CONTROLLED ENVIRONMENT CABINET USERS GROUP

John Innes Institute, Norwich

Thursday 2nd. November 1978 11.00 am.

AGENDA

1. **Minutes of the previous meeting (already circulated)**

2. **Light** — **Monitoring of UV radiation from mercury discharge lamps - informal talk by Dr. A. Davis**

   Incandescent light monitoring

3. **Temperature** — **A new type of temperature transducer (Antog Devices AD 590)**

4. **Humidity** — **Nobel control of dewpoint**
   Use of demineralised water

5. **Phytotoxicity**

6. **Servicing arrangements**

7. **Institute constructed cabinets**

8. **Any other business**

9. **Date and place of next meeting**

ARC CONTROLLED ENVIRONMENT USERS MEETING 1978

1st November at John Innes Institute

The following were present:

Miss M. A, Ford Mr. E.C. H. Johnson Mr. J. Adcock	P.B.I., Maris Lane, Trumpington, Cambridge.
Mr. K. Bambridge Mr. M. Yeomans	University of Nottingham, School of Agriculture, Sutton Bonington.
Dr. C. C. Hole	N.V.R.S., Wellesbourne, Warwick.
Dr. P. Sandwell	Plant Pathology Lab., Hatching Green, Harpenden, Herts.
Dr. C. G.Guttridge Dr. E. A. Baker	Long Ashton Research Station, Long Ashton, Bristol.
Dr. J. Caseley Mr. R. Simmons	W.R.O. Begbroke Hill, Yarnton, Oxford.
Mr. T. S. Crosby	Department of Plant Sciences (Baines Wing), University of Leeds, Leeds.
Dr. A. Davis	M.O.D. Propellants, Explosives and Rocket Motor Establishment, Powdermill Lane, Waltham Abbey, Essex.
Dr.G.Ryle Mr. R. Farrow	G.R.I. Hurley, Maidenhead, Berks.
Dr. C. F. Eagles	W.P.B.S Plas Gogerddan, Aberystwyth.

Dr. R. Hurd	G.C.R.I.
Mr. A. C. Mountfield	Rustington,
Mr. R. E. Randall	Littlehampton,
Mr. P. Douglas	Sussex.
Mr. D. Dickinson	University of Reading,
Mr. F. Minchin	Shinfield Grange,
Mr. P. Hadley	Reading, Berks.
Dr. L. Piper	Dept. of Education & Science Elizabeth House York Rd. Waterloo.
Dr. G. N. Thorne	Rothamsted Experimental Station
Mr. I. Pearman	Harpenden
Mr. A. A. Strange	Herts.
Dr. G. Hussey	John Innes Institute
Dr. C. L. Hedley	Colney Lane,
Mr. D. M. Harvey	Norwich.

(1) Minutes of the "previous meeting.

These had been circulated. There were no matters arising.

(2) Lighting.

Monitoring U.V. radiation from mercury discharge lamps.
An informal talk on the monitoring of U.V. radiation was given by Dr.A. Davis; MOD, Propellants, Explosives and Rocket Motor Establishment, Powder Mill Lane, Waltham Abbey, Essex EN9 1BP. His technique is based on chemicals which change their opacity to certain wavelengths linearly with increasing accumulated dose of UV and hence can be used as 'film badge' dose meters. Polyphenylene oxide is affected by wavelengths < 370nm and polysulphone by those < 325nm. The response curve of polysulphone is similar to that of the human skin erythema reaction and is suitable for personal dose monitoring.

Film badges are made by dissolving the polymer in chloroform, spreading on a glass plate, allowing to dry, peeling off, cutting up and mounting in a slide mount. Prepared film is available from Dr. Davis at £25 per sheet (1sq.ft). and samples are obtainable from him free of charge. Film is read by examining the change in opacity at 1 96nm wavelength, using a U.V. spectrophotometer. Dr. Davis said his results indicated that the correct total dose would be recorded when a film-badge was exposed to a low dose intensity over a long period. Full details of technique are contained in the following publications: Davis, A. et al. 1976. Worldwide program for the continuous monitoring of solar U.V. radiation using polyphenyl oxide film, and a consideration of the results: J. Appl. Polymer Sci., 20, 1165-1174. Davis, A. and Deane, G., 1976. Possible dosimeter for ultraviolet radiation: Nature 261, 169-170. Leach, J.F., et al. 1978. Measurement of the ultraviolet doses received by office workers; Clinical and Exp. Dermatology, 3, 77-79. Diffey, B.L. and Davis, A., 1978. A new dosimeter for the measurement of natural ultraviolet radiation in the study of photodermatoses and drug photosensitivity. Phys. Med. Biol. 23, 318-323. Challoner, A., et al. 1976. Personnel monitoring of exposure to ultraviolet radiations. Clinical and Expt. Dermatology, 1, 175-179. Davis, A., The weathering of polymers (ref. not known).

Dr. Bambridge said that he would use polysulphone film to monitor the U.V. output from mercury lamps fitted in the growth-rooms at Sutton Bonington.

Advice on safe dose levels of U.V. is available from: Dr. McKinley, National Radiological Protection Board, Harwell, Berks.

Incandescent light monitoring. Ron Hurd (G.C.R.I.) monitors the output from fluorescent lamps with a silicon cell filtered to respond only to visible wavelengths. This sensor was O.K. for fluorescent lamps but failed to detect light from the incandescent lamps included in the light source. Richard Simmons (WRO) suggested that a two sensor type silicon cell (long wavelengths are cut off by the difference between a sensor filtered with a Wratten 89B filter and one without) would be stable enough to measure incandescent lamps down to a few watts/m^2. The WRO cell is made with two Photain Controls, SBC-255 cells. (Tanner, N. and Thurtell, 1969. Photosynthetic light sensor for measurements in plant canopies. Agronomy Journal, 61, 840-843). Commercial PAR cells are available from: Lambda Instruments (L1-1905), a two cell differential unit; T.J.Crump (GCRI design), a single filtered cell; Carlove House, Church Rd. , Ramsden Bellhouse, Basildon, Essex.

More efficient fluorescent lamp. Denis Dickinson (PEL) reported Philips have a range of lamps with a higher luminous efficiency.

(3) Temperature

A new type of temperature transducer. Richard Simmons (WRO) has obtained samples of a new type of temperature sensor, the Analog Devices AD 590. This gives a current output proportional to absolute temperature. The transistors as supplied need further encapsulation for convenient use. The units are two-terminal devices and the applied voltage is not critical.

Derek Harvey (JI) described a home-made temperature sensing device based on a transistor-diode. (Garner, R.T. and Markham, R., 1972. John Innes Annual Report, No 63, 147-148).

Chris Hole (GCRI) demonstrated a home-made temperature integrator which uses thermistor sensors. It has a range of 0-40°C and the output is directly in degree days above a user-pre set threshold.

(4) Humidity

Nobel control of dewpoint. Roy Randall (GCRl) described improvements in the Nobel (Nobel Engineering Ltd., Chase Works, Woods Way, Mulberry Industrial Estate, Goring, Sussex. Tel. Worthing 40777) dew point controller which can be used in the Saxcil Cabinet. Accuracy has been improved by increasing the number of steps on the servo motor to 72 and widening the proportional band, to give 50% of full scale at 15°C.

Alan Strange (RES) is investigating a transistorised on/off time proportional controller and valve made by Stafa controls; Hounslow Road, Feltham, Middx.

Use of demineralised water. Chester Guttridge (LARS) found that slime built up in humidity systems where collected rain water was used, even when passed through a demineralising system. Gillian Thorne (RES) adds ACRIFLAVIN (Sigma Chemical, Norbiton Station Yark, Kingston-upon-Thames, Surrey KTZ 7BH) to reduce bacterial growth.

There was a general feeling that costs of demineralising water were high and improved methods of collecting and purifying rain water should be investigated. Ted Baker (LARS) uses a magnetic field system to reduce precipitation of inorganic salts in controlled environment equipment. (Polar magnetic water conditioner, BSAL, Eastwick Rd. Bookham, Surrey).

(5) Phytotoxicity.

Chester Cuttridge (LARS) warned that the 'Emtex' air diffuser used in Prestcold cabinets caused phytotoxicity (blotches on strawberry leaves) Nylon screens now employed by Prestcold appear to be non-toxic.

Graham Hussey (JI) drew attention to a paper by the growth chamber committee of the American Society for Horticultural Science (Tibbitts, T.W et al. 1977. HortScience 12(4), 310-311) concerning contamination of growth cabinets by a number of substances eg. U.V. release of ethylene from plastics and mercury damage following the breakage of thermometers It was suggested that mercury thermometers should not be used in growth rooms. Chester Guttridge uses rubber sleeves to protect the bulbs of thermometers.

Dr. Davis (MOD) reported that clear acrylic plastics such as 'Perspex' were more transparent to U.V. than glass unless a stabiliser was present.

Gillian Thorne found that phytotoxicity was less of a problem where CO_2 levels were maintained by the introduction of fresh air rather than supplementary CO_2 , where air tended to be recirculated.

(6) Servicing arrangements.

It was apparent that maintenance and servicing arrangements differ widely between institutes. Ron Hurd (GCRl) agreed to conduct a new survey on the running and maintenance of ARC controlled environment facilities.

(7) Institute constructed cabinets.

Both LARS and RES have constructed controlled environment rooms and and cabinets and the design and plans of these are available, contact Chester Guttridge (LARS) and Gillian Thorne (RES).

(8) John Innes C. E. Equipment. The following were displayed:-

1. 16 general purpose growth rooms commissioned: in 1973, with good temperature range (10°-37°C) but limited light input capacity (1KW). Used mainly for short term, experiments and tissue culture apparatus (shakers etc.).

2. 5 simple home-made walk-in growthrooms, temperature range 15O°-25°C, no humidity control, with a capacity to take 10KW lighting.
   4 sets each of 4 (= 16)
3. home-made CE shelves, temperature range 15° - 25°C, used for tissue culture.

4. 2 Fisons Fl-totron 3 growth cabinets.

(9) Date and place of next meeting.

Denis Dickinson agreed to hold the next meeting at the Plant Environment Laboratory at Reading: The date is to be fixed later.