Summary

The McGill Phytotron will be celebrating the completion of its 15th year of operation in November 2002. The facility continues to be actively used. Over the past fiscal year (June 00-May 01), a total of 85 research projects were conducted by 62 researchers. Projects in evolutionary ecology and plant molecular biology dominated the use of the facility. Utilization of the growth chambers (22 units) averaged 85% of capacity while greenhouse usage (10 units) averaged 69% and tissue culture zone (3 units) usage averaged 68%. This past year, after 15 years of service, Dr. Martin Lechowicz announced that he would step down from his position as scientific director of the facility. Martin is replaced by Dr. Dan Schoen, evolutionary ecologist and active Phytotron user.

New Equipment - Lighting

The Phytotron is working with Conviron (Controlled Environments, Winnipeg) to evaluate a new T12 fluorescent tube (96”) which is being produced by Philips. The F96/T12/41U/VHO/ALTO tubes may be used in existing VHO sockets and ballast installations thus making them practical retrofits for existing facilities.

Philips product literature indicates that the ALTO tubes have almost 50% more design lumens (16,100 lumens), a higher lumen maintenance (93%) and considerably longer lifetime (12,000 hours) than standard CW-VHO tubes. Purchase cost for the Philips ALTO tubes are approximately 3 times higher than standard VHO tubes.

Initial light measurements in a Conviron PGW36 M10 (high light) growth chamber are presented here. We found the Philips ALTO tubes produced between 18 – 22% more light than our standard Sylvania VHO tubes (at 100 hours). Early data concerning lumen maintenance was equally impressive. Light intensity decay over the first 400 hours was <1% for the ALTO tubes compared to 5.2% for the Sylvania tubes. The Phytotron will evaluate the long term performance of these tubes under working conditions and will assess any adverse plant responses to this new light source.
Sub-Ambient CO$_2$ Control

At the NCR-101-UK CEUG conference in September 2001, we presented a methodology paper on the control of CO$_2$ levels within growth chambers. Following that conference, we retrofit 2 reach-in chambers (15 ft$^2$) and began a series of experiments involving algae under sub-ambient CO$_2$ levels. Using our methodology, we succeeded in progressively lowering and maintaining CO$_2$ levels as low as 170 mol·mol$^{-1}$. A typical plot of CO$_2$ concentrations recorded during the study is presented in the graph below. For more information on CO$_2$ methodology, consult the conference publication cited below. (Romer 2002).

CO$_2$ concentration measured over 48 hours in a 2 m$^3$ growth chamber (Conviron E15)
(Setpoint: 170 mol·mol$^{-1}$, Mean: 174.9 mol·mol$^{-1}$, SD: 5.5, $n = 2880$)

Publications
