

ARC CONTROLLED ENVIRONMENT USERS MEETING 1977

20 October 1977 at Rothamsted

The following were present :

Dr. G.N. Thorne	Rothamsted Experimental Station,
Mr. I. Pearman	Harpenden,
Mr. A.A. Strange	Herts.
Dr. R. Hardwick	N.V.R.S. Wellesbourne, Warwick.
Dr. J.L. Brewster	
Mr. C.C. Hole	
Miss M.A. Ford	P.B.I. Maris Lane,
Mr. J. Adcock	Trumpington,
Mr. E.C.H. Johnson	Cambridge.
Dr. C.F. Eagles	Welsh Plant Breeding Station,
	Plas Gogerddan, Nr. Aberystwyth.
Dr. P. Hayes	Queen's University, Dept. of Agriculture,
	Field Botany Division, Newforge Lane,
	Belfast.
Mr. D.E. Filby	N.I.A.E. Wrest Park, Silsoe, Bedford.
Dr. J. Caseley	W.R.O.
Mr. R. Simmons	Begbroke Hill,
Mr. C. Stent	Yarnton,
Mr. R. Williams	Oxford.
Mr. R. Farrow	G.C.R.I. Rustington, Littlehampton, Sussex.
Mr. T.S. Crosby	Department of Plant Science (Baines Wing),
	University of Leeds, Leeds.
Mr. C.H.S. Walter	ARC Letcombe Laboratory, Letcombe Regis,
Mr. V.S. Priest	Wantage,
Mr. A.G. Bedwell	Oxon.
Mr. K. Bambridge	University of Nottingham,
Dr. G. Atherton	School of Agriculture,
Mr. M. Yeomans	Sutton Bonington.
Dr. A. Parsell	Institute of Terrestrial Ecology,
	Colney Research Station, Colney Lane,
	Norwich.
Mr. W.S. Clark	M.A.F.F., A.D.A.S. Block A Government Offices
	Coley Park, Reading, Berks.
Mr. A.E. Canham	University of Reading,
Mr. D. Dickinson	Shinfield Grange, Reading, Berks.
Dr. C.G. Guttridge	Long Ashton Research Station, Long Ashton, Bristol.
Mr. R.E. Randall	G.C.R.I., Rustington,
Mr. F. Douglas	Littlehampton,
Mr. A.C. Mountifield	Sussex.
Mr. P.K. Knapp	

(1) Minutes of the previous meeting

These had been circulated. There were no matters arising.

(2) Lighting

UV Damage. Some faulty HLRG lamps which damaged plants had been replaced by Phillips. There were worries about damage to people from HLRG and MBFRU lamps; one Safety Officer had suggested a maximum exposure to HLRG lamps of 5 min. in 24h. No-one knew of any convenient equipment for measuring the intensity of UV radiation produced by these lamps.

High Pressure Sodium Lamps. High-pressure sodium lamps (type SON/T) are available from a number of manufacturers (including Osram/GEC and Sylvania) in a tubular form which can directly replace the 400 watt high pressure mercury vapour lamps type MB/U, MBF/U or MBFR/U with no change of control gear. Known as "plug in replacements" the type which can be used depends on the control gear already in use.

In the case of Osram lamps, if this gear incorporates a tapped choke, the 310 watt sodium lamps should be used and the choke tapping set 10 v above the normal supply voltage (i.e. at 250 v for a 240 v supply). This will give a lamp output of 30,000 lux (at 2000h) equivalent to 76.8 watts of visible radiation (400-700 nm). To achieve power factor correction to 0.85 a small capacitor is required to bring the total value up to 25 mfd.

Where the choke is not of the tapped variety, or where a higher light output is preferred, the 360 watt lamp should be used. This has an output of 35,500 lux (or 87.6 watts). As it results in a rather higher choke current than the choke was designed for the suitability of the choke for this extra duty should be checked with the makers.

In either case the cable insulation should be checked as the thermal starter switch incorporated in the lamp produces high voltage pulses in the circuit.

A technical information and data booklet on the complete range of Osram high pressure sodium lamps ref. LI/2 is available from Osram GEC Ltd., East Lane, Wembley, Middx.

Details of the Sylvania lamps can be obtained from Endura Lamps Ltd., 29 Saltaire Road, Shipley, W. Yorkshire BD 18 3HM.

SHO/VHO Fluorescent Lamps. No-one has yet used these for more than 1000 hrs. The use of the correct voltage was essential to give maximum life. See : Characteristics of Fluorescent Lamp Types for Controlled-Environment Facilities: Final Report to ARC (Ref. AG 45/45) by T.R. Constantine, Department of Agriculture and Horticulture, University of Reading 1974.

Ordinary Fluorescent Lamps. Rothamsted were now using "White" (Phillips, colour 35) as this, and not warm white was now the most uniform and easiest obtainable white lamp. Atlas have recently produced an "efficient" lamp: Thorn 100 watt 8 ft. lamp. 20% less electricity, 9% less light, have added Krypton to the inert gas filling.

Lamps for Foreign Equipment are often difficult to obtain and expensive e.g. cannot get 5 ft. 140 watt lamps reflector backed for Votsch cabinet and have therefore lost the high light intensity.

Tungsten Sources. One reason for the short life of pigmy lamps in Saxcil cabinets was that these lamps were intended to be placed vertically. Letcombe use 25 watt silver_light lamp (manufactured by Oliver Lamps Ltd., Burnham Market, King's Lynn, Norfolk, PE31 8EH, agent H.W. Dix of Staines. Tel. 54439) which can be used in any position.

- (3) Abnormal Plant Growth. Leeds had experienced problems with short-day plants which grew very abnormally in long days. The trouble which might have been due to pollution, had now disappeared.

Letcombe have had trouble with deionised water from new resin. A one year old Permutit Ioniser Mark 12, after intermittent use, produced water of very low conductivity that was unsuitable for making solution cultures. Rate of root elongation of barley was reduced by almost a half although no cellular damage was obvious. The problem is being investigated by Houseman who own Permutit. GCRI do not use new resin when best quality water is required.

PEL, Reading, have found that the light quality required for "normal" growth of tropical grain legumes varies between species and between cultivars within a species, e.g. two cultivars of pigeon pea did best with warm white tubes plus 10% tungsten but two soybean cultivars required daylight tubes without tungsten. Full details are in: Huxley, P.A. & R.J. Summerfield, 1976. Photomorphogenic effects of lamp types on growth of some species of tropical grain legumes in controlled environment growth cabinets. Plant Science Letters 6, 25-33. Summerfield, R.G. et al. 1977. Photomorphogenic effects on cow pea: a comparison of controlled environment and field-grown plants. Ibid. 8, 355-361. Summerfield, R.J., P.A. Huxley and F.R. Minchin, 1977. Plant Husbandry and Management techniques for growing grain legumes under simulated tropical conditions in controlled environments. Expl. Agric. 13, 81-92.

- (4) Monitoring and Recording. NVRS are developing a machine to measure accumulated temperature in the field. Parts cost c. £100.

There are still problems with the Varsala/Lee Dickens humidity sensors. Several commercial humidity sensors, starting with the Lee Dickens one, are being tested by Sira Institute Ltd., on behalf of 15 ARC Institutes, including EMRS, GCRI, GRI, LARS, NVRS, RES Physics Dept., WRO, WPBS, who will receive reports. The co-ordinator of this project is L.F. Marsh, ARC Data Logging Service, NIAE.

- (5) Replacement for Saxcil Controllers. Nobel controller for heaters reported last year are satisfactory requiring little maintenance. The Nobel glycol control system fitted last year to cabinets at Reading is unsatisfactory and being changed. Nobel controllers can be upset by external equipment (e.g. alarm bell at Reading). Rothamsted have details of a control system from Staefa Ltd. (Hounslow Road, Feltham. Middx. TW14.9DE) which looks promising. Staefa Klimo controller is good up to $\pm \frac{1}{4}^{\circ}\text{C}$. Very few modifications are necessary to fit them - basically thyristor control for heaters and solenoid valve for glycol. Humidity and dry bulb controllers are completely interchangeable. High and low floating alarms are available as plug in module. Easy to service. There are no immediate plans for changing the controls at Rothamsted.

GCRI and PEL Reading have spare duotronic controllers.

- (6) Management. Many people were concerned about problems of management and about justifying the need for supervisory staff. John Caseley agreed to circulate a questionnaire and co-ordinate the replies.

(7) Manufacturers of C.E. Equipment.

EAC. The future of this Company since Mr. Scarles' death was uncertain. The ARC contract with them for a daylight cabinet had been cancelled. Some people still had EAC equipment which did not work (e.g. GCRI).

SFair had made satisfactory equipment for Jealott's Hill but rooms installed between January and August 1975 for MAFF Harpenden were still not working satisfactorily.

Fair-Air are making daylight cabinets for GCRI who find them a good helpful company to work with.

Convicon have informative literature and some sensible designs. GCRI have visited a number of users (including Jealott's H411) of Convicon equipment; most have had troubles with sealed compressors.

Sherer equipment at Belfast had been reliable.

Prestcold equipment at several places had suffered from breakdowns.

Ron. Hurd of GCRI (who was not at the meeting) has been investigating several makes and has visited the Fisons factory recently.

The University of Reading have prepared a summary of the CE equipment at the University, Tate & Lyle, Jealott's Hill, GRI, Letcombe, Royal Botanic Gardens, Kew and WRO, (A Survey of Controlled Environment Facilities within the University and Associated Institute,, August 1976. R. J. Summerfield, Department of Agriculture and Horticulture).

(8) Rothamsted C.E. Equipment. The following was displayed :-

(1) 4 growth rooms and 9 Saxcil cabinets in C.E. building, commissioned in 1969.

(2) New simple growth room and cabinet.

(9) Next meeting

Those present wished to meet at Norwich, if an invitation could be obtained. If not, the next meeting would be at Reading.