who adopt low-till practices or zero-till practices;
* forestry companies that engage in state-of-the-art forest management practices;
* businesses that develop innovative ways to reduce emissions through recycling and energy efficiency;
* municipalities that invest in alternative transportation modes or capture landfill gas to generate electricity; and
* companies who implement programs encouraging their employees to use public transit or tele-commute.

Companies, governments, organizations or citizens undertaking such projects – provided they meet the criteria to be finalized following consultations – will be awarded credits. In turn, these credits may be sold to:

* Canadian companies in the Large Final Emitters category to put towards their emission reduction targets;
* the Climate Fund, a new institution established by Budget 2005 to purchase credits on behalf of the Government of Canada; or
* another interested individual or organization.

As a key part of the Canada climate change plan, the Offset System represents further progress under Project Green, a set of policies and programs aimed at supporting a sustainable environment and a more competitive economy.

Along with climate change, it will address a range of environmental issues, including biodiversity, water, contaminated sites and clean air. Project Green's groundwork was established by the [October 2004 Speech from the Throne](http://pm.gc.ca/eng/sft-ddt.asp) and [Budget 2005](http://www.ec.gc.ca/press/2005/050302_n_e.htm). [Moving Forward on Climate Change: A Plan for Honouring our Kyoto Commitment](http://www.climatechange.gc.ca/english/newsroom/2005/plan05.asp), is Project Green's first instalment.

(Source: [www.climatechange.gc.ca/english/newsroom/
2005/offsetCreditAug11.asp](http://www.climatechange.gc.ca/english/newsroom/2005/offsetCreditAug11.asp))

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# FDA recruiting for Managing Director

Applications are invited for the post of Managing Director of the Forestry Development Association (FDA) Co-operative.

The successful candidate will have at least two years post qualification experience in all aspects of forest establishment management and will be able to demonstrate a high degree of self-motivation and inter-personal skills. He/She will be responsible for the provision of a comprehensive range of forestry services including on site forestry advice to members.

The position will also involve the following:

* Organisation and provision of professional forestry services to the existing membership of the co-operative
* Active recruitment of new membership to the co-operative
* Engage in the promotion of the co-operative
* Organisation and facilitation of local visits, field day events, information and discussion groups
* Development of commercial services offered by the co-operative
* Exploitation of new business opportunities
* Report directly to the Board and maintain regular contact with FDA Chairman, Secretary and Technical Director

A very attractive salary plus benefits is offered in line with the responsibilities of this position. Candidates interested in this position should apply in writing, enclosing a CV and outlining how best they fulfil the requirements of this challenging and varied role to FDA Secretary, The Plunkett House, 84 Merrion Square, Dublin 2; email: Noelle.oconnell@icos.ie. Applications from interested candidates are to be received no later than 5pm, Friday 9 September 2005. Your application should highlight your relevant qualifications and experience – full driving licence essential. This post is based in Dungarvan with some travel involved.

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# Opportunity to tender

Blackwater Resource Development is a community based, local development organisation, which administers the LEADER+ Programme in North East County Cork. Blackwater Resource Development are pleased to invite tenders for the following project: ‘***A Survey of North East Cork Farm Forestry Resources’.***

Farmers/private owners began involvement in forestry in Co Cork in the mid to late 1980s. This was due to the introduction of the Western Package Grant Scheme. Many of the earlier plantations are now close to the first thinning stage and there is an urgent need for structures to be put in place to facilitate this. The resource created by the commencement of thinning privately-owned crops should give rise to rural employment and enterprise opportunities. However, there are very few structures in place to either harvest or market the timber for owners and there is a danger that the resource will be overlooked if the potential is not fully investigated. It is envisaged that the forest crop potential be investigated in two stages.

* Stage 1*:* To quantify both the timber and human resources available.
* Stage 2: To carry out research to quantify both current and potential markets

Companies interested in tendering for this project should contact Ned Kearney at Blackwater Resource Development, The Showgrounds, Fermoy, Co Cork on 025 33411 or ned@blackwater-resources.com for a copy of the full tender document. Closing date for receipt of completed applications will be Friday 7 October 2005.

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# Masters Studentship in Forest Nursery Research

COFORD and Coillte are funding a major nursery research project on seed biology and seedling growth in alder, birch, ash and pedunculate oak. The aim of the research is to increase the growth and yield of seedlings in the nursery using better methods of seed pretreatment and improved fertiliser regimes. A vacancy has arisen in this project. The successful candidate will focus primarily on alder and birch.

Applications are invited from suitably qualified persons. The position will be based in UCD Belfield. However, field experiments, to be carried out at the Coillte Nursery, Ballintemple, Co Carlow (ca 100 km from Dublin), will form an important part of the research. It is envisaged that the successful candidate will commence work in July or August 2005. Funding will be provided until 31 August 2006. Additional funding may be available after this date. Stipend will be €12,500 (tax free) plus university tuition fees (value ca €3,000). Requirements include an honours university degree in Forestry, Horticulture, Botany or related discipline.

The closing date for receipt of applications is 30 September 2005 or as soon as a suitable candidate is found. Applicants are invited to submit their curriculum vitae to: Dr Conor O'Reilly, Dept. of Crop Science, Horticulture and Forestry, Faculty of Agriculture, University College Dublin, Belfield, Dublin 4, Ireland. Tel: (01) 716 7191; Fax: (01) 716 1104; Email: Conor .oreillv@ucd.ie.

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# Hardwood Matters

The second issue of “***Hardwood Matters***” is now available – download it from [www.coford.ie](http://www.coford.ie) or if you prefer a hardcopy contact us at 01-2130725. Should you have any material for inclusion in the next issue please forward it to COFORD on a standard form, which can be downloaded from [www.coford.ie/hardwoodmatters](http://www.coford.ie/hardwoodmatters). Further information can be obtained from the COFORD office by calling 01-2130725.

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# Wood – cross-section explained

*Author: Dr Mark Irle*

Wood is a composite of compounds brought together to form a complicated structure. The density of all wood cell walls is fairly constant at around 1,500kg/m3. These walls are not homogenous structures, but are made up of several layers.

The photograph shows a cross-section of Scots pine. It shows a number of tracheids - the most numerous cell in softwood trees. These particular tracheids are from the late wood or summer wood part of a growth ring; note the large thicknesses of the cell walls relative to the diameter of the lumen.

Several distinct layers can be seen in each cell wall: Starting from the lumen, the first layer is the tertiary wall (f); which is thin compared to the next layer, the secondary wall 2 (S2). Then there is another thin layer called the secondary wall (S1). Finally, in the photo, there is the compound middle layer (CML), made up of the primary wall and the middle lamella, but they are very difficult to separate and cannot be seen here.

The photo shows splits between the layers but this is not normal and is caused by the preparation of the wood for the photo. However, it does help to differentiate the layers. Typically the S2 layer makes up 80 to 85% of the cell wall volume. Consequently, it largely determines the mechanical properties of the cell and thereby the wood itself. The CML bonds the cells together to make up wood.

All the 'walls' CT, S2, Sl and primary) contain long thin fibrils made from crystalline cellulose, a natural polymer with very high tensile strength. These fibrils are laid down in each layer in a particular way: in the T layer, their orientation is practically perpendicular to the cell axis and the fibrils are not particularly parallel to one another, while in the S2 layer the fibrils are very parallel. They wind around the cell in a 'Z' helix.

If you could see the fibrils they would make an angle to the axis of the cell parallel to the central part of a capital Z. Because the S2 layer is so large the angle between the cell axis and the S2 fibrils determines the cell’s physical and mechanical properties; it is steepest in juvenile wood, well known for its high shrinkage.

Completing the description of the cell wall layers, the Sl layer is made up of several bands of fibrils wound in alternate Z and S helices and the primary wall has few randomly orientated fibrils. The middle lamella does not have fibrils; it provides the joint between cells and consists mainly of lignin-pectin complexes.

This complex structure provides an insight into why the behaviour of wood is not always straightforward and why, on occasions, there are unexpected, and often unexplained, glitches in the production of panel products. 

Photo courtesy of the Forest Products Research Centre, UK.

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Wood Based Panels International Issue 3 2005

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