CABINET USERS MEETING

W.R.O., Begbroke Hill, Yarnton, Oxford

The following were present:-

NAME	DEPARTMENT	INSTITUTE/UNIVERSITY
Kenneth Bambridge	Environmental Physics	University of Nottingham (S.B.)
Allen Canham	Horticulture (E.R.S.)	University of Reading
John Caseley	Environment	Weed Research Organization
John Cooper	Development Genetics	WPBS Aberystwyth
Richard Constantine	Horticulture (E.R.S.)	University of Reading
David Coupland	Environment	Weed Research Organization
Dennis Dickenson	Horticulture (P.E.L.)	University of Reading
Frank Douglas	Plant Physiology	G.C.R.I.
Winifred Dullforce	Agriculture & Horticulture	University of Nottingham (S.B.)
Doug E. Filby	Control Department	N.I.A.E. Silsoe, Beds.
Margaret Ford	Physiology	P.B.I. Cambridge
A.P. Gay	Plant Physiology	G.C.R.I.
Chester Guttridge	Pomology	Long Ashton
Richard Hardwick	Physiology	N.V.R.S.
Christopher Hole	Physiology	N.V.R.S.
R.P. Hurd	Plant Physiology	G.C.R.I.
Paul Knapp	Plant Physiology	G.C.R.I.
John Lake	Headquarters	A.R.C.
Barry Lancashire	C.E.	N.V.R.S.
Roger Parsell	Coastal Ecology Research Station	Nature Conservancy Norwich
Ian Pearman	Botany	Rothamsted
Christopher Robbins	Plant Physiology	University of Sussex
E. John Skerrett	Physical Chemistry	Long Ashton
Richard Simmons	Environment	Weed Research Organization
Gillian Thorne	Botany	Rothamsted
Colin Walter	Plant Physiology	Letcombe
Mike Yeomans		University of Nottingham (S.B.)
Andy T. Young	Botany	Rothamsted

1) Gillian Thorne took the Chair and started the meeting with a short tribute to Tony Hughes recalling how willingly he had helped Saxcil cabinet users as well as being chairman/secretary of this group since its inception. Gillian said she would write a letter to Peter Huxley expressing the thanks of the cabinet users to Reading University Horticulture Department for all Tony had done.

2) Technical matters

a) Light sources - high pressure sodium lamps

At WRO growth of Cyperus rotundus was good under high pressure sodium (Osram SON/T 360W) about 35-40 cm above canopy. These lamps were mounted horizontally about 40 cm apart and if one lamp failed to strike the heat from the other lamps occasionally caused the bimetal starter to stay open and the lamp remained off.

Transcribed from duplicated copies by L.D. Incoll, 26/7/2008

Allen Canham reported that low pressure sodium lamps were suitable for supplementary lighting for tomatoes and cucumbers, but there were undesirable formative effects on lettuce (petiole extension) at about 21°C. E.R.S. are testing other temperature regimes.

Mercury lamps. Letcombe and Nottingham found Philips HLRG satisfactory sources in their rooms and cereals and tomatoes grew well. Allen Canham said dysprosium iodide lamps have a spectrum closer to daylight than mercury halide lamps and are available in Britain from Neron Lamps, Wotan House, 267 Merton Road, London SW18.

High output fluorescent tubes. Richard Constantine has been making a preliminary evaluation of the ageing of SHO (Super High Output) tubes (warm white). With the 8 ft 215W tubes there was a 10% drop in light output after 2,000 hours compared with 100 hours which is about the same as for the standard 8 ft tube. The 6 ft high output 160W tubes declined in output about 2% more rapidly than the standard tubes. Light measurements have to be taken a long time (20 hrs) after switching on as these lamps stabilise slowly. Moving the tubes leads to a deterioration of output for some time. Lamps run on single or double chokes successfully, but a single tube cannot run on a double choke i.e. if one tube fails both go out. Dimming by dropping voltage is possible down to 70% but below this level an increased voltage is necessary for starting.

Paul Knapp found SHO tubes in EAC artificially lit cabinets had developed blackened ends quite rapidly and the output from 28 tubes was only 3,200 fc compared with an expected 4,500 fc at 2 ft below the lamps. This low light output was attributed to high temperature (75°C) around some of the tubes (recommend max 35°C lamp wall) because the cooling air flowed across the lamps rather than along the length of the tubes in the housing. At E.R.S. HSO tubes maintained at the recommended temperature had run for 2,000 hrs without ends blackening.

Measurement of photosynthetically active radiation. Ron Hurd said he would like to withdraw the statement he made at the 1971 cabinet users meeting regarding determination of photosynthetically active radiation. In fact subtraction of a Kipp with RG 695 dome from total Kipp reading is OK.

Simon Morgan from the Electricity Council Research Centre, Capenhurst, Chester, was unable to attend the meeting, but sent a reprint 'Growing role for sodium lamps in horticulture, Electrical Times 17th August 1972, p 10-13 which also has an article on SHO tubes. He also enclosed 'Grow-electric - Handbook No. 1 Growing Rooms' obtainable from the Electricity Council, 30 Millbank, London SW1P 4RD.

Temperature - errors in measurement systems

Richard Hardwick. NVRS had encountered difficulty in repeating a variety screening test in different cabinets. The indicated mean temperature was 12.5° ± 0.1° in each run. At the time this was regarded as satisfactory but subsequent investigations had thrown doubt on the accuracy of these measurements. The temperatures were measured by dry bulb thermocouples in a shielded open bottomed 'box'. This box was ventilated by the main circulation of air in the cabinet. Comparisons with an Assman showed that the 5 day mean 'box' temperature differed from the mean 'Assman' temperature by about 0.1° to 0.5° depending on the cabinet. The reasons for the variation in bias between cabinets were not known. In addition to the bias there was a random error component such that the 95% confidence limits on a single reading were ± 0.5°.

Most controlled environment cabinet users check monitoring systems with the Assman psychrometer. John Skerrett reported that mercury thermometers are not very accurate even those of BSI grade. John Lake pointed out that factors such as wind speed and humidity would influence the temperature of the plant. In discussion the majority opinion was that in measuring air temperature in cabinets it was probably unrealistic to ask for greater accuracy, or less random error, than ± 0.5°C.

CO_2 control and measurement and Rothamsted fresh air system

Andy Young handed out an illustrated sheet on the Rothamsted fresh air system and said there was a 20 ppm drift in the set point of their Gas-0-mat CO_2 controller when checked against an IRGA over a 24 h period. Ron Hurd suggested this drift was due to a diurnal temperature fluctuation as this instrument is not temperature compensated.

Maintenance

Burnt out stabilizer switch. If not in use the switch can be removed and mains supply wired directly to the main fuses.

Satchwell controller gear box oil leak usually due to vibration. Can be repaired with gaskets from Satchwell (insist on supply of less than 100!) and fill with Shell Turbo 27.

Satchwell controller, Dennis Dickenson said motors for MK1 cabinets are available from:-

J. Bull (Electrical) Ltd.,
Dept. WW),
7 Park Street,
Croydon, CR0 1YD.

The motors are advertised as ZPM Modulation Motors in 'Wireless World' June 1972, price £15. In order to convert to an EPM Modulation Motor suitable for cabinets change feedback potentiometer to EPM type.

A satisfactory replacement for the Londex delay relay for MKI cabinet can be found in the Electromatic range, obtainable from:-

Radiatron Ltd.,
76 Crown Road,
Twickenham,
Middlesex. Tel. 01-892 1008/9047

3) Abnormal growth

At NVRS some varieties of spring cauliflowers (not autumn varieties) were abnormal and ozone suspected, but tests with Nicotiana sp which is reported to be super sensitive were negative. At Wellesbourne a good correlation was found between cabinet and field with effects of low temperatures on Navy beans.

John Cooper discussed correlation between cold hardiness in perennial ryegrass in growth rooms and field, details of which can be found in: Lorenzetti, et al (1971) Cold tolerance and winter hardiness in Lolium perenne. J. Agric. Sci., Camb. 76, 199-209.

4) Other cabinets and rooms

EAC daylight. Paul Knapp reported that GCRI had terminated the present contract with EAC. The cabinet specified on original contract was still under construction and tenders had been invited from Prestcold, Fair-aire, Crowborough, Sussex and EAC to construct the remaining three production cabinets.

EAC 'simple' daylight cabinet. Gillian Thorne explained that this is based on a Minibright glasshouse with EAC humidification and temperature control. Blinds can be incorporated for photoperiod control. Project is in three stages 1) Drawings, 2) Prototype and 3) Production. To date drawings have been produced. Phases 2) and 3) will not necessarily be carried out by EAC.

EAC artificially lit cabinets. Paul Knapp reported that these cabinets had been at GCRI eighteen months without meeting specifications. Outstanding problems include 1) inability to meet control specifications on RH range, 2) low maximum light output (discussed under Lighting Sources).

EAC growth rooms. John Cooper reported that after initial problems rooms now working satisfactorily. (1. Refrigeration failure due to delivery with half specified number of cooling coils. 2. Overheating of lamps due to lamp housing louvers being inserted upside down).

SF Air Treatment Limited are being considered as suppliers of growth rooms for WRO. Have several satisfied users on the continent and ICI, Jeallott's Hill have recently installed three 3 x 8 m rooms which appear to be meeting specification. David Bullock, Chief Electrician, Jeallott's Hill can give details. The suppliers are SF Air Treatment Limited, Staines House, 158 High Street, Staines, Middlesex TW184 NR.

Vötsch rooms and cabinets are expensive but apparently are reliable and meet specifications and are recommended by the 'Phytotron Committee' at Wageningen, Holland. Only industrial test chambers in UK, but the company will supply list of growth chamber users in Europe. UK agents 'Tar Residuals Ltd., Plantation House, Mincing Lane, London EC 3M 3HS.'

5) Guidelines for reporting studies conducted in controlled environment chambers

Professor Tibbetts, Department of Horticulture, University of Wisconsin, sent a copy of the guidelines adopted by the American Society of Horticulture Science (Hort. Science Vol. 7 (3) 1972 p 239). Gillian Thorne attended a Controlled Environment meeting at Duke University, N.C. and was a member of a working party set up to define International standards for controlled environment work (Convener/Secretary: Peter Gaastra). Gillian will be circulating a questionnaire and will act as cordinator in the UK.

6) Future of cabinet users group

It was agreed that the name of the group should remain 'Cabinet users meeting' and that other types of rooms and cabinets should be included as in fact had already happened. To avoid the group becoming too large and losing its informal atmosphere participation would be restricted to people already on the mailing list, but other users of controlled environment facilities e.g. in Universities and Industry, might be invited to attend a particular meeting.

7) Selection of Chairman/Secretary

It was decided that future meetings will be chaired by a member of the host institute and that he or she will be responsible for sending out invitations. John Caseley will be the co-ordinating secretary for the time being.

8) A.O.B.

Winifred Dullforce reported on the 'International Society for Horticultural Science Meeting' at Hanover on 'Basic problems of protected vegetable cultivation', the proceeding of which will be published in Acta Horticulturae. Several papers included controlled environment work and correlation of results from cabinets, glasshouse and field.

Finally we have been invited to hold the next meeting at P.B.I., Cambridge in the autumn of 1973.

Transcribed from duplicated copies by L.D. Incoll, 26/7/2008