

The National Climate Laboratory - Station report 1999-2000

The National Climate Laboratory (NCL) is the only controlled environment facility in New Zealand. There are 24 built-in rooms with space of about 9 m² in each room. The temperature range in each room is from about 0 to 50°C although there are two specialised low temperature rooms which can go down to -25°C. A light array of 4 x 1kW high pressure and 4 x 1kW tungsten iodide lamps provide a standard PFD of 700 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ and is separated from the growing space by a plate-glass water barrier. Much of the current research carried out is on horticultural crops such as potted apple trees and kiwifruit vines although there is still considerable research into environmental factors influencing flowering in a range of cut-flower crops. The low temperature rooms continue to be used in frost physiology and currently there are two projects examining influences of temperature and daylength on the development of frost hardiness in poplar and some native plants.

Technology developments

Over the past year considerable effort was put into developing a system to control the temperature of a plant's root zone and to maintain this temperature independent from air temperature. A successful hydroponic system was designed that involved an insulated tank containing standard nutrient solution, a temperature controller, pump and tray to grow plants. The solution could be temperature controlled from about 10 to 35°C. The system uses thermal heater elements for heating and one major problem encountered was that the nutrient solution attacked the nickel coating thus exposing the plants to highly inhibitory concentrations of nickel and copper. This problem was successfully overcome by coating the heater elements with a high-temperature epoxy. One experiment using this rootzone temperature control system was carried out to evaluate the efficacy of the root pathogen *Pythium* at different root temperatures (20-35°C) on tomato growth.

Further work to expand this capability will include developing a prototype system for controlling the root temperature of single small potted trees.

Software development

New software to coordinate the allocation of rooms and to produce various reports was developed and implemented. Experimenters bring in their projects to the room coordinator who allocates a project number and enters experiment start and end dates. The software then automatically allocates the rooms from those currently available. From there, using another aspect of the software, and technicians can prepare job-sheets from the various conditions requested by the users. These reports go to the Operations technician who uses Paragon control software to programme room conditions according to these specifications. One new development in the future will be to have this information transferred electronically to the room control software. The booking software also suggests best times for the main lighting to be on in each room in order to manage the total laboratory power load.

Publications

The biennial National Climate Laboratory Newsletter No. 21 (1999) has been published and those who are interested in receiving a copy should contact us.

New web site

A new web page has been recently prepared and the URL site is **ncl.hort.cri.nz**

Novel uses of CE conditions

A premier sports team used high temperature and high humidity conditions to simulate conditions in Kuala Lumpur, Malaysia to acclimatise to these conditions in midwinter before participating at an international sports event.

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