

CABINET USERS MEETING

SUTTON BONINGTON OCTOBER 26 1971

1. Lighting

Dimming: G.C.R.I. reported that there were still problems with their "Transtar" dimmers which operated on 6 lamps per cabinet. A modified control unit with a lower voltage range has replaced the earlier nodal. The dimmers could not be relied upon not to drift over several days and had not been used at all for programmed dimming. No-one had any experience of the "Darco" system.

Spectrum: There was general agreement that young tomato plants grow reasonably normally at light levels of about 1,000 - 1,500 f.c. with several types of fluorescent tube but that trouble invariably occurred with higher light levels and worsened as the plants grow. Dr. Morgan reported that tomatoes had been grown to maturity in a growing room using high pressure sodium lamps, although it was not absolutely certain that the plants had never seen any natural light. Dr. Morgan also stressed the efficiency of the low pressure sodium lamp (about 5 times that of a daylight fluorescent tube on a lumens watt⁻¹ basis) and the high pressure sodium (about 2 times and slightly higher than mercury iodide). Either could be useful for short periods of nurse illumination (as a sole source or continuously for supplementation of natural daylight or in a growing room, where other lamps with a broader spectral emission are used.

Dr. Thorne would like suggestions for a good source for growing potatoes.

Dr. Hurd reported that there were discrepancies in determining photosynthetically active radiation by subtracting (Kipp with RG 695 dome) from total Kipp, due to the RS 695 dome and the normal Kipp glass having different transmissions beyond 2,000 nm. Using an incandescent source the normal clear glass dome transmits about 7% less of the radiation greater than 700 nm.

Intermittent illumination: No-one had any firm comments on a recent report that substantial increases in growth were exhibited by plants receiving intermittent illumination in equal on/off cycles of 1/100 sec. to 10 sec. Would anyone who comes across a fuller report please let me know?

General: In response to a request from Mr. Canham for details of any aspects requiring attention, the meeting suggested (1) dimming circuits, (2) a summary of the farred tail in fluorescent tubes, (3) a summary of the characteristics of TL 35 and TL 55 tubes compared to our Daylight and Warm White, (4) the possibility of replacing some tubes by either HP or LP sodium in order to get higher total photosynthetically active radiation in a standard cabinet

2. Temperature:

A hunting cycle of 1 - 2h period and -7 to +1°C amplitude on a Duotronic controller set at 15 °C was unresolved. Loss of control of this type can be caused by (1) the background heater, cured by altering the position of the cut in and cut out so that the background heater is always in or always out, whichever gives the variac control nearest the middle of the scale, (2) dxxxx faulty, (3) controller faulty - valve failure or out of balance, (4) a hunting cycle with excess high temperature could be caused by the dewpoint setting.

3. Humidity

G.C.R.I. exhibited some wicks suitable for use in an outlet duct humidifying trough. Two wicks would suffice per cabinet and would last about a year. Cost £25 for 40. The advantage of these wicks is that they are self-supporting in the trough and can maintain a very good evaporation rate. Anyone interested please contact Dr. Hurd. Professor Monteith drew attention to a new humidity sensor based on the change in capacitance of a dry aluminium oxide element. Reading are also following this up.

4. Carbon dioxide:

Some conductivity cells from Jacobs van dan Berg have been delivered to Rothamsted (£160 each), but they are not yet in use. The Physics Department at G.C.R.I. has tested one of their cells and a report is available from Mr. G. Slack. The Solplen instrument based on the same principle may become a competitive proposition in the future following a reorganisation in the firm.

N.V.R.S. has a sampler-controller from Industrial Developments (Bangor) Ltd, (£1,600, IRGA extra). This will control 10 cabinets at a single level with four samples per hour per cabinet. It operates by adjusting the CO₂ injection rate by one step up or down on a 20 stop range via motorised valves. N.V.R.S. have added an overnight cut out and feed the IRGA output directly to the data logger. Further details from Dr. Hardwick.

5. Cabinet, Maintenance

The commonest troubles were due to rusting in the base section. An early opportunity should be taken to inspect, wire brush, treat with anti-rusting compound and repaint with bitumastic paint. It is important to see that the heaters do not dip into standing water and do not corrode where they touch or pass through any other metal parts. They are all steel and literally will drop to pieces. Several Mk.X heaters had disintegrated at the terminals. New connections cannot be fitted. Encapsulation of the terminals of remaining Mk.X heaters in Araldite AY 103 (CIBA, Duxford, Cambs.) is recommended.

WRO are also testing another encapsulating compound (Mysol XC7 - W529, Mysol Sterling Ltd., Haddon Street, London W1R 8BP). The Mk.II heaters have bakelite end caps which also disintegrate. Encapsulate in Araldite or have butyl rubber end caps fitted by Eltron. The heater fixing plate in Mk.II (green) cabinets is difficult to remove. The sealing compound can be loosened by heating the edges with a blow lamp.

Several places reported glycol pump failures. If the temperature of the cooler bank is allowed to rise well above the dew point for some hours before switching a cabinet off, there is less risk of condensation in the motor which is one common cause of both electrical and mechanical failure. This can be done by motoring the mixing valve shut or by shutting off the main circulation. Pumps which do give trouble can sometimes be cure by heating to 80°C for some hours. The armature can often be freed with an old feeler gauge (Users' Meeting, 1967). The capacitors supplied with

exchange motors have changed several times and the latest motors have an integral capacitor needing a longer lead. The existing lead will do if the covering is stripped back but care must be taken of the sharp edges at the top of the main switch panel.

For access to the lamp fan motor do not follow the instruction book which says remove the top four screws of the housing. Instead remove the four underneath the cowling on the brackets. Mark the orientation beforehand as it probably only fits one way round. The commonest need for removing the housing is to replace the capacitor. An externally mounted capacitor is used at WRO. Grease should be applied most sparingly to the lamp fan motor.

When replacing melinex, it is essential to keep everything warm and dry and to take great care not to stretch it.

G.C.R.I. have replaced the Londex Lumitop alarm relay with one from Magnetic Devices. (Others may have previously changed to a Radio Spares equivalent).

WRO have found the replacement Blue Line relays will fit the space but that new mounting holes are needed.

N.V.R.S. have replaced the B & R day/night relay by one from Magnetic Devices (Users' Meeting, 1967).

G.C.R.I. have a 5 sec. delay on their alarm circuit to prevent a short power failure operating their external alarm to Securitas. (20 microfarads across relay, negative to battery, 6v 0.1 amp lamp in series).

6. Toxicities and other abnormalities

N.V.R.S. have further troubles with cauliflowers despite the charcoal air filter. The symptoms are punctuate marks on leaves and marginal chlorosis. 64 varieties have been tested and the damage has been found to be correlated with earliness. Winter cauliflowers are immune.

Capenhurst have found some liquid CO₂ contains as such as 5 ppm ethylene. They now obtain supplies from Air Products Ltd. specifying the Stanlow Oil Refinery which is virtually ethylene free. If anyone comes across a suspect cylinder, please retain it until we can get a certified assay. We shall need expert evidence if it is necessary to protest that the quality control is being relaxed.

N.V.R.S. found rod bacteria forming a slime on fibre-glass tanks, apparently living off the resins. They have replaced the tanks by polythene ones. Reading have the same trouble and are trying bituminous black tank paint on the fibreglass.

G.C.R.I. pass their rainwater over u.v. light; they do not find it a very effective sterilisant at present flow rates of 100 - 200 gall. per week.

Rothamsted have found plants grown in a cabinet without any sulphate in the rooting medium were sulphur deficient, whereas those grown in the same medium in the glasshouse were not suggesting that the air supply to the cabinets and rooms is partly freed of sulphur by the dust filter. Further details from Dr. Thorne.

7. Root Temperature Control

Such facilities were in use at G.C.R.I. (Saxcil, N.V.R.S. (Saxcil), Silwood Park (Fison), all of which are water cooled. Sutton Bonington have an aircooled system.

8. Water Conservation

N.V.R.S.-flip-flop valve to discard first 50 gallon per rainstorm.

G.C.R.I.-paper filter.

Reading - ceramic and cloth filter.

9. Daylit Cabinet

Progress at G.C.R.I. was very slow. Rothamsted hoped to have their version of the daylit cabinet in 1972 from the same firm (Environment and Air Conditioning Ltd.)

10. Cabinet Survey

Copies of Dr. Acock's comparison of the various commercially available cabinets were distributed to those present. Any others who would like a copy should contact Dr. Acock at G.C.R.I.

Dr. Hussey reported (by letter) that the Prestcold Cabinets at Norwich still give suspicions of toxicity. They have had to simplify the controlling and cut out the humidity control as the Honeywell Dew-probes deteriorate in about two years and cost about £100 each to replace.

11. Next meeting

We have been invited to meet at the Weed Research Organisation, Begbroke, Oxford next October.

A.P. HUGHES

31.12.1971