

**NCR-101 COMMITTEE ON CONTROLLED ENVIRONMENT TECHNOLOGY AND USE**  
**2006 STATION REPORT**

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### **Phytotron Projects**

Special projects in the Phytotron during 2005 included modification of the Phytotron Space Use Program. The new space use program integrates chamber data with Phytotron proposal forms that are submitted to request use of space. The integration of the 2 programs makes it easier for Phytotron users to renew their space and has streamlined the collection of data concerning space use.

### **Usage by Chamber**

Usage for all growth chambers in 2005 was 95% of the recommended optimal occupancy<sup>1</sup>, or 78% of maximal occupancy (Table 1). The 17 individually programmed A-chambers were occupied at 136% of optimal capacity and the five "standard"<sup>2</sup> A-chambers had a 63% optimal occupancy rate; total A-chamber usage was 120% for 2005. Usage of B-chambers was at 82% and C-chambers, 84 % for the year.

During 2005 the glasshouses had an optimal occupancy rate of 44%. A large portion of the glasshouse space allocation was utilized for studies with student projects (Bio 183), corn (Allen, Botany; Davis, Botany; Holland, Crop Science; Balint-Kurti, Plant Pathology), turfgrass (Dong & Qu, Crop Science), cotton (Haigler, Crop Science), tomatoes (Sederoff & Khodakovskaya), wheat (Qu, Crop Science) and to study the hydraulic architecture of redbay trees (Hoffman, Botany).

The two walk-in rooms equipped with high intensity discharge lamps (HID) were in use during 92% of the year for studies examining the growth responses of soybean (Israel, Soil Science; Burton & Villagarcia, Crop Science). Several studies examining chilling injury were conducted in the two B chambers that can be set to low temperatures. Cold temperature studies included: chilling injury in cucumber and watermelon seedlings (Kozik & Wehner, Horticultural Science), strawberries (Poling, Horticultural Science) and Argentine ants (Silverman, Entomology).

### **Usage by Crop Type**

17% of the space used in the Phytotron during 2005 was used to grow corn while 15% was allocated for growing *Arabidopsis* (Table 3). Many studies were conducted with non-crop type species, including many different weeds, as well as Argentine ants, Honey bees, *Cissus trifoliata*, *Anthurium crenatum*, *Casearia guianensis*, *Lotus japonicus*, and *Medicago truncatula*. Nearly 27% of the space was allocated to projects using tobacco which included continued research on the blue mold disease problem and research with transgenic tobacco. Research with field crops included soybeans (11%), and cotton (2%). Space for research on vegetable crops used 9% of the space in 2005, strawberries, 1% of the space, ornamentals, 5% and for trees, 3%. The 'Demonstration' category (2%) included space for plants grown for display during tours.

### **General Usage Information**

Phytotron space use rental fees applicable to grant-supported research and to off-campus users is currently \$1.47 per truck (unit) per day. The fee for an individual A-chamber is \$36.00/day; for a B-chamber, \$12.00/day; for a C-chamber, \$4.50/day; and the \$1.47/truck/day applies to space occupied in either the "standard" chambers or in the glasshouses. Fees include usage of plastic pots and substrate mixes, Phytotron nutrient solution and deionized water, and certain equipment such as balances, leaf area meter, drying oven, etc. Employment of part-time assistance for off-campus users can be arranged through the Director. Space use request forms are available on our website at <http://www.ncsu.edu/phytotron/application.html>.

<sup>1</sup> Usage calculations for A-chambers assume that the chambers contain a maximum of 24 units or 'trucks'. Optimal occupancy is set at 15 units, however, in order for there to be space for the investigator to work, for the staff to water plants and change lamps and wall fans, and to prevent overcrowding and shading of experimental material. B- and C-chambers usage is calculated on the basis of maximum occupancy since their small sizes allow for reach-in care by investigators and staff.

<sup>2</sup> Standard A-chambers are set at 4 day/night temperature regimes of 26/22, 22/18, and 18/14 C. There are 2 chambers for each temperature regime, both programmed for a 9-hr high intensity light period coincident with the day temperature; one of the two chambers has a 15-hr dark period following the high intensity light period (simulating a short-day photoperiod) and the other chamber has a 3-hr low intensity light interruption provided by the incandescent lamps during the middle of the dark period (simulating a long-day photoperiod).

Table 1. **CHAMBER USAGE SUMMARY, 2005**

<b>Chamber</b>		<b>% Optimal</b>	<b>% Maximum</b>
A-chambers	(17 individual)	136	85
A-chambers	(5 standard)	63	40
A-chambers	(22)	120	71
B-chambers	(10)	82	82
C-chambers	(22)	84	84
Glasshouses	(5)	44	36
HID Walk-in	(2)	92	92
Tall Chamber	(1)	43	40

\* Dimensions of Chambers are: Utilization of all growth chambers during 2005:

A = 8' x 12' x 7'h

Optimal Usage = 95

B = 8' x 4' x 7'h

% Maximal Usage = 78

C = 4' x 3' x 4'h

H = 10' x 6' x 8'h

T = 16' x 12' x 7'-15'h

Table 2. **DEPARTMENT USAGE SUMMARY, 2005**

<b>Department</b>	<b>% Total Use-Days</b>	<b># Projects</b>
Botany	8	15
Crop Science	35	21
Entomology	3	4
Genetics	6	1
Horticultural Science	8	7
Phytotron	19	4
Plant Pathology	13	15
Soil Science	5	1
Teaching	2	2

\*70 Studies Conducted in the Phytotron During 2005

Table 3. **CROP TYPE SUMMARY, 2005**

<b>Crop</b>	<b>% Total Use-Days</b>
<i>Arabidopsis</i>	15
Corn	17
Cotton	2
Demonstration	2
Ornamentals	5
Other	12
Peanut	1
Rice	3
Soybean	11
Teaching	1
Tobacco	7
Trees	3
Turf grass	11
Vegetables	9

Includes:

<sup>a</sup>Celosia, Corn, Himalayan Barley, Marigolds, Mung Beans, Peas, Pigweed

<sup>b</sup>Dogwood, Geranium, Helleborus, *Setcreasia purpurea*, Rhododendron

<sup>c</sup>Argentine ants, clover, *Commelina benghalensis*, Honey bees, *Cissus trifoliata*, *Anthurium crentum*, *Casearia guianensis*, *Lotus japonicus*, *Medicago truncatula*, Morning Glory, Palmer Amaranth, Rye, *Senna obtusifolia* (Sicklepod) & *Senna occidentalis*, Strawberry, Tropical Spiderwort, Watermelon, Wheat

<sup>d</sup>Fraser Fir, *Fraxinus americana* & *pennsylvanica*, *Nyssa sylvatica* & *aquatica*, Redbay, *Vaccinium corymbosum* & *staminaum*, *Viburnum dentatum* & *rudifulum*

<sup>e</sup>Bentgrass (*Agrostis palustris*), Bermuda grass, Saint Augustine grass, and Tall Fescue

<sup>f</sup>Cucumber, Potato, Tomato