

## UK CONTROLLED ENVIRONMENT USERS' GROUP

### MINUTES OF THE 2000 BUSINESS MEETING

The annual meeting of the Controlled Environment Users' Group was held on Tuesday 5<sup>th</sup> September 2000 at Withersdane Conference Centre, Wye College (now Imperial College at Wye). The meeting opened at 20:30 hours.

The chairman, L. Incoll (Leeds University), opened the meeting.

*Apologies* were received from Peter Gill, Bob Hughes and Gary Bignall.

#### 1. Minutes of the Previous Meeting

The minutes of the previous meeting, which had been distributed to members earlier in the year, were proposed by B. Wilson (Imperial College at Wye) and seconded by L. Incoll (Leeds University) and approved as a true record of the proceedings.

#### 2. Matters Arising

There were no matters arising.

#### 3. Future Meetings

##### *2001 Meeting: "Controlled Environments in the New Millennium"*

The 2001 meeting will be a joint meeting of the UK CEUG and the North American Committee on Controlled Environment Technology and Use NCR-101. The initial approach for a joint meeting in Europe was made by NCR-101, which was established before the UK CEUG and is a research-based group. The meeting is being organised by committees from both groups. The theme of the meeting, which will run from 9<sup>th</sup> to 12<sup>th</sup> September at the John Innes Centre and University of East Anglia, will be "Controlled Environments in the New Millennium". It is anticipated that 30 plus North Americans will attend and there is interest from Japan, Australasia and Europe. L. Incoll hoped that the programme would attract participants and that it would be a genuine international meeting. He hoped that the extra cost to cover the longer meeting would not deter members from attending. He stated that this would be the first international meeting organised by the group in its 35 years existence and a one-off and therefore surely worth employers sending delegates to the meeting. The estimated cost is about £200. The meeting will be publicised in Europe, North America, Japan, Australasia and on the UK CEUG and NCR-101 web sites.

L. Incoll discussed the proposed programme, which will have contributions from both sides of the Atlantic and possibly other places. The meeting will commence on the Sunday night with a reception following a buffet supper. Each session will have a specific topic. There will be a series of invited papers on various subjects. Each session will have panel-led discussions stimulated by the participating speakers. There will be a tour of the John Innes Centre on the Monday afternoon. The annual business meetings for UK CEUG and NCR-101 will take place on the Monday evening. The conference dinner will be on the Tuesday evening. On the Wednesday there will be a session with 10-12 solicited and selected five-

minute presentations. L. Incoll would like to invite someone eminent in the field to give a concluding address, perhaps on key events in the history of controlled environments/current limiting factors/the future. The programme will also include poster presentations and trade displays. The meeting will conclude at lunchtime on the Wednesday when the North Americans will be able to go on a short tour of high quality installations in the UK, guided by J. Franklin (IACR, Rothamsted), until the Friday.

L. Incoll reported that there was a good committee working on the meeting but they needed support. A team at the John Innes Centre is arranging local organisation. They have currently made a provisional booking for 80 people but hope there will be more. Including contributions from Europe is a problem because the group is not aware of who is actively interested in CEs there.

P. Henley (University of Wales) suggested Mike Dixon might be invited to speak on his LED work. It is anticipated that this topic will be covered in the session on CEs in space. M. Pratt (University of Leicester) reported that his department is in the early stages of developing facilities with LED's to complement research in the area of photobiology. He is not in a position to discuss it but could talk to Prof. G. Whitlam at Leicester who could be invited to present a poster if not in a position to give a full talk. M. Pratt will report back to L. Incoll. P. Goode (University of Warwick) reported that his department is also researching the use of LED's in photobiology research. He will also investigate the possibility of them presenting a poster. NCR-101 is organising the appropriate session, which might include the use of LEDs in photobiology and L. Incoll will inform them of the interest in the subject. The deadline for completing the programme will be six months before the meeting.

### ***Annual Meeting 2002***

L. Incoll has pencilled in Zeneca. P. Stratton (Zeneca Agrochemicals) said it will not be called Zeneca then but the meeting could still go ahead. The theme will be "**The Glasshouse Environment**". Accommodation may be a problem. Sunningdale and Reading University were suggested as possible places to stay.

### ***Annual Meeting 2003***

Biological Sciences at Lancaster is pencilled in. Their offer depends on the success of a bid for a JIF grant for rebuilding their facilities. L. Incoll has had no recent contact.

### ***Annual Meeting 2004***

Possibly HRI Wellesbourne as repeat visits are usually after nine years. Aberystwyth is also a possibility for 2004 or 2005.

L. Incoll invited offers to host a meeting from those present noting that are fewer places to go to now as some institutions are closing down. B. Wilson asked whether it would be possible to have a meeting in Europe, say Wageningen. L. Incoll is already investigating who is active in CEs in France and the Netherlands. K. Forsyth (Biogemma UK Ltd) will make enquiries through her company, which is French owned. G. Taylor (Sanyo Gallenkamp Ltd) said that Max Plank Institute in Köln has good facilities.

#### **4. Group Communications**

L. Incoll reported that there were 135 people on the mailing list at the end of August. Sixteen new members have been recruited since last year's meeting, five from overseas. Five members have left. 111 members are on his email mailing list. He hasn't the time to send postal mailings to those who are not on the Internet so they only receive the annual proceedings. Anyone not receiving emails who has an email address should inform L. Incoll.

The group web site has a revised address and has been updated and improved. The second announcement for the 2001 meeting, including the booking form, will go on the web site. A booking form will be designed that can be completed and printed on line. Manufacturers' information on the web site is not up to date and will only be if L. Incoll is informed of changes. The group's Majordomo mailing list is not well supported. It can be used to contact members with notices and to give/request information. It is a closed list and users have to be approved by the list-owner.

#### **5. Treasurer's Report**

A. Nichols (John Innes Centre) presented the financial report.

The balance brought forward was £2723.19, income from donations was £1970.00, and expenditure was £1515.02. The credit balance on the account on 10th August 2000 was £3,178.17. The account was unaudited, but was accepted as presented.

L. Incoll said that the group was in a position to pay the deposit of £2000 to UEA for next year's meeting. The committee organising the 2001 meeting expect to raise the £10,000 they believe will be required to support invited speakers but may need to use some of the credit balance to support the meeting.

#### **6. Maintenance, Servicing and Spares**

J. Franklin said that there were nine Saxcil cabinets and various Day-lit chambers, which Rothamsted will be disposing of in the next six months. If anyone is interested they should contact either J. Franklin or I. Pearman (IACR, Rothamsted). L. Incoll offered to circulate the details to the membership on his email list.

G. Pitkin (SCRI, Dundee) asked manufacturers' representatives their opinions on institute engineers trying to maintain equipment rather than having a maintenance contract with the company. G. Taylor said that his company did not have a problem with this and is happy to supply parts and advice to customers to assist with their own maintenance. SANYO Gallenkamp has in the past encouraged qualified in-house maintenance and is happy to provide maintenance/operator training at the SANYO factory. Problems often occur when people 'dabble' with chamber systems and upset the running of the equipment. Lack of maintenance is the major cause of chamber problems. D. Brault (Convion) responded with the comment that his company was agreeable to customers doing their own maintenance and they have a service school to assist in that regard. A. Walker (York Refrigeration Ltd.) added that he would like to agree - they do not have a problem with maintenance staff looking after equipment but they should have training and know their limitations. V. Frodsham (Vindon Scientific Ltd.) had nothing more to add.

## 7. Control Systems

J. Franklin asked how those present had managed with the "Year 2000" transition. G. Pitkin reported that TomTech had sent a new disc to SCRI as at the turn of the century the data was a day out but the controls were not affected. P. Stratton had discovered by testing, that some equipment would fail in 2008.

## 8. Humidification and Irrigation

B. Wilson asked controlled environment manufacturers the best way to humidify. There was discussion on the use of ultrasonics versus injection. V. Frodsham said they had been moving more towards ultrasonics. A. Walker has used both but also recently moved towards ultrasonics. D. Brault reported that atomising nozzles are used in all of their units except the small incubators, which use centrifugal atomising humidifiers. G. Taylor said that the most energy efficient method is ultrasonics but the safest is steam. Atomisers with high-pressure water which release small particles of water to make vapour, have the potential to create an aerosol of bacteria or salts which could be a health hazard to plants or humans. Steam is pure vapour and sterile. B. Wilson enquired whether steam is cheaper to install. G. Taylor responded that he was not sure that it is cheaper for the manufacturer. For either a chamber or a suite of rooms, the price is not the main consideration for the manufacturer. B. Wilson had asked a student to investigate the presence of *Legionella*. It was often found in small quantities. The sand and gravel of heated mist benches is a potential source of larger colonies. The critical temperature for *Legionella* is 20°C. G. Taylor said that *Legionella* is only a problem when airborne. V. Frodsham said that Vindons use ultrasonics on a regular basis and have an automatic drain down of the reservoirs every 24 hours. They do have a mobile cabinet which has a reservoir, which can be stagnant and the customer has to drain it down every three months. L. Incoll said that A & A Industrial Equipment of Leeds have spinning disc humidifiers which automatically empty when switched off. P. Warren (Purite Ltd.) enquired whether the discussion was on water that had been pre-purified and dechlorinated to go through the systems. He suggested that the amount of water stored needs to be kept at a minimum - minimum tank capacity with optimised system feed tanks.

## 9. Lighting

P. Goode has to review all their fluorescent lamp outputs and has discovered all kinds of numbers, which relate to colour suffixed to the manufacturer's product code. P. Stratton suggested he decide on the colour code, 84 or 83, for the colour range required and select one lamp manufacturer, because they all have a slightly different colour rendering, and then change the lamps every two years. Furthermore P. Goode has quite a few control chambers from Sanyo but does not know what the lamps in them are because the writing is in Japanese. G. Taylor said the chambers do take European lamps - 40 W lamps, 36 W European equivalent and colour 37. He recommended swapping them for Philips lamps eventually. I. Pearman did tests on different lamps and found there was no difference in plant growth for a range of crops. They standardised on white because it is cheapest.

A. Nichols cannot get odd fittings for fluorescent lamps now and 1500 mm and 1200 mm will become the standard. 8' lamps will be unobtainable. 16-mm tubes can be obtained in the 5' length.

J. Franklin found that keeping the supplementary tungsten lamps on for 30 minutes after the fluorescent lamps had switched off, doubled the leaf area of sugar beet, while keeping the dry matter the same. I. Pearman said they used to change 1/6th of the lamps every 1000 h, keeping the older lamps in the upper layer of double-layered lighting arrays, but since changing to high frequency dimmable lighting, they now did one lamp change every 18 months.

G. Pitkin asked about light levels in walk-in growth rooms. I. Pearman responded that light levels range from 400-1000  $\mu\text{mol m}^{-2} \text{s}^{-1}$  (depending on light source and distance from the lights). A fluorescent-based system gives good uniformity, but for high light levels you need to use HQI lamps. This requires careful design of lamp layout to avoid spots of high light intensity. P. Stratton is getting 800  $\mu\text{mol m}^{-2} \text{s}^{-1}$  330 mm from the lamps. B. Wilson's refurbishment involved Chris Lakwijk (Phillips, Eindhoven) with a computer-designed system. It uses luminaires as found in Shell Service Stations. They shine down and across to produce about 600  $\mu\text{mol m}^{-2} \text{s}^{-1}$  at 1.2 m from the lamps and about 80% on the edge as predicted by the computer design. The light output is trebled from 8' fluorescents and the electrical wattage reduced by 30%. The luminaire shape and siting is very important.

#### **10. Instrumentation, sensors, monitoring**

J. Franklin is trying out an Apogee light sensor, which has a reasonably good light response curve, is inexpensive and, according to the manufacturer's information, is quite reliable when exposed to the elements in natural light and ambient temperatures. It gives a millivolt output and a calibration factor to convert from millivolts is supplied. Accuracy is claimed to be within 5%. The company was easy to deal with and delivery was made within three weeks of placing the order. J. Franklin would recommend it to anyone with a limited budget and can provide the web address for Apogee Instruments.

#### **11. Heating, Reclamation and Energy Management**

No comments.

#### **12. Fabric, Glazing, Reflective Material.**

K. Forsyth raised the subject of polycarbonate glazing. J. Franklin uses it to keep refrigerated glasshouses cool in the summer months by reducing heat gain during periods of high outside ambient temperatures. It insulated the greenhouse but transmitted less light. It cannot be smashed like glass and is cheaper than hardened glass. The polycarbonate manufacturers specify that it will last for fifteen years without substantial degradation.

B. Wilson asked if it was true that the Eden project is using Teflon covering. J. Franklin understands they have a weight problem. Teflon has recently become available in a clear form. He has seen the literature available, which specifies that light transmissibility is good. M. Van der Velde (Sanyo Gallenkamp) said that Long Ashton has Tedlar but cleaning it is a problem.

#### **13. New Equipment, Recent Advances**

No comments.

#### **14. Plant Growth Problems, Pests and Diseases**

No comments.

#### **15. Safety**

No comments.

#### **16. Management, Staffing, Running Costs**

J. Franklin detailed the costs for GMO glass compared with conventional glass including ventilation costs, watering costs, maintenance costs, plant care costs, energy costs and basic pest and disease management costs at IACR Rothamsted. The overall costs of about £1.5 million per annum (1999-2000) for glasshouse and controlled environment services include space rental charges (~25%), cost of staff (~20%), cost of equipment and spares (~5%), cost of consumables (~5%), maintenance costs (~25%) and energy costs (~20%). Tissue culture room costs are less (~50% less) than those for controlled environment rooms. Currently charges to users are being redefined. Although maintenance costs are included and they are planning to amortise the cost of new facilities over a 20-year lifetime. In the future BBSRC are working towards a system whereby the capital costs are being fed into the system long term, so that a fund is built up through charges to users to buy new equipment and replace old. L. Incoll noted that equipment is usually amortised over five years e.g. by commercial companies and the EC.

#### **17. Any Other Business**

J. Boccon-Gibod (INH, Angers) expressed an interest in joining the group and believed he could help the group to make contacts in France. J. Franklin asked him what manufacturers there are at present in France. There are two medium sized companies manufacturing tissue culture and plant growth equipment. Some laboratories buy other makes and others prefer to design specific growth chambers and order them from a French bespoke manufacturer. L. Incoll said that he would like CE manufacturing companies from Europe to join the group and attend meetings. J. Boccon-Gibod will invite the two companies to join and ask his colleagues in INRA if they know of any other companies, which may be interested.

M. Copland (Imperial College at Wye) has found increasing difficulty over the years with regard to building his own equipment under increasing College restrictions. He finds that developing his own equipment is a way of making discoveries but cannot see future generations of researchers being able to do it because of restrictive legislation. L. Incoll noted that during his career professions such as instrument makers and precision tool machining have almost disappeared from the UK so there are not the experts around to assist. G. Taylor has found it more difficult to find true engineers. From an institute's point of view, labour cost is the main limitation. It is not cost effective to have technicians spending hours building equipment compared to buying an item off the shelf and adapting it if necessary. D. Brault has found researchers who make their own equipment are, in most cases, doing specialised work requiring them to do so and they have a mechanical aptitude. Although it is not so common, he believes it will continue. G. Taylor replied that from a manufacturers point of view they have liabilities and they cannot get away with some things that other individuals could. The requirement now is to provide uniform material for homogenous plants. P. Stratton believed it was important to employ staff with skills to make apparatus

and ensure it is safe. Not enough people are doing this and it should not be necessary to rely on ready-made items. Health and Safety regulations restrict development by individuals. J. Franklin feels that in some cases it is a question of the liability and competence of the person to handle the electrical side.

L. Incoll expressed his appreciation to B. Wilson, his team and the organisation at Wye College on behalf of the group for agreeing to host this year's meeting and also his thanks to B. Roberts (HRI, East Malling) for arranging the visit to East Malling. The paper session on "Controlled environments for specialist applications" had been very successful and he thanked the speakers.

The meeting closed at 11:05 p.m.

Recorder: L.D. Incoll