

North Carolina State University Phytotron
2014 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 use 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 2013 was 88% of the recommended optimal occupancy, or 71% of maximal occupancy (Table 1). For 2013, total A-chamber usage was 115% the recommended optimal occupancy. Usage of B-chambers was at 65% and C-chambers, 73 % for the year. Sixty-six different projects were conducted in the Phytotron during 2013 by faculty and students from 9 departments in the College of Agriculture and Life Sciences and (Table 2). Statistics were low during 2013 due to renovations at the Phytotron.

The Crop Science Department used the largest amount of space in 2013 (more than 40%, for 20 different projects). The Plant Pathology Department used 22% of the space for 14 projects. The Plant Biology Department used 20% of the space for 10 projects, and Entomology used over 5% for 6 projects. 10% of the space used in the Phytotron during 2013 was used to grow Corn (Table 3). Research with other agronomic crops included cotton (9%), turfgrass (9%), and tobacco (7%). Space for research on vegetable crops used 7% of the space in 2013, ornamentals, 1% and for trees, 4%. The 'Demonstration' category (1%) included space for plants grown for display during tours of the facility.

Selected Publications

Adisu Negeri, Guan-Feng Wang, Larissa Benavente, Cromwell M Kibiti, Vijay Chaikam, Guri Johal and Peter Balint-Kurti. 2013. Characterization of temperature and light effects on the defense response phenotypes associated with the maize Rp1-D21 autoactive resistance gene. *BMC Plant Biology* 2013, 13:106 <http://www.biomedcentral.com/1471-2229/13/106>

Xuechao Li, Feng Hua, & Daniel Bowman, Wei Shi. 2013. Nitrous oxide production in turfgrass systems: Effects of soil properties and grass clipping recycling. *Applied Soil Ecology* 67 (2013) 61– 69.

Faith E. Bartz , Norman J. Glassbrook, David A. Danehower, & Marc A. Cubeta. 2013. Modulation of the phenylacetic acid metabolic complex by quinic acid alters the disease-causing activity of *Rhizoctonia solani* on tomato. *Phytochemistry* 89 (2013) 47–52.

Fatima Alejos-Gonzalez, Kelly Perkins, Malcolm Isaiah Winston, De-Yu Xie. 2013. Efficient Somatic Embryogenesis and Organogenesis of Self-Pollination *Artemisia annua* Progeny and Artemisinin Formation in Regenerated Plants. *American Journal of Plant Sciences*, 2013, 4, 2206-2217. <http://dx.doi.org/10.4236/ajps.2013.411274>.

Juan Liu, Robert G. Franks, Chun-Miao Feng, Xiang Liu, Cheng-Xin Fu and Qiu-Yun (Jenny) Xiang. 2013. Characterization of the sequence and expression pattern of LFY homologues from dogwood species (*Cornus*) with divergent inflorescence architectures. *Annals of Botany* :1 -13
doi:10.1093/aob/mct202, available online at www.aob.oxfordjournals.org

Katherine Drake and Ramsey S. Lewis. 2013. An Introgressed *Nicotiana rustica* Genomic Region Confers Resistance to *Phytophthora nicotianae* in Cultivated Tobacco. *Crop Sci.* 53:1366–1374 (2013).
doi: 10.2135/cropsci2012.10.0605

M. Rahman, J. Ballington & F. Louws. 2013. Role of foliar hemibiotrophic and fruit resistance in anthracnose-resistant strawberry genotypes for annual hill plasticulture systems. *Ann Appl Biol* 163 (2013) 102–113.

Marissa R. Lee , Cong Tu , Xin Chen & Shuijin Hu. 2013. Arbuscular mycorrhizal fungi enhance P uptake and alter plant morphology in the invasive plant *Microstegium vimineum*. *Biol Invasions* DOI 10.1007/s10530-013-0562-4.

Emily K. Meineke, Robert R. Dunn, Joseph O. Sexton, Steven D. Frank. 2013. Urban Warming Drives Insect Pest Abundance on Street Trees. *LoS ONE* 8(3): e59687. doi:10.1371/journal.pone.0059687.

William Casey Reynolds, Grady L. Miller, and Thomas W. Rufty. 2013. Athletic Field Paint Color Differentially Alters Light Spectral Quality and Bermudagrass Photosynthesis. *Crop Sci.* doi: 102135

Sunita ChoudharyA, Thomas R. SinclairA,C and P. V. Vara Prasad. Hydraulic conductance of intact plants of two contrasting sorghum lines, SC15 and SC1205. *Functional Plant Biology*, 2013, 40, 730–738.
<http://dx.doi.org/10.1071/FP12338>

Michael D. Martin, Enrico Cappellini, Jose A. Samaniego, M. Lisandra Zepeda, Paula F. Campos, Andaine Seguin-Orlando, Nathan Wales, Ludovic Orlando, Simon Y. W. Ho, Fred S. Dietrich, Piotr A. Mieczkowski, Joseph Heitman, Eske Willerslev, Anders Krogh, Jean B. Ristaino & M. Thomas P. Gilbert. 2013. Reconstructing genome evolution in historic samples of the Irish potato famine pathogen. *NATURE COMMUNICATIONS*. 2172 doi:10.1038/ncomms3172.
<http://www.nature.com/ncomms/2013/130718/ncomms3172/full/ncomms3172.html>

Table 1. CHAMBER USAGE SUMMARY, 2013

Chamber		% Optimal	% Maximum
All chambers	(57)	88	71
A-chambers	(22)	115	72
B-chambers	(10)	65	65
C-chambers	(22)	73	73
Glasshouses	(5)	54	46
HID Walk-in Chambers	(2)	86	86
Tall Chamber	(1)	62	58

* Dimensions of Chambers are:

A = 8' x 12' x 7'h

B = 8' x 4' x 7'h

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, 2013

Department	% Total Use-Days	# Projects
Crop Science	41	20
Entomology	5	6
Forest Resources	1	2
Genetics	1	1
Horticultural Science	5	3
Phytotron	3	2
PlantBiology	20	10
PlantPathology	22	14
Soil Science	1	2
Teaching	1	1
Zoology	2	1

*66 Studies Conducted in the Phytotron During 2011

Table 3. CROP TYPE SUMMARY, 2013

Crop	% Total Use-Days
ARABIDOPSIS	5%
BIOFUELS ^a	7%
CORN	10%
COTTON	9%
DEMO ^b	2%
FRUIT ^c	6%
INSECT ^d	4%
MAINTENANCE	4%
ORNAMENTALS ^e	1%
OTHER ^f	23%
RICE	1%
SOYBEAN	5%
TOBACCO	7%
TREES ^g	4%
TURFGRASS ^h	9%
VEGETABLES ⁱ	6%

Includes:

^a Camelina sativa, Switchgrass

^b Corn, Peas, Mung Beans.

^c Strawberries, Watermelon

^d Ants, Heliothis subflexa, Scale

^e Dogwood, Helleborus

^f Eucalyptus, Oak, Short Leaf Pine

^g Bentgrass (*Agrostis palustris*), Bermudagrass, and Tall Fescue

^h Cucumber, Tomato