North Carolina State University Phytotron
2012 Station Report for NCERA-101
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Accomplishment Summaries

Experiments at the NCSU Phytotron encompass many areas of research and a summary of our accomplishments is published annually on our website (http://www.ncsu.edu/phytotron/).

Impact Statements

Tables summarizing the usage of our facility by growth chamber type, department and crop are listed at the end of the report and a more detailed report is published annually on our website (http://www.ncsu.edu/phytotron/). Usage for all growth chambers in 2007 was 96% of the recommended optimal occupancy, or 79% of maximal occupancy (Table 1). The 17 individually programmed A-chambers were occupied at 131% of optimal capacity and the five "standard" A-chambers had a 64% optimal occupancy rate. For 2007, total A-chamber usage was 116% the recommended optimal occupancy. Usage of B-chambers was at 86% and C-chambers, 82 % for the year. 76 different projects were conducted in the Phytotron during 2011 by faculty and students from 9 departments in the College of Agriculture and Life Sciences (Table 2).

The Crop Science Department used the largest amount of space in 2011 (more than 32%, for 25 different projects). The Plant Pathology Department used 22% of the space for 13 projects. The Plant Biology Department used nearly 15% of the space for 10 projects, and Entomology used over 5% for 5 projects. Microbiology, and Soil Science each had a space use allocation of approximately 2%. 21% of the space used in the Phytotron during 2011 was used to grow Soybean (Table 3). Research with other agronomic crops included cotton (4%), corn (7.5%),) and tobacco (3%). Space for research on vegetable crops used 7% of the space in 2011, weeds, 2%; ornamentals, 1% and for trees, 3%. The 'Demonstration' category (1%) included space for plants grown for display during tours of the facility.

Selected Publications

Cary, H.J., Frank A. Blazich and Anthony V. LeBude. 2010. Seed Germination of Five Populations of *Rhododendron vaseyi*: Influence of Light and Temperature,J. Environ. Hort. 28(3):166-172. September 2010

Idris AM, Tuttle JR, Robertson D, Haigler CH, Brown JK (2010) Differential cotton leaf crumple virus-VIGS-mediated gene silencing and viral genome localization in different *Gossypium hirsutum* genetic backgrounds. *Physiological and Molecular Plant Pathology* 75: 13-22, doi:10.1016/j.pmpp.2010.07.002

Khodakovskaya M, Sword C, Wu Q, Perera IY, Boss WF, Brown CS and H Winter Sederoff (2010). Increasing inositol (1, 4, 5)-trisphosphate metabolism affects drought tolerance, carbohydrate metabolism, and phosphate-sensitive biomass increases in tomato. Plant Biotechnology Journal 8:170-183

Li, R. and R. Qu. 2010. High throughput *Agrobacterium*-mediated switchgrass transformation Biomass and Bioenergy (2010), doi: 10.1016/j.biombioe.2010.11.025 (online)

Rapp RA, Haigler CH, Flagel L, Hovav RH, Udall JA, Wendel JF (2010) Gene expression in developing fibers of Upland cotton (*Gossypium hirsutum* L.) was massively altered by domestication. *BMC Biology* 2010, 8:139, doi:10.1186/1741-7007-8-139

Salinas-Mondragon RE, Kajla JD, Perera IY, Brown CS and HW Sederoff (2010) Role of inositol 1,4,5-trisphosphate signaling in gravitropic and phototropic gene expression. Plant cell Envrion 33: 2041-55

Upchurch, Robert G. and Martha E. Ramirez. 2011."Soybean Plastidal Omega-3 Fatty Acid Desaturease Genes GmFAD7 and GMFAD8: Structure and Expression," Crop Science, Vol. 51

Wherley BG, DC Bowman, TW Rufty. 2011. Effect of soil saturation on development and ^{15}N-nitrate uptake efficiency of two warm season grasses emerging from dormancy. Journal of Plant Nutrition 34: 2039-2054.

Table 1. **CHAMBER USAGE SUMMARY, 2011**

Chamber		% Optimal	% Maximum
A-chambers	(20 individual)	156	97
A-chambers	(2 standard)	110	69
A-chambers	(22)	152	95
B-chambers	(10)	85	85
C-chambers	(22)	93	93
Glasshouses	(5)	100	80
HID Walk-in	(2)	79	79
Tall Chamber	(1)	81	81

* Dimensions of Chambers are:
A = 8' x 12' x 7'h Optimal Usage = 96
B = 8' x 4' x 7'h % Maximal Usage = 79
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, 2011**

Department	% Total Use-Days	# Projects
Crop Science	32	25
Entomology	6	5
Horticultural Science	3	3
Microbiology	1	1
Phytotron	5	2
Plant Biology	13	10
Plant Pathology	15	13
Soil Science	1	3
Teaching	1	4
Visitor	22	9
Zoology	1	1

*87 Studies Conducted in the Phytotron During 2011

Table 3. **CROP TYPE SUMMARY, 2011**

Crop	% Total Use-Days
Arabidopsis	7.6
Biofuels[a]	0.3
Corn	8.5
Cotton	3.8
Demonstration[b]	0.4
Fruit[c]	1.5
Grasses	3.4
Hydroponics	1.6
Insects[d]	2.8
Maintenance	0.6
Ornamentals[e]	0.4
Other[f]	21.9
Rice	2.6
Soybean	21.4
Tobacco	3.2
Trees[g]	3.1
Turfgrass[h]	7.9
Vegetables[i]	7.2
Weeds[j]	1.8

Includes:
[a] Camelina sativa. Switchgrass
[b] Corn, peas, mung beans.
[c] Strawberries
[d] Heliothis subflexa, cockroach
[e] Dogwood, Helleborus
[f] Artemisia, Clover, Canola
[g] Oak
[h] Bentgrass (*Agrostis palustris*), Bermudagrass, and Tall Fescue
[i] Cucumber, Tomato, Pepper
[j] Japanese Stiltgrass, Meadow Beauty,