# Landwards

Agriculture • Horticulture • Forestry • Environment • Amenity

## FARM POWER & CONSERVATION AGRICULTURE

The potential for two-wheel tractors in sub-Saharan Africa

## CAFRE INVESTS IN FARM MECHANISATION TRAINING

College upgrades much of its tractor and machinery fleet

## DOUGLAS BOMFORD TRUST

Recipient Report from Wyoming, USA and Saskatchewan, Canada

IAgrE Professional Journal www.iagre.org Volume 67, Number 3 Autumn 2012

# Biosystems Engineering

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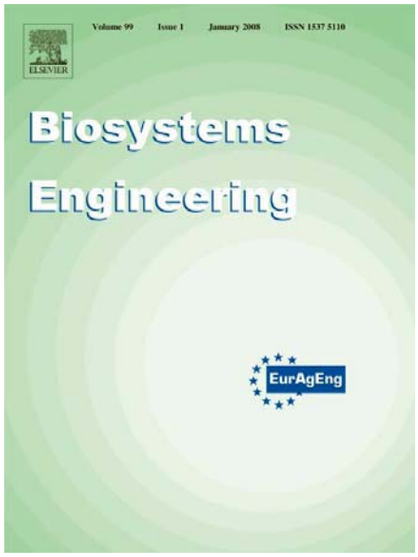


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IAgrE

EurAgEng

The Managing Editor of ***Biosystems Engineering***, ***Dr Steve Parkin***, has kindly summarised some of the papers published in the last three issues which he thinks may be of interest to IAgrE members

**Biosystems Engineering**

**Volume 112, Issue 1, May 2012, Pages 42-48**

Cutting energy characteristics of Miscanthus x giganteus stems with varying oblique angle and cutting speed

**Phillip C. Johnson, Clairmont L. Clementson, Sunil K. Mathanker, Tony E. Grift, Alan C. Hansen**

Department of Agricultural and Biological Engineering, University of Illinois at Urbana-Champaign, Urbana IL, USA

Previous studies highlighted the need to develop efficient harvesting and size reduction equipment for miscanthus. This study investigated the effect of blade oblique angles and cutting speeds on cutting energy. Cutting blade speed, before and after severing a single miscanthus stem, was used to calculate the cutting energy. The cutting energy was determined at three oblique angles and three cutting speeds. A 60° oblique angle cut required the least energy to cut miscanthus stems averaging about 7.6 J whilst a 30° oblique cut averaged 8.7 J and a straight cut averaged 10.1 J. In general, the 60° oblique cut performed best since it required average lowest specific energy (energy per unit of stem diameter) of 741.9 J m?1 at an average cutting speed of 12.9 m s?1. The specific cutting energy was directly proportional to the cutting speed and cutting energy was proportional to the stem diameter. The results indicate that optimisation of cutting speed and blade oblique angle will result in significant energy savings and increased efficiency of miscanthus harvesting machinery.

**Volume 112, Issue 2, June 2012, Pages 75-81**

Development of a device for sampling cattle breath

**Claire Turner, Henri Knobloch, John Richards, Peter Richards, Toby T.F. Mottram, David Marlin, Mark A. Chambers**

Cranfield Health, Cranfield University, MK43 0AL, UK
Solutions for Research, Wrest Park, Silsoe, MK45 4HP, UK
eCow Ltd, Innovation Centre, University of Exeter, EX4 4RN, UK
David Marlin Consulting Ltd, PO Box 187, Newmarket, CB8 1BA, UK
Veterinary Laboratories Agency, Addlestone, Surrey, KT15 3NB, UK

Diagnostic tests for some conditions affecting cattle, such as tuberculosis, are often expensive and required over a prolonged period, so that the diagnostic tests involve more than one visit by a qualified vet. An alternative rapid and non-invasive diagnostic test would be desirable. One possibility is the use of breath testing, which has been shown to have diagnostic potential in humans. The development of a device for taking a representative breath sample from a bovine animal is described. Six devices using different configurations were assessed, over three separate testing days, for their ability to take a representative breath sample which does not cause undue stress to the animal and for the ease of operator use. The main factor affecting the sample integrity was dead space; however temperature also played a role. The best samples causing the least stress to animals were taken using a nostril sampler. The nostril samplers were then used to take breath samples from cattle with and without tuberculosis which were then analysed using selected ion flow tube mass spectrometry and gas chromatography-mass spectrometry to demonstrate proof-of-principle.

**Volume 112, Issue 4, August 2012, Pages 359-369**

Improvement of air distribution in a fixed-bed dryer using computational fluid dynamics

**Franz Román, Vitus Strahl-Schäfer, Oliver Hensel**

University of Kassel, Nordbahnhofstr. 1a, 37213 Witzenhausen, Germany

Uneven air distribution is a major problem in the performance of batch dryers. Zones receiving a higher airflow rate dry faster, and this heterogeneity reduces efficiency by increasing energy consumption and drying time. Simulations showed that this configuration produced a poor air distribution. Trying to overcome this problem, simulations were conducted with a modified design consisting of a wide inlet into the plenum. Results showed an almost perfectly uniform air distribution. Drying trials with woodchips were conducted for the original and modified dryer configurations, during which the drying course and airflow of each box were measured. Results for the original configuration showed, like the simulations, that there was a wide variation in airflow among the boxes, and also the expected wide differences in drying rate. A very significant correlation between these two variables was found. The modified version resulted in much more homogenous air distribution and drying rates and therefore represents a viable approach to improve dryer performance.

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Landwards
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## THIS ISSUE



## EDITORIAL

# Out of this world . . .

FEEDING the world's future population is such a complex prospect that it requires all the relevant agencies, from across the world to be 'singing from the same hymn sheet'.

Yet there is little sign that this is likely to happen from either scientific nor political perspectives.

Only in the past month, a major conference on future water supply for agriculture has produced a prediction that food shortages could force the world into switching to a vegetarian diet over the next 40 years in order to avoid catastrophic shortages.

The issue has been exacerbated by the present drought conditions in the US and Russia and lower than average rainfall across Asia which has caused a spike in commodity prices.

Many of us have sat at conferences and heard the issue brought into sharp focus with the phrase 'they are not making any more land these days'.

Coincidentally, the report was issued during the week that saw the death of Neil Armstrong and the successful landing of an exploratory vehicle on Mars.

It seems such a long time since those of us of a certain age watched the moon landing live on television. At the time, we were promised that many new technologies would flow from that breakthrough moment over 40 years ago.

There will have been some advances, notably in battery cell technology and in the composition of materials - but in general they were limited and world governments haven't continued to pour huge funds into space exploration.

It would be easy therefore to conclude that funding has to be directed at solving the acute need to feed future generations on our planet, rather than spend huge sums in getting to other planets far, far away.

And yet, whilst we appear to be a long way from the writings and predictions of Arthur C Clarke, nonetheless the reality of a diminishing land bank on Earth, and the prospect, however remote, of being able to identify and access resources on other planets, would suggest that we need to keep an open mind.

We cannot make any more land on Earth, but elsewhere . . ?

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*The views expressed in Landwards editorial are those of the Editor, and do not necessarily reflect those of the Institution*

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*IAgrE is a founder member of* ***EurAgEng,*** *a licensed body of the* ***Engineering Council*** *and a founder constituent of the* ***Society for the Environment***

## Professor Bill Day launches Blog

PROFESSOR Bill Day, Fellow of IAgrE and consultant in agricultural engineering research, has launched a blog entitled *"Food production: what about engineering?"*


Professor Bill Day

Bill Day is Editor-in-Chief of the international journal Biosystems Engineering. He recently helped IAgrE draft their report *'Agricultural Engineering: a key discipline enabling agriculture to deliver global food security'*. He worked at Rothamsted Research and Silsoe on agricultural research from 1974 to 2006.

Read his blog at *www.foodsecurity.ac.uk/blog*

## Young Engineers Competition 2013

THE Aston Martin works in Newport Pagnell, "a Super Dealership for Servicing", will host the IAgrE organised Young Engineers Competition next year.

This event is part of the IAgrE's "Raising the Profile of the Industry" campaign and is designed to raise the awareness among young engineers of the width and vibrancy of our industry. The challenge will be to create a remote or radio controlled vehicle to produce the best performance on a standard test track from a set of standard wheels, a battery and maximum dimensions.

**Date**
Weds 20 March 2013

**Venue**
Aston Martin, Tickford Street, Newport Pagnell, Bucks, MK16 9AN

**Website**
*www.iagre.org/careers/devcareeryecomp*

# Krone UK Ltd achieves LTA Level 3 accreditation

THE Institution of Agricultural Engineers (IAgrE) is delighted to announce that Krone UK Ltd's service training courses have been accredited by the LTA Scheme, following an independent audit on behalf of the Landbased Technician Accreditation (LTA) scheme.

Krone UK Ltd operates its sales, service, parts support and training operations from a modern facility in Micklefield, Leeds. The training area, inside the parts warehouse, can accommodate multiples of the largest Krone machines with the factory providing training support materials and training rigs of the highest quality.

LTA Assessor David Kirschner said, "Training is held in high regard at Krone. The training rigs used are without doubt amongst the best in the industry and the company's approach and commitment to training is driving up service support standards and the continuance of LTA within the Krone dealership network."

Robert Thornborrow, Krone UK Aftersales manager said, "We at Krone UK are delighted to have achieved this LTA accreditation showing that our training conforms to the current benchmark in the UK LTA training scheme. We place a high priority on training as the after sales service carried out by dealers and Krone UK, is key to supporting the end user.

"In the current economic climate and with the harvest windows becoming ever shorter the efficiency and speed of dealer support becomes more and more important. We look forward to working closely with AEA, BAGMA and IAgrE moving forward to enhance our training to give Service Technicians both the best possible working knowledge of Krone machines and the opportunity to follow the LTA career pathway."

The Landbased Technician Accreditation (LTA) scheme was launched in 2007 to provide a readily recognised, industry benchmark for acknowledging and identifying the skill levels and competence of service technicians across the agricultural industries.

IAgrE has recognised and approved a number of manufacturer's apprenticeship schemes for dealer technicians. These are run in conjunction with manufacturers' training courses and form part of the industry's LTA Scheme. The scheme provides a clear career path within the sector. Membership of the Institution forms part of the scheme, as does registration with the Engineering Council as an Engineering Technician.

### Heralding from a non-farming background

# Huw's the Welsh Ag Society's Student of the Year

A STUDENT in south-west Wales, signed-up for an agricultural course with a non-farming background and in a space of only two years, has won the prestigious Royal Welsh Agricultural Society's 2012 Student of the Year award.

18 year-old Huw Rees from Pembrokeshire has really impressed his tutors at Coleg Sir Gâr's Gelli Aur campus in Carmarthenshire. "I'm so proud of Huw," said Mary Richards, lecturer in agriculture. "Not being a family resident on a working farm, he wasn't eligible for Welsh funding to complete an AI course, so he paid for it himself and completed it in his first year of study, which is an unusual achievement."


The college released Huw so that he was able to complete an AI and foot trimming course and his commitment paid off with an offer of an assistant herdsman at a 750-herd farm at Langdon Mill Farm in Pembrokeshire, where he is currently employed.

Mary Richards added, "Huw is proof that someone with an interest in agriculture, with the right support and commitment, can gain a profitable career within the industry and I'm delighted to have played a part in nurturing him towards his success."

Now that Huw has completed his course, he's looking towards a future possibility of gaining a farm tenancy in his home county and possibly returning to college to complete a one-day-a-week HNC in agriculture.

Launch of report takes place

# IAgrE respond to Foresight


THE Institution of Agricultural Engineers (IAgrE) has launched a report in response to the UK Government's Foresight Project: Global Food and Farming Futures

The report, stimulated by discussions with the Government's Chief Scientific Adviser and others, is entitled '*Agricultural Engineering - a key discipline enabling agriculture to deliver global food security*.'

There are formidable challenges, which will increase markedly over the next 40 years, if we are to improve global food security under the pressure of increasing world population, little or no new farm land, and the need to conserve natural resources and minimise environmental pollution. Sustainable intensification of agriculture is needed and the report emphasises the important role agricultural engineering will play in delivering this goal. It highlights the opportunities that engineering, allied with other disciplines, is already offering as part of a vision for future global food security.

"The UK response to global food security will be much stronger if agricultural engineering is recognised as a critical component, capable of breaking down traditional barriers and enhancing multidisciplinary approaches to the challenges," said Andy Newbold, President of IAgrE.

The report advocates:

- **a new approach to encourage strategic engagement of public and private sector stakeholders for agriculture and the food chain with the UK engineering sector, from education and research through to business and practical application**
- **the development of education and training in agricultural engineering**
- **the establishment of an active research programme in engineering for agriculture**
- **a partnership approach to translating research and innovation into practice**

The report also illustrates the importance of agricultural and biosystems engineering in contributing to advances in technologies, processes and knowledge that can help make farming methods and practices more sustainable, while having less impact on the environment.

"Advances in agricultural engineering have delivered some of the most significant developments we've seen in modern farming. These aren't technologies of tomorrow, they are already being used by many farming businesses today, however, we've only seen the tip of the iceberg in terms of what this area of R&D can deliver for our industry in the future," said Peter Kendall, President of the NFU.

L-R: Government Chief Scientist, Sir John Beddington and IAgrE President, Andy Newbold

"Deploying new and existing technologies, processes and knowledge that help make farming methods and practices more sustainable, while having less impact on the environment will be important. I welcome this report in highlighting the importance of agricultural and Biosystems engineering in contributing to these advances," said Government Chief Scientist, Sir John Beddington.

"This report has been welcomed by key stakeholders. It is an important opportunity to advance engineering as a key discipline for agriculture and to encourage a wide commitment to education, training and research to deliver tangible benefits not just in the UK but globally," concluded Andy.

The report is available for download at www.iagre.org or a hard copy can be requested from the IAgrE Secretariat.

IAgrE Executive has set up a Working Party to take forward the recommendations of the report working closely with other stakeholders.

# Hats off to East Durham

A NORTH-east college has taken delivery of some exciting state-of-the-art equipment to aid teaching and learning on its arboriculture and horticulture courses.

East Durham College's Houghall Campus in Durham has recently taken delivery of a brand new set of intercom helmets to aid communication between students and staff, following successful trails with the new technology.

Campbell Sinclair, an arboriculture lecturer at the College, said, "Communication between a trainee tree surgeon 50 foot up a tree with a chainsaw, and a lecturer on the ground can be difficult. So these new helmets have helped students and tutors greatly."

The noise cancelling microphone on the 2talk Arborcom helmets filters out the background noise, allowing speech to be heard clearly and concisely. The excellent passive attenuation also ensures hearing is protected at all times.

## Otely and Easton given permission to merge

Two specialist agricultural colleges in Suffolk and Norfolk have been given government approval to merge.

Otley College, near Ipswich, and Easton College, near Norwich, specialise in subjects including agriculture, horticulture and animal care.

The Department for Business Innovation and Skills said at the time of going to press, a new institution, called the Easton & Otley College, could formally be created in August.

The colleges serve about 3,000 students across the two counties.

David Lawrence, principal designate for the new institution, said: "We're both quite small institutions and we've been working together in partnership for over three years by sharing administrative and human resources staff.

"It's about meeting changing industry demands and making sure we get our students into long-term careers.

"The industry is becoming ever more technical and it's going to make it easier to share specialised staff and equipment, build on each other's existing skills and use public money more efficiently."

Mr Lawrence said they would not be moving students or large numbers of staff between the two sites and they did not expect to make any redundancies.

### Media group purchases major farming event

# LAMMA show buy-out

LAMMA, the UK's premier farm machinery, equipment and services event, has been acquired by Briefing Media, parent company of *Farmers Guardian*. The publication has been the event's media partner for a number of years.

Briefing Media's directors believe the event, which continues to grow in popularity more than 30 years after it was founded, provides a fantastic experience for exhibitors and visitors alike, and are keen to build on its successful format.

The LAMMA Show has been bought by Briefing Media

Neil Thackray, co-founder and director of Briefing Media said, "The team behind Lamma has built a superb event which is much admired within the industry. We wish to build on this outstanding work, and to continue to grow Lamma for the benefit of exhibitors and visitors alike.

"We are acutely aware of the factors which make this event a success, and we aim to ensure this continues."

Cliff Preston, who has been pivotal to Lamma's development, will continue to work on Lamma as part of the Briefing Media team.

John Sartain, chairman of Lamma said, "Since Lamma was founded in 1981, a number of dedicated and enthusiastic people have worked very hard to build what is today a very successful event. However, over recent years the Directors have taken great care to develop a succession policy which will not only enable the show to continue to thrive but at the same time protect the ethos of the event.

"I believe that Neil Thackray, and his fellow directors at Briefing Media, fully appreciate the unique nature of the Lamma Show and are committed to protecting and enhancing the LAMMA heritage in the coming years."

The next Lamma event will be held at the Newark showground on 16-17 January 2013.

## Ransomes in college deal

ASKHAM Bryan College, the centre of educational excellence for land-based careers, has signed a rolling 12-month preferred supplier agreement with Ransomes Jacobsen.

Askham Bryan has been at the forefront of training in sports turf maintenance for over thirty years, offering various routes of learning from Level 2 and 3 Apprenticeships through to Foundation Degree. From September 2012, this will be enhanced with a full time Level 2 course in sports turf maintenance.


L-R: Jim Whitton, regional sales manager, Ransomes Jacobsen; Steve Prinn, lecturer, Askham Bryan; Stuart Green lecturer, Askham Bryan and Chris Barnacle, sales representative, Golf and Turf Machinery

Ransomes Jacobsen and their local dealer Golf and Turf Machinery have formally signed this agreement to enable the college's full time and work-based sports turf apprentices to have access to modern and innovative turf maintenance equipment.

## Just Ask R.A.B.I

*R.A.B.I (Royal Agricultural Benevolent Institution) already helps around 2000 people every year.*

*However, they say they know they don't reach every farmer and farmworker who may be in need. To tackle the issue they are launching a year-long campaign to raise awareness.*

*'**Just Ask!**' encourages farming families to contact them if they face hardship. As part of the initiative they have introduced a new confidential helpline, the number is 0300 303 7373. It's free if anyone is calling from a landline in England or Wales. Costs from mobiles will vary according to the service provider.*

*For more information about the campaign and how R.A.B.I can help, visit their website at www.rabi.org.uk.*

# FE needs backing and support

CEO VIEW

I HATED school. Just about every minute of it. My Headmaster (of a grammar school no less - how I ever got there is still a mystery) did not believe in late developers. Luckily, C A Goodger, then Principal of Rycotewood College, did and six months after failing 'O' level maths at school, I was to pass applied maths at Rycotewood. Thank you Wilf Ings (maths lecturer. I believe he also played a mean jazz piano!).

Some 35 years later, just after joining the IAgrE Secretariat, I attended an Institutions Secretaries meeting at the Engineering Council where the problems of school leaver numeracy (or lack thereof) were discussed. At the time, GCSE maths was counted in the statistics which determined secondary school league tables. This meant that those who were not considered to be a guaranteed pass in maths were not put in for the exam. Great for school statistics but sad for those who were perhaps late developers.

Perhaps a little naively, I asked why we (i.e. the 30 or so engineering institutions) didn't ask government to remove maths from the league tables. There was a stunned silence in the room followed by a (not very) sotto voce comment from the CEO of one of the bigger institutions "hell will freeze over first". I assume he meant that hell would freeze over before government would respond to such a request but I suppose he may have meant that hell would freeze over before "we" would rock the boat in such a manner.

Obviously others were braver than we pathetic bunch and some years later maths was indeed taken out of the league tables. But for a variety of reasons, maths was still not given the priorities it needed and we now find ourselves with recent government figures indicating that 49% of the UK working-age population do not have the numeracy levels expected from an 11-year-old.

With only 2% of primary school teachers with a maths degree and 3% with a science degree, it is little wonder that we as a nation struggle with numbers. And come on teachers, just because we engineers are too busy 'doing' and 'making' things to have the time to blow our collective trumpets, please tell your learners that without engineers and scientists, they would be walking to school, living in makeshift wooden shelters and hunting and gathering to survive.

If it is true that the economy needs a boost from major infrastructure projects then we will struggle to find the engineers and technicians required to carry out the design, construction and maintenance of such projects. Not to mention the need to find solutions to the impending challenges posed by increasing world populations and climate change.

And so it will be the undervalued and beleaguered Further Education sector which will bear the brunt of the numeracy deficit. Just as Rycotewood bore the brunt back in 1965 with a certain CRW (and, I hasten to add, others like me). The difference was that back then, FE was valued, thriving and well resourced.

The apparent need to pander to government (and their so called special advisors) rather than tell them some home truths seems to prevail. If we had all been braver at that Secretaries Meeting back in 2000, we might not be in the situation we are now.

So here we go . . . *Extractum digitum* Mr Gove and give the FE sector the backing and support it needs.

Christopher Whetnall

## Excellence in Ag journalism awarded

TWO members of the British Guild of Agricultural Journalists were treated to a day at the Olympic Games as winners in the annual Power on the Farm journalism awards.

Sponsored by Perkins Engines Co Ltd of Peterborough for the past 40 years, the Guild award recognises the best in agricultural journalism related to the broad topic of 'power'.

Devon-based freelance Olivia Cooper took the top prize for an article published in *Farmers Weekly* that highlighted a growing skills shortage in the agricultural engineering sector. The industry needs a steady flow of new talent with skills in electronics, software and diagnostics; without them, it will become increasingly difficult to properly maintain and repair farm equipment.

Winners Olivia Cooper and Emma Penny with Nigel Basely of Perkins Engines

The judges said of the piece: "It raised some important and topical points and was written in a way that made a dry subject more interesting and engaging. It is clearly of great relevance to the industry and provided information which those looking to be involved in farm machinery would need to know."

Olivia's article notes that fewer colleges now offer the specialist training needed and those that do find it difficult to fund the increasingly high-tech equipment needed to give students experience of working on modern machinery. It also provided information on courses available to young people interested in this field.

The runner-up award went to the editor of *Farmers Guardian*, Emma Penny, for an article describing a new type of anaerobic digester that could offer farmers a cheaper, practical way of generating heat and power on-farm.

# Congratulations to graduating New Holland technicians

THERE were celebrations recently as a fresh group of apprentices graduated from New Holland's special three-year course to equip its dedicated team with the latest knowledge and skills.

Twenty-three graduates returned to their New Holland dealerships with a BTEC National Diploma in Land-based Technology after completing their training at Reaseheath College in Cheshire.

The specialist, semi-residential course is partly funded and run by New Holland, and involves an extra five modules specific to its range of tractors and harvesting machinery, such as hydraulics, diagnostics and electronics.

Students hail from dealerships around the country: as far afield as Aberdeenshire in Scotland, Wrexham in Wales and Cheltenham in England.

They were presented with certificates by New Holland's After-Sales Commercial Manager, Rob Alker, at a ceremony at the college on Tuesday May 29th.

He said: "Congratulations to all the trainees who have worked so hard to complete this challenging course.

"Their careers will benefit immensely from what they have learned during their time here and I have no doubt their new-found knowledge and expertise will be fully appreciated by grateful customers."

Every graduate is also qualified to apply for LTA status at Level 2.

Tim Ball, from Reaseheath College, has the job of liaising with New Holland, the dealerships and the college itself, where the course has been run since 2002.

He said: "The performance of all has been extremely good and the success rate 100 per cent. There have been some high achievement grades throughout the group. The apprentices themselves are very happy with the time they have spent here.

One of the dealerships taking part was Francis Bugler's branch in Beaminster, Dorset. Managing Director John Bugler said, "The course has definitely raised the profile of the agricultural service engineer and given it the recognition it deserves.

"It is an improvement on the traditional college training that tended to be too general to meet a New Holland dealer's specific requirements – the Dealer University is more focused on what we need and at a high standard too."

# Bomford promote UK agricultural engineering

## European trade journalists invited to Salford Priors

BOMFORD say they are proud that for many years they have flown the flag for British agricultural machinery manufacturing throughout the world.

Export has always played a major role for the company's hedge and grass maintenance products, with a recent growth area being central and eastern Europe. Here there is an increasing demand for the company's products, mainly in the agricultural but also the amenity maintenance sectors.

In recognition of this, Bomford recently held a press meeting at its Salford Priors headquarters in Warwickshire, at which they presented their latest product ranges to journalists representing 16 different agricultural and amenity machinery publications from Germany, Romania, Bulgaria, Hungary, Slovenia, Czech Republic and Poland.


European journalists watching a hedge-cutting demo at Bomford

Following a presentation of the latest Bomford product ranges, they then had the opportunity in the afternoon to see a cross section of Bomford machines in action.

In addition to demonstrating the latest Hawk Evo fitted with flail and Pro-Saw heads, the demonstration included the new Bomford Rotary Ditch Cleaner and the Buccaneer, which both attracted considerable attention. There was also particular interest in the Electronic Proportional (EPP3) and Intelligent Control System (ICS) control systems available for reach arm mowers.

Commenting on the meeting, Marketing Manager Chris Tucker said, "We were delighted with the success of the day and in particular the exceptional level of attendance and support from the European press."

# IAgrE meet with All Party Parliamentary Group to determine Foresight Report Action Strategy

THE meeting, chaired by Lord Cameron chair of the All Party Parliamentary Group on agriculture and food for development was held to determine the next steps following the publication of IAgrE's report 'Agricultural Engineering: a key discipline to deliver global food security'.

The report, which was developed at the instigation of Sir John Beddington in response to the Government's Foresight Project: Global Food and Farming futures, was discussed with representatives from the Agriculture and Horticulture Development Board, Biotechnology and Biological Science Research Council and the Technology Strategy Board. A number of IAgrE members, with industry, research and education/training interests were also in attendance.

As a result of recommendations from the report, IAgrE, working together with the Government Office for Science, the Research Councils, Defra and the Department for International Development will establish a programme aimed at strengthening coordination within the engineering research community and industry that serves the agrifood sector. The discussion group agreed that the engineering community needs to be coordinated and build a network which can work together to develop a strategy for 'engineering for agriculture'. A concerted focus on engineering for agriculture, technology and practical solutions is long overdue.

> "... A concerted focus on engineering for agriculture, technology and practical solutions is long overdue"

The meeting concurred with the concerns expressed in the report that issues surrounding the skills deficit needed to be urgently addressed.

"The importance of the role of the engineer in agriculture, is not only about developing machines and efficient and effective use of water and chemicals, but also about a better understanding of soils and their interactions with these elements," said Chris Whetnall, chief executive officer of IAgrE.

Lord Cameron, chair of the All Party Parliamentary Group on agriculture and food for development

# Land-based colleges merge

## Barony, Elmwood and Oatridge Colleges and SAC

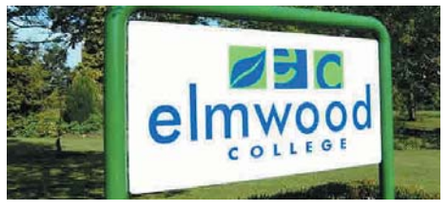
**BARONY, Elmwood and Oatridge Colleges and SAC have merged.**

**The Boards of the four partners believe the merger presents a unique opportunity to combine and enhance their valued strengths. Their vision is of a dynamic and successful approach to Higher and Further Education, high quality research and consultancy provision within a single, integrated organisation.**

**The merge follows consultation and planning among the college partners, their staff, students and stakeholders. The new merged College officially came into existence on 1 August 2012 following approval by the Cabinet Secretary.**

**The new College is titled 'SRUC'. It will become the first University College in Scotland in a process that will take a further 12-18 months but will culminate in SRUC being known as 'Scotland's Rural University College'.**

**The college partners have appointed SAC's Chief Executive & Principal, Professor Bob Webb, as Chief Executive & Principal of SRUC.**




**Financial due diligence took place before the merger was finalised, a process which was vital in securing a strong, sound and successful future for SRUC.**

**A Shadow Board, with representatives from all of the colleges, was established to drive progress and action ahead of 1 August, when the new SRUC Board assumed responsibility.**

**SAC Consulting and the services it provides to its clients will continue uninterrupted as part of the new SRUC.**

**Andy Robb, Chairman of the Merger Partnership Board said: "SRUC will bring together the features of four very successful colleges in their own right. It will be the first fully integrated tertiary education, research and consultancy institution for the rural and land-based sectors in Europe".**

**"We are very excited about the fact that, for the first time in Scotland, learners and stakeholders will have comprehensive and integrated expertise available to them for the full range of skills, training, education, research and business support."**

**Lord Jamie Lindsay, Chairman of the new SRUC Board, said, "SRUC will serve a national and international constituency and be an organisation of which staff, students and indeed Scotland as a whole can be proud."**

### Tillage-Live tickets now available

DISCOUNTED tickets are now available for Tillage-Live which takes place on Wednesday 3rd October at Westfield, Haddington, East Lothian.

The national event is aimed at professional farmers growers and contractors focused on making the most of the latest technology and techniques.

Tickets are available via the Tillage-Live Website (*www.tillage-live.uk.com*) at £7.50 per car (£10 per car on the day).

For any more information visit the Tillage Live website, or contact 0845 4900 142.

# Over 1100 at the CIGR-AgEng2012 International Conference of Agricultural Engineering

## Over 1,500 scientific papers presented and individuals honoured at Awards Ceremony

VALENCIA, Spain, welcomed over 1100 attendees from 71 different countries around the world to CIGR-AgEng2012.

They enjoyed an interesting and lively conference by the shores of the Mediterranean during July 8-12. Initial numbers show that a total of over 1500 scientific papers were presented (715 oral and 818 posters) in 14 parallel sessions.

Plenary speaker Christopher Wathes, who spoke at this year's Landwards Conference, encouraged people to think about the welfare issues of livestock production

CIGR-AgEng2012 was designed as an umbrella meeting allowing several simultaneous thematic conferences and this format promoted interactions between CIGR and EurAgEng members and their Working Groups as well as others attending. The Special Parallel Conferences covered wide ranging topics, from *Computational Fluid Dynamics in Agriculture*, *Computer Image Analysis*, *Automated Off-Road Equipment* and *Livestock Environments*.

Three plenary presentations were thought provoking covering animal welfare, robotics and automation and technology for developing countries and leading to plenty of discussion.

The conference was hosted by the International Commission of Agricultural and Biosystems Engineering (CIGR), the European Society of Agricultural Engineers (EurAgEng) and the Spanish Society of AgroEngineering (SEAgIng). In particular, special thanks go to previous EurAgEng President, Prof Florentino Juste, for the foresight and flair in organising this 2012 International Conference at the superb Congress Palace.

Apart from the formal programme there was plenty of networking at the busy coffee and lunch times, where even the Presidents of EurAgEng, CIGR and ASABE managed to meet briefly. Workshops and project meetings, often with a theme of European research funding, included the '*Agricultural Engineering and Technologies*' group and the '*Agriculture and Energy Efficiency*' project and a chance for Eastern European participants to meet EurAgEng.

Robert Kaufmann of Agroscope, Switzerland, became the new President of EurAgEng during the conference, taking over from Prof Peter Schulze Lammers. Robert Kaufmann will be in post until the AgEng2014 Conference in Zurich, which Robert is also organising.

A packed house at CIGR-AgEng2012 in Valencia, Spain

### Award Ceremony

An Award Ceremony took place at the event where EurAgEng and CIGR chose to honour their prize winners for 2012.

Four teams of authors collected an Outstanding Paper Award from the editors of *Biosystems Engineering*, the EurAgEng Official Scientific Journal.

They were chosen by the Editorial Board from a shortlist of 11 papers submitted to Biosystems Engineering over the last two years.

Congratulations go, firstly to D. Bochtis, C. Sørensen for '*The vehicle routing problem in field logistics: Part II*'.

Secondly to S.-W. Hong, I. Lee, H. Hwang, I. Seo, J. Bitog, K. Kwon, J. Song, O. Moon, K. Kim, H. Ko, S. Chung for '*CFD modelling of livestock odour dispersion over complex terrain: Part II, Dispersion modelling*'.

Thirdly to P. Sonneveld, G. Swinkels, J. Campen, B. Tuijl, H. Janssen, G. Bot for '*Performance results of a solar greenhouse combining electrical and thermal energy production*';

Finally to B. Vanthoor. C. Stanghellini, E. Henten, P. de Visser for '*A methodology for model-based greenhouse design: Part I, a greenhouse climate model for a broad range of designs and climates*'.

Demetres Briassoulis from Greece, Ettore Gasparetto of Italy and Peter Pickel from Germany, and past President and organiser of the conference, Florentino Juste of Spain, were all honoured with the Society's Recognition Award for their efforts in leading and promoting EurAgEng.

EurAgEng has future conferences in Hannover: Land.Technik-AgEng 2013, 8-9 November, and in Zurich AgEng 2014 for 6-10 July while CIGR have the 18th World Congress 16-19 September 2014. CIGR and EurAgEng meet up again for another international conference in Aarhus, Denmark, 26-29 June 2016.

Peter Schulze Lammers (left) and Bill Day (right) with the *Biosystems Engineering* Outstanding Papers 2012 recipients.

# Invention, innovation and initiative

## IAgrE President, ANDY NEWBOLD, gains an insight into the forest engineering world with a visit to the FEG Symposium

I RECENTLY had the privilege to attend the annual FEG (Forest Engineering Group) Symposium at Newton Rigg in Cumbria, with the unexpected honour of being invited to sum up the day.

This has brought about a degree of brow furrowing and sweaty palms from your correspondent on the basis of his somewhat sketchy forest engineering knowledge and the fear of being 'rumbled' by the delegates as something of an outsider to boot. However the convener having done a great job of convincing me that ignorance is an advantage for this role (ever since I have become President people keep saying this to me!) I set about to learn a little more and treat the day as a CPD opportunity.

I was not disappointed. The day's title was '*Innovation for Survival*', however in the summing up I suggested in the light of what I heard that this should have been retitled '*Innovation to Thrive*', as not only was there a wealth of excellent engineers within a brilliant, topical and exciting programme, but the day provided a wonderful insight into a industry with a great future. Once I started to consider wood as a growing crop, my conversion began and by the end of the day I was positively evangelical about forest engineering.

Credit is due to FEG for a stimulating symposium and to acknowledge the hard work, which went into the event. Well done, it was a pleasure to be able to take part.

ENGINEERS are expected to innovate (its what we do), to make the most of what's about and lying to hand. With this spirit of adventure firmly in mind I have set about writing this edition's musings on the train!

So what resource and inspiration is to hand? First, the discarded edition of the *Scottish Sun* newspaper on the train (not quite the *Church Times* or my regular read but no matter).

On page 23 under the headline '*15,000 Calorie Burger Is Vast Food*' is an exclusive about the 'Judgement Day' burger served up in a Scottish cafe, which contains the same calorific content as six healthy adults need in a day. My observation is that we have a tough job ahead convincing others of the need for safe, secure food and agricultural engineering when, in a starving world, the popular press consider a story such as this newsworthy.

AS I look out of the window heading north in late August, harvest is not in full swing. It is stop start to say the least, not to mention variable and very wet by the look of things.

And yet as Agricultural Engineers we have lots to take heart from. In years past a harvest like this would have been a disaster for all concerned. Yet we can now still harvest with tracks, travel on wet fields with low profile and low ground pressure tyre equipment, measure and monitor crop yields, moisture content and temperature with ease and accuracy whilst maintaining crop condition, drying and cleaning it quickly.

This year will provide challenges for soil structure, from machinery damage. But again the appliance of some basic soil science and investment in a shovel to dig a hole, will be worthwhile this autumn, prior to hooking the cultivation train on the back of the quadtrac, or indeed tracked tractor, irrespective of paint job!

I HAVE been heartened by the Olympics coverage this summer.

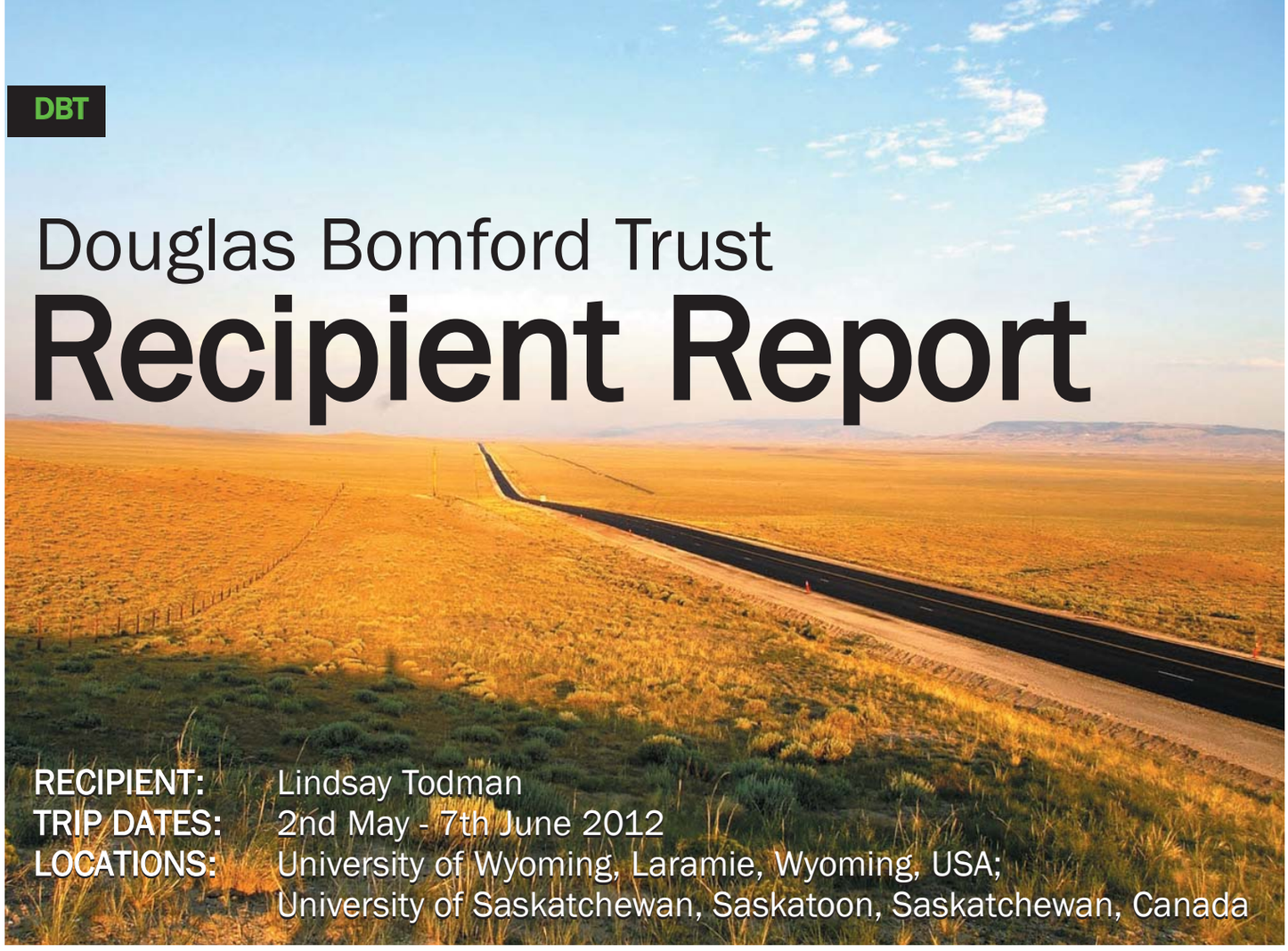
The opening ceremony paid tribute to our industrial heritage and also the results showed Great Britain with a disproportionate amount of medals for the size of country. Well done team GB. The country has punched above its weight.

Oh well, back to my train journey! I wish you well this Autumn and please do be in touch if you would like to catch up.

> "... by the end of the day I was positively evangelical about forest engineering"

DBT

# Douglas Bomford Trust
# Recipient Report



**RECIPIENT:** Lindsay Todman
**TRIP DATES:** 2nd May - 7th June 2012
**LOCATIONS:** University of Wyoming, Laramie, Wyoming, USA; University of Saskatchewan, Saskatoon, Saskatchewan, Canada

## INTRODUCTION

FOR my PhD research I am investigating a novel irrigation system that desalinates water as it is applied for irrigation.

Desalination occurs due to a polymer membrane that allows water to cross but prevents the transport of salt. To irrigate, the polymer membrane is formed into a tube, which both treats saline water and distributes water to the crop. The polymer tube is buried in soil and filled with saline water.

If the surrounding soil is dry there is a moisture gradient that draws water across the membrane, whilst salt is retained. Plants can then access this water, and in doing so dry out the soil and maintain a potential gradient to draw more water from the pipe. Thus, in addition to treating saline water, this irrigation method also inherently responds to the plant water use.

The aim of my research is to quantify the flow rate from the irrigation tube in different environmental conditions. With this knowledge the system can be implemented with sufficient tubing to ensure the crop water requirement will be met. Throughout my PhD most of my work has been conducted in the laboratory, where carefully controlled conditions can be manipulated and the response observed.

These experiments were designed to investigate the fundamental processes that affect the flow across the membrane in different soil environments. These insights were also used to develop a conceptual model of the irrigation system which I am now using to develop a mathematical tool to predict the flux under different conditions.

The membrane used in this study was synthesised and supplied by DuPont de Nemours.

The aims of this trip were:

1. To disseminate my research findings to other research groups also investigating this irrigation system (both locations).
2. To visit a field site, discuss with the engineers who are implementing the system in the field and to identify other factors that were not included in my laboratory studies (Wyoming)
3. To develop the mathematical model of the system by discussing options with an experienced unsaturated zone modeller (Saskatchewan).
4. To discuss future directions for further research (both locations).

## WYOMING

WYOMING is in the northwest of the USA, it is predominantly a high plain and is semi-arid.

The semi-arid conditions lead to soil salinisation, and salt deposits on the soil surface are a common sight. The main farming activity is ranching and crops are grown almost exclusively for cattle-feed, predominantly alfalfa.

FIGURE 1: Salt build up on ranch land

Although alfalfa can be grown in the region without irrigation, sprinklers are often used to increase yield. Drip irrigation is also becoming more widely used. Water availability is a limiting factor in crop production.

One of the main economic outputs for the region is natural gas production. Significant quantities of water are used during natural gas abstraction and this water is contaminated with traces of methane and other contaminants.

Considerable research is already being undertaken to investigate the effect of irrigating using these waters on crop yield and

FIGURE 2: Field site in Sheridan, Wyoming

soil properties. At the University of Wyoming, Dr Jon Brant and his group are researching whether this membrane irrigation system could be used to prevent contaminants from this water entering the soil.

The main field site for this work is located in Sheridan in the north east of the state. This site of approximately 10 x 20m of established alfalfa is being used to investigate how this membrane irrigation system performs in field conditions.

Whilst the irrigation of the plants is of interest to the researchers, the primary aim is to provide a cheap way to treat water from the natural gas sites. Thus the main interest is in how the presence of the plants increases the flow from the tubes. The site is still in the early stages of the project but it was interesting to discuss the setup with the agricultural scientist in charge of the site and irrigation engineers who are also involved with the project.

There are many additional challenges in operating the pipe in field conditions, these include gophers which may chew through the pipe to access the water and freezing conditions that occur in winter and will affect the longevity of the system.

After my discussions with the agricultural scientist there, we now also plan to conduct some greenhouse tests with different plant types to observe the effect on the flow rate.

## SASKATCHEWAN

THE primary aim of my time in Canada was to develop a predictive model of the irrigation system working with Dr Andrew Ireson at the University of Saskatchewan.

Although this model is still a work in progress, during the three weeks I spent working there I developed the basic model structure. There are some concerns that in general the flow from the system is too low to sustain plant growth in challenging conditions. However, along with the laboratory work, this model suggests that the flow from the tube is limited by the environmental conditions. Thus when there is a higher demand from the crop, more water should be provided.

During my time in Saskatchewan I also went on a field trip to the boreal forests in the north of the province. A number of field sites have been set up there to quantify the carbon and water fluxes from the canopy using flux towers and from the moss and lichen that covered the forest floor using soil gas chambers.

Whilst this had no direct relation to my current work it was interesting to see the instrumentation they used to quantify vapour flows. The soil gas chambers were particularly interesting. The lids were programmed to close intermittently and allow gases released by the lichen to accumulate. The rate of increase of different gases was monitored. The lid was then removed so that the conditions returned to atmospheric.

This could be an interesting way to look at vapour flows through the soil and from the plants in field conditions.

## PERSONAL DEVELOPMENT

AS well as contributing to this current project this trip also broadened my experience of agriculture.

FIGURE 3: Soil gas chamber

### LINDSAY TODMAN: *Career details*

I graduated from the University of Cambridge in 2008 with a Master of Engineering. I then went on to obtain a MSc in Hydrology for Environmental Management at Imperial College London in 2009 where I remained for my PhD.

I am now in the final year of my PhD and am supervised by Dr Michael Templeton and Dr Adrian Butler from Imperial and Dr Andrew Ireson from the University of Saskatchewan.

Both in Wyoming and in Saskatchewan farming takes place on a different scale to that in the UK. Both areas also had significant issues with salt build up in the soil due to the low rainfall of the area and the high evapotranspiration.

This factor significantly affects the cropping choices in the regions.

FIGURE 4: Flux tower

**. . . The site of approximately 10 x 20m of established alfalfa is being used to investigate how this membrane irrigation system performs in field conditions**

# Farm power and Conservation Agriculture:

## The potential for two-wheel tractors in sub-Saharan Africa

by **Brian Sims** (FAO agricultural engineering consultant) &
**Frédéric Baudron** (International Centre for Maize and Wheat Improvement [CIMMYT])


### ABSTRACT

CONSERVATION agriculture (CA) is needed in sub-Saharan Africa (SSA) if we are to achieve the necessary sustainable intensification of food production that is required in the light of projected increases in world population.

CA, as all agricultural production, needs farm power as a necessary input to allow it to grow and become more productive. Two wheel tractors (2WTs) are a power source currently being explored for SSA smallholder farmers. Experience from Bangladesh has shown how successful they can be and how well the supporting infrastructure can develop organically, creating employment and keeping the machinery in productive work throughout the year.

No-till planter development for 2WTs is discussed and examples are given for chisel-tine and strip-tillage machines. CA planters should be developed as a component of innovation networks and all relevant stakeholders should be involved. The best way to supply services to SSA smallholder CA farmers is through well trained and well equipped CA mechanisation service providing entrepreneurs.


### 1. INTRODUCTION

FARM power is an essential input for agricultural production and a lack of it can consign smallholder farm families to a downward spiral of food insecurity and poverty (FAO, 2005).

Sources of farm power in sub-Saharan Africa (SSA) include human, draught animal and engine-power with the human contribution being the most prevalent and contributing around 65% of the total. Draught animals contribute 25% and tractors only 10%. The availability of farm power is seriously depleted by pandemics such as malaria and HIV/Aids which can debilitate key workers in the household. HIV/Aids has a more pronounced impact on the male population so that women tend to be left to attend to agricultural production tasks.

A further factor which exacerbates an already difficult situation is the tendency for people to abandon agricultural work in pursuit of a perceived easier life in towns; so that there is a migration of able-bodied workers from the rural to urban sectors. It is estimated (FAO, 2011) that by 2050 70% of the global population will be urban, compared to the 50% today.

At the same time world population is growing and needs to be fed, clothed and housed. The Green Revolution did a remarkable job in boosting world agricultural production but had the tendency to deplete natural and social capital. Production intensity was increased with expensive external inputs without taking natural resource conservation into account. And its technologies were generally only available to the better off who tended to prosper at the expense of those who could not afford them or did not have access to them. But they did feed people.

Linked to the situation of rising populations and insufficient food production we have the uncertain impacts of climate change precipitated by the Anthropocene. More prolonged dry seasons, more irregular and violent rain storms and reduced reliability of weather patterns are becoming the norm as a result of greenhouse gas emissions ($CO_2$, $CH_4$, $NO_2$) emanating from mankind's polluting activities.

Current agricultural practices are estimated to contribute about a third of GHG emissions. There is little scope on Earth to expand the agricultural area available for growing crops and raising livestock and so the increasing use of crops (especially maize) to produce biofuels puts additional strains on food production.

Against this background the pressing need to produce more food in a more sustainable way becomes apparent and it is why there is an urgent priority to promote methods of sustainable crop production intensification - SCPI (FAO, 2011a). SCPI takes an ecosystems approach to crop production, protecting and nurturing the planet's natural capital (principally soil, and water) and working with it to raise crop yields in a way that can continue to be practised indefinitely.

Central to SCPI is the concept of conservation agriculture (CA) which, in summary, involves the site-specific adaptation of three basic principles.

Firstly by keeping the soil covered with organic matter which means retaining crop residues and augmenting them with specially sown cover crops.

Secondly the soil is not disturbed more than is absolutely necessary to get the seed through the organic mulch and into the soil at the required depth. In effect this means practising no-till agriculture.

And thirdly is the application of the well understood concept of crop and cover crop rotations and associations. Legumes fix nitrogen and fertilise the forthcoming crops; mixing different crop types in the sequence has a major effect on reducing the build up of pests, diseases and weeds.

CA, because it does not involve the employment of energy-intensive and destructive soil tillage operations, drastically reduces the need for farm power and so

can contribute significantly to alleviating the farm power deficit afflicting millions of farm households in SSA.

It is estimated that 80% of agricultural production in the region is from smallholder farmers and so smaller-scale power options are relevant to their situation. Draught animal power (DAP) is one way to improve farm power input supply and can make a difference comparable to that between night and day according to women farmers (FAO, 2006).

However adoption of DAP is constrained by cattle health problems, especially trypanosomiasis (transmitted by the tsetse fly) and East Coast fever, a tick borne disease, and so is common in only few countries and regions (including Ethiopia and Eritrea, Mali and Burkina Faso, the Lake Victoria Region, and southern Africa).

Another option that is currently attracting interest is the use of two-wheel tractors (2WTs) to replace human and draught animals as primary power sources. It is argued that they are much cheaper than conventional four wheel tractors (4WTs) whose introduction into SSA has been somewhat problematic in the past (FAO, 2011b).

## 2. THE ROLE OF 2WTS

2WTs are single-axle light-weight tractors typically fitted with a 10-15 hp engine.

Their traditional function has been to cultivate soil for paddy rice and the 2WT achieves this with a rotary cultivator. 2WTs are not ideally suited to pull conventional soil tillage equipment (such as mouldboard and disc ploughs) because their light weight reduces their tractive capacity (however this does not stop such high-draught implements being supplied to several government-inspired 2WT import programmes in SSA - see Figure 1). The problems of limited traction, high slip and consequent heavy fuel consumption of small-scale machines, including 2WTs, when used for high-draught tasks such as ploughing are discussed by Crossley and Kilgour (1983).

2WTs have been successfully introduced into previously un-mechanised situations to replace draught animal power. One notable example is Bangladesh where, in the space of 20 years small-scale farming has moved from a reliance on muscle power (predominantly oxen) to 2WTs.

After the disastrous flood of 1987 which decimated the draught animal population, duties, taxes, and testing requirements were all removed from imported tractors and the result has been a dramatic rise of

FIGURE 1.
Two-furrow mouldboard plough as supplied with a 2WT in SSA. It was being stored beneath the recipient's bed where it is likely to remain as its draught would exceed the capability of the light-weight tractor. *Photo: Brian Sims*.

2WT imports (mostly from China) from 35,000 in 1992 to over 350,000 today. Today 80% of agricultural land is cultivated using tractor power and this comprises predominantly the use of rotary power tillers for rice production (Biggs et al., 2011).

Even though all farmers, even the poorest, have access to 2WT services in Bangladesh, only one in thirty farmers actually owns one. Others gain access via custom service providers for which there is now a highly developed supply chain.

Supplying cultivation services is a seasonal business and service provision entrepreneurs need to ensure that their expensively acquired tractors are in profitable and productive work throughout the year (or as much of it as possible). This means investing in ancillary equipment and the most important item is a transport trailer for taking produce to market; over 40% of 2WTs are equipped with a trailer in addition to the rotary cultivator. Other uses include water pumping and crop threshing.

The increase in 2WT imports has, perhaps paradoxically, resulted in a marked stimulation of the local agricultural machinery manufacturing, repair and supply market. Locally-made equipment is needed for transport, soil cultivation and crop processing; and the 2WTs need good quality maintenance and repair. Repair workshops have sprung up in response to this demand and they are able to offer rapid, effective service at low cost to the tractor owner.

The local machinery manufacturing industry is not very sophisticated and can best be described as being able to produce equipment that is 'good enough' for local conditions and can be produced at a price attractive to local 2WT owners and operators.

## 3. DEVELOPMENT OF CA EQUIPMENT FOR 2WTS

We have seen that 2WTs do not lend themselves, for technical reasons, to be used with high draught tillage equipment; we have also seen that they have been widely adopted for rotary tillage work.

This evidence has guided the nascent work on developing planters for CA using 2WTs as a power source. Work to date has focused on the use of tined implements to open a slot for seed placement and on adapting rotary cultivators for strip tillage.

The following are examples of some recent developments:

### 3.1. Tined openers

*ARC Gongli*. The most successful development of a no-till planter with chisel-tine openers for 2WTs has been Jeff Esdaile's Australian Centre for International Agricultural Research (ACIAR) - Rogro (*www.rogro.com.au*) machine (Esdaile, 2012).

The original planter was designed with the aim of producing a machine costing no more than USD 500. This is not an easy task as there will always be suggestions for 'improvements' which usually carry a heavy increased cost burden. The machine is now made and marketed as the ARC (ACIAR; Rogro; China Agricultural University) Gongli no-till drill by Gongli Ltd, Shandong, China (Figure 2).

The design concept is straightforward, there are adjustable chisel-point tines on two tool-bar frame members for the delivery and placement of seed and fertiliser. These are followed by press wheels, also adjustable in number and position. Seed and fertiliser metering is by fluted roller and can be adjusted by sliding the rollers laterally along their drive shafts.

A wide range of additional options are being evaluated and include the use of

FIGURE 2.
ARC Gongli no-till planter for 2WTs. *Photo: ARC Gongli seed drill instruction manual*.

**. . . 2WTs have been successfully introduced into previously un-mechanised situations to replace draught animal power**

discs for cutting residue and opening the seed and fertiliser slots, seed coverers and an operator platform.

*Other no-till seed drills with chisel tine openers*. No other machines have been developed as far as the ARC Gongli, but other projects are in the pipeline, to our knowledge there is little readily available published literature on these machines:

*John Morrison (University of Texas)*. This prototype (Figure 3) uses a spider wheel to clear residue from the planting line, followed by a vertical disc and a chisel tine opener for seed and fertiliser delivery and placement. It is mounted on the front of the 2WT which makes it rather difficult for the operator to see.

FIGURE 3. Prototype no-till planter (John Morrison, University of Texas) on trial in Tanzania. *Photo: Peter Chisawillo*.

*Ndume, Kenya*. Ndume (*www.ndumekenya.com*) is a well established agricultural machinery manufacturer which has recently ventured into the market for CA equipment for smallholder farmers. Their trial machine (commercially available) is mounted on a Chinese Kungfu 16 hp 2WT (Figure 4). The seed and fertiliser metering mechanisms are driven from a ground wheel via a chain and wheel transmission.

The pump of an optional sprayer is driven from the engine flywheel shaft. Furrow opening is by reversible narrow chisel-point tines.

FIGURE 4. Ndume no-till planter and sprayer mounted on a Kungfu 2WT. *Photo: Brian Sims.*

*Intermech, Tanzania.* Intermech has developed a prototype no-till planter after having been involved in the construction and field trials of the ACIAR-Rogro and John Morrison machines. The planter (Figure 5) has a mulch-cutting disc followed by a chisel-tine opener for seed and fertiliser delivery and placement.

The two seeding units can float independently and are spring loaded to maintain working depth. Seed and fertiliser metering mechanisms are driven by a chain and sprocket transmission from the front cutting disc.

FIGURE 5. Intermech two-row no-till planter for rear mounting on a 2WT. *Photo: Peter Chisawillo.*

*Department of Agriculture, Thailand*. This machine, already available commercially, is designed for dry direct sowing of rice in low-surface residue conditions. It has single disc openers and only delivers seed at one dose rate (by design). There are spring-loaded seed coverers (Figure 6).

FIGURE 6. Thai Department of agriculture designed no-till drill for dry direct seeding of rice. *Photo: Jack Desbiolles*.

## 3.2. Strip tillage

Chinese 2WTs can be equipped with a seeding box (e.g. the BG-6A) mounted above a rotary cultivator for full-width, full cultivation, one-pass sowing and so are not suitable for CA (Figure 7).

FIGURE 7. Chinese BG-6A full width, full cultivation one-pass seeder. Not CA. *Photo: Brian Sims*

The rotary cultivator can be modified by removing most of the tiller blades so that only narrow strips are tilled (Figure 8). A metering unit - such as the ACIAR-Rogro - can then supply seed and fertiliser to narrow tine openers running in the tilled strips (Figure 9).

The Versatile Multi-crop Planter (VMP) developed in Bangladesh (Haque et al., 2011) can sow up to four lines and one version has rotary blades bolted on to a square cultivator shaft so that row spacing is infinitely variable and rapidly adjusted (Figure 10).

FIGURE 8. Full width rotary seeder / fertilizer modified for strip till sowing. *Photo: Ken Sayre*.

The use of rotating soil cutting blades in strip tillage is a good way to manage heavy residue on the soil surface. Also by cutting seeding slots in the soil in this way, the draught requirement of the planter is reduced to practically zero.

FIGURE 9. VMP seed and fertilizer delivery from an ACIAR-Rogro set up. *Photo: Brian Sims*

The VMP concept is designed to be versatile in terms of the range of crops that can be sown so that its use can be extended over the farming year and so is a useful implement for contractors supplying planting services.

It is also suitable for planting on permanent beds which allows the concept of controlled traffic to be brought in. Controlled traffic farming, for example as achieved by planting on raised beds, coupled with CA can produce the best possible conditions for crop establishment, rooting system development and crop performance (Yule and Chapman, 2011).

FIGURE 10. VMP square shaft for infinitely variable and rapid adjustment of row width. *Photo: Enamul Haque*.

> “. . . In the development process leading to the evolution of relevant CA machinery, it is really very important to involve all relevant stakeholders in an innovation network”

### 3.3. Draught animal no-till planters modified for 2WTs

Brazil has experienced exceptional success in the development of no-till planters for manual, animal traction and 4WTs (Casâo Junior, et al., 2012).

Although 2WTs are not widely used in Brazil, it is possible to attach machines made for draught animal power to them. Two manufacturers have been notably successful in this activity - Knapik (*www.knapik.com.br*) and Fitarelli (*www.fitarelli.com.br*).

The planters are of relatively sophisticated design (Figure 11), the Knapik machines use off-set double disc openers for seed and fertiliser, and so are expensive compared with the machines designed for African and south Asian situations described in this overview.

FIGURE 11. Two Knapik no-till planter units attached to a 2WT.
*Photo: Brian Sims*

## 4. THE FUTURE

EFFORTS are being made to introduce 2WTs into SSA agriculture to increase the power supply available for smallholder farming. But a mistake commonly made in the past - thinking of power units in isolation rather than as movers of vital productive machines - is still apparent.

Measures to increase agricultural production sustainably, that is whilst protecting the planet’s natural resource capital have been investigated and are being promoted and adopted. Development work on suitable CA equipment for 2WTs is still in its infancy although there are important developments, especially in China with the advent of the Gongli no-till planter and in Bangladesh with the development of strip till planting machinery.

So this time we can expect that there will be fewer graveyards of expensive machinery discarded as being inappropriate for the needs of agricultural development in the region.

In the development process leading to the evolution of relevant CA machinery, it is really very important to involve all relevant stakeholders in an innovation network (Johansen et al. 2012). In the case of CA mechanisation innovations these will include: farmers; manufacturers; researchers, extensionsists, academics, input suppliers and finance providers.

It is still a frequently encountered failure that equipment developers work in isolation from other vital stakeholders in the supply chain. It is also the case that working in this way fails to encourage the synergies that participatory collaboration can bring.

Much the same is true of CA as well. CA is a knowledge intensive concept and will require a great deal more training and demonstration before it becomes more widespread, which it must if we are not to plunge into a Malthusian abyss of persistent hunger and degraded natural resources.

Bringing innovations in CA machinery to the smallholder farmer can best be done by entrepreneurs trained in CA and machinery operation who can offer a high quality service to a large number of farmers. This is the model that has proven to be so successful in getting mechanisation to smallholder farmers in Bangladesh and it is one that should be followed for extending mechanised CA to farmers in SSA (FAO, 2012).

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# MY STORY:

## Carla Pegurara,
## Global Electronic Product Manager, AGCO

CARLA Pegurara Gasparin is the Global Electronic Product Manager at AGCO in South America.

She received her bachelor's degree in Agriculture Engineering from ULBRA (Canoas, RS, Brazil) in 2005. In 2000, she started her career at AGCO Brazil as a trainee where she gained experience in the technical service, marketing and sales training areas.

In March 2006, she joined Cranfield University as a Ph.D student at the School of Applied Science at Silsoe Campus. "The aim of my thesis was to identify the factors that influence the adoption and acceptance of automated traceability systems at farm level," said Carla.

During her Ph.D, she counted on the support of her supervisor Professor Dick Godwin, Dr. Kim Blackburn and was sponsored by AGCO UK.

In her current role she is involved in the research and development process and is responsible for identifing and defining customer requirements and features for technology products that integrate and add value into the whole-good products sector, for example tractors, sprayers, combines, etc. She states that the Ph.D gave her the opportunity to understand the marketing aspects of product development, which is essential to ensure future products are delivered on time, according to budgets and schedules, and satisfy customer needs.

Carla has a very dynamic position which acts as the pivotal link between the product management, engineering and marketing teams and interfaces with suppliers and developers to identify promising future technologies and opportunities.

As important as a doctoral degree is the life experience. Almost half of the Cranfield students are from outside the UK. Living and studying in a multi-cultural environment provided her the opportunity to understand different cultures and values. It is a very positive experience that helps her in her daily activities at AGCO, as a global manufacturer of agricultural equipment, which is important to build relationships across the board.

She understands that the Ph.D experience is much more than learning how to conduct a deep research, but it is also a valuable life experience.

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*pressroom@iagre.org*


Dr Abdul Mouazen's rig, tractor mounted

# Soil management

## Cranfield demonstrates its commitment to soil management research and teaching

ON the 12th of June, Cranfield's National Soil Resources Institute (NSRI) welcomed guests from the UK and abroad, to an event marking the completion of a multi-million pound investment in the relocation and upgrade of its facilities for soil management research and teaching; formerly housed at Silsoe.

This investment reflects Cranfield's commitment to providing innovative soil and water management solutions and future champions and engineers of sustainable soil management.

The event, which was supported by the Institution of Agricultural Engineers and the British Society of Soil Science, was opened with a presentation by Dr Alan Belward, Head of the Land Resource Management Unit at the European Commission's Joint Research Centre in Italy.

The topic of Alan's presentation was '*Searching for balance in the global land-use market place*', in which he highlighted the competition which exists for land globally (food production, fuel production, carbon sequestration and conservation of biodiversity), the important policy decisions which are having to be made regarding how the land is used and the role of monitoring, continuity of data and availability of data to those who need it to formulate policy within individual countries.

The work being carried out by NSRI has an important part to play in this, not only through land use monitoring but also in the development of improved land management practices, through controlled environment and in-field testing, the combination of remote sensing and agricultural engineering and the generation and provision of data for supporting land management decisions.

Following on from Alan's presentation, Mark Kibblewhite, Professor in Applied Soil Science within NSRI, described the new facilities as a communal resource for both research and industrial communities, for which Cranfield is the guardian. He went on to highlight a number of ways in which the facilities can be accessed by those outside the university, including; Knowledge Transfer Partnerships, sponsorship of student projects and the development of strategic partnerships.

FOLLOWING lunch, guests were taken on a series of guided tours and demonstrations of facilities.

**Dr Rob Simmons** demonstrated some of NSRI's testing and research capability in the new wet experimental laboratory, including; the different rainfall simulators, slope adjustable runoff rigs and ability to measure rainfall characteristics in real time using a laser-optical disdrometer.

Although used extensively for soil erosion and conservation research, the facilities are utilised in a number of other applications including product wash-off and leaching assessments.

Rob described some of the field-based work undertaken by NSRI on agricultural land and on engineered slopes, both in the UK and internationally, which is being informed by the findings of lab-based experimental work.

**Professor Jane Rickson** led the demonstration of the up-graded Soil Bin facility.

As well as a live demonstration of the facility being used in an implement performance assessment, guests were shown video footage of how repeatable test profiles are prepared in layers using a dedicated processor unit. Video footage was also used to demonstrate a number of other uses, including compaction studies, and the use of pressure sensitive mats and sensors. Jane went on to explain how this controlled environment facility enables the repeatable testing needed to inform implement design and the development of experimental methods, prior to full scale manufacture or field-based trials.

NSRI's well established and continued relationship with the agricultural sector was highlighted by the work of **Dr Abdul Mouazen** and his team, who are working on the development of on-line sensor and system control technology, with predictive modelling of the soil-plant-water system.

Abdul demonstrated how his team's research is helping to improve precision, speed and affordability of soil characterisation and the targeted application of inputs in agricultural systems.


The Soil Bin demonstration with Professor Jane Rickson

**Dr James Brighton** showed guests around the Soil Lane - a controlled environment test facility designed for whole vehicle testing.

The facility and its associated equipment (the Intelligent Winch System and Single Wheel Tester) have proven to be extremely valuable in the study of vehicle mobility, soil - vehicle and soil - tyre interactions. This has helped not only to improve vehicle mobility on a variety of different soil types but also reduced the impact of vehicle trafficking on the soil environment, such as that caused by large agricultural vehicles and sports utility vehicles.

Findings from the research and testing have also played a life-saving role in conflict areas where the use of improvised explosive devices is prevalent and the maximisation of vehicle ground clearance is essential in minimising casualties.

**Professor Guy Kirk** presented the Wolfson Field Laboratory, which has been designed for measuring whole-soil carbon balances and greenhouse gas fluxes and has been developed with funding from the Royal Society and Wolfson Foundation.

The laboratory contains 24 0.8-m diameter 1-m deep lysimeters with temperature and moisture control, and above ground gas flux chambers that can be sealed to collect emitted soil gasses. Guy explained that the flux chambers are connected via a valve system to instruments for measuring CO2, CH4 and N2O concentrations and isotope compositions. It is believed to be the only facility of its kind in existence.

For those who missed the event, a short video interview between Dr Thomas Mayr (Head of NSRI) and Dr Alan Belward can be viewed by following this link:
**tinyurl.com/99bxp7c**

For more information on the Soil Management Facility, visit:
**tinyurl.com/boxorf4**

For more information on the Wolfson Field Laboratory, visit:
**tinyurl.com/bs6faw3**

# Greenmount (CAFRE) invests in farm mechanisation training

## College upgrades much of its tractor and machinery fleet

A NUMBER of new tractors (via lease tenders) were recently acquired by Greenmount College, which is part of CAFRE (College of Agriculture Food & Rural Enterprise).

These include a Massey Ferguson 5450, two 6470s and a Fendt 415 Vario - notable for its high power output (150hp) from just a 4-cylinder engine.

The tractors range from basic models, with mechanically-operated spool valves, right up to a CVT-equipped model with electro-hydraulic engagement of all major functions. One tractor was specified with a GPS guidance and steering system, which offers RTK accuracy. This enables students to get to grips with the latest agricultural technology.

The current fleet is representative of tractors that are being used by farmers and contractors. in Northern Ireland. Land-based Technology students are afforded the opportunity to work on and operate these machines. Commenting on the fleet renewal, a CAFRE spokesperson said, “This investment programme demonstrates our commitment to ongoing student training”.

### LAND-BASED TECHNOLOGY COURSE

The tractors are used as integral components of the Land-based Technology and Agriculture courses (at Levels 2 and 3), in which well over a hundred students are involved each year.

These students train to enter the agricultural sector - not just directly into farming but also related businesses. The Land-based technology course, in particular, gives students a good understanding of agricultural mechanisation and engineering. Likely career paths include farming, agricultural engineering, service engineer-


Greenmount (CAFRE) renewed its student training and farm tractor fleet this year. Pictured also is David Gregg (second from right), who retired in 2012 following 35 years of service.

ing and sales / support within the machinery industry. There is a diverse range of subjects; from welding/fabrication to machinery management.

## TRAINING

The tractors are also extensively used by CAFRE's Short (Industry) Course Department.

Health and Safety legislation was introduced in October 2006, in relation to the safety of young people on the farm. One component of this legislation requires anyone under the age of 18 to have attended and passed a nationally recognised training course in the use of tractors. CAFRE trains very significant numbers of schoolgoers each year.

## LONG SERVICE

David Gregg, an instructor in the Engineering Department and manager of the Machinery & Buildings Centre, retired from Greenmount College this year following 35 years of service. He played a key role at CAFRE.

David joined the fledgling Engineering team at Greenmount in 1977, having previously worked as foreman of the machine shop at GEC turbines in Larne.

David was Greenmount's first Engineering instructor. He delivered on a range of agriculture courses, including CCA, ANCA and OND programmes. He was based in new Engineering workshop facilities, which were completed in the mid 1970s.

From 1989 onwards, David moved from instruction to become the workshop manager. Between 1999 and 2001, the new MBC (Machinery & Buildings Centre) was commissioned and brought into service. David managed this facility from that point on. He also adopted a variety of additional roles, including vehicle management and procurement as well as other campus-wide activities.

David is well known across the organisation. He played a key role - not just within CAFRE's education service but also assisting the college farms. To mark his long and valued service to CAFRE, a presentation was recently made to David by staff.


Old and new: New-generation tractors alongside a grey Ferguson

## NEW ADDITION

Selwyn Graham, a qualified and experienced tractor and machinery service engineer, joined CAFRE in August. He is now a full-time member of the Engineering teaching team, chiefly on the Level 2 and 3 Land-based Technology courses.

Selwyn was himself a former student of Greenmount College. Since then, he has worked at a number of farm machinery dealerships, principally R Kennedy & Co in Ballymena - a major New Holland agent. There, he amassed considerable experience working on tractors, forage harvesters and a variety of other machines.

His choice of career is not surprising; Selwyn commented, "I've always had a keen interest in farm machinery; that's what led me to choose this career."

Also new to the Engineering team in 2012 was Andrew Murray. Andrew will also teach on the Land-based technology programmes on a part-time basis, in conjunction with other industry activities.

Andrew was a former Greenmount student. Following his studies, he worked for one of Northern Ireland's leading agricultural equipment manufacturers for several years. He also worked abroad, where he operated some of the largest tractors and farm machinery available anywhere on the globe.

Andrew has particular expertise in precision farming and related technologies (covering GPS applications for farm machinery and field / farm mapping). He commented, "I hope to bring this knowledge to bear on next year's students."

## MACHINERY SHOWCASE

As part of its recent Centenary Show celebrations, Greenmount College played host to a major display of vintage, classic and modern tractors and equipment.

This machinery showcase was coordinated by the Engineering Department's own William Richmond. Particular attractions included a live steam-powered threshing display, an exhibition charting tractor and machinery developments throughout the ages, a Mini arena and a Friends of Ferguson Heritage display.

The Ferguson tractor re-build challenge (against the clock) proved a major crowd puller; so too was the 4x4 Land Rover adventure track. Perhaps the most innovative attraction was the Pedal-powered Tractor Pulling Competition, in which younger visitors vied for the coveted title.

The event was the brainchild of Darren Houston - a lecturer in the Engineering Department.

**. . . I've always had a keen interest in farm machinery, that's what led me to choose this career**

Selwyn Graham, CAFRE's new full time member of the Engineering teaching team

# Staff training & CPD

**GEOFFREY WAKEHAM uses his career to consider some aspects of training and CPD**

POST my apprenticeship, my expertise on this subject is some sixty years of limited structured in-house staff training; also a suspicion that a lot of CPD sessions have been a social evening out on a topic of marginal relevance to my needs.

As this is *Wakeham's World* please indulge me if I use my career as a vehicle to look at some aspects of training and CPD.

After school, where I did reasonably well in Maths, Physics and Art but poorly in English, History and particularly Foreign Languages, I took up a four year comprehensive apprenticeship with Ransomes Sims and Jefferies which was then a major manufacturer of Farm Machinery, Commercial and Domestic grass cutting equipment and Electric Forklift trucks.

After three months in the Training Centre, where we learnt how to use a range of basic machine tools and some fitting skills, we were set the task of putting together our programme for the next three years and nine months. I remember little guidance. The last two years of this programme bore no resemblance to the plan. However we gained experience in the foundry, forge, heat treatment, laboratories, maintenance departments and the various product specific manufacturing units.

Running parallel to this hands-on practical experience was a programme of academic studies, which in my case, ran for seven years. This included day-release and evening classes to obtain an HNC in Mechanical Engineering, a year at Writtle studying for a Diploma in Agricultural Engineering and two years studying Industrial Administration. This gave me the academic qualifications to later obtain Charter Engineer status.

The practical experience was invaluable, as it covered such a wide range of engineering disciplines. The day to day activities were driven by the needs of the area I was working in, rather than some structured programme of learning. Due to changes in production practices, few modern apprenticeships can match such a diverse experience and now far more structured training is required.

The four years of day release was clearly structured and because all calculations in the mathematical based subjects were carried out by hand, a true understanding of the topics was gained. Overall it is likely we covered as much 'technical' engineering as a modern degree student and may have had a far better retention of the subjects studied. We were never set individual or group projects and all calculations were based on 'ideal' structures.

The year at Writtle was of mixed value due to the problems of putting together a course that catered for such a diverse intake. I gained useful knowledge regarding soil types, their make up, structure and mechanical properties. When lecturers got excited about fitting rubber tyres to potato graders I lost confidence in the course.

In the six month period prior to going to Writtle I had been involved in work on hydrostatic transmission systems for combines, ground effect systems for grass machinery and the conversion of a Mini to electric drive. Having also been largely responsible for the layout of a new heat treatment facility incorporating some of the latest equipment that accurately controlled cooling rates, exact temperatures and hold times, the lectures on heat treatment based on Blacksmith rules of thumb further increased my arrogance.

Between returning to a full time job through to 1980, joining Harper Adams as a lecturer, CPD was primarily doing ones job, keeping up to date with the latest technologies by building test rigs and test machines along with visiting Mexico, France, Belgium, Italy, Northern Germany and Scotland, talking to experts and visiting Research Institutes.

At Harper Adams staff training was often dictated by The Department of Education and delivered by people with no understanding of their audience. Diversity training turned me into a racist / sexist unable to hold a relaxed conversation with

> “. . Health and Safety is a state of mind rather than a tick box activitiy”

more than half the human race, while Health and Safety courses developed an ability to fill in forms with spurious analysis of improbable hazards. It did not, however, alter the way I taught the subject to my students. H&S is a state of mind rather than a tick box activity.

Studying for a Masters in Design for Manufacture between 1986 and 1988, generously supported by The Douglas Bomford Trust, was in part prompted by the need to out qualify my students when the college introduced degree courses in engineering. The course provided one of the most valuable CPD activities since my apprenticeship.

In 1994, an interest in expanding the engineering provision into Food Engineering meant an interesting period of visiting Food Technology Research Facilities, sitting in on Reaseheath Food Technology modules, consulting with industrial experts and spending a week in a Premier Foods production facility. This convinced me that there was a need for such a course. With the help of those at Reaseheath, we could provide it but there would be few applicants due to schools perception of the academic ability of those directed by staff to study relevant subject areas; a very useful period of CPD in many ways, if not as expected.

Visits to East Germany and Bulgaria widened my understanding of the failings of centralised planning and the need to give control to local people based on local realities. My visits to Greece and Spain now give me a better understanding of their current financial problems: one never knows when prior learning can become useful.

Here are a few thoughts on how to maximise the value of any CPD and training based on my past experience:

## FARM TO FACTORY

WITH any new machinery there is a need for training, from the operator through to the driver who unloads the equipment onto the dealer’s yard.

Some equipment is so complex that it is unlikely the farm staff will get the best out of this sophistication. In the past, simple draft / depth control was poorly understood. Should we rewrite handbooks as training manuals even for the simplest of cultivation machinery? How far does the supplier go in providing training with a new tractor having thirty or more control buttons, switches and levers? Is the potential of modern combines compromised because of poor operator training?

Within the dealership, continuous updating of staff is required and the needs of individuals and the business as a whole need regular review and action. With apprenticeships there is a need to closely link college work to reality in the workshops and visa versa. Expert staff should be kept up to date with the latest developments within their fields and then provide training to junior staff. Is it worth while finding individual modules at local university/technology colleges that are relevant to your needs?

And where does customer relations fit into your training programme? Most staff in this part of the supply chain deal with the ultimate customer and can easily persuade them to go elsewhere.

## DESIGN OFFICE TO DISPATCH DEPARTMENT

A DIFFERENT environment but the same challenge; how do you keep yourself and your staff ahead of the game?

If you work for a large corporation you may have the advantage of a large HR department with responsibility for staff development. They will be guided by a cross company committee that meets regularly. There will be a body of procedures that clearly lay out every aspect of the process. The HR department will instigate and coordinate courses with titles such as ‘*Engineering in a gender neutral sustainable environment*’. It will be often misdirected, cumbersome, frustrating and not least expensive.

In my mind there is a better option. It applies across the industry, large or small, and relies on localising the process and trusting those appointed to manage. These people know their local needs, local expertise, and the best time and method of providing the necessary training or professional development. Group size should be small and confined to staff with a common interest. Small companies may limit their groups to one or two and there is no reason why they should be bigger than six or seven people. It is likely they all know each other well and interact regularly.

An obvious example is those employed in the design and development of products. A group made up of Spares, Warranty and Field Engineers may only work within specific organisations. It would be helpful if the group could all go down to the pub for lunch (at company expense, soup and sweet only, buy your own drinks) and hold their meetings there. Get the staff to decide what training and CPD is required and if it is possible to provide it in house or through current equipment providers at sensible times? Only as a last resort, should they fall back onto outside providers of prepackaged programmes.

As a matter of interest, when did your Production Foreman last provide an update for the Design Staff as to the capabilities and limitations of current production equipment; when did your Field / Customer Support Engineer do a night shift on that new combine you have started to market? Has the designer of the latest ballast system on your new tractor range calculated the required ballast for ploughing, fitted the system and then tried it in the field before returning to re-ballast it for transport duties?

Have faith in those appointed to manage and give them the freedom to manage, not only the processes they are responsible for, but also the task of keeping their teams ahead of the game regarding technology and working practices.

Turn over to read Dr Clare Butler Ellis’ response to last issue’s *Wakeham’s World*

# Wakeham's World: *Womengineering* - a response


## By Dr Clare Butler Ellis

Head of Silsoe Spray Application Unit
NIAB TAG


MY first reaction on seeing the headline '*Womengineering*' (*Landwards Summer 2012*) was "Oh no, not another pointless article written by a man about how to get more women in our industry".

Having seen a few of these over the years from a range of sources, I didn't expect much insight or anything in the way of meaningful answers. To be fair to Geoffrey Wakeham, he didn't actually attempt any answers, which in my view was wise. The subject is an important one, and I suspect Geoffrey's article was intended primarily to provoke a response - and in that he succeeded!

I think his questions were, mostly, the wrong ones. He seeks to blame in turn mothers, educational institutions and the government for the lack of women in agricultural engineering. There is one fundamental reason why there are so few women in our industry: to the majority of women, it isn't very interesting.

You therefore have two options - you can try to change women (and best of luck to you, mate) or you can try to change the industry. I can already hear hoards of old codgers harrumphing in their armchairs saying it is a fine industry and doesn't need changing - it's the rest of the world that's got it wrong. And I would reply that yes, it is a fine industry, but everything needs to move with the times, and its image is, in my view, truly appalling.

I haven't checked, but I'm guessing it is a rare copy of *Landwards* that doesn't have a picture of agricultural machinery on the cover. At least two of the three pictures in Geoffrey's article feature women in overalls with a large chunk of machinery. Agricultural Engineering is so much more than farm machinery and while it appears to have such a narrow remit, it will only appeal to a narrow group of people.

I personally wouldn't waste 30 seconds of my life in a lecture on diesel engines and believe only those with arrested development give tractors nicknames and want to have small grey ones all of their own. My son's first word was tractor but he stopped being fascinated by them soon after starting primary school.

I don't know how much of the difference in interests between men and women is genetically hard-wired, and how much is cultural, but it is pretty deep-seated, and is not going to be changed easily or quickly, if at all.

This brings me to the silly question Geoffrey raised about 'mothers of girls'. In response, I shall quote my own mother who, whenever she comes across some household appliance with a basic design flaw, says "it must have been designed by a man". She's probably right and she has had plenty of opportunities to say it.

The answer, then, to Geoffrey's questions 2 and 3 about why girls don't choose to study engineering is they just don't want to. They have the skills and abilities, but they choose to apply them elsewhere.

**. . . The answer to the question about why don't girls study engineering is they just don't want to**

You'd have to have been a hermit for the last 35 years not to know that schools, colleges and universities bend over backwards to make all subjects equally attractive and accessible to boys and girls, and to make sure that where girls are in the minority, they are not disadvantaged. Efforts may not always have been successful, and some are undoubtedly misguided, but we have come a long way since I was at school.

In our house we use the term "poorly elephant's foot question" to describe exam questions that have been clumsily re-written to make them more 'girl-friendly', after one particularly dreadful GCSE example which was actually, if I remember rightly, about the permeability of Gore-tex.

Geoffrey's final question is about why we need more women in our industry. I do agree that a mixed gender working environment is 'simply better', but more importantly we will have better solutions to problems if they are addressed by a more diverse workforce with a wider range of viewpoints and experiences.

How do we achieve this?

Well I'm sure many people out there will have valuable suggestions - I have some of my own - and perhaps now is the time to get a good debate going, bring together the best ideas and actually start doing something that will make a difference.

It isn't about recruiting more women, it is about recruiting a wider range of people, with different perspectives and different backgrounds. Amongst them, with luck, will be more women.

But don't expect equal numbers - most women have far too much sense!


Dr M C Butler Ellis
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# PROFILE:

# Service Manager

**JON ROBINSON, is Service Manager at dealers Seward in Sinderby and also holds the position of LTA 4 service technician**


**Name**
Jon Robinson

**Dealership**
Seward, Sinderby Station, Sinderby, Thirsk (part of the Claas dealer network).

**Position**
Service manager. LTA 4 service technician.

**Responsibilities**
Managing a busy agricultural service workshop, mainly office based, but also when needed working alongside the service technicians with fault finding and diagnosis on a wide range of Claas machinery.

Q&A

### What qualifications have you achieved to get to the position you are in?

I achieved a national diploma in agricultural engineering, then I joined Sewards and gained experience working on the Claas product.

I attended many training courses at the Claas training academy at Claas UK Saxham working on the full range of products including balers, foragers, combines, tractors and telescopic handlers.

Next I achieved the Claas master mechanic qualification, following which I was one of the youngest and one of the first in the country to achieve Claas Master Technicians qualification.

Next I took over the role as service manager and continued taking service and management training at the academy.

I also have a first aid at work qualification and I am depot safety officer.

### Why did you choose to go into the role?

I have always been very interested in engineering and how things work. I'm from an agricultural background and I grew up repairing farm machinery. And now working for Sewards and on the Claas product I been able to increase my knowledge of engineering, which has enabled me to achieve the position of Service Manager.

### What skills do you need in your job?

People skills are very important. A good understanding of the product and how it works. Good computer skills. I also have to be organised with good time management.

Being able to stay calm as my job means being on the front line to customers and at times when they have had a breakdown, staying calm is very important.

### How does an LTA accreditation help your career?

It is a good industry standard to be able to achieve and is a good structure to be able to work towards LTA4. Which allows you to gain experience and knowledge to move on in your career.

### What have been your main career achievements?

First when I achieved Claas Master Mechanic and then when I achieved Claas Master Technicians

After this, taking on the role as Service Manager, which made me one of the first in the country to be be both a Service Manager and a Claas Master Technician.

### How do you see your role / career progressing?

To keep up my product and technical knowledge but concentrate more on the management side of the job role. And also to be able to progress further in management with Sewards and Claas.

### Are you intending to study further?

Yes. I believe that continued training is necessary for me to be able to fulfil my job role and progress further.

### What do you like most about your job?

I like working with the Claas product which, I believe, is the leading manufacturer in harvesting machinery. Also with the addition of tractors and forklifts it means it is such a varied job role.

Being Service Manager I am also able to continue my interest in engineering and technology, whilst enjoying the pressures and challenges of managing a service workshop.

### What do you think are the most interesting new technology developments since you began work?

I think the advancement of electrics and electronics in the Claas product range is massive.

The information and controls that the Cebis operating system gives you in the combines, foragers and tractors means that nearly everything can be done quickly and accurately from the cab. Claas telematics is very interesting to be able to use the internet to remotely monitor the machine's performance, looking at things like throughput, gps position, working time, fuel usage.

This is a great tool for the customer, but also from a service point of view using this alongside remote diagnostics I can dial into a machine from my office and look at everything that I would be able to see if I was sat on the machine with my service laptop. This means that I can check fault codes, service times and even reprogramme the machine.

### What piece of advice would you give someone wanting to become a landbased technician?

It is a great job that covers a wide verity of skills and knowledge. The technology is constantly changing, so it takes a lot of hard work and effort to keep up-to-date with everything.

But this also makes it a very enjoyable job and being able to successfully meet the challenges that are different every day is very satisfying.

### Has membership of IAgrE helped you at all?

Yes, being a member of a recognised engineering body strengthens the qualifications I have achieved within the industry.

**I believe that continued training is necessary for me to be able to fulfil my role and progress further**

MEMBERSHIP ENQUIRIES
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MEMBERSHIP MATTERS

# BRANCH REPORTS

## WREKIN BRANCH

### Visit to Ironbridge Power Station

THE power station is situated on the south bank of the river Severn at the north western end of the Ironbridge Gorge and power has been generated on this site since 1932.

During that time the fuel, coal, was mined locally at Granville Colliery Wellington and supplies were also available from Silverdale near the Potteries and Littleton pit near Cannock all delivered to the site by train. The Ironbridge 200MegaWatt A station continued to operate until the new 1000MW B station was completed and commissioned in February 1970.

The B station has two furnace boilers which are each 154 ft high and are spring suspended from above to allow for free expansion and contraction; each boiler is fed via six grinding mills with glass-lined hoppers, which pulverise the coal to the consistency of talcum powder by tumbling steel balls onto it. The powdered coal is blown into the furnace through 24 low Nitrous oxide burners at three different levels by heated air travelling at 15m/sec. When operating at full capacity the plant consumes 10,000 tons of coal per day.

The steam pipes are fed with preheated pure water which is raised to a temperature of 568° C at a pressure of 164bar, 2400psi, which is then fed to three stage turbines. Once the steam has passed through the high pressure stage it is reheated to 566° C before being passed through the intermediate stage and then at 285°C it passes through the three low pressure cylinders.

As the steam temperature drops its energy potential reduces; to counteract this the turbine diameter is increased resulting in the tip speeds of the low pressure turbine blades reaching 1,780 ft per second, 2000kph (twice the speed of sound). It is critical that the steam entering this section of the turbine does not contain any water droplets as erosion and serious damage to the blades would result. Exhausted steam is then passed through condensers and returned into the heating circuit where it is reused.

The plant has a water abstraction licence to take 24 million gallons per day from the river and up to 7 million gallons can be lost to evaporation.

The turbine runs at 3000rpm and drives the 500MW generator which is cooled by circulating hydrogen gas (used because of its high thermal conductivity) though ducts in the stator and rotor while pure water is used to cool the stator windings. The turbine generator units are located on either side of the turbine hall on concrete plinths at a height of about 12m (40 ft) and each is coupled to a dedicated furnace boiler. This enables the station to continue to generate at half capacity while maintenance or overhaul is taking place.


Ironbridge Power Station

1350 tons of fuel ash is produced each day and, where possible, is sold off in three grades, light for use as a cement additive, medium for use in road construction and heavy for the production of breeze blocks for construction. There is also a storage site close by which is also in use. The burner flue gases are passed through mechanical cyclones and an electrostatic precipitator to remove ash dust and sulphur particles before passing up the furnace chimney which is 204m (670ft) high, to clear the height of the gorge.

Low sulphur coal supplies now come from Russia and other world markets, delivered to an east coast port where the coal is loaded onto trains which bring it to Ironbridge. The wagons are bottom unloaders which deposit the coal into a hopper as the train slowly moves forward. There are ten 1000-ton deliveries each day. There is however a large stockpile of coal on site estimated to be over 1 million tons, which is referred to as the Scargill Dump.

The B station has in recent years been operated by the German energy producer E.ON. The plant has reached the end of its intended design life but the company has obtained a licence to continue to operate as an experimental biomass fuel station until 2015. Planning is at an advanced stage to prepare the plant to burn pulverised wood together with a small quantity of coal.

The wood will come from Canada in a pelleted form and be unloaded at Liverpool where most of the 100,000-ton load will be stored under cover. It is very important to keep the wood pellets dry in order to maximise furnace efficiency. This has proved to be a major consideration in arranging the storage of large quantities on a continuous basis. The rest will be delivered by train to Ironbridge where it will be stored in a 20,000-ton capacity weather-proof building ready for use.

Once running, train loads of the pelleted fuel will be delivered on a daily basis. The wood pellets, 8mm dia x 24mm, will pass through 10 Buena 25 ton/hr hammer mills which will break them down to 1.5mm particle size. This will be blown into the furnace by warm air at 50-70° C travelling at 20m/sec. 2 coal mills will be retained to provide control and flexibility. The wood fuel is anticipated to reduce the maximum output of the plant to 800MW.

The electricity produced is supplied to the grid at prices which reflect demand such as weather conditions, time of day and time of year. From a cold start, which involves using oil burners to ignite the coal dust, it takes 72 hours to bring the plant to full capacity, as a complex procedure must be followed to prevent damage due to thermal shock and other mechanical considerations.

However if the plant is in standby mode as little as 40 minutes is required to be working at capacity. The electricity is generated by the alternators at 9500 volts and is then transformed on site up to 4Kv for feed into the grid.

Before departing, the branch thanked Mary Thornton for organising our visit and Paul Foster, the site construction manager, for giving up his valuable time to answer our many and varied questions.

J. Gough

## SCOTTISH BRANCH

### Visit to Royal Botanical Gardens, Edinburgh

MEMBERS of the Scottish branch met recently at the Royal Botanical Gardens in Edinburgh for a visit.

The members were treated to a private tour of part of the 70 acre site which is situated only a mile from the city centre. Our guide came prepared for the elements but unlike most of the rest of the summer the weather was kind.

In spite of recent major storms the gardens were looking fantastic. In the storms the gardens suffered over 40 trees downed or destroyed and the greenhouses also suffered major damage.

The gardens are home to cultivars of half of the worlds' known species of Rhododendons. The site is also the home to the world famous rock garden with its stunning 165m herbaceous border which is sheltered by an outstanding and impressively high century old Beech Hedge.

Some of the members present being from the forestry section were equally impressed with the large Sierra Redwoods.

It was noted that within the site is contained the largest collection of wild origin Chinese plants outside China, which owes a lot to the Scottish Victorian founders of these gardens. One of the great uses of glass saw us marvel at the Temperate Palm House which is in need of alteration due to the large palms stressing the interior roof space. We also saw some alpine houses under reconstruction due to inside pressure of the raised beds on the brickwork.

The gardens as you would expect have an educational role to play and it was embarrassing to see how local school children can shame us all as to the size and quality of the flowers and produce they can grow with a little expert guidance.

The tour started and finished in a bright and spacious new visitor reception centre with a large wooden and glass content, which had among other things a wooden staircase which drew the members' attention as to its design fault in that it did not fully fit the space in which it was intended. After some consultation, it was good to see that some good old fashioned engineering came in to play and remedy the situation.

After our tour we finished with a round of traditional afternoon teas and are still in debate as to what constitutes a weed and its definition, as we all saw plants which to our guide, all have horticultural merit.

David Blackburn



Members of the Scottish Branch being shown around the Royal Botanical Gardens in Edinburgh

## OBITUARY - William John (Bill) Bradfield

BILL BRADFIELD, a veteran of multiple worldwide consultancy missions connected with his specialism of rural engineering and infrastructure for more than 30 years, has died aged 58 after losing a long and courageous battle against multiple carcinomas. Often working in the most challenging rural circumstances, he was a practical and pragmatic engineer who commanded widespread respect and gained immense satisfaction from a job well done.

Born in the 'Protectorate of Nyasaland', now Malawi, where his father was a Medical Officer in a rural hospital, Bill often caused his mother great embarrassment in his early years by refusing to wear shoes and a shirt when visiting his father at work, actions which were considered highly disrespectful locally. He had no siblings and played with the local children until he was ten years old when he came to England for schooling.

He spent a short time as a border at Belmont School in Surrey, before moving to Beeston Hall School, West Runton until he was 13 years old. He then enrolled at Pangbourne Naval College, near Reading. Bill found what he called the "intense communalism" of Pangbourn's Military life to be oppressive and so he sought sanctuary in the woods around the college where he developed his interest in natural history and learnt to write poetry.

A further year at Norwich City College was the final precursor to Bill embarking on his Agriculture career, working on various farms in Norfolk and neighbouring counties as a tractor driver and machinery operator, before attending Shuttleworth Agricultural College in Bedfordshire. This was followed by a VSO assignment in North Kenya and early work in Algeria and the Solomon Islands. In turn, this lead on to his enrolment for post graduate studies at Silsoe College, Cranfield University, resulting in, amongst other professional qualifications, that of chartered environmental engineer.

He then went on to work on numerous rural engineering assignments in more than 20 countries across Africa, Asia, the middle east and Oceania, all aimed at poverty reduction in rural communities through creation or improvements to water supplies, irrigation schemes or rural infrastructure. His last mission was to Kenya in 2011 where he contributed to the Agriculture and Livelihoods in Western Communities Project as a rural roads specialist.

Bill was an intensely private man, who lived life by his own moral, ethical and spiritual compass. This was tempered by his upbringing, personal beliefs and experiences of living, at times, on the margins of human existence, where normal rules of society had occasionally been forgotten, corruption was sometimes endemic and religious or political extremism had been known to obscure objectivity. He always tried to look at the bigger picture, to see the positive side of what ever situation he found himself in and to see the good in others.

He will be remembered for improving the quality of life for many thousands of people across the world with his technical analysis, design skills and above all making projects happen, in a participatory, uncondescending, good humoured and non confrontational way. His personal bravery in the face of adversity is an example that many of us would find hard to follow. Not only did he demonstrate fortitude in the way he managed in post conflict environments, but also in the way he handled his own long and painful illness with patience, and good humour.

He touched the lives of his many colleagues, associates and friends, with his great vision, wisdom, kindness and energy, not only in his professional life, but also through his many interests. These included his sports (including running, football, cycling, rowing and especially Rugby), wildlife conservation, Overstrand Parish Church, local history and archaeology, the conservation of his home village and its seascape, and indeed the wider cultural heritage of his beloved Norfolk.

He is survived by Yeshi, his wife and two children Andrew (18) and Alice (15)

*William John (Bill) Bradfield; International rural engineer, poet, sportsman and quiet activist; born 11th July 1954- died 22nd July 2012.*

# LETTERS *to the editor*

I WAS privileged to attend an event at Harper Adams University College that included the introduction of "A status report developed by IAgrE in response to the UK Government's Foresight Report: The Future of Food and Farming."

This was presented by Andrew Newbold to the good and the great of the industry.

I was impressed by the gracious response by Professor Sir John Beddington, Chef Scientific Adviser to HM Government and his acceptance of the importance of Agricultural Engineering in securing future global food security.

Can I recommend your readers obtain a copy and be impressed by the visual and tactile quality of the document. More importantly read it and then lobby for its inclusion in core Governmental Policy regarding "a key discipline enabling agriculture to deliver global food security."

Who do you want in your lifeboat?

As with many such reports that make recommendations requiring substantial funding there would appear to be no clearly defined pots of money available to take proposals forward. What size fund might reasonably be expected?

I put forward suggestions based on some simple but justifiable estimation.

Let me assume the industry can be valued as contributing £3 billion to the UK economy.

Save 40-50% of this sum will end up in Government coffers via Business Rates, Corporation Taxes, National Insurance Contributions, PAYE, VAT etc.etc. The 'Tax Take' will be in the order of £1.35 billion (45%).

Currently the government expenditure on education is 13% of the total usual budget. If we take 25% of this figure for the FE/HE Sector of our industry we should expect about £44,000,000 to be available on an annual basis.

With regards to research at least 1% of the tax take from the Agricultural Engineering industry could be available. Such a low percentage would not reflect serious commitment to Global Food Security but yields a figure of £13,500,000.

**So £44 million for FE/HE education and £13.5 million for research**.

I am not sure how close government support of our industry matches the above very reasonable justified estimates but we should expect some significant increase if the UK/industry is AgEng to make any impact on the future well-being of the world..

Having spoken to two senior members of the Institution I have made a rough estimate of what is spent and came to the following figures of £4m for education made up of student fees and capital grants. For Research it would seem that little money comes from the tax payer direct and most research is funded by the Douglas Bomford Trust.

Further expenditure here could produce greater long term benefits than many areas of other areas of research. Healthy and adequate diets are the basis of a satisfactory and rewarding life.

G.F.D.Wakeham, MIAgE, MIMechE.

**TABLE 1: Estimated values for Educational and Research Expenditure**

| | |
|---|---|
| Approximate Industry Value to UK Economy | £3 billion |
| Tax Take (45%) | £1.35 billion |
| Total Education Expenditure (13%) | £0.1755 billion |
| FE/HE (25%) | £0.044 billion |
| Research (1%) | £0.0135 billion |
| | |
| FE/HE | £44,000,000 |
| RESEARCH | £13,500,00 |

# Rycotewood Association

## Bursary Captial Fund appeal

IF you are an Association member you will be aware of the bursary award made available to current students, if you are not a member or have a lapse of memory, then let me quickly explain.

A suggestion was made that the Association might like to make monies available to current students at Oxford & Cherwell Valley College, on courses similar to those at old Rycotewood, to assist in paying for materials required by students for their particular course. This would also maintain a contact between old Rycotewood personnel and their successors at O&CVC.

After due consideration and discussion a bursary was put into action, the first agreed amount of £600 being paid last autumn. Applications for a share of that money are to be made by current students to the heads of the particular departments and the latter to decide upon the final recipients.

Those lucky enough to be successful are to let the Association know what use the money is being put to, the result related back to members in the next Association magazine. It was made clear by the Association that the amount could vary or be withdrawn depending on the financial state of our funds.

Clearly with falling membership and with no other income we will not be able to sustain the £600 indefinitely. We have however received some small donations towards the funds from ex-students who feel they want to give something back, to help current students, after themselves being given a successful career start by the College.

Then we received this wonderful, generous offer which has instigated this appeal.

Providing we can raise an equal amount by the end of 2012, a successful ex-student has pledged a donation of £7,500. This money then totalling £15,000 to be safely invested, which should easily maintain the bursary at the current level. I have researched possibilities and returns are available, with this size of investment, to achieve this.

Now for the crunch. *Matching money must be raised before the end of 2012 or we loose this generous offer*.

Can you help? Do you wish to acknowledge the boost the College gave your career start? Will you help us to leave a legacy for all time?

Whatever your contribution your gift will be recorded. Next year, 2013, is the seventy-fifth anniversary of the founding of the College at Thame. It would be marvellous to celebrate this historic occasion having achieved the goal - £7,500 for 75 years.

Please give some serious thought to our appeal so that we can achieve this very worthwhile goal. You may need time to consider your response, but the sooner we receive your donation the better, to give us an idea of our direction.

In the event of a shortfall, donations will be used to support the Bursary, and only for this purpose, for as long as possible.

So please donate to the Rycotewood Association Bursary Captial Fund.

Contact the Honorary Secretary of the Association, Stewart Sloan on Tel: 01844 290142 or email *stewart.j.sloan@googlemail.com* with any donations.

Lionel T. Gibbs (Tom)
Chairman - Rycotewood Association

# NEWS OF INTEREST TO MEMBERS

## Find the training you need

LEARNERS and land-based professionals across the UK can now benefit from visiting *www.lantra-awards.co.uk*, which has been re-launched with a new look and feel, offering the qualifications and training solutions that the UK's learners are looking for.

Lantra Awards develops national qualifications and training courses offered through a national network of approved training centres. Redesigned to give comprehensive information on Lantra Awards qualifications, *www.lantra-awards.co.uk*, features a sophisticated yet user-friendly design that makes it navigate. With an enhanced search facility, the website uses smart keywords and filters to narrow results so learners can be confident they will quickly find the training they need.

Lantra say it isn't just learners that will benefit from the new website. Existing Lantra Awards training centres will also notice the immense improvements with new sections dedicated just to them, filled with helpful tools and functions. The new website will help providers attract more learners than ever. In addition, providers will have access to a dedicated, password protected area on the website with a new registration system and up-to-date course information.

The website was designed following research, aimed at understanding what customers wanted from the website. Lantra say initial customer feedback on the new website has been very positive, with users citing how fresh and clean the new website looks, while complementing the quick and accurate search functions.


This is one of the many steps that Lantra say they are taking this year to offer more solutions to the land-based and environmental professionals, ensuring that businesses and their employees have the skills needed to support the UK during the next generation.

Find out more about Lantra Awards' new website by visiting *www.lantra-awards.co.uk*.

## NEWS OF INTEREST TO MEMBERS

**Agricultural industry could be forced into 'sweeping changes' due to weather patterns**

# 'Confused' crops could pose complications for future of farming

THE agriculture industry could be forced to undergo sweeping changes because warmer winters could be confusing their crops, scientists have warned.

It follows a detailed study showing hundreds of plant species, that appear to not be affected by warmer Spring temperatures, are in fact responding as much to warmer winters and getting 'messed up' in the process.

For years, scientists have accepted that certain species are flowering earlier each year due to changes in climatic conditions, but many – varying around 30% depending on the region – appeared not to be affected and had been classed as stable.

Now a group of researchers have called this theory into question, saying the apparently stable species are, in fact, unquestionably feeling the effects of rising temperatures throughout the year. They say further research is needed to figure out what all this means, not only for wild plants, but for the future of farming.

Nobel Prize winning scientist Professor Camille Parmesan, NMA Chair in Public Understanding of Oceans and Human Health within Plymouth University's Marine Institute, was part of the research team alongside colleagues from North American universities and NASA's Goddard Institute.

She said: "For years, horticultural and farming experts have believed they can either use traditional adaptation methods or genetic manipulation to negate the effects of climate change. But our studies show the species they rely on – such as many fruit and nut trees – could in fact be getting really messed up by rising temperatures.

"Farmers may have had several bad years with their crops, but blamed it on other factors, and we feel more research is needed to examine where and when species that need cold winters should be planted to ensure the industry remains active."

Many of the species that have not appeared to be altering their spring timing in recent years need cold winters to 'tell' them when to become dormant and when to 'wake up' in spring. With winters getting warmer, these species appear to be 'waiting' for their cold cue, which can end up delaying their normal responses to the arrival of spring. The end result is species that show no change, or even a delay, in spring budding, leafing or blooming, in apparent contradiction with warming spring temperatures.

This new study resolves that contradiction for many species, indicating about two-thirds of 'stable' species are, in fact, sensitive to warmer springs, but even moreso to warmer winters, with the end result being a confusion in timing of leafing, budding or blooming.

To reach their conclusions, Professor Parmesan and two colleagues - Dr Benjamin Cook from NASA and Columbia University, and Dr Elizabeth Wolkovich from the University of British Columbia - spent months analysing two detailed sets of data recording the flowering trends of almost 500 species.

> "... while crops that require cold winters may appear to be flowering at their normal time, they may actually be losing out by not starting growth earlier in spring in concert with warmer spring temperatures"

Professor Camille Parmesan

They are now looking for their findings to be built on because of the huge implications they feel it could have for the future of agriculture.

Professor Parmesan said, "I am looking to open dialogue with agricultural research groups and policy makers because while crops that require cold winters may appear to be flowering at their normal time, they may actually be losing out by not starting growth earlier in spring in concert with warmer spring temperatures.

"It would be interesting to do this analysis on cold-adapted crops that have had some bad yields in recent (warm) years, and see if the same explanation holds for crops as we found for wild plants."

# Unique design for new 21,000 tonne grain store

## Believed to be one of the largest on-farm stores to built for many years

SIMPSON & Allinson have recently completed what is certainly the largest single grain storage building that they have been commissioned to construct, and what they believe is one of the largest on-farm stores to have been built for many years.

The grain store, which has a total capacity of 21,000 tonnes, was commissioned by Tripp Batt for erection at PX Farms, based at Dry Drayton near Cambridge. Tripp Batt has worked with the client for a number of years and was responsible for configuring the building and managing the whole construction project.

In order to meet a specific requirement that the building keep to a restricted footprint, the new grain store only measures 91.7m long by 32.6 m wide. However, to achieve the total capacity requirement of 21,000 tonnes, divided into three equal sized 7,000 tonne capacity bays, to accommodate this tonnage the building has an eaves level of 10.1m and a ridge height of 17.1m. Each 30 metre bay is designed so that grain can be stored to a surcharged depth of up to 13.4 metres along the full length of the building.

To enable this, the building has been designed so that both the side and end walls, plus the internal dividing walls, incorporate load bearing concrete panels. The staggered panels, which are up to 200mm thick, are designed to flex by no more than 25mm, and rise to 6.9m along the side of the building, and 13.5m high on the end and internal walls.

With the panels alone weighing 750 tonnes and a further 250 tonnes of steel used in the building, in addition to the crop storage loadings resulting from the configuration, the challenge for the structural engineer who designed the building has been to come up with a detailed design capable of withstanding the forces.

"The main issue is the loadings involved, especially on the end and internal walls where the grain will be heaped up to 13 metres high," explains John Allinson of Simpson & Allinson.

The new 21,000 tonne grain store at Dry Drayton in April as the outer shell nears completion, with the end-wall concrete panelling clearly visible that will enable grain to be heaped up to 13.4m.

"For this reason, instead of the normal portal frame design used in most buildings, the building is of a braced box frame design, which uses a network of roof and wall bracings to transfer the loadings involved back down to ground level at the bottom of each stanchion. As a result the building is far stiffer than normal and compared to a normal portal frame, this is very exceptional."

In total, the building contains over 4.0 miles of steel, the largest stanchions being over 16m long, nearly 1.0m wide and weighing 4.0 tonnes. In addition there is 6,500m of purlins and side rails and the whole building is held together by just over 10,000 bolts.

The doors to each bay use demountable steel retaining panels, which are designed by Tripp Batt to allow grain to be piled behind them, and are fitted with telescopic handler couplings so that they can be easily manoeuvred. These are designed so that the bottom panel can be initially removed to enable sufficient grain to be outloaded to then allow the remaining panels to be removed.

Running the length of the building and at one end is a lean-to extension which houses the main crop ventilation fans, plus a fuel tank for the existing grain dryer and an additional intake pit. The store is filled using 120 tonne/hour capacity elevators and overhead conveyors connected into the existing grain handling system and an additional 180 tonne hopper silo has also been added to hold wet grain.

Two of the storage sections are equipped with four ventilation fans, whilst the third bay, which will be used for oilseed rape, has six. These blow air into stepped twin wall plastic tubing, that is anchored to the floor to hold the tubes in place whilst the store is being filled. The ventilation and exhaust fans will be controlled using an extension of the temperature monitoring and control system already fitted in a neighbouring store.

The building uses a braced box frame with extra bracing in the roof and walls, so that grain can be heaped to 13.4m against the end and internal dividing walls

# Membership changes

## Admissions

*A warm welcome to the following new members:*

### Associate Member

Cooper N A (Kent)
Davison S T (Nottinghamshire)
Letts N (Co. Durham)
Logan G (Ayrshire)
Murrell W (Kent)
Newton A (Renfrewshire)
Penrose D T W (Cornwall)
Vooght P J (Devon)
Wakely A J (Cornwall)
Wallond G (Kent)
Ward C (Devon)
Webber C D (Devon)
Wilton A C (Devon)

### Associate

Chambers J D (Leicestershire)
Hall N (Cheshire)
Norton T (Shropshire)
Owen D K (Carmarthenshire)
Pearson C J (Wiltshire)
Price R L (Cheshire)
Seabridge C J (Staffordshire)
Stirling G K A (Scotland)
Thamm A (London)
Vicary C J (East Yorks)
Wilson J G (Wrexham)

### Student

*Babcock Training*

Baillie A
Baker N
Bray J
Christie B
Close J
Coleman L
Dodd C
Fryer E M F
Hadley T O
Hadman E
Johnstone R G
Jones R
Leath D J
Lievesley D J
Miller M J
Miskin S J A
Munro E
Newbitt T
Owston H
Palmer C
Richardson T
Rowland T
Setchfield N P
Smerdon R P
Spencer T J
Stephens G
Warren J

*Coleg Sir Gar*

Atherton J M
Evans S J
Harries C
Johnson G R
Lloyd J
Morgan E
Morris S
Pugh M
Radcliffe L L
Spencer P J

*South West College, Omagh*

Barclay J R
Clarke S A
Crozier J J
Dunlop G
Good M
Hamilton R
Healy D A
Heslip S
Hessin A
Hood J
Milligan N
Monteith D J
Murray D
Vance A R
White A

## Re-admissions

### Fellow

Sun Da-Wen (Dublin)

## Deaths

We have recently learned of the death of the following members and we send our condolences to their family and friends:

**Mr Anthony John Smith Armitage** (MIAgrE) (Devon) - *a member since 1954.*

**Mr William John Bradfield** (CEnv, MIAgrE) (Norfolk) - *a member since 1987.*

**Mr Ronald Russell** (CEng MIAgrE) (Lincolnshire) - *a member since 1962.*

## Transfers

### Honorary Fellow

Whetnall C R (Hertfordshire)

### Associate

Mitchell J W (Scotland)
Thomas B (Gwynedd)

## Engineering Council

*Congratulations to the following members who have qualified as Chartered Engineers and Engineering Technicians entitling them to use the designatory letters CEng and EngTech after their names.*

### Registrations

*CEng*

Borland R T (West Midlands)

*EngTech*

Coulter M R (Co. Antrim)
Cowe A (Roxburghshire)
Newton A (Renfrewshire)
Vooght P J (Devon)

## Long service certificates

| *Name* | *Grade* | *Date of anniversay* |
|---|---|---|
| **50 years** | | |
| John Thornton **Calvert** | IEng, MIAgrE | 27 Sept 2012 |
| David Frederick **Kane** | IEng, MIAgrE | 27 Sept 2012 |
| John **Tyblewski** | IEng, MIAgrE | 27 Sept 2012 |
| Arthur Ernest Lawson **Walker** | IEng, FIAgrE | 27 Sept 2012 |
| **35 years** | | |
| Geoffrey **Hanson** | FIAgrE | 14 Jul 2012 |
| Richard Martin **Frost** | IEng, CEnv, MIAgrE | 16 Sept 2012 |
| Lance Harold **Rayner** | CEng, MIAgrE | 22 Sept 2012 |
| John Linwood **Page** | IEng MIAgrE | 22 Sept 2012 |
| Royston Leslie Peter **Lemberger** | MIAgrE | 22 Sept 2012 |
| **25 years** | | |
| Andrew **Downing** | AIAgrE | 16 Jul 2012 |
| George Antony **Fenton** | AIAgrE | 23 Jul 2012 |
| Laurence Victor **Brown** | AMIAgrE | 22 Sept 2012 |

# Academic members

Askham Bryan College
Askham Bryan
York
YO23 3FR

Barony College
Parkgate
Dumfries, DG1 3NE

Bicton College
East Budleigh
Budleigh Salterton
Devon
EX9 7BY

Bishop Burton College
York Road
Bishop Burton
Beverley
HU17 8QG

Brooksby Melton College
Asfordby Road
Melton Mowbray
Leics
LE13 0HJ

Coleg sir Gar
Pibwrlwyd Campus
Pibwrlwyd
Carmarthen
SA31 2NH

Cranfield University
Cranfield
Bedfordshire
MK43 0AL

Easton College
Easton
Norwich
Norfolk
NR9 5DX

Greenmount Campus
CAFRE
22 Greenmount Road
Antrim,
Northern Ireland
BT41 4PU

Harper Adams University
College
Newport
Shropshire,
TF10 8NB

Institute of Technology Tralee
Clash, Tralee
Co Kerry, Ireland

Myerscough College
Myerscough Hall
Bilsborrow
Preston
Lancashire PR7 0RY

Oatridge Agricultural College
Ecclesmachan
Broxburn
West Lothian
EH52 6NH

Pallaskenry Agricultural
College
Co Limerick
Ireland

Plumpton College
Ditchling Road
Lewes
East Sussex
BN7 3AE

Reaseheath College
Reaseheath, Nantwich
Cheshire, CW5 6DF

Royal Agricultural College
Cirencester
Gloucester
GL7 6JS

Scottish Agricultural College
SAC Ayr Campus
Auchincruive Estate
Ayr
KA6 5HW

Sparsholt College
Sparsholt
Winchester
Hampshire
SO21 2NF

Willowdene Training Ltd
Chorley
Bridgnorth
Shropshire
WV16 6PP

Wiltshire College - Lackham
Lacock
Chippenham
Wiltshire
SN15 2NY

# Commercial members

Agricultural Engineers
Association (AEA)
Samuelson House,
62 Fodder Way, Hampton
Peterborough,
PE7 8JB

AGCO Ltd
Stoneleigh, Abbey Park,
Kenilworth, Warwickshire
CV8 2TQ

BAGMA
Middleton House,
2 Main Road,
Middleton Cheney,
Banbury,
Oxon, OX17 2TN

Alvan Blanch Development
Co Ltd
Chelworth, Malmesbury
Wiltshire, SN16 9SG

Autoguide Equipment Ltd
Stockley Road
Heddington
Calne, Wiltshire
SN11 0PS

Bomford Turner Limited
Salford Priors
Evesham
Worcestershire
WR11 5SW

David Ritchie (Implements) Ltd
Carseview Road
Suttieside
Forfar, Angus,
DD8 3EE

Douglas Bomford Trust
The Bullock Building
University Way
Cranfield
Bedford MK43 0GH

FEC Services
Stoneleigh Park
Kenilworth Warwickshire CV8
2LS

Garford Farm Machinery Ltd
Hards Lane
Frognall
Deeping St James
Peterborough
PE6 8RR

Huntaway Consulting
Ivy Cottage
Torlundy
Fort William
Inverness-shire
PH33 6SW

John Deere Ltd
Harby Road
Langar
Nottinghamshire NG13 9HT

Shelbourne Reynolds
Shepherds Grove Ind. Est.
Stanton
Bury St Edmunds
Suffolk
IP31 2AR

SSAB Swedish Steel Ltd
De Salis Court
De Salis Drive
Hampton Lovett
Droitwich
Worcestershire
WR9 0QE

White Horse Contractors Ltd
Lodge Hill
Abingdon
Oxfordshire
OX14 2JD

# EVENTS

## IAgrE Branch Meetings and Events

**Scottish Branch**
**Wednesday 3 October 2012, 1.30pm**
BIOCHAR PROJECT
Venue: Edinburgh University
For further information and to register a place, please contact the Branch Secretary: Malcolm Cattermole
Tel: 0131 445 8717 Email: malcolm.cattermole@forestry.gsi.gov.uk

**Wrekin Branch**
**Tuesday 9 October 2012, 19:00**
CLAAS UK
Speaker: tbc. Venue: Harper Adams University College, Newport, Shropshire TF10 8NB
For further information please contact the (acting) Branch Secretary: Jim Loynes.
Tel: 07836 602750 Email: jloynes@harper-adams.ac.uk

**South East Midlands Branch**
**Tuesday 9 October 2012, 19:00**
TURBOCHARGERS. THE ANSWER TO POWER, ECONOMY, EMISSIONS AND MORE!
Speaker: Nick Sharp, Cummins Turbo Technologies ltd
Venue: Cranfield University
For further information please contact the Branch Secretary: John Stafford
Tel: 01525 402229 Email: John.stafford@silsoe-solutions.co.uk

**Western Branch**
**Wednesday 10 October 2012, 19:00**
DEVELOPMENT OF THE BIG X FORAGE HARVESTER. KRONE UK AND LOCAL DEALER BARNES AGRI.
Venue: Lackham College
For further details please contact Rupert Caplat
Tel: 01235 522828 Email: Rupert.caplat@lindehydraulics.co.uk

**East Midlands Branch**
**Tuesday 16 October 2012, 19:00**
VISIT TO STAYTHORPE GAS FIRED POWER STATION
For security clearnance, names must be registered by Friday 12 October.
To book a place, please contact: David Yates
Tel: 01636 830628
Email: inquiries@yatesengineering.co.uk

**South East Midlands Branch**
**Thursday 1 November 2012, 17:00**
CONFESSIONS OF A EUROCRAT. A PERSONAL REFLECTION ON THE EUROPEAN COMMISSION
Speaker: Geoff Rudd
Venue: IAgrE Meeting Room, Cranfield
For further details please contact Branch Secretary: John Stafford
Tel: 01525 402229
Email: John.stafford@silsoe-solutions.co.uk

**West Midlands Branch**
**Tuesday 6 November 2012, 19:30**
CARBON CAPTURE
Venue: Friends Meeting House, Maidenhead Rd, Stratford upon Avon CV37 6XT
For further details please contact Branch Secretary: Mike Sheldon
Tel: 01926 498900
Email: michaelcsheldon@yahoo.com

**Wrekin Branch**
**Thursday 8 November 2012, 19:30**
DEVELOPMENT OF THE 'OCELOT' MILITARY VEHICLE - JOINT MEETING WITH IMECHE STAFFORDSHIRE BRANCH
Venue: Ruxton Lecture Theatre, Stafford University
For further details please contact Jim Loynes
Tel: 07836 602750
Email: jloynes@harper-adams.ac.uk

**Wrekin Branch**
**Monday 19 November 2012, 1930- tbc**
WREKIN BRANCH YOUNG ENGINEERS COMPETITION AND PRESENTATION OF BRANCH STUDENT AWARDS
Speaker: tbc. Venue: Harper Adams University College, Newport, Shropshire TF10 8NB
For further information please contact the (acting) Branch Secretary: Jim Loynes.
Tel: 07836 602750 Email: jloynes@harper-adams.ac.uk

**EMESP and East Midlands Branch**
**Wednesday 28 November 2012, 19:30**
26TH ANNUAL JOINT INSTITUTIONS PRESTIGE LECTURE: THE GALILEO SATELLITE NAVIGATION SYSTEM - CONCEPT, DEVELOPMENT & EXPLOITATION
Speaker: Dr Stuart Eves, Lead Mission Concepts Engineer
Venue: Albert Hall Conference Centre, North Circus Street, Nottingham NG1 5AA
Galileo is Europe's own global navigation satellite system under civilian control. Dr Eves's presentation will guide the audience through the principles behind the Galileo system concept, show how the UK is helping to steer the programme through its development phase and provide pointers towards the ways in which the system will be exploited in the future.
Applications for tickets by post ONLY. Application forms will be available to downloaded from the website soon. Tickets cost £5.00.
For further information visit the website or email Eric Wetton
Email: e.wetton@ntleworld.com
Web: www.esa.int/esaNA/galileo.html

**Wrekin Branch**
**Monday 3 December 2012, 19:30**
TESTING VEHICLES
Speaker: Ted Nichols, JLR.
Venue: Harper Adams University College, Newport, Shropshire TF10 8NB
For further information please contact the (acting) Branch Secretary: Jim Loynes.
Tel: 07836 602750 Email: jloynes@harper-adams.ac.uk

**West Midlands Branch**
**Tuesday 4 December 2012, 19:30**
DEVELOPMENT OF HARVEST EQUIPMENT - A HISTORICAL REVIEW
Speaker: Richard Trevarthen
Venue: Stoneleigh Village Hall, Birmingham Road, Stoneleigh, Nr Kenilworth CV8
For further details please contact Branch Secretary: Mike Sheldon
Tel: 01926 498900 Email: michaelcsheldon@yahoo.com

**South East Midlands Branch**
**Tuesday 11 December 2012, 19:30**
BULK GRAIN DRAYING - THE INSIDE STORY
Speaker: David Bartlett
Venue: Maulden Church Hall, Maulden, Beds MK45 2AU
For further details please contact Branch Secretary: John Stafford
Tel: 01525 402229
Email: John.stafford@silsoe-solutions.co.uk

**West Midlands Branch**
**Tuesday 15 January 2013, 19:30**
GREENWATT ENERGY - A REVIEW OF RENEWABLE ENERGY SYSTEMS
Speaker: Mike Wollacott, Sustainable Technology Consultant
Venue: Friends Meeting House, Maidenhead Rd, Stratford upon Avon CV37 6XT
For further details please contact Branch Secretary: Mike Sheldon
Tel: 01926 498900
Email: michaelcsheldon@yahoo.com

**South East Midlands Branch**
**Thursday 17 January 2013, 19:30**
SOILS - IT'S ALL ABOUT THE STRUCTURE
Speaker: Sacha Mooney, University of Nottingham
Venue: Maulden Church Hall, Maulden, Beds MK45 2AU
For further details please contact Branch Secretary: John Stafford
Tel: 01525 402229
Email: John.stafford@silsoe-solutions.co.uk

**Wrekin Branch**
**Monday 21 January 2013**
VISIT TO CAT FINNING, CANNOCK, STAFFS
For further information please contact the (acting) Branch Secretary: Jim Loynes.
Tel: 07836 602750
Email: jloynes@harper-adams.ac.uk

**Western Branch**
**Wednesday 23 January 2013**
VISIT TO KEMBLE FARM BIO-DIGESTER
Speaker: tbc. Venue: Harper Adams University College, Newport, Shropshire TF10 8NB
For further details please contact Rupert Caplat
Tel: 01235 522828
Email: Rupert.caplat@lindehydraulics.co.uk

**Scottish Branch**
**Friday 25 January 2013, 7pm**
BURNS SUPPER
Venue: Old Roslin Inn
Tickets £15 per person (members and guests). All welcome.
For further information and to register a place, please contact the Branch Secretary: Malcolm Cattermole or organiser Geoff Freedman
geoff.freedman@gmail.com
Tel: 0131 445 8717
Email: malcolm.cattermole@forestry.gsi.gov.uk

## Other Events:

**Monday - Wednesday 24-26 September 2012**
**UK Irrigation Association**
**AN IRRIGATION FIELD VISIT TO AIZ-EN-PROVENCE**
Venue: Cemagref and WAG
Tel: 01427 717627
Email: m.kay@ukia.org

**Wednesday 3 October 2012**
**TILLAGE-LIVE 2012**
Venue: Westfield, Haddington, East Lothian
Tillage-Live is the national event for professional farmers, growers and contractors focused on making the most of the latest technology techniques.
Tel: 0845 4900 142
Web: www.tillage-live.uk.com/

**Thursday 08 November 2012**
**Forest Research and IUFRO**
**MANAGING FORESTS FOR ECOSYSTEM SERVICES: CAN SPRUCE FORESTS SHOW THE WAY?**
Venue: Heriot-Wyatt University, James Watt II Building, Riccarton, Edinburgh EH14 4AS
This meeting will enable researchers, practitioners and policymakers to present and discuss findings on how best to translate the concepts promulgated by the Millennium Ecosystem Assessment (MEA) and successor documents into strategic, tactical and operational management regimes that will help adapt forests to meet changes in climate and in societal demands
Of interest to Researchers, practitioners and policy makers.
For further details contact Evelyn Hall.
Email: evelyn.hall@forestry.gsi.gov.uk
Web: www.forestry.gov.uk/fr/INFD-8K6C49

**Tuesday / Wednesday 16 & 17 October 2012**
**CUMBRIA 'BIG BANG' SCIENCE & ENGINEERING FAIR**
Venue: Carlisle Racecourse
One of a programme of events designed to inspire, enthuse and celebrate the achievements of young people in the areas of science, technology, engineering and maths.
Tel: 01539 814610
Email: tony@cumbriastemcenter.co.uk

**Tuesday & Wednesday 6-7 November 2012**
**UBM/BCPC**
**CROPWORLD GLOBAL 2012**
Venue: QEII Conference Center, London
Web: www.cropworld-global.com/

**Wednesday 21 November 2012**
**AGRI SCOT 2012 - SCOTLAND'S FARM BUSINESS EVENT**
Venue: The Royal Highland Centre, Ingliston, Edinburgh
Web: www.agriscot.co.uk/info.html

**Friday 23 November - Saturday 24 November 2012**
**NATIONAL ENGINEERING AND CONSTRUCTION RECRUITMENT (NECR) EXHIBITION**
Venue: NEC Birmingham
Web: www.engineerjobs.co.uk/engineering-exhibitions/autumn-birmingham-2012

**Wednesday & Thursday 16 - 17 January 2013**
**LAMMA SHOW 2013**
Venue: Newark and Nottinghamshire Showground, Winthorpe, Newark, Notts NG24 2NY
UK's Leading Farm Equipment and Services Show
Tel: 0845 331 6123
Email: admin@lammashow.co.uk
Web: www.lammashow.co.uk

**Monday & Tuesday 10-11 June 2013**
**IAgrE**
**MODELLING SPRAY DRIFT FROM GROUND-BASED APPLICATIONS - 2-DAY WORKSHOP**
Speaker: tbc
Venue: Auditorium, The Vincent Building, Cranfield University, Cranfield, Bedford MK43 0AL
a 2-day workshop for all with an interest in modelling spray drift. Further details will be available in due course together with on-line registration.
Tel: 01234 750876 Email: conferences@iagre.org

**Full details of forthcoming events can be found on www.iagre.org/events**

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