



P. Gill & G. Pitkin  
Scottish Crop Research Institute,  
Invergowrie,  
Dundee DD2 4DA

12<sup>th</sup> May 2008

Dear colleague,

## **Workshop on “Water and its measurement in Controlled Environments”**

We have great pleasure in inviting you to this year’s annual UK CEUG meeting, which is being hosted by the Scottish Crop Research Institute (SCRI).

For most delegates Dundee will be a long journey, so why not come earlier and have a pre-conference weekend to explore Dundee and the local countryside. Extra nights’ accommodation can be booked at the Conference Centre. A Sunday afternoon visit has been arranged to Verdant Works, which traces the prosperity that Dundee achieved from its jute industry, one of the city’s three ‘J’s; the others being jam and journalism.

Travel by rail: Dundee is on the east coast mainline from Kings Cross with expresses operated by National Express (ex-GNER) and Arriva Cross Country.

By air: There are direct flights from Birmingham International to Dundee airport by Flybe and to Edinburgh airport by several carriers, including BA, easyJet, Flybe & BMI. We hope to run a mini-bus shuttle to Edinburgh airport subject to demand.

By road: It is quicker up the west coast route – M6 / M74.

The meeting will commence on Sunday 7th September with registration from 4.00 pm in the ‘Burrelton’ function room of the West Park Conference Centre, University of Dundee. Bedrooms will be available for occupancy from 2.30 pm, but for those who arrive early, a bag-drop will be provided. A buffet will be held in the adjoining ‘Balbeggie’ function room from 7.00 pm until 9.00 pm, with a pay bar open throughout the evening.

Breakfast on Monday, Tuesday and Wednesday mornings will be in the restaurant from 7.30 am until 8.30 am. Each morning session of lectures will be held in the ‘Sidlaw’ Conference

**Continued overleaf...**

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Centre starting at 9.00 am. Lunches on Monday and Tuesday are in the restaurant, with a self-service buffet on Wednesday in the Conference Centre foyer. Dinner on Monday evening will be in the restaurant from 6.30 pm.

The practical sessions will be held at the Scottish Crop Research Institute (SCRI) on the afternoons of Monday and Tuesday from 1.30 pm to 5.15 pm. At each stopping point, there will be a manufacturer's display and presentation with the opportunity for hands on use of equipment for measuring water in the atmosphere and soil. A bus will transport delegates between the West Park Conference Centre and SCRI.

Topics for lectures and practical sessions will include:-

- Terminology of water measurement in air and in growth media
- Methods of calibration of instruments
- Generating water vapour, sterilisation and health and safety
- Water as a sustainable resource in irrigation
- New technology of application of water to growth media
- Group discussion

The Annual General Meeting will be held in the 'Balbeggie' function room on Monday evening from 8.00 pm onwards, with a pay bar open throughout the evening.

The conference dinner will be held at 'Discovery Point' on Tuesday evening at 7.00 pm, starting with a wine reception on the RSS Discovery, hosted by the Provost of Dundee. There will be time to explore the ship and museum. A bus will provide transport between the Conference Centre and Discovery Point.

We enclose a booking form for the conference, which we hope you will attend. Please return the form promptly and at the latest by Friday 11<sup>th</sup> July. Further details of the programme and directions to Dundee will be sent with the confirmation of booking.

Please contact us if you have any enquiries about the conference.

Yours faithfully,



Peter Gill & Graham Pitkin, local organisers

**Contact details:**

Peter Gill -	Tel: 01382 568547 (direct),	email: peter.gill@scri.ac.uk
Graham Pitkin -	Tel: 01382-562731 (x2803),	email: graham.pitkin@scri.ac.uk
	Fax: 01382 562426	

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*Please fill in this slip, tear it off and return it to Peter Gill with your booking form.*

**UK CEUG Database Information Request**

Name..... Institution .....

**I am able/unable\* to attend the 2008 workshop at the Scottish Crop Research Institute, Invergowrie, Dundee, and the University of Dundee, West Park Conference Centre.**

**Please keep/remove/add \* my name on/from/to \* the UK CEUG mailing list.**  
(\* delete as appropriate)



Meeting Organisers:  
 Peter Gill & Graham Pitkin  
 Scottish Crop Research Institute,  
 Invergowrie,  
 Dundee DD2 4DA

Email: peter.gill@scri.ac.uk  
 Tel: +44 01382 568 547 (direct)  
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 Tel: +44 01382.562 731 (x2803)

## Workshop on “Water and its measurement in Controlled Environments”

Sunday 7th – Wednesday 10th September: Scottish Crop Research Institute, Invergowrie, Dundee, and University of Dundee, West Park Conference Centre

### Booking Form

Your name as you'd like it on the badge:	Your name & title for mail:
Your Postal address:	
Email:	Telephone:

	Fee	To pay
<b>Registration fee</b>	£27	£27
<b>'Residential Delegate' rate</b> <b>En suite bedroom</b> Includes all meals from evening Sunday through to lunch on Wednesday including evening meals, breakfasts, lunches, morning coffee, afternoon tea, and Conference Dinner with wine	£300	
<b>Visit to Jute Museum (Verdant Works)</b>	£3	
<b>For booking after 11<sup>th</sup> July</b>	£20	
<b>Please make your cheque payable to:</b> " UK-Controlled Environment Users' Group " For other methods of payment see overleaf.	<b>Total</b>	

Please contact Peter Gill for information about 'Non-residential' delegate rates.

Special dietary requirements:
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**PLEASE RETURN THIS FORM BY FRIDAY 11<sup>th</sup> JULY 2008 TO**

Peter Gill, Scottish Crop Research Institute, Invergowrie, Dundee DD2 5DA  
 Tel: +44 (0)1382 568 547      Email: peter.gill@scri.ac.uk

**PLEASE NOTE: A charge of £20 will be made for any forms returned after the closing date. Refunds for cancellations will not be possible after 1<sup>st</sup> August**

## Booking Form (continued)

### METHODS OF PAYMENT

**Bank Transfer:** Payment by bank transfer will be accepted, in pounds Sterling, via

Bank: **The Royal Bank of Scotland, Dundee Chief Office, 3 High Street, Dundee, DD1 9LY**

Account No: **10081698**

Sort Code: **83-50-00**

IBAN No. **GB82RBOS83500010081698**

IBAN BIC **RBOSGB2L**

Ref: **UK Controlled Environment Users' Group**

**Payment by Bank Draft, Bank Cheque or Personal Cheque:** Payment by bank draft, bank cheque or personal cheque must be in pounds Sterling and drawn on a UK bank.

**Payment by Non-Sterling Cheque:** This is not a preferred method of payment for the organisers. If you are unable to pay in pounds sterling, please contact Peter Gill at <peter.gill@scri.ac.uk > for instructions.

Please indicate which method of payment you will be using by ticking one of the following:

**Cheque or Bank Draft** (made payable to "UK-  
Controlled Environment Users' Group" and enclosed)

**Bank Transfer**

Signature: ..... Date: .....

Please return to:

Mr P. Gill  
Scottish Crop Research Institute,  
Invergowrie,  
Dundee DD2 4DA

**AVOID THE LATE BOOKING FEE: HELP US TOO BY BOOKING BEFORE  
FRIDAY 11<sup>th</sup> JULY 2008**



## Workshop on “*Water and its measurement in controlled environments*”

### Programme

This programme is provisional. We expect there to be variations in the final programme but they will not be major ones.

### Elements

- a) A number of **Lectures** on water, vapour and liquid (not one per bullet point) covering:
- Water - terminology, units and measuring instruments for atmospheric water vapour
  - Water - terminology, units and measuring instruments for liquid water in growth media e.g. soil, compost, agar gel
  - Water – understanding growth media, measurement of water quality
  - Water – irrigation in CEs, principals and practice, efficient use of water
  - Water - sources for various purposes, purification, sterilisation, health and safety
  - Water - generating water vapour – humidification – steam/ultrasonic
  - Water - calibration of measuring instruments for atmospheric water vapour and liquid water in soils – local & standards laboratory
  - Water - what should a CE manager or user record for monitoring & publication purposes?
  - Water - what are the guidelines for reporting measurements of water vapour and liquid water – minimum and full
  - Water - as a sustainable resource - recycling
  - Water – new technologies
- b) **Demonstrations** of measuring and calibration equipment by manufacturers and/or distributors.
- c) **Hands-on instrument sessions** for delegates or delegates, in various environments (e.g. CE rooms, cabinets and glasshouses) and in substrates at various water contents (e.g. in soil, compost and tissue culture media) using their own instruments and demonstration instruments supplied by manufacturers:
- Water vapour - capacitance sensors
  - Water vapour - dew point sensors
  - Water vapour - IRGA
  - Soil water content – gravimetry
  - Soil water content – capacitance sensors
  - Soil water content - tensiometers
  - Soil water content - time domain reflectometry (TDR)
  - Spatial distribution of water vapour content in CE spaces or canopies
  - Spatial distribution of soil water content in soil columns and plant containers
  - Calibration of sensors in flowing gas streams and over standard salt solutions
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### Lecturers

There will be four and a half sessions of lectures. Lecturers will include

- a) Prof. Lyn Jones, University of Dundee
- b) M/s Lindsey Henderson, Walter Meier (Climate UK) Ltd

- c) Dr Stephanie. Bell, Thermal Measurement Team, National Physical Laboratory
- d) Dr Paul Hallett, Scottish Crop Research Institute
- e) Dr Jean-Charles Michel, Institut National d’Horticulture, Angers
- f) Dr Chris Atkinson, East Malling Research
- g) Prof. Gaylon Campbell, Decagon Devices, Inc., Pullman

### Practical exercises

There will be four and a half practical sessions involving manufacturers and delegates.

1. *Measuring atmospheric water vapour*

- Using and do exercises on:
- a) capacitance and dewpoint sensors,
  - b) various sources of atmospheric water vapour - spinning disc, steam, atomizer and ultrasonic humidifiers
  - c) in various CE spaces - cabinets, rooms and glasshouses,
1. Measuring atmospheric water concentration;
  2. Comparing different types and makes of sensors.

2. *Measuring liquid water in solid media*

- Using and do exercises on:
- a) gravimetry, capacitance sensors, tensiometers and TDR sensors,
  - b) in columns of growth media at various water contents,
  - c) and in various CE spaces - cabinets and glasshouses,
1. Measuring liquid water content and water potential;
  2. Measuring spatial distribution of water content

4. *Calibration of sensors*

- Using
- a) static and dynamic calibrators and sources of flowing gas streams
- calibrate your own water vapour sensor.

5. *Synthesis of results*

There will one half concluding session for participants to report to the workshop on the results of the practical sessions.

### Manufacturers - participants and sponsors

	Company	Products	Field of expertise
1	Decagon	Measuring equipment	Soil moisture
2	Delta-T Devices	Measuring equipment	Soil moisture
3	Edgetech	Measurement and calibration equipment	Water vapour
4	GE Sensing	Measurement and calibration equipment	Water vapour
5	LiCOR	Sensors	Calibration gas supply
6	Michell	Measuring equipment	Water vapour
7	Rotronic	Measurement and calibration equipment	Water vapour
8	Skye Instruments	Measuring equipment	Soil moisture
9	Vaisala	Measurement and calibration equipment	Water vapour
10	* ADC Biosciences		Calibration gas supply
11	* Campbell Scientific UK		Soil moisture

**Note:** \* Loaning equipment only



### EVENT SPONSORS



## Summary of Timetable: UK Controlled Environment Users' Group Meeting 2008

Sunday 7th September	Monday 8th September	Tuesday 9th September	Wednesday 10th September
	<i>Breakfast</i>	<i>Breakfast</i>	<i>Breakfast</i>
<b>Morning</b>	<b>Morning</b>  <i>Scientific session 1 session, 3 invited lectures</i>	<b>Morning</b>  <i>Scientific session 1 session, 3 invited lectures</i>	<b>Morning</b>  <i>Wash-up session Synthesis Scientific session 1 session, 1 invited lecture</i>
	<i>Lunch</i>	<i>Lunch</i>	<i>Buffet</i>
<b>Afternoon</b>  <i>Jute museum visit (optional) Arrival &amp; registration</i>	<b>Afternoon</b>  <i>Hands-on practical sessions and demonstrations: 2 sessions</i>	<b>Afternoon</b>  <i>Hands-on practical sessions and demonstrations: 2 sessions</i>	<b>Afternoon</b>  <i>End of workshop</i>
<b>Evening</b>  <i>Buffet Bar</i>	<b>Evening</b>  <i>Dinner AGM</i>	<b>Evening</b>  <i>Civic reception Tour of R.S.S. Discovery Conference Dinner</i>	<b>Evening</b>
<i>Bed and Breakfast</i>	<i>Bed and Breakfast</i>	<i>Bed and Breakfast</i>	

**Note:** The shading shows the period of the meeting for delegates.